

Lonneke Sacha Frie



From expert to flexpert:
How workers meet new expertise
needs throughout their careers

Nijmegen School
of Management

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Lonneke Sacha Frie

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From expert to flexpert: How workers meet new expertise needs throughout their careers

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For Tes, Lot, Floor, Puck, Merel, Mads and Daantje

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1

Introduction

This dissertation concerns the adaptive ability by which workers meet new expertise needs throughout their careers. We aimed to increase our understanding of this adaptive ability through a series of four studies building upon the concept of flexpertise (Van der Heijden, 1998, 2000). These studies were designed to advance theorizing, specifically in scholarly research on expertise and expert performance (Ericsson et al., 2006) and sustainable careers (Van der Heijden & De Vos, 2015), and to increase our understanding of how flexpertise may be fostered among workers across expertise domains and working contexts.

In this introduction chapter, we outline the key theoretical concepts regarding the flexpertise phenomenon that we will use throughout this dissertation, a description of the knowledge gap in the scholarly literature, and our research focus. This is followed by a summary of this PhD project that outlines the overall research objective, the research questions and research methods that we deployed, as well as an overview of the four flexpertise studies conducted (see Table 1.1). The subsequent chapters include the four (submitted) scientific publications on this matter. We conclude by reflecting on the theoretical, methodological and practical value of our research, and on the limitations of our research approach. We finish with recommendations for future research, ethical considerations on the usage of the flexpertise concept in labor market debates, and a personal reflection on this PhD program.

Before explaining the key concept of flexpertise and related core concepts, we first outline what we mean by new expertise needs. These needs shaped the background of the four studies conducted.

1.1 Background of the PhD project: new expertise needs

Over the past two decades, scholars aimed to increase our understanding of how workers deal with ongoing changes in labor demands (LePine et al., 2006; Niessen & Lang, 2021; Pulakos et al., 2000) that arise in work environments that are volatile, uncertain, complex, and ambiguous (VUCA) (Baran & Woznyj, 2020; Bennett & Lemoine, 2014). Such shifting labor demands can involve new expertise needs that create a necessity or opportunity for workers to renew their expertise (Frie et al., 2019) after attaining initial expertise (Van der Heijden, 2000), also known as expertise redevelopment (Grenier & Kehrhahn, 2008) or ongoing expertise development (Wallin et al., 2019). These new expertise demands can arise because of changes in the expertise domain(s) or working context(s) of workers and changes in their

surrounding field of stakeholders (Grenier & Kehrhahn, 2008), such demands require flexible workers.

From an expertise domain perspective, there are different types of changes that require workers to be flexible or adaptive. Flexibility or adaptivity can be required to make sure that the worker has up-to-date expertise when one's original domain knowledge and skills becomes obsolete (Kaufman, 1979). Flexibility can also be required when a worker wants or needs to develop a new area of expertise in an adjacent or radically different field in addition to one's current domain (Van der Heijden, 2000). This is known as the need to be multi-skilled (Hesketh, 1997) or being a professional with multi-disciplinary know-how (Frodeman et al., 2017). A banker, for example, may need to acquire sustainability expertise on top of their financial know-how in response to the need to act as the sparring partner of a client on financing sustainability transitions. Workers can also be pushed or invited to make a transition to a new field, in practice labelled as reskilling (WEF, 2017). Workers who lost their jobs through digitalization of their work, for example, are required to build up expertise in a new field (Brynjolfsson & McAfee, 2014; Harteis, 2018). Developments in the expertise domain of a worker can also result in a worker needing to master a higher level of expertise in light of the increasing complexity of problems, which requires upskilling (e.g., Jaiswal et al., 2022). To illustrate: the need for workers who function at a bachelor level and need to get a master's degree to cope with upcoming demands in their field. In the context of innovation, being one of the first to build up a new area of expertise may also be an opportunity to consider, making this area an emerging field (e.g., Shuster, 2016; Tøsse, 2014) or expertise niche (e.g., Da Silva et al., 2015).

In addition to the needs in the expertise domain(s) of the worker changing, flexibility or adaptivity can also be required when a working context is subject to change. For example, new processes, systems, resources, and leadership may necessitate or create opportunities for a worker to apply their expertise in novel ways (Bohle Carbonell et al., 2014; Grenier & Kehrhahn, 2008). To put it differently: this may change the way in which workers can materialize their individual expertise (Marand & Noe, 2017), also known as exploiting expertise (Mylopoulos & Farhat, 2015) or expertise in action (Guile & Unwin, 2020). The materialization of expertise entails being able to translate your expertise into multi-level outcomes (Marand & Noe, 2017), e.g., when these are used at both a team and an organizational level (Baard et al., 2014) or even broader at a societal level (Gruber & Harteis, 2018).

Finally, changes in the surrounding field of stakeholders of the worker can be a source of new expertise needs that require workers to be flexible or adaptive. If a

worker encounters new stakeholders, or in case the needs of existing stakeholders have changed, one may need to (re)gain social recognition of one's expertise and contributions. As we outline in more detail below, the ability to gain social recognition is one of the dimensions that underpins the operationalization of occupational expertise (Van der Heijden, 1998, 2000), and it appears to be an important ingredient of the employability of a worker (Van der Heijde & Van der Heijden, 2006). In this dissertation, we use new expertise needs as an umbrella term for the variety of changes in the expertise domain(s), working context(s) of an individual, and/or the changes in the surrounding field(s) of stakeholders that necessitate and/or create an opportunity for an individual to adapt. These comprise the kind of changes where flexpertise can be beneficial. In the next section, we explain the concept of flexpertise and related concepts which delineate the scope of our research. In our integrative review, we supplement this outline of key concepts with a map of concepts regarding flexible or adaptive forms of expertise (see Figure 3.1).

1.2 Theoretical concepts

This section provides an overview of the key theoretical concepts in this PhD research project. We start with a definition of flexpertise, as this is the core concept in this dissertation.

1.2.1 Flexpertise

The term flexpertise was coined in the field of expertise research by Van der Heijden (1998), and defined as “the ability to maintain a certain amount of expertise under changing circumstances and in different situations, and also the mastery of certain learning strategies and learning skills to reach a certain level of expertise in any domain” (p. 69) (see also Van der Heijden, 2000). It indicates that experts need to have a certain amount of flexibility to cope with new expertise demands that arise in their current expertise domain(s) and working context(s), and in adjacent and/or radically different fields. Experts who display high levels of flexpertise have been labelled as flexperts. These flexperts are “able to adapt their expertise rapidly and smoothly to different tasks, functions and/or environments” (Van der Heijden, 1998, p. 69). We used the concept of flexpertise and the related concept of flexpert as the foundation for studying the individual adaptivity that workers need across expertise domains and working contexts. It concerns the adaptive ability by which individuals protect and further enhance their position as a worker or expert, through valuable and recognized expertise after having gained initial expertise. This form of flexibility enables workers to stay employable (Van der Heijde & Van der Heijden, 2006) and

to safeguard their career sustainability (Van der Heijden & De Vos, 2015). Below, we provide further explanation of the concepts that are related to flexpertise and that demarcate our research scope.

1.2.2 Expertise

For decades, researchers have examined what expertise constitutes, mainly through increasing our understanding of what underpins the superior performance of experts (Ericsson, 2006, 2018) and by studying the development stages that a novice goes through on the road to becoming an expert (Dreyfus & Dreyfus, 1986). The general assumption this field of research is based on is that there are generic competencies that underly expertise across different expertise domains (Bereiter & Scardamalia, 1993; Chi et al., 1988; Ericsson & Smith, 1991; Van der Heijden 2000), and can therefore be measured using generic measurement instruments (Grenier, 2021). Other scholars approached expertise from a sociological perspective, stating that what counts as expertise is also related to what others know, do and value (Mieg, 2012; Mieg & Evetts, 2018). In this latter case, expertise is the outcome of social acknowledgement, making it an attribute relative to the perception of others.

Van der Heijden (1998, 2000) took both approaches into account in her operationalization of occupational expertise. Based upon empirical research in various expertise domains and working contexts, she distilled five dimensions of occupational expertise, namely 1) domain- and context-relevant knowledge, 2) domain- and context-relevant skills, 3) social recognition of know-how by key figures in your environment, 4) metacognitive skills to understand when the current knowledge and skills are insufficient, and 5) knowing which peers can help, and the flexibility to deal with new expertise demands [see the aforementioned definition of flexpertise (Van der Heijden, 1998)].

Billet et al. (2018) defined three bases for occupational expertise: 1) the canonical base, which comprises what knowledge and skills in a certain domain or occupational practice others expect you to have, 2) the situational base, which concerns the understanding how to use your expertise in a specific working context, and which shapes and constraints how you can act, and 3) the personal base, which reflects the unique set of experiences, knowledge and skills that you have gained over the course of your career. This last-mentioned base also includes the affections and motivations you may have in response to your canonical and situational bases.

Unless stated differently, we use this multi-dimensional definition of Van der Heijden (1998, 2000) and the expertise bases of Billet et al. (2018) as definition of expertise

in this dissertation. In line with the tradition in expertise research, we focus on expertise at work that is developed through vocational educational and experiences in practice (Grenier, 2021).

1.2.3 Expertise domain

Over the past decades, scholars in expertise research focused on studying expertise development and expert performance in relatively well-defined domains such as music, sports, mathematics, medical science, and physics (Ericsson, 2006, 2018). In these domains, authorities or elite groups define what constitutes an expertise domain, including general criteria for expert performance and standard practices. These criteria are assumed to apply across working contexts and were defined to rule out social biases when determining the level of expertise of an individual (Collins & Evans, 2018). Domains that have a more limited number of prescribed performance criteria and standard practices are labelled as ill-defined or ill-structured domains (e.g., Voss & Wiley, 2018). This is especially the case when fields are upcoming, and know-how has yet to be gained. Scholars described these as emerging fields in which workers need to “overcome and negotiate the boundaries of different knowledge and working environments” (Hytönen et al., 2016, p. 354). Expertise domains can also vary in the degree to which they are multi-disciplinary (Frodeman et al., 2017). An example of a multi-disciplinary domain is the field of Human Resource Development (HRD) (Valkeavaara, 1999) which is rooted in different scholarly disciplines such as psychology, business management and education. In this dissertation, we build upon empirical research that addressed the development and performance of workers in expertise domains that range from well-defined to ill-defined fields and that are rooted in one or more disciplines.

1.2.4 Expert

As described above, various scholars in expertise research hold the opinion that an individual is an expert by virtue of superior performance in one’s field (Ericsson, 2006), also referred to as being a master (Dreyfus & Dreyfus, 1986) or genius (Simonton, 2018). Psychological research has taught us that this superior performance is accompanied with faster problem-solving through automated processes (also described as routines, habits or tacit knowledge) and pattern recognition (Dane, 2010; Glăveanu, 2012). In practice, this superior performance is generally supported by the credentials, experience and track record of the individual (Collins & Evans, 2007) or by one’s performance on tasks that are assumed to be representative for a certain expertise domain (Ericsson, 1999). As outlined before, in protected professions, authorities or other designated bodies define performance criteria and practice standards based on the assumption that these apply across

working contexts, aiming to rule out social biases when determining an individual's expertise level (Collins & Evans, 2018).

However, from the perspective of the sociological approach previously described, being an expert is an outcome of acknowledgement by the stakeholders of the expert, including for example their supervisor, users, customers, and peers. In this field, the viewpoint is that in social constellations or networks, stakeholders jointly construct and define expertise (Eyal, 2013; Noordegraaf, 2020), resulting in expertise being owned by a group instead of something that a sole individual 'possesses'. Following this context-dependent perspective, one becomes an expert by acting in ways that the other group members recognize as appropriate (Collins & Evans, 2018). Van der Heijden (1998, 2000) identified that if workers have elevated levels on the aforementioned five dimensions of occupational expertise, they are perceived as experts in their organization. In practice, workers may need to meet the expectations of multiple stakeholders, each having their own criteria for labeling someone as an expert (Fortney & Yamagata-Lynch, 2013; Noordegraaf, 2020). This may imply that an individual is perceived as an expert in one context but not in the other (Valkeavaara, 1999).

In this dissertation, we take into account that, throughout their careers, workers may need to deal with these various perspectives on what makes an expert.

1.2.5 Worker

In line with the prevalent approach in expertise research, our research focused on workers in paid positions, who can be labelled as white-collar workers (i.e., working in higher educated jobs performing knowledge work) or grey-collar workers (i.e., conducting a combination of knowledge work and manual work) (Eurofound, 2010; ILO, 2012). Furthermore, the term workers in this dissertation applies to those who are employed in the traditional sense, as well as entrepreneurs and workers who combine employed and self-employed modes of work. The latter have been labelled multi-optional experts (Ruiner & Liebhart, 2018) or competence nomads (Johansson, 2012).

In the first study of this dissertation (see Chapter 2), we used the word professional instead of worker. However, we changed this into worker in the successive studies following the feedback of a blind reviewer in the editorial process of our integrative review study (see Chapter 3). S/he/they noted that the word professional is associated with an elite position or with protected domains within the field of the sociology of expertise (Eyal, 2013). As we have a broader scope than these relatively well-defined domains in which this association is prevalent, we decided to use the term worker to do justice to our research scope.

1.2.6 Working contexts

As aforementioned, we investigated flexpertise in working contexts, meaning the physical and psychological environment in which an individual performs work. In practice, workers can have multiple contexts in which they are developing and exploiting their expertise. This multiplicity of contexts makes their work more boundaryless (Korver & Potting, 2013). For example, this cross-boundary work happens when a worker participates in multiple project teams, works within a matrix organization or combines being employed and self-employed. When using the term working context from here on, we refer to one or more of these types of working contexts.

1.2.7 Employability

Employability has mostly been studied at either the individual or at the organizational level. The interdependency between these levels has been left largely unaddressed as a result (Fugate et al., 2021). Given our focus on increasing our understanding of flexpertise as being the ability of an individual to adapt, we used a definition of employability at the individual level that takes into account this notion of interdependency (cf. Van der Heijde & Van der Heijden, 2006). Van der Heijde and Van der Heijden (2006) defined employability as “the continuous fulfilling, acquiring or creating of work through the optimal use of competences” (p. 453). That employability, enabling both career success at the individual level and sustained competitive advantage at the organizational level, was seen by these scholars as consisting of occupational expertise [following Van der Heijden (2000)] complemented by four more generic dimensions. These are anticipation and optimization (i.e., preparing for future changes), personal flexibility (i.e., adapting easily to all kinds of changes in the internal and external labor market), corporate sense, and balance (i.e., balancing between personal and employer interests). In this dissertation, we adopt this multi-dimensional view on the employability of individuals.

1.2.8 Sustainable careers

Career research increasingly focuses on career sustainability to address the fact that career demands are evolving and that workers need to anticipate and react to these changing demands in a sustainable way (Van der Heijden & De Vos, 2015). De Vos et al. (2020) provided conceptual clarity of this upcoming concept through consolidating insights from career research including studies on employability. According to these scholars, sustainable careers should be examined using a systematic approach, given the notion that multiple stakeholders affect the career sustainability of an individual. Furthermore, they outlined that such research requires a dynamic approach by acknowledging how changes over time affect career

sustainability. As such, career sustainability concerns a “process of preservation, as well as generation of resources across one’s career span” (De Vos et al., 2020, p. 5), partly through displaying proactivity and adaptability and by deploying work-related and private resources. Moreover, the authors posited that sustainable careers are characterized by beneficial consequences for both the person and for their surrounding context. In their conceptual model, De Vos et al. (2020, p. 3), identified three indicators of sustainable careers: being happy, healthy and productive (cf. Van der Heijden, 2005). Happiness refers to the subjective feeling of being successful or satisfied with your career from a broader life perspective. Health encompasses both physical and mental health and concerns a “dynamic fit of the career with one’s mental and physical capacities” (De Vos et al., 2020, p. 4). Productivity means strong performance in your current position as well as high employability or career potential, thus incorporating a short- and long-term perspective. In line with their conceptual model of sustainable careers, we aimed to incorporate a system dynamic approach towards flexpertise when considering how this adaptive ability may contribute to the career sustainability of an individual.

1.3 Knowledge gap and focus

Over the past decades, a large body of scholarly knowledge has been generated on the question of what makes someone an expert (Ericsson, 2018). We briefly summarized this research in our previous outline of how scholars define (occupational) expertise, experts, and expertise domains. However, the question of how an individual stays an expert throughout one’s career was addressed far more limitedly (Grenier & Kehrhahn, 2008). We noticed that the field has been fragmented, given the various conceptualizations that were introduced in different scholarly disciplines, including the conceptualization of adaptive expertise (Hatano & Inagaki, 1984, 1986), flexible expertise (Birney et al., 2012) and learning agility (DeRue et al., 2012). These concepts address similar yet distinctive aspects of the flexpertise phenomenon (Van der Heijden, 1998). Furthermore, we identified that the field has become segmented through four different theoretical approaches, namely scholars approaching individual adaptivity as a trait or meta-competency, as a performance construct, as intra-individual changes that occur because of learning and development, and as an adaptation process (cf. Baard et al., 2014). We noted that the adaptation process approach has been underexposed, creating a lacuna in our understanding of how workers can effectively adapt. More specifically, there has been a limited understanding of what triggers individuals to renew their expertise in VUCA working contexts in which they encounter a plethora of changes, in what

the process by which workers effectively deal with a variety of new expertise needs in interaction with surrounding stakeholders consists of, and how their adaptive responses lead to outcomes at the individual level and beyond. To resolve this lacuna, our PhD project aimed to provide conceptual clarity. We furthermore strived to increase the understanding of the adaptive processes by which workers deal with multiple new expertise demands in their VUCA working context(s) in interaction with surrounding stakeholders who have varying expectations in terms of the expertise and contributions of workers. Through gaining these insights, we aimed to provide the foundation upon which practices may be designed that foster this individual adaptivity to safeguard the career sustainability of an individual in case one is not sufficiently capable of dealing with current and upcoming expertise needs. This may fill the gap that we identified in HR/D handbooks and practitioner guides, namely that more knowledge is available on leadership careers than on expert careers (Bergenhengouwen & Mooijman, 2010; Boselie, 2014; Chalofsky et al., 2014; Kluijtmans, 2014; Swanson & Holton, 2009; Weggeman, 2007).

1.4 PhD project

This section provides an outline of the PhD project on flexpertise wherein the overall research objective is described, as well as an outline of the research questions and methods that we used to bridge the knowledge gap. We conclude this section with an overview of our four flexpertise studies, shown in Table 1.1.

1.4.1 Research objective

The objective of this PhD project was to increase the understanding of how workers are able to meet new expertise needs in such a way that it leads to beneficial outcomes for themselves as well as for their surrounding stakeholders, safeguarding their career sustainability by doing so (De Vos et al., 2018). More specifically, we aimed to unravel the interplay of adaptation processes by which a worker is able to deal with multiple new expertise needs within and across the boundaries of their expertise domain(s) and working context(s) on an ongoing basis, and to provide the foundation for the design of HR/D practices that may foster this adaptivity.

1.4.2 Research questions

The main research question of this PhD project was the following:

What makes workers capable of meeting new expertise needs throughout their career?

As we outlined in our section on this knowledge gap, we specifically aimed to contribute to the theoretical and empirical understanding of the flexpertise phenomenon by focusing on the processes by which workers meet a variety of new expertise demands on an ongoing basis. Table 1.1 at the end of this Chapter outlines the specific research questions that we used to gain insights for building a new theoretical perspective on the flexpertise phenomenon. RQ1.1 was used as an initial exploration of the processes based upon the retrospective insights of flexperts on their expertise renewal episodes throughout their career. Research questions RQ2.1 through 5 were used to refine and enhance the Model of Expertise Renewal that we developed based upon the research regarding RQ1.1. We used these five questions to integrate the scholarly knowledge on flexible or adaptive forms of expertise into a dynamic process model of flexpertise based upon system dynamics principles (Vennix, 1996). In doing so, we sought to increase our understanding of the contextual triggers that necessitate or create an opportunity for an individual to adapt (RQ2.1), the personal qualities that enable the individual to adapt (RQ2.2), the dynamic interplay of processes by which an individual adapts (i.e., addressing how one adapts) (RQ2.3), and how this lead to beneficial outcomes at a contextual level (RQ2.4) and at an individual level (RQ2.5). To confirm the face validity of the dynamic process model of flexpertise, we asked HR/D professionals about what they perceive as the interplay of adaptation processes by which workers meet new expertise needs on an ongoing basis, based upon their experiences in practice (RQ3.1). In the dynamic process model co-defined by these HR/D professionals, they identified the leverage points where a small intervention can have a large and positive effect on the ability to meet new expertise needs (RQ3.2), and the HR/D practices that could foster this ability at these leverage points (RQ3.3). These latter two research questions were used as the foundation for defining HR/D practices (see the third column of Table 1.1). We used RQ4.1 for the conceptualization of possible HR/D practices that may foster flexpertise, based upon the notion that flexpertise requires different types of practices than the prevalent expertise development and maintenance practices (Kooij et al., 2014). To signify this shifting paradigm from expertise to flexpertise development, we introduced the term renewal practices.

Based upon the insights gained regarding the flexpertise phenomenon, we aimed to redefine the concept of flexpertise as addressed in the final chapter of this dissertation. By doing so, we strived to provide conceptual clarity on this phenomenon characterized by a wide variety of concepts formulated around flexible or adaptive forms of expertise.

1.4.3 Research methods

In this section, we give an outline of the specific research methods that we used in the four individual studies in this PhD dissertation, and the methodological considerations for selecting them.

Retrospective interviews

This project started with the identification of the lacuna in our understanding of the process of adaptation in naturalistic settings, in which expertise domains and working contexts are constantly changing and wherein workers encounter stakeholders who hold different expectations of what valuable expertise constitutes. To lay the groundwork for bridging this knowledge gap, we decided we must develop in-depth insight into the adaptation processes of experts with high levels of flexpertise (i.e., flexperts) through retrospective interviews [see Chapter 2 for the full article (Frie et al., 2019)]. We selected a sample of ten renowned flexperts from different expertise domains, who developed different areas of expertise throughout their career and got recognition for this from different stakeholders. We used these retrospective interviews to collect data on the processes by which these flexperts were able to meet a variety of new expertise needs in different episodes throughout their careers. This method was selected because it appeared to be a reliable method for the recollection of expertise development processes (Sosniak, 2006). By means of semi-structured interviews, we aimed to explore with an open mind what characterizes the adaptation processes of flexperts. Figure 2.1 outlines how we developed our Model of Expertise Renewal based upon an inductive analysis of the interview data by two researchers using the Grounded Theory Approach (Strauss & Corbin, 2007). Through this research approach, we identified a set of processes that these flexperts applied across expertise domains and working contexts, which supports the assumption that flexpertise can be approached from a domain-generic theoretical point of view. Furthermore, this method revealed the interrelatedness of different adaptation processes. In addition, we identified that the outcomes of a renewal episode could be the input for subsequent episodes in which a flexpert renews one's expertise. As such, this qualitative research method provided the foundation for an in-depth review of the scholarly literature from a system dynamics lens.

Integrative review

We conducted an integrative review to synthesize the scholarly knowledge regarding flexible or adaptive forms of expertise into a dynamic process model. We chose this method to synthesize a comprehensive body of literature in which a variety of concepts and theoretical approaches were adopted (Grant & Booth, 2009). By applying principles for systematic reviews (Daniels, 2019; Liberati et al. 2009; Moher

et al. 2015), we aimed to safeguard a transparent and reliable process regarding the search and selection of literature regarding the flexpertise phenomenon. To synthesize the findings that our integrative review revealed, we used a system dynamics (SD) lens (Vennix, 1996) for building a dynamic model of flexpertise to address the interplay of adaptation processes on an ongoing basis.

Group Model Building

To confirm the face validity of the model generated through the integrative review, we conducted a Group Model Building (GMB) study (Vennix, 1996). This method is based upon SD principles and is used to collect the diverse perspectives of stakeholders regarding a complex phenomenon or ‘messy problem’. We used this method for a structured brainstorming and decision-making process in order to build a dynamic process model with a group of HR/D professionals. Together they reached a consensus on what the ability to meet new expertise constitutes, in terms of a practice-based dynamic process model. Following the SD principles, they defined leverage points in the model where a small intervention may foster the individual adaptivity that their model addressed (Meadows, 1999). As a final step, they defined HR/D practices that could be offered at these leverage points to foster flexpertise.

Conceptual study

In our final study, we conceptualized what the shifting focus from expertise development to flexpertise development implies for the HR/D function [see Chapter 5 for our contribution to the Handbook of HRD (Poell et al., 2024)]. We outlined prevalent bundles of HRD practices for expertise development (cf. Kooij et al., 2014) and provided directions for the design of renewal bundles of HR/D practices that may foster flexpertise development. The conceptual outline of this paradigm shift that we foresee to be required in the HR/D field, provides the foundation for further empirical research on how to foster flexpertise development.

1.4.4 Overview of the PhD project

Table 1.1 provides an overview of the studies that make up this PhD project. This table lists per study the publication title, the research question(s), the research method, the independent contribution of the PhD candidate, the theoretical contributions, and the scientific conferences where the study has been presented in a preliminary, intermediate, or final stage.

Table 1.1 Overview of flexpertise studies

Chapter	Publication title / status	Research question(s) ¹	Research	Independent contribution of the PhD candidate ²	Theoretical contributions	Paper presentations at scientific conferences
2	Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. <i>Human Resource Development Quarterly</i> , 30, 61-79.	RQ1.1: By which processes do flexperts accomplish to renew their expertise?*	Retrospective interviews with ten flexperts.	• Literature search. • Project design. • Semi-structured interviews with co-author. • Data analysis with co-authors using Atlas.ti. • Writing concept article, including processing of feedback of co-authors. • Revision of article (major and minor revision) and writing response letters, including processing of feedback of co-authors, native speaker, editor, and anonymous peer reviewers.	<i>Model of Expertise Renewal</i> (see Figure 2.2).	Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. (2017). <i>PhD project plan. Experts in the new economy: How expertise renewal contributes to the sustainability of expert careers</i> . IMR Research Day, 15 th of June. Radboud University, the Netherlands. Frie, L. S., Sjoer, E., Korzilius, H. P. L. M., & Van der Heijden, B. I. J. M. (2018). <i>What determines the ability of experts to renew their expertise?</i> IMR Research Day, 21 st of June. Radboud University, the Netherlands.

Table 1.1 Continued

Chapter	Publication title / status	Research question(s) ¹	Research	Independent contribution of the PhD candidate ²	Theoretical contributions	Paper presentations at scientific conferences
3	Frie, L. S., Van der Heijden, B. I. J. M., Korzilius, H. P. L. M., & Sjoer, E. (sixth resubmission round – minor revisions). How new expertise needs throughout their career: An integrative review revealing a dynamic process model of flexpertise.	• RQ2.1: Which contextual factors necessitate and enable workers to respond to changing expertise needs? (Contextual inputs)* • RQ2.2: Which personal factors enable workers to respond to changing expertise needs? (Personal inputs)* • RQ2.3: Which adaptation processes enable workers to respond to changing expertise needs? (Mediators: episodic cycles, developmental processes, and emergent states)* • RQ2.4: What are the contextual outcomes of the workers' responses to changing expertise needs? (Contextual outcomes)* • RQ2.5: What are the personal outcomes of the workers' responses to changing expertise needs? (Personal outcomes)*	Integrative review of scholarly knowledge regarding flexpertise phenomenon as published in review, conceptual and empirical studies in a variety of scholarly fields.	• Literature search. • Defining review approach after participating in a RU PhD course regarding systematic reviews, and collecting expert opinions of RU librarians. • Data extraction and data analysis using Atlas.ti, including interrater agreement. • Defining concept dimensions of flexpertise (1st version of article), conceptual map (2nd version) and dynamic process model of flexpertise using Vensim (2nd and 3rd version), including processing feedback of co-authors. • Writing concept article, including processing feedback of co-authors, editor, and anonymous reviewers. Revision of article (2 major and three minor revisions) and writing response letters, including processing of feedback of co-authors and native speaker (2nd version – feedback on English response letter), editorial feedback, and feedback of anonymous reviewers.	<i>Conceptual map</i> providing an overview of concepts regarding flexible or adaptive forms of expertise (see Figure 3.1 and Appendix 3.1). <i>Search syntax for flexpertise literature search</i> (see Appendix 3.2). <i>Input-Mediator-Outcome Framework</i> (see Table 3.1). <i>Dynamic process model of flexpertise</i> (see Figure 3.3).	Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. (2019). <i>Understanding the processes related to flexpertise: A systematic review of studies regarding flexible and adaptive expertise</i>. 11th Biennial International Conference of the Dutch HRM Network, 14-15th of June. Tilburg University, the Netherlands. Frie, L. S., Van der Heijden, B. I. J. M., Sjoer, E., & Korzilius, H. P. L. M. (2020). <i>A systematic review of flexpertise and its influence on career sustainability</i>. IMR Research Day, 7th of January. Radboud University, the Netherlands. Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. P. L. M. (2020). <i>A systematic review of flexpertise and its beneficial outcomes for the professional's stakeholders and individual career sustainability</i>. Academy of Management 1st Careers Division Conference, 14-15th of February. WU Vienna, Austria. Frie, L. S., Van der Heijden, B. I. J. M., Sjoer, E., & Korzilius, H. P. L. M. (2020). <i>A systematic review of the nature and application of flexpertise and its influence on career sustainability</i>. SGM Towards inclusive careers across the lifespan: Integrating HRM and careers perspectives, Amsterdam Business Research Institute, 9th of March. Amsterdam, the Netherlands.

Table 1.1 Continued

Chapter	Publication title / status	Research question(s) ¹	Research	Independent contribution of the PhD candidate ²	Theoretical contributions	Paper presentations at scientific conferences
5	Frie, L., Sjoer, E., Van der Heijden, B., & Korzilius, H. (in press). <i>Fostering career sustainability: Renewal bundles of HR/D Practices for flexpertise development</i> . In 2024 Handbook of HRD (Eds. Rocco, Morris & Poell).	RQ4.1: Which renewal bundles of HR/D practices may foster flexpertise development? **	Conceptual paper outlining the shift from expertise to flexpertise development that is required in the HR/D practice based upon the insights gained in the flexpertise studies included in Chapter 2–4.	Literature search. Writing concept chapter, including processing of feedback of co-authors. Formatting of figures. Minor revision of chapter by processing the feedback of the editor.	<i>Outline of paradigm shift in HR/D: from expertise to flexpertise development (see Figure 5.2). A renewal bundle of HR/D practices to foster flexpertise (see Figure 5.3).</i>	Frie, L. S., Sjoer, E., Van der Heijden, B. I. J.M., & Korzilius, H. P. L. M. (2022). <i>The flexpertise phenomenon: The process by which professionals adapt to new expertise needs</i> IMR Research Day, 16 th of June. Radboud University, the Netherlands.

¹ Research questions ending with * concern theorizing regarding the flexpertise phenomenon. Research questions ending with ** concern the foundation for designing HR/D practices to foster flexpertise development.

² All studies: organizing meetings with supervisory team to critically reflect on project design, analysis, integration of results, and publication approach (scientific journals, conferences, public media), and on how to process the feedback of the supervisory team and anonymous reviewers on concept versions of the articles.

The four chapters that follow include the articles on the four studies that, at the time of writing, were/are to be published in three different scientific journals (Chapter 2-4) and an academic peer-reviewed HRD handbook (Chapter 5).

References

- Baard, S. K., Rench, T. A., & Kozlowski, S. W. J. (2014). Performance adaptation: A theoretical integration and review. *Journal of Management*, 40, 48-99.
- Baran, B. E., & Woznyj, H. M. (2020). Managing VUCA: The human dynamics of agility. *Organizational Dynamics*, 20, 100787.
- Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, 57, 311-317.
- Bereiter, C., & Scardamalia, M. (1993). *Surpassing ourselves. An inquiry into the nature and implications of expertise*. Open Court.
- Bergenhengouwen, G. J., & Mooijman, E. A. M. (2010). *Strategisch opleiden en leren in organisaties*. [Strategic training and learning in organizations]. Noordhoff.
- Billett, S., Harteis, C., & Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 105-126). Cambridge University Press.
- Birney, D. P., Beckmann, J. F., & Wood, R. E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, 22, 563-574.
- Bohle Carbonell, K., Stalmeier, R. E., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, 12, 14-29.
- Boselie, P. (2014). *Strategic Human Resource Management: A balanced approach* (2nd ed.). McGraw-Hill.
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton.
- Chalofsky, N. E., Rocco, T. S., & Morris, M. L. (Eds.) (2014). *Handbook of Human Resource Development*. Wiley.
- Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (1988). *The nature of expertise*. Lawrence Erlbaum.
- Collins, H., & Evans, R. (2007). *Rethinking expertise*. University of Chicago Press.
- Collins, H., & Evans, R. (2018). A sociological/philosophical perspective on expertise: The acquisition of expertise through socialization. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 21-32). Cambridge University Press.
- da Silva, J. R., Clua, E., Murta, L., & Sarma, A. (2015, March). Niche vs. breadth: Calculating expertise over time through a fine-grained analysis. In 2015 IEEE 22nd international conference on software analysis, evolution, and reengineering (SANER) (pp. 409-418).
- Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, 35, 579-603.
- Daniels, K. (2019). Guidance on conducting and reviewing systematic reviews (and meta-analyses) in work and organizational psychology. *European Journal of Work and Organizational Psychology*, 28, 1-10.
- De Vos, A., Van der Heijden, B. I. J. M., & Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, 117, 103196.
- DeRue, D. S., Ashford, S. J., & Myers, C. G. (2012). Learning agility: In search of conceptual clarity and theoretical grounding. *Industrial and Organizational Psychology*, 5, 258-279.

- Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the age of the computer*. Basil Blackwell.
- Ericsson, K. A. (1999). Creative expertise as superior reproducible performance: Innovative and flexible aspects of expert performance. *Psychological Inquiry*, 10, 329-361.
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683–703). Cambridge University Press.
- Ericsson, K. A. (2018). An introduction to Cambridge handbook of expertise and expert performance: Its development, organization, and content. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 3-19). Cambridge University Press.
- Ericsson, K. A., & Smith, J. (1991). *Toward a general theory of expertise. Prospects and limits*. Cambridge University Press.
- Eurofound (2010). Coding and classification standards. Retrieved from <https://www.eurofound.europa.eu/surveys/ewcs/2005/classification>
- Eyal, G. (2013). For a sociology of expertise: The social origins of the autism epidemic. *American Journal of Sociology*, 118, 863-907.
- Fortney, K. S., & Yamagata-Lynch, L. C. (2013). How instructional designers solve workplace problems. *Performance Improvement Quarterly*, 25(4), 91-109.
- Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, 30, 61-79.
- Frodeman, R., Klein, J. T., & Pacheco, R. C. D. S. (Eds.). (2017). *The Oxford handbook of interdisciplinarity*. Oxford University Press.
- Fugate, M., Van der Heijden, B., De Vos, A., Forrier, A., & De Cuyper, N. (2021). Is what's past prologue? A review and agenda for contemporary employability research. *Academy of Management Annals*, 15(1), 266-298.
- Glăveanu, V. P. (2012). Habitual creativity: Revising habit, reconceptualizing creativity. *Review of General Psychology*, 16, 78-92.
- Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, 26, 91-108.
- Grenier, R. S. (2021). Identifying and measuring expertise in organizations. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 57-69). Palgrave Macmillan.
- Grenier, R. S., & Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, 7, 198-217.
- Gruber, H., & Harteis, C. (2018). Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise, vol. 24. Springer.
- Guile, D., & Unwin, L. (2020). Expertise as a 'capacity for action': reframing vocational knowledge from the perspective of work. *Journal of Vocational Education & Training*.
- Harteis, C. (Ed.). (2018). *Machines, change and work: An educational view on the digitalization of work*. Springer.
- Hatano, G., & Inagaki, K. (1984). Two courses of expertise. *Research and Clinical Center for Child Development Annual Report*, 6, 27-36.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262-272). Freeman.

- Hesketh, B. (1997). Dilemmas in training for transfer and retention. *Applied Psychology*, 46, 317-339.
- Hytönen, K., Palonen, T., Lehtinen, E., & Hakkarainen, K. (2016). Between two advisors: Interconnecting academic and workplace settings in an emerging field. *Vocations and Learning*, 9, 333-359.
- ILO (2012). International Standard Classification of Occupations Structure, group definitions and correspondence tables. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf
- Jaiswal, A., Arun, C. J., & Varma, A. (2022). Rebooting employees: upskilling for artificial intelligence in multinational corporations. *The International Journal of Human Resource Management*, 33(6), 1179-1208.
- Johansson, K. (2012). Experts, entrepreneurs and competence nomads: the skills paradox in higher music education. *Music Education Research*, 14, 45-62.
- Kaufman, H. G. (1979). Technical obsolescence: Work and organizations are the key. *Engineering Education*, 69(8), 826-830.
- Kluitmans, F. (Ed.) (2014). *Leerboek Human Resource Management* [Textbook Human Resource Management]. Noordhoff.
- Kooij, D. T., Jansen, P. G., Dikkers, J. S., & De Lange, A. H. (2014). Managing aging workers: A mixed methods study on bundles of HR practices for aging workers. *The International Journal of Human Resource Management*, 25(15), 2192-2212.
- Korver, T., & Potting, K. (2013). Onbegrensd werken: Arbeid en hrm in de 21e eeuw. [Boundaryless work: Labor and HRM in the 21st century]. Coutinho.
- LePine, J. A., Colquitt, J. A., & Erez, A. (2006). Adaptability to changing task contexts: Effects of general cognitive ability, conscientiousness, and openness to experience. *Personnel Psychology*, 53, 563-593.
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Journal of Clinical Epidemiology*, 62, e1-e34.
- Marand, A. D., & Noe, R. A. (2017). Facilitating the development of expertise: An individual to organizational perspective. In K. G. Brown (Ed.), *The Cambridge handbook of workplace training and employee development* (pp. 38-74). Cambridge University Press.
- Meadows, D. H. (1999). Leverage points: Places to intervene in a system. The Sustainability Institute.
- Mieg, H. A. (2012). *The social psychology of expertise. Case studies in research, professional domains, and expert roles*. Psychology Press.
- Mieg, H. A., & Evetts, J. (2018). Professionalism, science, and expert roles: A social perspective. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 127-148). Cambridge University Press.
- Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, S., Stewart, L. A., & PRISMA-P Group (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4, 1.
- Mylopoulos, M., & Farhat, W. (2015). "I can do better": exploring purposeful improvement in daily clinical work. *Advances in Health Sciences Education*, 20, 371-383.
- Niessen, C., & Lang, J. W. B. (2021). Cognitive control strategies and adaptive performance in a complex work task. *Journal of Applied Psychology*, 106, 1586.
- Noordegraaf, M. (2020). Protective or connective professionalism? How connected workers can (still) act as autonomous and authoritative experts. *Journal of Professions & Organization*, 7, 205-223.
- Pulakos, E. D., Arad, S., Donovan, M. A., & Plamondon, K. E. (2000). Adaptability in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology*, 85, 612-624.

- Ruiner, C., & Liebhart, U. (2018). How multi-optional experts maintain and enhance their employability. *German Journal of Human Resource Management*, 32, 52-74.
- Shuster, S. M. (2016). Uncertain expertise and the limitations of clinical guidelines in transgender healthcare. *Journal of Health and Social Behavior*, 57, 319-332.
- Simonton, D. K. (2018). Historiometric methods. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 319-335). Cambridge University Press.
- Sosniak, L. A. (2006). Retrospective interviews in the study of expertise and expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 287-302). Cambridge University Press.
- Strauss, A. L., & Corbin, J. (2007). *Basics of qualitative research. Techniques and procedures for developing a grounded theory* (3rd ed.). Sage.
- Swanson, R., & Holton, E. (2009). *Foundations of Human Resource Development* (2nd. ed.). Berrett-Koehler.
- Tøsse, S. E. (2014). Concern and confidence. Architects making sense of climate adaptation. *Environment and Planning B: Planning and Design*, 41, 24-38.
- Valkeavaara, T. (1999). "Sailing in Calm Waters Doesn't Teach": constructing expertise through problems in work—the case of Finnish human resource developers. *Studies in Continuing Education*, 21, 177-196.
- Van der Heijde, C. M., & Van der Heijden, B. I. J. M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, 45, 449-476.
- Van der Heijden, B. I. J. M. (1998). The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch professionals. Doctoral dissertation, University of Twente, the Netherlands. <https://hdl.handle.net/2066/127534>
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9-39.
- Van der Heijden, B. I. J. M. (2005). 'No one has ever promised you a rose garden'. On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Heerlen: Open University of the Netherlands. Van Gorcum.
- Van der Heijden, B. I. J. M., & De Vos, A. (2015). Sustainable careers: introductory chapter. In B. I. J. M. Van der Heijden & A. De Vos (Eds.), *Handbook of research on sustainable careers* (pp. 1-19). Edward Elgar.
- Vennix, J. A. M. (1996). *Group model building: Facilitating team learning using system dynamics*. John Wiley & Sons.
- Voss, J. F., & Wiley, J. (2018). Expertise in history. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. Ed.) (pp 569-584). Cambridge University Press.
- Wallin, A., Nokelainen, P., & Mikkonen, S. (2019). How experienced professionals develop expertise in work-based higher education: a literature review. *Higher Education*, 77, 359-378.
- WEF (2017). *Accelerating workforce reskilling for the fourth industrial revolution*. <https://www.weforum.org/whitepapers/accelerating-workforce-reskilling-for-the-fourth-industrial-revolution>
- Weggeman, M. (2007). *Leidinggeven aan professionals? Niet doen! Over kenniswerkers, vakmanschap en innovatie*. [Leading professionals? Don't do it!: About knowledge workers, craftsmanship and innovation.] Scriptum.

2

How flexperts deal with changing expertise demands:

A qualitative study into the processes of expertise renewal

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Human Resource Development Quarterly, 30, 61-79.

Abstract

Flexperts are a particular category of experts who are in the possession of in-depth domain-specific knowledge and skills combined with the ability to develop and materialize new areas of expertise, that is, expertise renewal. This ability enables them to decisively respond to new expertise demands that arise as a result of changes in their expertise territories. Thus far, there is a limited understanding of how flexperts develop new areas of expertise in a complex, professional setting, and how they accomplish to materialize this new expertise for multiple stakeholders, both inside and outside organizations. In this qualitative interview study, we aim to increase our understanding of the processes by which flexperts accomplish the renewal of their expertise. Ten Dutch flexperts, known for their high level of expert performance and ability to renew their expertise, and from a variety of disciplines, were interviewed. Based on the findings of our study, we have developed a model that summarizes their expertise renewal processes. This Model of Expertise Renewal extends process models on expertise redevelopment and adaptive expertise, and provides directions for future research on how the ability of expertise renewal contributes to the career sustainability of experts. Furthermore, it provides experts, Human Resource Development (HRD) practitioners, and line managers with a framework for creating learning paths and interventions for renewing expertise in case expertise territories are about to change.

KEYWORDS: career sustainability, flexpertise, Model of Expertise Renewal, qualitative research.

2.1 Introduction: Changing expertise demands in nowadays' working life

Adequately responding to new expertise demands is perceived to be an important capability for professionals in nowadays' working life to safeguard the sustainability of their careers (Susskind & Susskind, 2015; Van der Heijden & De Vos, 2015). Grenier and Kehrhahn (2008) stated that professionals frequently experience a need to "redevelop" their expertise as a result of changes in their so-called "expertise territories" wherein their knowledge and skills come into play. In particular, they distinguished three types of expertise territories where the necessity for the redevelopment of expertise is prevalent. First, the redevelopment of expertise can be required as a result of changes in its *content*, which relates to the knowledge and skills that define or delineate a certain expertise domain. Over the past few decades, the content of expertise domains appeared to become obsolete sooner than ever before (Van der Heijden, 2005). This is partly due to an increasingly shorter half-life of knowledge (Arbesman, 2012), which is defined as the time it takes to become half as knowledgeable in a field without any new learning (Neimeyer, Taylor, Rozensky, & Cox, 2014, p. 92). Expertise can in particular become obsolete or less demanded if new technology (partly) replaces the knowledge and skills that are key to excel in a certain expertise domain (McKinsey, 2017). These developments imply that in nowadays' working life higher levels of domain-specific knowledge and skills are required (Will-Zocholl, 2017; World Economic Forum, 2016; World Employment Confederation, 2016), and/or the development of new knowledge and skills (Levy & Murnane, 2004; OECD, 2009). Second, changes in the *environment*, referring to the setting in which professionals apply their expertise, also urge the need for redevelopment. When environmental elements change, such as an organization's culture, procedures or systems, strategies by which professionals materialize their expertise might need to be adjusted or even replaced by new ones. Currently, professionals are said to encounter these changes more frequently due to the effects of digitalization, robotization, and globalization (Laloux, 2015). Third, changing expertise demands also stem from changes in the *constituency*, that is, the audience that is interested in the specific expertise. After all, professionals need to have an audience that recognizes and actually labels their knowledge and skills as expertise (Grenier & Kehrhahn, 2008, p. 210). The latter pertains to the function others ascribe to expertise, as reflected by expert reputation and the related willingness of an audience to pay for the specific expertise (Mieg, 2006). Thus, when the audience changes, which could be the result of changes in the expertise domain and/or in the environment, professionals need to (re)build their expert reputation among (new) groups of stakeholders.

However, meeting these changing expertise demands at the current labor market is by no means an easy task (Van der Heijden, 2005) and not necessarily mastered by each professional (e.g., CBS, 2015). Van der Heijden (1998) coined the term *flexperts* for those experts who have the ability to meet changing expertise requirements above and beyond their already existing in-depth domain-specific knowledge and skills. This study aims to increase our understanding of what this ability, which we call “expertise renewal,” entails by answering the following research question: *By which processes do flexperts accomplish to renew their expertise?* For the purpose of this qualitative interview study, we define processes as the range of activities that flexperts undertake in interaction with their expertise territories to develop and materialize a new area of expertise that might be beneficial for multiple stakeholders. The following review of theories and empirical studies on the nature, development, and materialization of expertise is meant to reveal lacunas in the Human Resource Development (HRD) scholarly knowledge on expertise renewal in a complex, professional context.

2.1.1 The nature of expertise

During the past few decades, a large amount of research on the nature of expertise has been conducted, by comparing the performance of experts with their less-experienced peers or novices. This research has typically been done within expertise domains that are characterized by a relatively stable and well-delineated knowledge base and by a domain-specific skill set, such as chess, mathematics, and sports (Feltovich, Prietula, & Ericsson, 2018). However, there has been less focus on studying the nature of expertise in complex, professional contexts in which the multiplicity and changeability of domains prevail (Grenier & Kehrhahn, 2008, p. 204), and that are characteristics for upcoming expertise areas in, for example, the professional fields of Information and Communication Technology (ICT) and HRD.

Based on an elaborate literature review and extensive empirical work on the performance of experts in professional settings, Van der Heijden (1998, 2000)¹ came up with a comprehensive definition and multidimensional operationalization of the concept of *occupational expertise*. The first dimension concerns the acknowledgement that professionals need to have a vast amount of relevant domain-specific *knowledge*, often described as declarative or factual knowledge (“knowing that”), procedural knowledge (“knowing how”), and conditional knowledge (“knowing when and where or under what conditions”) (see also Alexander, Schallert, & Hare, 1991). The second dimension, so-called *meta-cognitive skills*, refers to self-consciousness

¹ See Appendix I of Van der Heijden's dissertation (1998) for an overview of definitions of experts and expertise.

about strengths and weaknesses in one's own performance domain, and insights about how to compensate for the specific lacking knowledge and/or skills. The third dimension of occupational expertise relates to the domain-specific *skills* that enable a professional to translate his/her knowledge into overt behavior, and to deliver high-quality work. These three dimensions taken together reflect the degree by which individuals master the aforementioned content of an expertise domain and are able to evaluate if their own knowledge and skills fit the environment in which these have to be materialized. The fourth dimension of expertise concerns the *social recognition* from relevant stakeholders, both within and outside one's working organization, with regard to the professional's achievements. This aspect relates to the capability to (re)build an expert reputation (Germain & Tejeda, 2012), which might be required when changes in the afore-mentioned constituency of an expertise domain occur. The fifth expertise dimension, *growth and flexibility*, refers to the fact that professionals need to develop knowledge and skills in new or adjacent areas of expertise in response to changes in the earlier mentioned three expertise territories. A high score on this dimension is interpreted to be indicative for the performance of flexexperts. Van der Heijden (2000) defined "flexexperts" as "individuals who are capable of acquiring more than one area of expertise within adjacent or radically different fields or who are capable of acquiring a strategy to master a new area of expertise or expert performance in another territory" (p. 12). As suggested by Van der Heijden (2000, p. 30), more insights into concrete examples of expert performances and behaviors might increase our understanding of what constitutes expertise, including the dimension of growth and flexibility.

Recently, different researchers showed a regaining interest in better understanding what is needed for meeting the changing demands for expertise, which Van der Heijden (1998, 2000) labelled as "flexexpertise". Birney, Beckmann, and Wood (2012) used the term "flexible expertise" for "the capacity to move across different domains and problem types smoothly and appropriately" (p. 573). Based on their study of the precursors of flexible expertise, they argued that flexible expertise differs qualitatively from routine expertise. Their distinction between these two types of expertise resembles the difference between *adaptive expertise* and *routine expertise* as originally introduced by Hatano and Inagaki (1986). With regard to the first distinguished form of expertise, Hatano and Oura (2003) stated that experts who have adaptive expertise "can be characterized by their flexible, innovative, and creative competencies within the domain" (p. 28), building upon their routine, more mechanical, rule-based, expertise. In a similar vein, based on a thorough literature review on individual and environmental factors influencing adaptive expertise, Bohle Carbonell et al. (2014) defined adaptive expertise as "the ability

to use existing expertise in a new context in which the task, method or desired outcome is not known in advance” (p. 15). As such, it allows for the easy overcoming of the novelty of a certain setting in which the expertise has to be applied, and to quickly build up expert level performance. Their descriptions of novel contexts or settings seem to relate to changes in the aforementioned expertise environment. The authors concluded that both the main ingredients and the development of adaptive expertise are not yet well understood. Therefore, to further our scholarly understanding of what makes professionals develop adaptive expertise, Bohle Carbonell, Könings, Segers, and Van Merriënboer (2016) called for interview studies on the strategies that experts apply to deal with novel contexts.

2.1.2 The continuous development and materialization of expertise

Previous scholarly work on the flexible or adaptive nature of expertise implies that being an expert is not a final state, but requires the continuous development of expertise. However, most empirical research on expertise development has focused on how individuals go through different stages to become an expert (see Ericsson, 2014 for a summary of influential models). In particular, we lack insight into how a professional career unfolds when expertise territories change and experts need to continuously renew their expertise in favor of the sustainability of their career (De Vos & Van der Heijden, 2017).

Grenier and Kehrhahn (2008) defined a three-stage process model for “expertise redevelopment.” The first stage refers to *dependence* in which the expert needs to rely on other people and resources, and learns to adapt his/her current repertoire to new demands. During the second stage of *independence*, there is an increasing comfort with the new knowledge, skills and/or role, that allows experts to supplement their existing knowledge base with new information. In the third and final stage of the so-called *transcendence*, the expert has developed a sense of ownership regarding the new expertise by which the latter becomes more tacit, and which is accompanied by a growing confidence to experiment.

A limitation of the model by Grenier and Kehrhahn (2008) is that it leaves relatively unanswered what triggers redevelopment in the context of a wide variety of changes in expertise territories, how experts accomplish the move from one stage to the other in interaction with elements of their environment, and how their new expertise materializes or manifests itself to different audiences. These latter aspects are partly addressed by Ward, Gore, Hutton, Conway, and Hoffman (2018) who conducted a review of research on adaptive skills. They concluded that “adaptive skills is the *condition sine qua non* of expertise” (p. 46), meaning that being an expert entails being

adaptable (i.e., as was addressed by the growth and flexibility dimension of expertise of Van der Heijden, 2000). They argued that it is important to distinguish between what constitutes expertise (i.e., the nature of expertise), and how professionals use this expertise to make effective contributions in those contexts where these matter most. Accordingly, Ward et al. (2018) formulated a conceptual “macrocognitive model of adaptive skill” for future empirical research needs incorporating HRD practices that are necessary in this regard. More specifically, this model consists of a process of *sense-making* where experts elaborate, question, and reframe their understanding of a certain situation. As such, this process coincides with a cycle of *flexecution* by which individuals pursue goals in a complex setting wherein they encounter emergent and unpredictable challenges in their professional field. The authors label this process as adaptive performance, that is, performance by discovery, as learning takes place by the doing. A limitation of the models by Grenier and Kehrhahn (2008) and by Ward et al. (2018) is that none of them addresses how individual expertise materializes at multiple levels of an organization. In the light of this, Marand and Noe (2017) identified an increasing need for understanding the emergent, bottom-up processes through which individual expertise translates itself into valuable organizational outcomes in interaction with a complex setting. In their view, HRD plays an important role by providing the necessary conditions and processes for this materialization. However, in the light of the shift toward more sustainable business models, Thunnissen, Boselie, and Fruytier (2013) argued that HRD practitioners should not only focus on the desired outcomes for an organization. Rather, they should take their practice a step further by helping individuals to create (non) economical value beyond the boundaries of an organization, hereby incorporating the needs of multiple stakeholders both inside and outside an organization. This broader constituency urges professionals to increasingly focus on how they are known, by whom and for what, rather than merely on what they should know (Holtskog, 2017; Oldham & Hackman, 2010).

To summarize, in the context of changing expertise territories in nowadays’ working life, scholarly researchers on the nature, development, and materialization of expertise had previously called for a better understanding of how professionals, flexperts in particular, continuously develop expertise in adjacent or new expertise domains. In addition, they stressed the need for more insight into how these flexperts materialize their newly required knowledge and skills for multiple stakeholders both inside and outside an organization, and, finally, how meeting the demands for new expertise contributes to the sustainability of an individual career.

2.2 Method

To contribute to the HRD literature, we adopted a qualitative interview study to conduct an initial exploration of the processes by which flexperts continuously renew their expertise, in specific, aimed at better understanding how they develop and materialize new expertise throughout their career.

2.2.1 Sample

Prior to a purposeful selection of flexperts, we defined five criteria, which should all be met, that strive for a representative sample covering a maximum variation of expertise renewal episodes (Boeije, 2010, p. 36). We derived these criteria from the expertise theories and current labor market demands as described in the introduction section. First, in line with Van der Heijden (1998, 2000), we intended to build upon a general theory of expertise and recruited flexperts from a variety of occupational disciplines. Second, we selected highly educated flexperts given the ever-increasing levels of knowledge and skills that are required (e.g., Levy & Murnane, 2004; Will-Zocholl, 2017). Third, following the seminal finding that around 10,000 hr of deliberate study and practice are required to perform at the expert level (Chi, Glaser, & Farr, 1988; Ericsson, Krampe, & Tesch-Römer, 1993; Simon & Chase, 1973), we needed to sample professionals with ample experience. In addition, we gave account of studies that provide valid criticism to the 10,000 hr rule. For example, the review study by Macnamara, Hambrick, and Oswald (2014) showed that most variance in performance between experts and novices could not be explained by differences in deliberate practice. We also acknowledged that in new areas of expertise, professionals can reach “world-class levels” in fewer than 10 years given a lack of history in the field (Ericsson, 2006, p. 690). Nevertheless, we decided to select flexperts who had at least 10 years of experience in their specific field after graduation to have sufficient expertise renewal episodes to reflect upon. Fourth, to address the issue of required reputation, the flexperts in our sample needed to have been recognized as high-performing and renewing experts by representatives from at least two of the following stakeholder groups: the community of peers in their field, users of their specific expertise within their own organization, and the general public. With regard to the first stakeholder perspective, the flexperts should have received two or more awards or official acknowledgements for innovative or renewing contributions to a certain field of expertise. From the organizational perspective, the flexperts should have been assessed by their supervisor and/or talent manager as a high-performing expert who was capable of materializing new areas of expertise for the organization, as part of a performance appraisal during the preceding 3 years. From the point of view of the general public, we aimed to select renowned flexperts who were consulted or put in the spotlight for their contributions to, or

for renewing perspectives on, societal challenges in the public media, that is to say journals, television programs, social media, and/or radio. And finally, the flexperts in our sample should have developed and materialized at least two new expertise areas throughout their career. By applying this selection criterion, we intended to be sure that the expertise renewal was not a mere coincidence but an ability that could be applied more than once. We earmarked the developed expertise as “new” in case the specific stakeholders stated this expertise to be new in relation to their domain.

2.2.2 Procedure

We contacted flexperts who met all of the sampling criteria using a snowball sampling procedure through the networks of the first two authors of this article, in parallel to conducting the interviews. In particular, we approached six companies, out of which three of their talent managers responded with a list of five flexperts in total. Four of them responded and decided to participate in our study. In parallel, we addressed seven public experts directly, out of whom six responded and decided to participate.

The primary method of data collection involved retrospective, semistructured interviews, which is a commonly used method to recollect the long-term process of expertise development (Sosniak, 2006). The first two authors conducted the interviews using a set of open questions to produce rich, descriptive data on expertise renewal processes. To begin with, flexperts were asked to describe the succession of expertise areas they had developed throughout their career. In a dialogue with the flexpert, we selected one episode in which a new area of expertise was developed and materialized. Next, we went into the elements that had stimulated and hindered them, into concrete examples of the latter, and into what triggered the participating flexperts to look for the development and materialization of a new area of expertise. In addition, we dealt with similarities and dissimilarities with other expertise renewal episodes in the flexpert’s career. We prompted the recollection of information by probing questions such as: What did you do? What did you do next? What was the effect? As part of the selection process, and in parallel to conducting the interviews and their coding (see section Data Analysis), the first two authors consulted supplementary data from online resources and public media on the flexperts’ broadcasting strategies, (co)developed products, and reputation/ recognitions of their achievements from the general public and from peers, to elaborate our understanding of their renewal episodes. Directly after each interview, both interviewers independently wrote down their first impressions from the interview and cross checked their notes to align on which emerging processes might require further elaboration in successive interviews. After five interviews, we constructed a tentative conceptualization of possible processes. After ten interviews,

we appeared to have reached the point of saturation (Anderson, 2017, p. 129) given the identification of similar renewal processes across interviewees, expertise areas, and organization types, while, at the same time, having managed to collect a rich variety of behavioral examples of these processes. We decided to collect additional information on how flexperts differ from less-flexible experts and, if needed, more information as well on process features, sequences, and their interrelationships, during a process of member validation with half of the interviewees (see section Data Analysis).

The final sample consisted of ten renowned Dutch flexperts (six men and four women) who developed new areas of expertise in the following broad fields²: HRD (R1, 5), Medical (R2, 7, 9), Business Management (R3), ICT (R4, 8, 10), and Education (R6). Their experience ranged from 8 to 30 years (on average 21 years) in a wide variety of organizational types (e.g., multinational, university, freelance network, hospital, and consultancy firm). All interviews were conducted from May until July 2016 and lasted 59 min on average (ranging from 46 to 80). All flexperts provided consent for both recording the interviews and the member validation (see section Data Analysis). A third party agency made full verbatim transcripts of all interviews. The resulting transcripts were uploaded in ATLAS.ti (version 7) for data analysis.

2.2.3 Data analysis

As the process by which flexperts renew their expertise is a relatively unknown phenomenon and given that prior empirical studies in this field are limited, we used an inductive approach for an in-depth analysis of the interview transcripts. This analysis was meant to make an initial exploration of the processes by which flexperts renew their expertise throughout their career, and what they considered as stimulating and hindering elements. In particular, we used open, axial, and theoretical coding for inducing an expertise renewal model (Boeije, 2010) and applied Charmaz's (2014) guidelines for coding actions undertaken.

For the process of open coding, the first two authors created codes consisting of short names that were "grounded" in the interview data and that reflected actions and their stimulating or hindering elements. We used the same code for text segments wherein interviewees used highly similar wording. Moreover, we used "in vivo" codes to capture the flexperts' terminology (Strauss & Corbin, 2007) to facilitate retrieval of this information for the successive coding steps and reporting. Next, we started the process of axial coding by comparing, discussing, and clustering codes to uncover the processes by which flexperts interacted with their expertise territories, the stimulating

² There was one exception to the 10-year rule in our final sample: one flexpert had 8 years of experience in an upcoming younger field of ICT.

and hindering elements for these processes, and their outcomes (Strauss & Corbin, 2007). Throughout this process of iterative clustering, we checked for similarities and dissimilarities among codes and (sub)clusters of codes by verifying text segments within and across interview transcripts, and we changed the initial coding where necessary. In addition, during the processes of interviewing and coding, we kept track of our reflective thoughts and decisions by means of memo writing (Boeije, 2010, p. 70). To secure the consistency and quality of our coding (Murphy, Klotz, & Kreiner, 2017), the first two authors jointly distinguished text fragments and assigned open codes to them. Next, the first author created axial codes during several iterations in which the second author reviewed the clustering. Disagreements among the two coders were solved by thorough discussions after verifying the original interview transcripts. Subsequently, we started the process of theoretical coding to develop a conceptual model for processes of expertise renewal. This resulted in the emergence of alternative conceptual models and accompanying theoretical concepts based upon a thorough brainstorm about the key processes, and the essence of the relationships between these, that were, subsequently verified using the interview data. The resulting model was then compared with the aforementioned theories on the nature, development, and materialization of expertise, and with additional scholarly literature on the processes of expertise renewal that we derived from the coding process (see Discussion section for more details).

A member validation (Anderson, 2017, p. 129; Boeije, 2010, p. 177) was carried out with half of the flexperts between June and August 2017 to verify the credibility of our analyses. With each flexpert individually, we reflected upon their individual expertise renewal processes which we derived from analyzing their interview transcripts and supplementary data. In addition, we cross validated the emerging process model (Murphy et al., 2017, p. 302) to determine to what extent the flexperts endorsed the visualization of the process model, the distinguished processes and their relationships, and whether there were missing elements (Andersen et al., 2010). In addition, we asked in what way the flexperts considered themselves to be different from experts who they perceived as less capable of renewing their expertise.

2.3 Findings

Figure 2.1³ summarizes the outcomes of our coding processes. It shows the first-order codes as a result of open coding, the more abstract categories that we derived from the axial coding, and the aggregated theoretical dimensions that finally led to the formulation of our newly developed conceptual model.

³ The template for Figure 2.1 has been derived from Pratt, Rockmann, and Kaufmann (2006).

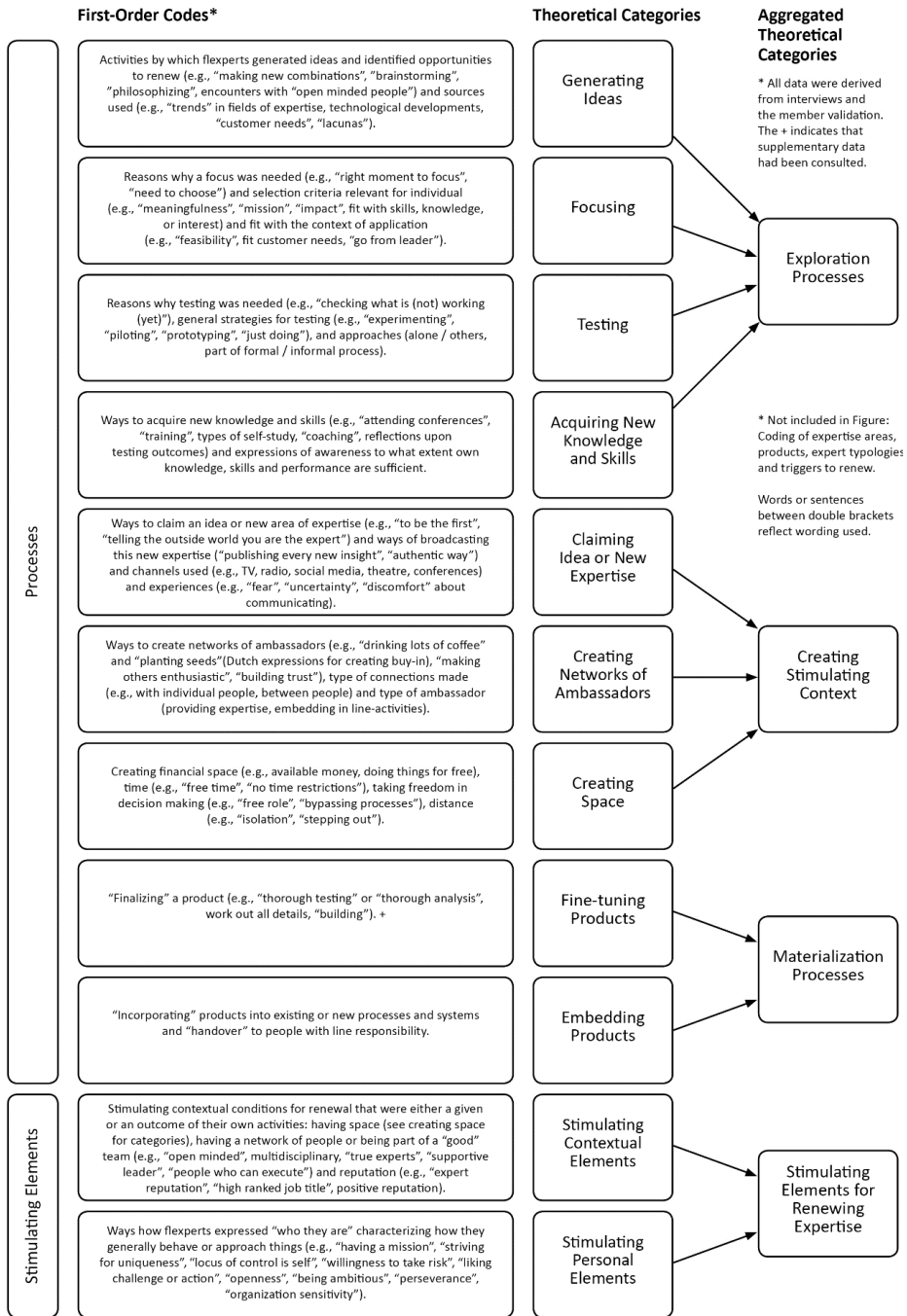


Figure 2.1 Overview of data structure

Later, we describe in more detail how and why each process was applied by the flexperts, and which elements they considered to have stimulated or hindered these processes. Words between double brackets capture the wording used by the flexperts. Next, we discuss the conceptual Model of Expertise Renewal that we have derived from our analysis.

2.3.1 Generating ideas: An important source of expertise renewal

The flexperts in our sample reported that expertise renewal starts with an “idea” or “opportunity to do something new.” They described how they generated ideas by a range of activities and the usage of multiple sources (see Figure 2.1 for examples) resulting into a wide variety of ideas. In some cases, these ideas concerned the opportunity of acquiring high-level performance in an adjacent or new area of expertise. All flexperts identified opportunities to create a new field of expertise by making unique combinations among disciplines. For example, Int. 10 saw an opportunity to combine her expertise in the fashion industry with her ICT expertise to develop a new expertise area on “fashionable technology” during one of her expertise renewal episodes. Other flexperts described the opportunity of building upon an upcoming field of expertise. For example, one HRD flexpert (Int. 1) spotted the opportunity to acquire and materialize an upcoming expertise area, that is, early career crises, in the context of a growing demand for career support among young workers. In a subsequent renewal episode in her career, she noticed that “new ways of working” was another upcoming topic in the HRD field. She developed and implemented a method for organizations on new ways of working, and became a well-known expert on this new topic. Flexperts also identified opportunities to apply one’s given expertise to a new environment, such as Int. 7 who spotted the opportunity to apply his specific medical expertise to a new patient group. Six flexperts were triggered by what they called “lacunas” regarding, for example, processes, customer insights, or systems. These lacunas could be a source for generating ideas for a product or process innovation. In other words, the flexperts had to learn a new area of expertise, being a fortunate side effect of this innovation. During the interviews and member validation, the flexperts reported that they were rather inclined to approach these lacunas as an opportunity for renewal, whereas others tend to perceive them as a problem or hindrance. Some flexperts described the process of generating ideas as a relatively effortless activity that could happen spontaneously, during work or private activities, as illustrated by Int. 2: “Good ideas are not steered by a date or time.” In addition, the flexperts appeared to generate ideas either as a solitary act or as a result of being inspired by others, specifically “open-minded people” from multiple disciplines.

2.3.2 Focusing: Selecting an idea out of the many ideas

There appeared to be a kind of momentum to focus on either one or on a limited number of ideas, including opportunities to develop or materialize a new area of expertise. For example, Int. 10 described this type of situation as follows: "You have to stop whatever you are doing to seize an opportunity once it presents itself." A number of flexperts verbalized an intuitive feeling that a certain idea was potentially a good one. To take a well-considered decision whether an idea required further exploration, or whether it rather should be abandoned, all flexperts did multiple checks. We identified categories of personal and contextual checks that were used to evaluate an idea.

We clustered codes as *personal checks* in case the flexperts evaluated whether an idea could create outcomes in line with a number of personal characteristics or with their own needs. All but one flexpert checked whether an idea was expected to have meaningful outcomes in line with their personal mission, which was used as an overall guide in their career. For example, one ICT flexpert (Int. 10) explained that any decision on whether to start learning or doing new things was steered by her mission: "All the time going back to the mission: What is the mission? Does it fit and if not, ..., then don't do it ... For example ... our mission is to empower women through technology, that is what we stand for, thus for very specific women, and not for girls." In addition to checking the fit with one's personal mission, it was also important for the flexperts to be passionate about the idea, and to have relevant knowledge and skills. Others also checked whether they could have "impact" with the idea (Int. 3; 4; 8; 9; 10), or "be the first with an idea" stemming from a personal driver to be unique or different from others (Int. 1; 4; 5; 7; 9). The second category of checks concerned the *fit with the context of application*, relating to the environment and constituency, as explained in the introduction section. Depending upon the context, this has to do with, for example, the evaluation of whether the idea could potentially fulfill the customers' needs, or whether it seemed feasible to realize. Half of the participating flexperts specifically reported the importance of a "go" from their line manager to be a stimulating contextual factor, as illustrated by the following quote of Int. 6: "My direct supervisor [name] ... I encountered him frequently about, hey is this nice?, and he always said, yes, go on. Thus I started ... just doing." Being the first to come up with a certain idea was also a reason to select it. For example, one medical flexpert (Int. 7) noticed multiple times in his career that he could be ahead of others by developing a new area of expertise, for example described as: "An area ... nobody knows of ... meaning you are the first ... makes people interested, makes me to be invited everywhere."

The personal and contextual checks that have been outlined here were applied without a specific rank order. For example, the business management flexpert (Int. 3) described why he decided to focus on developing a new assessment tool: “Yes, because it is actually what ... I can, what I want, and what the market demands, these are the three ... things that come together.” All in all, the flexperts focused on an idea because of its anticipated positive outcomes for both themselves and their stakeholders. Depending upon the specific expertise area or environment in which they were operating, these stakeholders could be customers, users, peers, or broader entities such as an organization as a whole or “the society.” The expectations regarding positive outcomes justified themselves and others to spend time and money to (further) explore a certain idea. Some flexperts indicated that immediate action or testing was needed after a decision to focus on a certain idea to be “the first,” summarized by Int. 9 as: “I spotted an opportunity and acted upon it.”

2.3.3 Testing: Getting a better understanding of what the idea is about

Flexperts reported multiple reasons for testing their idea. For example, one ICT flexpert (Int. 8) explained why he introduced an idea testing approach: “Now we know actually ... this is ... gold or this is nothing.” Int. 10 explained that he was testing his ideas to get feedback on how well they were resonating with his audience, as explained in the following text excerpt: “If someone does not favor the idea than I have not explained it well enough, ... I must return to the drawing board to make the idea more clear.” All flexperts mentioned that they tested their idea with the help of others, such as colleagues, relatives, and friends, whom they perceived as “open-minded people.” Flexperts described specific strategies for testing their idea, which they described in wordings such as “experimenting,” “prototyping,” or “running a pilot.” Six flexperts also frequently referred to this testing as “just doing.” Moreover, the participating flexperts also gave examples of carrying out “thought experiments” by which they visualized and thought through an idea. The information resulting from testing activities was sometimes used to come up with the decision to focus on one of the flexper’s ideas, that is, the process of focusing as we described before. In addition, testing sometimes generated new ideas for the development of expertise in an adjacent or new domain.

2.3.4 Acquiring new knowledge and skills: Becoming confident

By acquiring new knowledge and skills, flexperts could enrich an idea resulting into a sound knowledge foundation for it, and enabling them to learn how to do things. This together gave flexperts a growing feeling of confidence to be an expert on the new topic. Even though flexperts voiced to continuously develop themselves in their broad field of expertise, they specifically delved deeper into topics during

the exploration of a new field of expertise. They reported to have acquired new knowledge and skills by, for example, evaluating the outcomes of testing, extensive reading, consulting experts, attending conferences, joining training, interviewing, and observing. For example, Int. 1 described how she spends an extensive amount of hours on self-study by reading scientific articles on new ways of working, following experts in this field on social media, and reflecting on the effectiveness of methods that she had been trying out. In this way, she internalized peers' expertise supplemented with her own insights. She summarized this as follows: "Then it also became an expertise of myself." Int. 4 described the outcome of this process as "A cloud of knowledge that was expanding." Flexperts also recognized that some expertise areas were too deviant or dissimilar from their own one to cope independently with closing the accompanying knowledge and skills gap. This was illustrated by the following quote of one medical expert (Int. 9): "Don't try to be the expert in an area you are not." In that case, they attracted other experts (see the section *Creating Networks of Ambassadors* for more details).

2.3.5 Creating a stimulating context

The flexperts described how they were actively influencing their context, relating to elements of their expertise environment and constituency, aimed at stimulating both the (further) exploration of their idea, or the materialization of their expertise by means of fine-tuning and embedding a variety of products (see later on in this section). They all described three processes by which they created a (more) stimulating context where needed: claiming the idea, creating networks of ambassadors, and creating space. During the interviews and member validation, some flexperts mentioned that they differed from others by perceiving their context as something they could potentially influence, and as such applied the following three processes.

Claiming an idea or new expertise: Broadcasting to be the expert

Along iterations of testing an idea and acquiring new expertise, all flexperts reached a point where they felt a need to claim their enriched idea or to associate their name with an emerging area of expertise given the insights gained. Besides, all flexperts communicated their idea or new area of expertise to inspire, inform, and make others familiar with it, and as such built their reputation or labelling as an expert on the new topic. More specifically, all flexperts claimed their selected idea by broadly communicating it as a new concept, vision, insight, product, approach, or new area of expertise, even though it was still in an explorative stage. Three flexperts purposively used a unique name for the new expertise area or gave themselves a special expert label. For example, one HRD flexpert (Int. 1) explained why she gave a special label to her growing expertise on "early career crisis": "I know a lot about it, I

have done much with it, but you only will be seen if it gets a name.” Seven flexperts reported a specific strategy: claiming a topic or new area of expertise by telling “to be the first.” This claiming happened in organizations, among communities of peers, and in the public media. During the member validation, two ICT flexperts (Int. 4; 8) pointed out the necessity of the “right timing” for broadcasting, as people need to be “receptive to new ideas.”

Flexperts claimed “ownership” of a new field *before* their newly obtained expertise was fully developed. Int. 1, 6, 8, and 9 reported fear, uncertainty, or discomfort to communicate about their new expertise while not having sufficient expertise yet. This feeling is due to the fact that the audience expects an expert to be knowledgeable. HRD flexpert Int. 1 explained how she coped with this: “In the beginning you feel ill at ease because you are of course totally nothing, so the reflex is to keep up appearances.” After an initial claim, it was a fruitful strategy to publish or broadcast every new insight or evidence that was found to further enhance their expert reputation. Figure 2.1 shows the multiple channels that were used for this broadcasting. By repeatedly telling the outside world you are the expert, it became a kind of self-fulfilling prophecy, illustrated by one medical expert (Int. 9) as: “By the act of being the expert, I became the expert.”

Creating networks of ambassadors: Stimulating exploration and materialization

The flexperts aimed to create networks of ambassadors to enable access to expertise and resources in favor of their intended renewal process, as reflected in the quote one ICT flexpert (Int. 10): “You need enthusiastic and interested people. You cannot handle it on your own ... I strongly belief that you can become anything you want and that everything is possible and no is actually not an option, but it requires that you can’t do it on your own. ... I ask immediately for help.” Another ICT flexpert (Int. 4) explained the need for creating ambassadors among various departments within his organization as follows: “The larger you are making your network and the longer you have been working somewhere, the higher the chance that things go faster, because you are much more of a spider in a web ... Instead of spinning a couple of strings, you have spun a thousand of these.”

Flexperts described ambassadors as those people who were actively supporting their claim of a new area of expertise or the launch of an idea, either inside or outside an organization. Two types of ambassadors emerged from the interview data. The first type were experts with the required complementary or in-depth expertise who contributed to testing a preliminary idea and/or fine-tuning it into a product. The

second type of ambassadors were line managers or colleagues with complementary planning or coordination skills, who helped to embed the new knowledge, skills, and products in regular processes and systems. If needed, they also helped in creating the required space (see the next paragraph for more details). The flexperts created networks of ambassadors as a side effect of involving them in the previously described processes of claiming and testing, and by involving them in the fine-tuning and embedding of products as we will describe further on. Flexperts also reported actions that were specifically targeted at creating ambassadors. They typically conducted these actions in bilateral settings, and actively built trust and expanded their network by making connections with and between people who should advocate or support their idea, new product, or new area of expertise. Flexperts purposively stimulated this process by using their expert reputation, their positive performance evaluation within the organization, or a high-ranked job title to gain easy access to people who could be their ambassador. If needed, these ambassadors could help the flexperts in creating “space” for renewal.

Creating space: Having the required room to explore

All flexperts voiced examples of why they needed “space.” They described space as a context that specifically provided them room to (further) explore an idea or a new area of expertise, as it helped them with generating new ideas, testing these, and deliberately studying. Space stimulated these processes as it provided, as reported by Int. 8, for example: “Freedom to take decisions.” Int. 7 verbalized it as: “It allowed me to continue,” and for Int. 4 “It helped to keep the energy.” One HRD expert (Int. 5) described how “space” helped her to explore the opportunity of developing a new area of expertise. She explained how she frequently had created space throughout her career to make unique combinations of her expertise in arts, pedagogics, and business management. She described the function of space as something that people need to “reinvent themselves”: “It opens up possibilities for individuals to become intrinsically motivated to define for themselves what to learn, how to deal with change, and, ultimately, how to reinvent themselves within the safety of the space.”

Flexperts voiced examples of four different kinds of “space” that they either created themselves or that were perceived as stimulating elements that were provided by other parties: the possibility to circumvent existing processes or regulations, financial space, time, and distance. Eight flexperts bypassed existing processes that they perceived as a barrier, as described by one ICT flexpert (Int. 8) who created a position for himself akin to the “sweeper position” in football: “Now I do not need to ask anyone for permission, thus when I have an idea today, I can do it tomorrow.” In a different way, Int. 3 and Int. 4 circumvented barriers by starting their own firm in

combination with being employed. Int. 3 also commenced to work with start-ups to have more freedom to act. Six flexperts created financial space, for example by investing their own money (Int. 3; 5), doing work for free (Int. 1; 10), or by finding funds (Int. 2; 7). Int. 1, 5, 6, and 10 organized the time to do the things they wanted to do. Int. 1, 5, 6, and 9 isolated themselves for a longer period of time for an in-depth elaboration on the new topic.

2.3.6 Fine-tuning products

The interviews and supplementary data showed that flexperts developed a variety of products by which they made their initial idea and new area of expertise accessible and useful for multiple stakeholders, both inside and outside an organization. For example, they developed ICT tools, summaries of their understanding (e.g., scientific articles, popular scientific books, and blogs), learning tools (e.g., eLearning, lectures, theater show, assessments, and coaching), methods (e.g., medical treatment, ICT selection process), or policies. One medical flexpert (Int. 9) explained that the development of products was a necessity to keep on being an expert: "... you have to produce, because it is a temporary status. You are an expert and ... people ascribe you this status on the basis of the knowledge and the materialization of your skills, but if you do not follow up on this ... than it breaks off. Your expert role will vanish." The development of usable products involved a process of fine-tuning. Some flexperts involved what they called "true experts" or "craftsman" for this process of fine-tuning given their in-depth expertise on a specific topic and/or their stronger focus on details. For example, one medical flexpert (Int. 7) involved a statistician who did a more thorough analysis to standardize a treatment. Similarly, one ICT flexpert (Int. 8) attracted another ICT specialist for systematic testing by which he made the product suitable for a customer launch.

2.3.7 Embedding products

In parallel to this fine-tuning process, flexperts made sure that their products were integrated into existing processes and systems. Many flexperts preferred to handover this process of embedding, as well as the aforementioned process of fine-tuning, as reflected in the quote of Int. 8: "I never finish anything, that is a bad habit, but also a good habit, thus I reach 60, 70% and then hand it over to ... people with line responsibility. Then I got rid of it and it allows me to do something new." In this process he considered the following: "How can I make sure that we build up something, which doesn't break down .. if I withdraw." Flexperts reported losing interest or getting bored during this process of embedding and the aforementioned process of fine-tuning and started looking for "something new." They had these experiences because their work had become more routine, lowering the

Model of Expertise Renewal

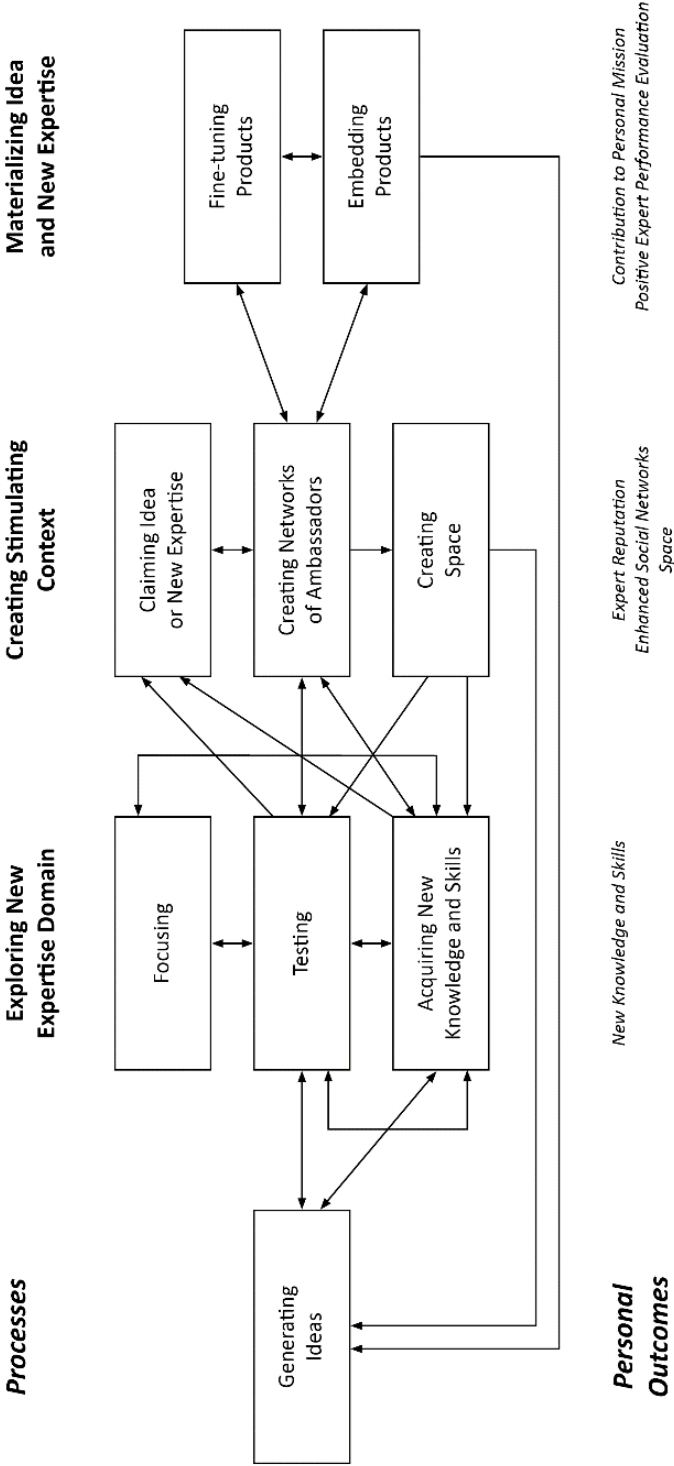


Figure 2.2 Conceptual Model of Expertise Renewal

opportunities to learn something new, as illustrated by the following quote of Int. 9: “Look, in the beginning you are anxious and you want to do it right, but now I do not have that anymore ... it became a skill ... and this is a point where I think ... this is not attractive.” As a result, flexperts were not much inclined to report extensively about the details of fine-tuning and embedding. Handing over the work to others, during this stage of materializing their expertise, often resulted into more openness for new opportunities, which could lead to the generation of ideas as a basis for a new expertise renewal episode.

2.3.8 Toward a conceptual Model of Expertise Renewal

Based on this empirical work, we have developed a conceptual Model of Expertise Renewal visualized in Figure 2.2. It summarizes the previously described key processes, and explains how each process can be interconnected during an expertise renewal episode in a flexpert's career. We have distinguished three main process cycles: an exploration cycle, a cycle in which a stimulating context is created, and a materialization cycle.

An expertise renewal episode usually starts with *generating ideas*, including ideas for developing adjacent or new areas of expertise. It can set in motion a cycle of *exploring a new expertise domain* in which flexperts perform iterations of *testing* the value that the idea could have for others, and *acquiring new knowledge and skills* to enrich the preliminary idea. Sometimes these two processes generate new ideas in return. During the exploration cycle, flexperts make a well-considered decision by *focusing* on one or a limited set of ideas, often after some iterations of testing and acquiring new knowledge and skills. To do this, they weigh up both the potential of having beneficial outcomes for themselves as well as for relevant stakeholders. Having a focus can be a trigger to further test or enrich a certain idea.

If needed, flexperts start a cycle of processes by which they are creating a stimulating context in three different ways. Flexperts start *claiming the idea or new expertise* once they have sufficient testing data gathered and/or new knowledge and skills acquired. This claiming helps to build up an expert reputation on the new topic, herewith enhancing the possibilities of *creating networks of ambassadors*. This network can support exploration if it consists of people who can help with further testing, can provide additional knowledge and skills, or can help *creating space*, that is, the possibility to circumvent processes, gaining access to financial resources, having time available, and taking distance for further exploration. If the time is right, ambassadors can also contribute to the materialization of the newly acquired expertise.

The *cycle of materializing ideas and new expertise* typically starts after a number of exploration cycles. This is the stage in which it usually becomes clearer as to how a tested idea, enriched with new knowledge and skills, can be materialized after also having been able to create a (more) stimulating context. This materialization is realized by the development of tangible products for multiple stakeholders inside and outside an organization. It often requires the *fine-tuning* of products for which flexperts involve other (fl)experts among their network of ambassadors who have complementary or in-depth expertise on components of the desired output. Line managers from their network of ambassadors are usually involved in the process of *embedding* the new products in regular ways of working. Flexperts tend to hand over this fine-tuning and embedding to enable themselves to shift their attention to opportunities for developing new areas of expertise. This shift is often triggered if the work becomes more routine and when learning opportunities have grown thin. As flexperts are mobilizing ambassadors during the exploration cycles, they have relatively easy access to experts and line managers. Therefore, they may delegate the work of fine-tuning and embedding new products to start a new renewal episode in their career.

A sound expertise renewal episode can support flexperts in subsequent episodes in their career given the beneficial *personal outcomes*. First, exploration can generate *new knowledge and skills* that can enhance the flexpert's reputation, the quality of the products, and the generation of new ideas. Second, an *expert reputation* can help a flexpert in making people willing to become their ambassador. Third, an *enhanced social network* can help the flexpert during a future expertise renewal episode by providing expertise, mandate, and resources for both the exploration and the materialization of new ideas and expertise. Fourth, having *space* also helps in creating room to focus on a subsequent renewal episode. And finally, the implementation of new products based on a tested idea and enriched with new knowledge and skills can lead to a *positive expert performance evaluation in line with one's personal mission*.

To summarize, the Model of Expertise Renewal that we propose is iterative, meaning that an expertise renewal episode is characterized by recurrent sequences of two or more processes, such as for example the iterations of testing and acquiring new knowledge and skills. The model is multidirectional as flexperts move back and forth between exploration, creating a stimulating context for renewal, and materialization. The distinguished expertise renewal processes are executed in unique ways given the specific characteristics of the flexpert's expertise domain, environment, and audience, which requires a flexpert to adapt his or her behavior. Consequently, the

sequence, frequency, and duration of processes is different between flexperts as well as across different episodes of a single flexpert, resulting into idiosyncratic expertise renewal paths by which a flexpert materializes new expertise for multiple stakeholders, both inside and outside the organization. As such, the model provides a framework for defining learning paths as we will further discuss in the final section of this article.

2.4 Discussion

2.4.1 Contribution to the HRD scholarship

With this contribution, we aim to shed more light on the richness and complexity of the processes by which flexperts develop and materialize new areas of expertise. By developing a conceptual Model of Expertise Renewal, we are able to extend the process models of Grenier and Kehrhahn (2008) and Ward et al. (2018). In line with Grenier and Kehrhahn's model of expertise redevelopment (2008), we have described the acquisition of new knowledge and skills as a shift from reliance on other resources toward a level of "transcendence" in which the possession of high-level domain-specific knowledge and skills is accompanied by a growing confidence, herewith providing a platform for starting new expertise renewal episodes. The alternation between the exploration and materialization cycles resembles the model of adaptive skill of Ward et al. (2018) to the extent that flexperts were both "making sense" of a preliminary idea to renew, and while "doing" things they were finding ways to materialize their idea or new area of expertise for multiple stakeholders. Our model extends these two process models by the addition of processes and by their refinement. Firstly, we have added the processes by which flexperts generate and focus on ideas about how to deal with changing expertise demands, often described as opportunities for renewal. In the fields of entrepreneurship and intrapreneurship, many researchers were already captivated by the question of what makes people to perceive opportunities. Review studies of Baggen (2017), Brandstätter (2011), and George, Parida, Lahti, and Wincent (2016) described the positive effects of prior knowledge, social capital, and personality traits on opportunity recognition. Analogously, we could argue that the flexperts in this study recognized a wide variety of opportunities to develop new areas of expertise by having an extensive knowledge base and supportive social networks. Moreover, the abovementioned review studies showed that Big Five traits, in particular Openness, appeared to partly explain individual differences in opportunity recognition, which we assume to be characteristic for flexperts as well, given their explanations of how they were open for opportunities to deal with changes in their expertise territories. In line with

Thunnissen et al. (2013), we posit that flexexperts contribute to the sustainability of their careers by making a balanced decision to focus on those ideas that could create a value for multiple stakeholders in and outside an organization, as well as valuable outcomes for themselves. Secondly, our model extends the aforementioned process models by the addition and refinement of processes by which flexexperts interact with certain elements in their environment and with their audience, and by which they alter these elements if needed to stimulate the development and materialization of their newly gained expertise. Specifically, the flexexperts seemed to organize their own resources by the process of creating ambassadors, and appeared to be able to circumvent barriers by the process of creating space. In this way, their activities resembled the so-called job-crafting strategies (e.g., Tims, Derks, & Bakker, 2016) by which professionals influence elements of their environment to have a better personal fit with their job and to experience their work as more meaningful. To the best of our knowledge, earlier research on job-crafting strategies has not yet addressed the search for optimal strategies for (expert) reputation building by which an audience can be created or maintained among groups of stakeholders. Therefore, our contribution helps to close the knowledge gap on how the sustainability of professionals' careers can be enhanced (see also Van der Heijden & De Vos, 2015).

2.4.2 Limitations of this study and directions for future research

This study has some limitations. First, although the flexexperts operated in a variety of expertise areas and types of organizations, we found commonalities in their expertise renewal processes. However, given the limited number of flexexperts interviewed, more empirical research is needed to determine the generalizability of our conclusions. This would also include to interview “negative cases” (Andersen et al., 2010; Boeije, 2010, p. 38) to verify eventual disproval of the provisional findings so far. In addition, follow-up research is needed to develop a generic (i.e., domain-independent) quantitative measurement instrument based on the newly developed conceptual model to test whether the described mechanisms are established in larger and more diverse samples. Second, we should consider the possibility of a hindsight bias or internal attribution error (Kelley & Michela, 1980). In particular, it could be that flexexperts had a distorted recollection of their expertise renewal processes, and as such might have incorrectly attributed successes to their own efforts rather than perceiving it as an outcome of beneficial circumstances. Future research could make use of feedback from multiple sources, such as the flexpert's line managers and peers, to understand whether their performance is largely determined by the given context or facilitated by environmental elements and/or the audience, which was created by the flexpert him/herself. Third, by only studying flexexperts in the top end of the performance ratings, we should be cautious making statements about the extent

to which they differ from those professionals who are less capable of renewing their expertise. Therefore, we suggest that further quantitative research explores the potential effects of personality characteristics on the flexpert's ability, varying in terms of excellence, to recognize opportunities for developing new expertise, and the exploration and materialization of these opportunities. Fourth and finally, as we have only incorporated Dutch experts, it is worthwhile to cross validate our findings with a more culturally diverse flexpert population. As there are cultural differences in the way that people grant status to someone and to what extent people act as an individual or a group (Trompenaars & Hampden-Turner, 1998; Yuan, Bazarova, Fulk, & Zhang, 2013), we recommend to further examine cross-cultural differences in building up and maintaining flexpert reputation.

2.4.3 Implications for the HRD practice

Expertise is argued to be a core concept for the HRD practice, as much of the work concerns “unleashing expertise for the purpose of improving performance” (Swanson & Holton, 2009, p. 252), and, therefore, we will conclude with practical recommendations for the HRD practice. Over the past few years, there has been an increased focus on how employees can take responsibility for their own career (Poell & Van der Krogt, 2014; Van der Heijden & De Vos, 2015). In this regard, Poell (2017, p. 14) called for more attention on how employees create their own learning paths, and how HRM and HRD managers, and other actors can influence professionals in having sustainable careers. A learning path refers to “a set of learning-relevant activities that are both coherent as a whole and meaningful to the employee” (Poell, 2017, p. 11), and can be described by the learning theme, learning activities, social context, learning facilities, and the learning motive. The conceptual Model of Expertise Renewal provides a framework for experts to create their own learning paths in situations wherein learning is required as a result of the shifting demands for their expertise. It shows that experts need to make a deliberate choice for selecting a learning theme, taking the needs of multiple stakeholders or actors into account as well as the fit with one's own learning motive or mission. Furthermore, it shows that in the light of a sound design of learning activities, experts have to involve and expand their social network to materialize the new expertise for both themselves and multiple stakeholders. For initiating these learning activities, they should also play an active role in arranging learning facilities. To better understand which group of experts might require developmental support, a HRD professional could conduct an initial assessment of their level of expert performance, and in particular, of their level of “growth and flexibility” (Van der Heijden, 2000). Subsequently, a HRD professional could use the Model of Expertise Renewal to review, together with the expert and line manager, which processes the expert finds difficulty to deploy and/

or which elements of the expert's environment or constituency may stimulate or hinder one or more processes. As such, the Model of Expertise Renewal can be used to identify where a certain process of an expert was enhanced or, in contrast, where opportunities for creating beneficial outcomes for stakeholders involved or for the expert's career have not been seized. A HRD professional could use these insights for the design of learning interventions in close collaboration with the experts and their line managers (Poell & Van der Krogt, 2014). These interventions could focus on how experts can be a strategic actor by creating their own learning paths and/or the development of abilities, which are required for specific expertise renewal processes. Given the notion that flexperts might differ from their less-flexible peers with regard to their perception of how they can influence their context, a HRD professional or line manager could specifically focus on making the latter ones more aware of the possibility to shape their social context and learning facilities, using insights on how job-crafting abilities can be developed (Tims, Bakker, & Derks, 2012, p. 176). Thus, by stimulating experts to create their own learning paths and learning them how to create a stimulating context, HRD practitioners can support experts in dealing with changing expertise demands to safeguard the sustainability of their professional career.

References

- Alexander, P. A., Schallert, D. L., & Hare, V. C. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of Educational Research*, 61(3), 315-344.
- Andersen, D. L., Luna-Reyes, L. F., Diker, V. G., Black, L., Rich, E., & Andersen, D. F. (2010). The disconfirmatory interview as a strategy for the assessment of system dynamics models. *System Dynamics Review*, 28(3), 255-275.
- Anderson, V. (2017). Criteria for evaluating qualitative research. *Human Resource Development Quarterly*, 28(2), 125-133.
- Arbesman, S. (2012). *The half-life of facts: Why everything we know has an expiration date*. Penguin Putnam.
- Baggen, Y. (2017). *Opportunity identification competence. Explaining individual and exploring team opportunity identification by employees* (Doctoral dissertation). University of Wageningen.
- Birney, D. P., Beckmann, J. F., & Wood, R. E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, 22, 563-574.
- Boeije, H. (2010). *Analysis in qualitative research*. Sage.
- Bohle Carbonell, K., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2016). Measuring adaptive expertise: Development and validation of an instrument. *European Journal of Work and Organizational Psychology*, 25, 167-180.
- Bohle Carbonell, K., Stalmeier, R. E., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, 12, 14-29.
- Brandstätter, H. (2011). Personality aspects of entrepreneurship: A look at five meta-analyses. *Personality and Individual Differences*, 51, 222-230.
- CBS (2015). *Lack of important new skills or know how among nearly a quarter of Dutch employees*. <https://s>
- Charmaz, K. (2014). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage.
- Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (1988). *The Nature of expertise*. Lawrence Erlbaum.
- De Vos, A., & Van der Heijden, B. I. J. M. (2017). Current thinking on contemporary careers: The key roles of sustainable HRM and sustainability of careers. *Current Opinions in Environmental Sustainability*, 28, 41-45.
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683-703). Cambridge University Press.
- Ericsson, K. A. (2014). Adaptive expertise and cognitive readiness: A perspective from the expert-performance approach. In H. O'Neil, R. Perez, & E. Baker (Eds.), *Teaching and measuring cognitive readiness* (pp. 179-197). Springer.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406.
- Feltovich, P. J., Prietula, M. J., & Ericsson, K. A. (2018). Studies of expertise from psychological perspectives: Historical foundations and recurrent themes. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed., pp. 59-83). Cambridge University Press.
- George, N. M., Parida, V., Lahti, T., & Wincent, J. (2016). A systematic literature review of entrepreneurial opportunity recognition: Insights on influencing factors. *International Entrepreneur Management Journal*, 12, 309-350.

- Germain, M., & Tejeda, M. J. (2012). A preliminary exploration on the measurement of expertise: An initial development of a psychometric scale. *Human Resource Development Quarterly*, 23(2), 203-232.
- Grenier, R. S., & Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, 7(2), 198-217.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262-272). Freeman.
- Hatano, G., & Oura, Y. (2003). Commentary: Reconceptualizing school learning using insight from expertise research. *Educational Researcher*, 32(8), 26-29.
- Holtskog, H. (2017). Defining the characteristics of an expert in a social context through subjective evaluation. *Journal of the Knowledge Economy*, 8, 1014-1031.
- Kelley, H. H., & Michela, J. L. (1980). Attribution theory and research. *Annual Review of Psychology*, 31, 457-501.
- Laloux, F. (2015). *Reinventing organizations*. Nelson Parker.
- Levy, F., & Murnane, R. J. (2004). *The new division of labor. How computers are creating the next job market*. Russell Sage.
- Macnamara, B. N., Hambrick, D. Z., & Oswald, F. L. (2014). Deliberate practice and performance in music, games, sports, education, and professions: A meta-analysis. *Psychological Science*, 25, 1608-1618.
- Marand, A. D., & Noe, R. A. (2017). Facilitating the development of expertise: An individual to organizational perspective. In K. G. Brown (Ed.), *The Cambridge handbook of workplace training and employee development* (pp. 38-74). Cambridge University Press.
- McKinsey. (2017). *Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe's digital front-runners*. <https://www.mckinsey.com/global-themes/europe/shaping-the-future-of-work-in-europes-ninedigital-front-runner-countries>
- Mieg, H. A. (2006). Social and sociological factors in the development of expertise. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 743-760). Cambridge University Press.
- Murphy, C., Klotz, A. C., & Kreiner, G. E. (2017). Blue skies and black boxes: The promise (and practice) of grounded theory in human resource management research. *Human Resource Management Review*, 27, 291-305.
- Neimeyer, G. J., Taylor, J. M., Rozensky, R. H., & Cox, D. R. (2014). The diminishing durability of knowledge in professional psychology: A second look at specializations. *Professional Psychology: Research and Practice*, 45(2), 92-98.
- OECD. (2009). *21st century skills and competences for new millennium learning in OECD countries* (EDU Working Paper No. 41). [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP\(2009\)20&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2009)20&doclanguage=en)
- Oldham, G. R., & Hackman, J. R. (2010). Not what it was and not what it will be: The future of job design research. *Journal of Organizational Behavior*, 31, 463-479.
- Poell, R. F. (2017). Time to 'flip' the training transfer tradition: Employees create learning paths strategically. *Human Resource Development Quarterly*, 28(1), 9-15.
- Poell, R. F., & Van der Krogt, F. J. (2014). The role of human resource development in organizational change: Professional development strategies of employees, managers and HRD practitioners. In S. Billett, C. Harteis, & H. Grub (Eds.), *International handbook of research in professional and practice-based learning* (pp. 1043-1070). Springer.
- Pratt, M. G., Rockmann, K. W., & Kaufmann, J. B. (2006). Constructing professional identity: The role of work and identity learning cycles in the customization of identity among medical residents. *Academy of Management Journal*, 49, 235-262.

- Simon, H. A., & Chase, W. G. (1973). Skill in chess. *American Scientists*, 61, 175–188.
- Sosniak, L. A. (2006). Retrospective interviews in the study of expertise and expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 287–302). Cambridge University Press.
- Strauss, A. L., & Corbin, J. (2007). *Basics of qualitative research. Techniques and procedures for developing a grounded theory* (3rd ed.). CA: Sage.
- Susskind, R. E., & Susskind, D. (2015). *The future of the professions: How technology will transform the work of human experts*. Oxford University.
- Swanson, R., & Holton, E. (2009). *Foundations of human resource development* (2nd ed.). Berrett-Koehler.
- Thunnissen, P., Boselie, P., & Fruytier, B. (2013). Talent management and the relevance of context: Towards a pluralistic approach. *Human Resource Management Review*, 23(4), 326–336.
- Tims, M., Bakker, A. B., & Derks, D. (2012). Development and validation of the job crafting scale. *Journal of Vocational Behavior*, 80, 173–186.
- Tims, M., Derks, D., & Bakker, A. B. (2016). Job crafting and its relationship with person-job fit and meaningfulness: A three-wave study. *Journal of Vocational Behavior*, 92, 44–53.
- Trompenaars, F., & Hampden-Turner, C. (1998). *Riding the waves of culture: Understanding cultural diversity in global business* (2nd. ed.). McGraw-Hill.
- Van der Heijden, B. I. J. M. (1998). *The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch professionals*. (Doctoral dissertation). http://www.ru.nl/library/resources/radboud_repository/
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multi-dimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9–39.
- Van der Heijden, B. I. J. M. (2005). ‘No one has ever promised you a rose garden’ On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Heerlen: Open University of The Netherlands. Van Gorcum.
- Van der Heijden, B. I. J. M., & De Vos, A. (2015). Sustainable careers: introduction chapter. In B. I. J. M. Van der Heijden & A. De Vos (Eds.), *Handbook of research on sustainable careers* (pp. 1–19). Edward Elgar.
- Ward, P., Gore, J., Hutton, R., Conway, G. E., & Hoffman, R. R. (2018). Adaptive skill as the condition sine qua non of expertise. *Journal of Applied Memory and Cognition*, 7, 35–50.
- Will-Zocholl, M. (2017). New topologies of work: Informatisation, virtualisation and globalisation in automotive engineering. In J. Flecker (Ed.), *Space, place and global digital work* (pp. 31–51). Palgrave Macmillan.
- World Economic Forum. (2016). *The future of jobs: The future of jobs and skills*. <http://reports.weforum.org/future-of-jobs-2016/skills-stability/>
- World Employment Confederation. (2016). *The future of work: White paper from the employment industry*. http://www.wecglobal.org/fileadmin/templates/ciett/docs/WEC___The_Future_of_Work_-_What_role_for_the_employment_industry.pdf
- Yuan, Y. C., Bazarova, N. N., Fulk, J., & Zhang, Z. (2013). Recognition of expertise and perceived influence in intercultural collaboration: A study of mixed American and Chinese groups. *Journal of Communication*, 63, 476–497.

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How workers meet new expertise needs throughout their career:

An integrative review revealing a dynamic process model of flexpertise

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Abstract

In expertise research, the focus is shifting from how one becomes an expert in a specific field towards understanding how workers sustain the value and recognition of their expertise by being flexible. This so-called flexpertise requires that workers meet new expertise demands within and across the boundaries of their current expertise domains and working contexts. This study grounds a new theoretical paradigm regarding this individual adaptivity by introducing a 'dynamic process model of flexpertise'. By deploying a system dynamics lens, it synthesizes the scholarly knowledge from different disciplines about flexible or adaptive forms of expertise. The model incorporates six categories of adaptation processes that involve intra-individual changes and social interactions over time, and that are interconnected by means of feedback loops without a single start- or endpoint. This enables scholars and practitioners to identify leverage points where small interventions can have a large effect on the individual's adaptivity. As such, the dynamic model provides a new paradigm on how to foster workers' continued possession of expertise that is valuable to organizations' competitive advantage and enables organizational and societal transitions and innovations, while safeguarding an individual's career sustainability.

3.1 Introduction

In nowadays' volatile, uncertain, complex, and ambiguous (VUCA) working contexts (Baran and Woznyj 2020; Bennett and Lemoine 2014), workers need to display adaptivity to deal with the plethora of changes they encounter (LePine *et al.* 2006; Niessen and Lang 2021; Pulakos *et al.* 2000). In particular, they need to adapt to their constantly changing working contexts and expertise domain(s) (Grenier and Kehrhahn 2008; Ward *et al.* 2018). This requires that workers keep their domain expertise up-to-date, timely renew their expertise across the boundaries of their domain(s), and attune its exploitation to the different working contexts in which they operate (Dall'Alba 2018; Frie *et al.* 2019; Van der Heijden 2000). More specifically, workers may need to become skilled in multiple domains (Guimarães *et al.* 2019; Hesketh 1997), are challenged to use their expert status for spanning their practice boundaries (Collien 2021), and/or may even be requested to create a new area of expertise to enable innovation for complex organizational and societal changes (Gruber and Harteis 2018). These adaptations also require that workers make sure that key figures in their environment keep recognizing them as experts (Van der Heijden 2000).

Adapting to new expertise demands is by no means an easy process and not necessarily aspired and mastered by all workers (Van der Heijden 2005). Earlier research indicated that some workers can become more rigid in their thinking, acting and motives regarding their expertise domain (Dane 2010; Feltovich *et al.* 1997; Lysova *et al.* 2018). This may inhibit further expertise development or hamper adequate adjustment to changing circumstances, ultimately leading to decreasing expert performance and therefore endanger their employability (Van der Heijden 2002b). At the same time, some other workers may manage to timely develop and materialize new expertise, when the circumstances enabled them to adapt (Frie *et al.* 2019; Goller 2017; Gruber and Harteis 2018). If an individual's adaptivity is associated with beneficial consequences for both the worker as well as their surrounding context, it is assumed to contribute to their career sustainability (Van der Heijden and De Vos 2015), which is reflected in them being '*happy, healthy and productive*' (Van der Heijden 2005).

Increasing our understanding of this adaptivity, that is required for an increasing number of workers across the globe (WEF 2020) and across their whole life-span (Davies *et al.* 2017), can help workers and their stakeholders to foster adaptation if needed. For that purpose, in this integrative review we unravel the dynamic interplay of intra-individual and social adaptation processes that a worker needs to display

in order to meet their own expertise needs and those of surrounding stakeholders throughout their career.

3.1.1 Conceptualizations of (fl)expertise

Before going into our integration of the empirical research capturing the interplay of adaptation processes for building a dynamic process model, we first compare and contrast the conceptualizations that address aspects of the so-called flexexpertise phenomenon. In specific, scholars hold different perspectives on what constitutes expertise and what makes someone an expert. Across disciplines, scholars used these perspectives to conceptualize what the required flexibility entails when workers encounter new expertise needs.

What constitutes expertise and what makes an expert?

During the past decades, researchers investigated ‘expertise’ by studying superior performance (Ericsson 2006, 2018) and the development stages a novice goes through to become an expert (Dreyfus and Dreyfus 1986). Although it differs per expertise domain and working context what counts as expert performance (Mieg and Evetts 2018), it has generally been assessed by the worker’s credentials, experience and track record (Collins and Evans 2007) or by their performance on domain-specific tasks (Ericsson 1999). In more or less protected professions, such as medicine and accountancy, authorities or privileged networks typically define an expertise domain through prescribing practice standards and performance criteria that are assumed to apply across working contexts and to rule out the effect of social dynamics on performance evaluations (Collins and Evans 2018).

From a sociological perspective, being an expert is an outcome of an attribution by the expert’s stakeholders (e.g., supervisors, users, and peers). In social constellations, such as boundary-crossing networks and communities of practice, these stakeholders jointly construct and define expertise (Eyal 2013; Guile and Unwin 2020; Noordegraaf 2020). Following this perspective, one can become an expert within a certain group by acting in ways that the other group members recognize as appropriate (Collins and Evans 2018). It signifies that social recognition of expertise is a *relative* attribute as it is related to what others know, do, and expect (Mieg 2009; Van der Heijden 2002c).

In practice, workers need to meet the expectations of multiple audiences, each having specific criteria for labeling someone as an expert (Fortney and Yamagata-Lynch 2013; Noordegraaf 2020). At the same time, they may experience that practice standards, performance criteria, and clear group expectations are lacking or regularly changed, as is typically the case in emerging fields (e.g., Shuster 2016) and less

protected domains (e.g., Ha 2015). As such, when workers enact their expertise in various contexts or master multiple areas of expertise, they can experience variations of the acknowledgement of their know-how (Valkeavaara 1999).

Other scholars focused on identifying the generic competences that constitute 'occupational expertise' (Bereiter and Scardamalia 1993; Chi *et al.* 1988; Ericsson and Smith 1991; Van der Heijden 2000), and for which scholars developed generic expertise measurements that can be applied across domains and working contexts (see Grenier 2021 for an overview). The occupational expertise instrument from Van der Heijden (1998, 2000), being the first generic operationalization of expertise, covers a set of five dimensions that incorporate the aforementioned performance and social perspectives: 1) domain- and context-relevant knowledge, 2) domain- and context-relevant skills, 3) social recognition of know-how by key figures in one's environment, 4) metacognitive skills to understand when the current knowledge and skills are insufficient, and knowing which peers can help, and 5) the flexibility to deal with new expertise demands [see Van der Heijden's (2000) 'flexpertise' conceptualization in Appendix 3.1]. It appeared that workers are perceived as experts when they have elevated levels on each of these five dimensions. Billett *et al.* (2018) defined three 'bases' underlying occupational expertise. First, the 'canonical base' relates to societal expectations of what an expert should know, do, and value within their profession. Second, the 'situational base' concerns knowing how to enact one's expertise in a specific working context. Third, the 'personal base' reflects what individuals know, can do, and value because of their unique experiences. When using 'expertise' and 'experts' below, this incorporates the different perspectives that we outlined in this section.

Flexible or adaptive forms of expertise

From a historical perspective, we noted that scholars introduced the same and different concepts to address the individual adaptivity that workers need to display to safeguard their position as expert with valuable and recognized expertise. Our conceptual map in Figure 3.1 outlines all concepts that we identified for the scoping of our integrative review (Snyder 2019). Appendix 3.1 provides all details regarding their definitions, the professional domains in which the concepts were applied, and their positioning within a nomological network of related concepts.

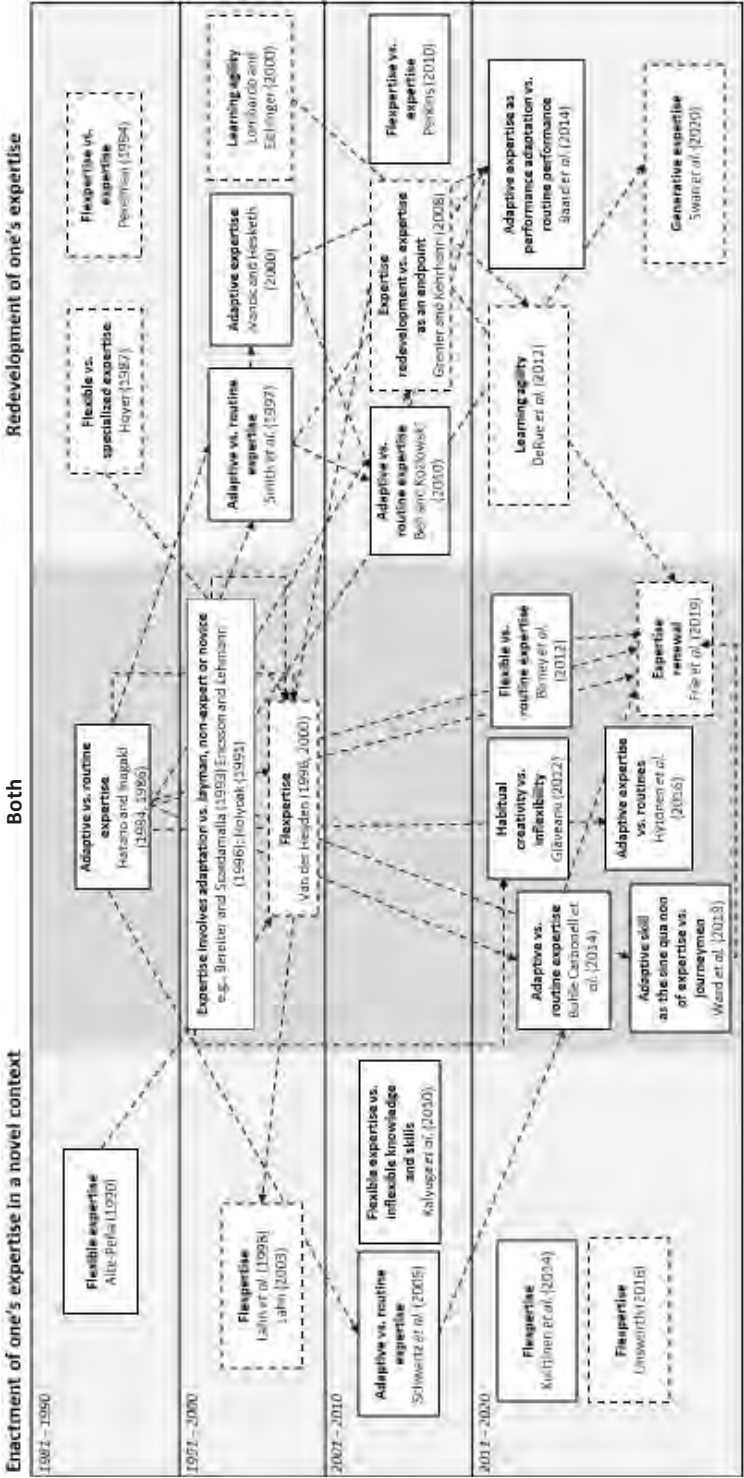


Figure 3.1 Conceptual map¹

¹ Arrows indicate that a certain concept was used as the basis for other conceptualizations. Solid/dashed line rectangles indicate adaptation within/across boundaries of a working context or an expertise domain.

We clustered the conceptualizations into two categories: 1) the enactment of one's expertise in novel contexts that require workers to adjust how they exploit their expertise, and 2) the redevelopment of one's expertise (i.e., the learning of new knowledge and skills, or adaptation of one's current know-how, after having developed initial expertise). Some scholars addressed both categories by describing how one's expertise enactment in new contexts leads to expertise redevelopment, or vice versa (the dark grey area in Figure 3.1).

Figure 3.1 also outlines whether earlier scholars perceived flexible or adaptive forms of expertise to be qualitatively different from routine expertise. Hatano and Inagaki (1984, 1986) asserted that routine expertise involves mastering procedures to perform flawlessly in familiar situations. Individuals with adaptive expertise (i.e., adaptive experts), not only understand the 'know-what' and 'know-how' (being indicators of routine expertise), but also possess the knowledge of why and under which conditions certain methods need to be used or when new procedures must be invented. Similarly, Birney *et al.* (2012) contrasted flexible with routine expertise, and Kalyuga *et al.* (2010) differentiated between flexible and inflexible expertise. Other scholars stated that adaptivity is an integral part of (occupational) expertise or of being an expert (Bereiter and Scardamalia 1993; Ericsson 2014; Van der Heijden 2000; Ward *et al.* 2018), and therefore made a distinction between experts and laymen or novices.

Furthermore, we noticed that some concepts addressed how workers deal with changes within their current working context or expertise domain. Other concepts related to expertise enactment in new working settings and expertise development in new domains, which we labelled as examples of boundary crossing (Akkerman and Bakker 2011; Engeström *et al.* 1995). In the context of ongoing expertise development, this requires that workers are capable of "negotiating and combining ingredients from different contexts" (Wallin *et al.* 2019, p. 372).

Taken together, even though the different conceptualizations address various contextual changes and forms of adaptation, they share an underlying assumption that the individual adaptivity involves personal qualities which workers may apply across working contexts and expertise domains.

3.1.2 The need for an evidence-based and dynamic process model

Next to the shared domain-generic view on the flexexpertise phenomenon, by using the Input-Mediator-Outcome (IMO) framework (Mathieu *et al.* 2008) in the further scoping of our review, we identified a segmentation in the field. The IMO framework revealed the variety of theoretical approaches that guided the review studies and empirical

research related to the concepts presented in Figure 3.1, and disclosed the related lacunas in our scholarly understanding. Specifically, previous scholars focused upon identifying contextual and personal inputs, or antecedents, that can enable or constrain an individual's adaptive response. In their review on performance adaptation, Baard *et al.* (2014) described the personal inputs as relatively stable traits or meta-competencies. Other scholars identified adaptive responses (i.e., mediators) in terms of 'episodic cycles' in which individuals interact with their environment for effectively realizing outcomes, and by making use of the available inputs. According to Mathieu *et al.* (2008), mediators can also be 'developmental processes' by which qualitative changes occur over time, or cognitive, motivational, and affective states emerging from episodic cycles and developmental processes. Finally, scholars studied the results of these mediating processes and emergent states by measuring a variety of contextual and personal outcomes, which, according to Baard *et al.* (2014), represent a performance construct of the individual's adaptivity. These multilevel outcomes may, in turn, be the input for a new iteration of interrelated mediating processes (Mathieu *et al.* 2008).

To illustrate this segmentation in the field, the review of Bohle *et al.* (2014) focused on identifying the antecedents (i.e., inputs) of adaptive expertise that distinguish adaptive experts from routine experts when enacting their expertise in novel situations. However, Schwartz *et al.* (2005) used the adaptive expertise concept to set out how adaptive experts make balanced decisions to deal with changing demands (i.e., thus focusing upon the mediators that signify the exploitation of one's expertise in novel ways). Mylopoulos and Woods (2009) applied the concept to outline the development of adaptive expertise (i.e., being another type of mediator). As a final example, Paletz *et al.* (2013) used the concept of adaptive expertise to define innovation. The latter incorporates the contextual outcome of being adaptive, that is the implementation of ideas. In general, the segmentation in the field has been strengthened by the specific scholarly lenses on individual adaptivity as reflected in literature reviews in the field of Human Resource Development (HRD) (e.g., Cherrstrom and Bixby 2018), innovation (e.g., Pusic *et al.* 2018), and decision-making processes (Ward *et al.* 2018).

Taken together, we noticed that the individual's adaptation processes in naturalistic settings, involving responses to multiple changes and social interactions with different stakeholders, were limitedly addressed thus far (cf. Jundt *et al.* 2015) and require novel theorizing to move the field of expertise research forward (Kim 2021). More specifically, it is underexposed how the distinguished adaptation and learning processes and emergent states are affecting each other and are influenced by individual qualities and contextual opportunities and constraints, and how this interplay leads to beneficial outcomes for both the individual workers and their surrounding stakeholders.

Up until now, three models addressed how adaptation processes of experts are mutually linked. Each have their limitations by focusing on a specific subset of processes, the inherent limited specification of the relationship between these processes and their outcomes, and/or sparse empirical grounding. In particular, Ward *et al.* (2018) introduced a model on the 'adaptive skill' underlying expertise, based upon a literature review regarding naturalistic decision-making in volatile contexts. Their model consists of two reciprocally applied processes: sensemaking (i.e., consisting of three interlinked sub-processes: questioning, elaborating, and reframing one's understanding of a novel situation), and flexexecuting (i.e., containing three sub-processes: questioning goals, elaborating action plans, and reframing priorities). We noted that this model lacks a perspective on social dynamics and does not address how being adaptive materializes at an individual and/or contextual level (Marand and Noe 2017).

In the field of HRD, Grenier and Kehrhahn (2008) introduced the Model of Expertise Redevelopment. It describes the stages of dependence, independence, and transcendence an expert goes through when developing new expertise within and across their domain boundaries. Similar to the model of Ward *et al.* (2018), this model is neither widely adopted in empirical research so far (Cherrstrom and Bixby 2018), nor addressed the required social interactions in naturalistic settings (Gruber and Harteis 2018; Kua *et al.* 2021).

Frie *et al.* (2019) introduced the Model of Expertise Renewal in the field of HRD, based upon interviews with 'flexexperts' (i.e., renowned experts that frequently renewed their expertise). Their process model describes how flexexperts go back and forth through stages of idea generation, developing new expertise, and materializing their expertise with beneficial outcomes for themselves and their surrounding stakeholders. These outcomes appeared to be input for subsequent renewal episodes in flexexperts' careers. The model also incorporates the social interactions with stakeholders leading to the flexexperts' social recognition, and the creation of conditions for materializing and further developing one's expertise. However, this model also requires further empirical research as it is based on a limited sample of ten flexexperts.

Altogether, we posit that the variety of concepts, the segmentation in the empirical literature, the limited grounding of existing process models and the underexposed relationships between different forms of adaptation and social interactions when applied in VUCA work environments, urge the need for a new theoretical paradigm to move the field forward. Through applying a system dynamics (SD) lens, we have been able to develop a new theoretical model that builds upon and transcends the

integration of literature regarding flexible or adaptive forms of expertise in which the individual adaptivity is approached from a domain-generic point of view. As Cronin and Bezrukova (2019, p. 789) outlined, “applying the SD framework has the capacity to leverage existing research in ways that linear causality alone cannot”. It takes into account that “the only constant is change” (Cronin and Vancouver 2019). More specifically, our contribution responds to the plea in employability research for taking up a SD lens to make significant theoretical contributions to this field (Fugate *et al.* 2021). Specifically, our newly developed ‘dynamic process model of flexexpertise’ sets the stage for future research regarding the adaptation processes by which workers meet new expertise needs after having attained initial expertise. In this model, flexexpertise is conceived to be a multi-faceted phenomenon (Bell *et al.* 2012) that enables workers to realize beneficial outcomes for themselves, their organizations (Barney and Wright 1998; De Vos *et al.* 2017), and society (Billett *et al.* 2018). As such, our model aligns with the research paradigm stating that the ongoing expertise development is the resultant of both individual agency (Goller 2017) and the opportunities and constraints by the specific context wherein one’s expertise takes shape (Zimmerman 2006).

3.1.3 Integrative review for building a dynamic process model of flexexpertise

To integrate the scholarly knowledge about the flexexpertise phenomenon, we built upon the aforementioned Input-Mediator-Outcome (IMO) framework (Mathieu *et al.* 2008). We used the categories of inputs, mediators, and outcomes as a basis for defining our five research questions (see below) and the criteria for our systematic search, selection, and data-analysis processes (see Method section).

RQ1: Which contextual factors necessitate and enable workers to respond to changing expertise needs? (Contextual inputs)

RQ2: Which personal factors enable workers to respond to changing expertise needs? (Personal inputs)

RQ3: Which adaptation processes enable workers to respond to changing expertise needs? (Mediators: episodic cycles, developmental processes, and emergent states)

RQ4: What are the contextual outcomes of the workers’ responses to changing expertise needs? (Contextual outcomes)

RQ5: What are the personal outcomes of the workers' responses to changing expertise needs? (Personal outcomes)

3.2 Method

We conducted an integrative review (Sutton *et al.* 2019) to conjoin knowledge about the flexpertise phenomenon. We selected databases specifically covering the fields of management and organization, HRD, Human Resource Management (HRM), psychology, and vocational training and education in which the concepts of Figure 3.1 were introduced. Furthermore, we included the databases Web of Science and Academic Search Complete to cover the range of working contexts and expertise domains in which these concepts were applied in empirical research. We followed the guidelines for a systematic, transparent, and reliable approach for the search, selection, data extraction, and analysis of the literature in these fields (Daniels 2019; Tranfield *et al.* 2003). Figure 3.2 summarizes the search and selection steps into a 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) diagram (Liberati *et al.* 2009; Moher *et al.* 2015), including the selected databases, the building blocks of the search syntax, and assessments of the interrater agreements. It also portrays the 'Population, Exposure, Comparators, Outcomes, and Study designs' (PECOS) framework (Daniels 2019; Morgan *et al.* 2018) that we used for the systematic inclusion and exclusion of studies. The online supporting information contains more details regarding Figure 3.2.

After the identification of the final sample of 107 studies, we started our analysis with a critical full-text review of the 20 included review studies (Grant and Booth 2009). By means of a process of first- and second-order coding (Boeije 2009) using ATLAS.ti (V.8), we first extracted text excerpts related to our overarching research aim addressing the inputs, mediators, and outcomes. Furthermore, we extracted information regarding the interrelatedness of these factors, and about lacunas in our scholarly understanding. Second, through an iterative process of analyzing the overlap and differences between the selected text excerpts, we defined possible (sub)categories of the IMO factors and critically compared these against the extracted data. More specifically, we critically reviewed whether the personal inputs and mediators could be approached as domain-generic factors, and whether and how social interaction and other contextual factors may have an impact on mediating processes and emergent states. We reached agreement about a set of (sub)categories and clustered them into our IMO framework, and identified the lacunas in our understanding, that is, aspects of the phenomenon under study that were not sufficiently covered by the review studies.

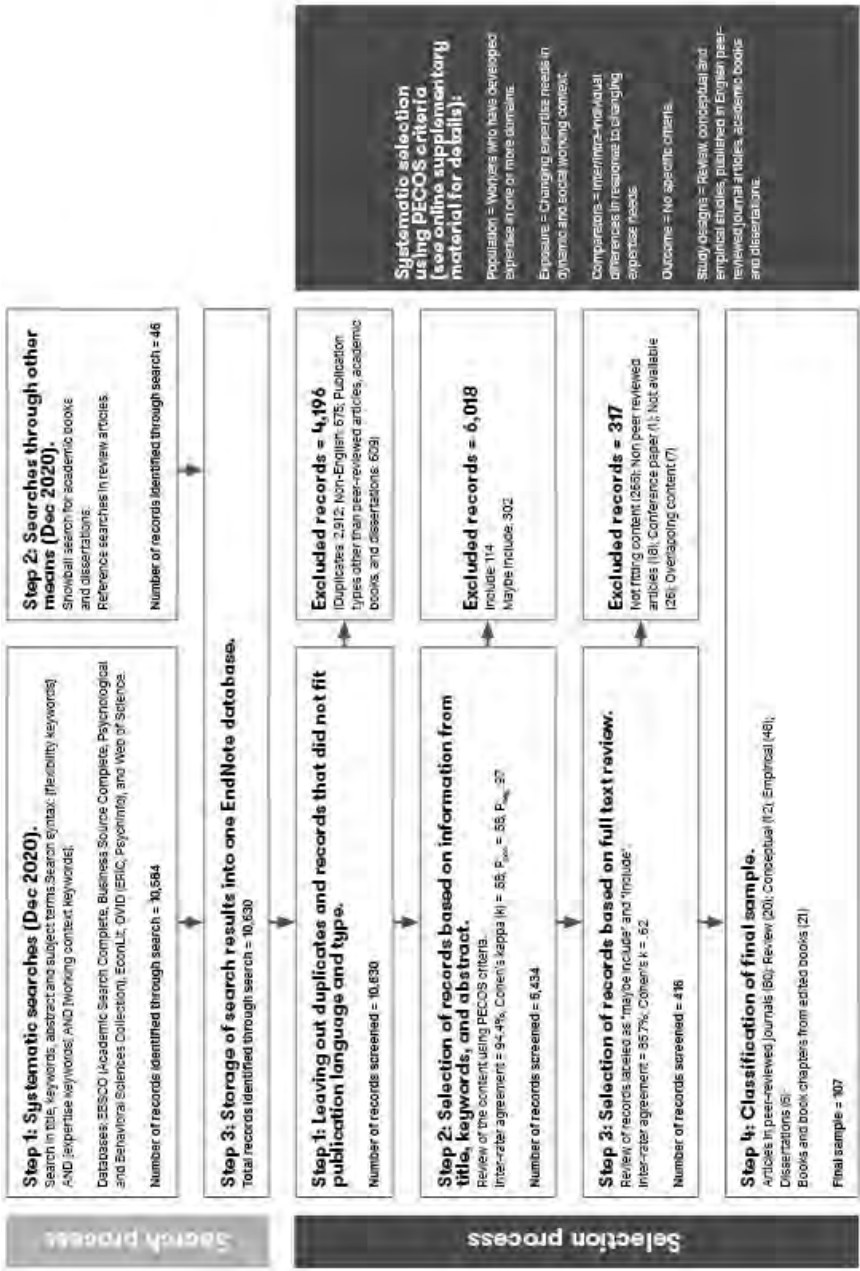


Figure 3.2 PRISMA diagram

Next, we continued our analysis with a critical full-text review of the remaining part of our sample that comprised 87 studies published in peer-reviewed journals, dissertations, and book chapters. Similar to the analysis of the review studies, we extracted information regarding the IMO factors, and added and finetuned the (sub) categories that we derived from our analysis of the review studies.

Finally, we used the distinguished mediators as variables for building a dynamic process model regarding the flexpertise phenomenon. We used the principles for dynamic modelling which entails, among others, that model variables may change over time, and that there is no single start- or endpoint in the overall process (Cronin and Vancouver 2019). We conducted an iterative process of proposing possible variables and their interrelatedness in terms of reinforcing and balancing loops (Cronin and Vancouver 2019; Vennix 1996). In doing so, we critically reviewed possible models against the data extracted before launching our final 'dynamic process model of flexpertise'.

3.3 Integration of knowledge into the IMO framework

This section highlights the findings regarding the inputs, mediators, and outcomes, and their interrelatedness, thus addressing RQ1-5. Table 3.1 summarizes our integration of these findings into the IMO framework.

Below, we describe the main findings per research question and the lacunas in our understanding. As the number of findings differs per RQ, the length of the sections differs accordingly.

RQ1: Contextual inputs

We distilled three categories of contextual inputs that were assumed to engender an individual to adapt (cf. Grenier and Kehrhahn 2008), that is 1) the expertise enactment contexts (e.g., new processes, systems and technology), 2) the knowledge and skills that make up an expertise domain, and 3) the audiences (i.e., stakeholders) that need to recognize one's expertise (see Table 3.1). These contextual changes may necessitate or create opportunities for workers to exploit their expertise in novel contexts, to develop new know-how, and/or to (re)build social recognition among (new) stakeholders.

Table 3.1 Input-Mediator-Outcome (IMO) framework with cross-reference to Research Questions 1-5²

Inputs	RQ3: Mediators	Outcomes
RQ1: Contextual Change or novelty creating a need or opportunity for the individual to adapt¹ • Enactment context(s): novel task, problem, intervention, or working context^{a,t,1,2,3,4,7,9,10,12,13,15,18,23,24,26,27,28,34,36,41,43,47,48,55,58,60-62,64,70,71,73,76,80,82,85} • Expertise domain(s): demands for new knowledge and skills within and outside domain^{ad,jk,np,rs,12,13,15,23,28,29,31,40,41,43,58,63,65,69} • Audiences: (new) stakeholders who need to recognize the worker's (new) expertise^{c,j,p,11,14,18,28,62} Factors enabling adaptation • Autonomy^{b,c,ns,t,13,62} • Learning/innovation climate^{c,fg,hk,ln,op,st} • Supportive supervisor^{b,c,g,kl,ns,28} • Openness of social group that holds the expertise^{17,54,59} • Optimal adaptability corridor^{eq,p,q,55} RQ2: Personal	Perceiving a need or opportunity for adaptation Sensemaking ^{b,h,i,t,2,4,24,26,38,45,46,47,65,68,72,73} with networks of stakeholders having dissimilar expertise ^{15,23,28,29,41,66,69,72,76} Managing cognitive space ^{a,f,h,i,k,m} Generating ideas ^{f,h,p,38,52,60,61,84} with networks of stakeholders having dissimilar expertise ^{28,40} Flexible goal setting (flexecuting) ^{b,t,28,47,72} Exploiting expertise Routinizing, adjusting and innovating practices ^{b,c,eq,i,p,q,r,3,4,7,11,12,26,28,34,38,41,43,53,55,57,60,65,71,76,82,85} Gaining social fluency in new working context(s) ^{17,19,27,69} Crafting conditions for exploitation ^{3,7,13,28,31,64,78,79,87} Redeveloping expertise Individual and social learning from solving ill-defined or non-routine problems, reflection, knowledge transformation and/or integration, errors, and boundary crossing (expert learning) ^{15,13,20,29,31,34,37,41,43,44,51,61,64,66,70,76,86} Relearning or unlearning ^{b,d,h,i,k,t,34} Stages of dependence, independence and transcendence to internalize new know-how ^{ad,j,33,75} Balancing between developing expertise in current and new domain(s) ^{1,36,37,43,50,56,58,63,78,80,81} Crafting conditions for redeveloping expertise ^{28,31} Developing confidence in new expertise field Experiencing unsettling feelings ^{ab,de,kl,nq,st,9,13,18,27,28,65,73} Gaining confidence in new expertise domain ^{j,n,7,18,27,28,31,49,65,73,74,76}	RQ4: Contextual Routinized, adjusted or innovated practices in own or new domain ^{b,c,eq,i,p,q,r,3,4,11,12,23,28,32,34,38,43,53,55,57,60,65,67,69,71,72,73,82,85} Embedded products ²⁸ RQ5: Personal Proximal¹ High performance on novel or transfer task ^{b,c,f,h,i,j,lm,t,1,2,3,7,8,10,17,18,26,27,28,31,32,38,39,45,47,51,72,76,86} Expertise within one or more domain(s) that is socially recognized ^{9,11,13,16,17,18,28,32,34,37,51,53,54,56,58,61,76,77,78,79,80,81} Distal¹ Employability ^{7,12,28,30,37,43,49,50,52,65,64,81}

Table 3.1 Continued

Inputs	RQ3: Mediators	Outcomes
Problem-solving capabilities Flexible and fast problem-solving skills <u>ab,ce,fg,ij,m,ors,45</u> General cognitive ability or flexibility <u>b,c,g,h,i,o,t</u> Innovative skills ⁸	Adjusting identity Adjusting expert or professional identities <u>ij,np,s,19</u> when developing a new area of expertise ^{13,18,43,70,73,76} Cognitive switching between normative and own identity ⁶²	
Expertise bases ⁵ Flexible and rich knowledge representations <u>cf,ik,j,m,op,r,2,5,2,6,31,39,44,45,52,83,84</u> or knowledge breadth ^{3,12,27,52,67,71} Routine or domain-specific expertise <u>b,c,e,f,g,i,j,k,ja,q,8,18,30,32,39</u>	Building social recognition Claiming new area of expertise ^{28,61} Building credibility among new stakeholders ^{3,7,13,28,31,64,78,79,87} Transforming and disseminating expertise to new audience ^{14,16,28,32,40,43,48,51,71}	
Metacognition Metacognitive skills <u>c,e,g,h,k,r,t,6,16,39,44,45</u>		

² Underlined text concerns IMO framework elements of Mathieu et al. (2008). Bullet and bold text contains the IMO-(sub)categories, being the output of our first- and second-order coding process, addressing RQ1–5. The superscript letters a–t refer to the included review studies from which these categories have been derived and the numbers 1–87 to the other studies (see reference list).

Scholars argued that the more complex (Baard *et al.* 2014), wicked (Yukawa 2015), or ill-structured (Jonassen 2000) a novel problem or situation is, the further ‘away’ one’s expertise needs to be transferred (Brooks 2009; Kimball and Holyoak 2000), or the more radically different a to-be acquired expertise domain is in comparison to one’s current domain (Van der Heijden (2000)), the more difficult it is to adapt. However, adaptation might be easier if a worker’s expertise domains comprise general knowledge and skills as opposed to highly specialized or situated know-how (Barnett and Koslowski 2002; Weisberg 2006).

Contextual factors, such as autonomy at work, a learning or innovation climate in which errors are accepted and creative ideas are welcomed, or a supportive role of supervisors can facilitate adaptive responses to the aforementioned changes (Bohle Carbonell *et al.* 2014). Furthermore, the individual’s ability to adapt can be supported if the social group, that is recognized for a certain type of expertise, is relatively open and not confined to an elite group (Collins and Evans 2018). The included review studies also reported about a so-called ‘optimal adaptability corridor’, being the context that facilitates the development of adaptive expertise (Schwartz *et al.* 2005). This corridor involves domain-specific and/or adjacent problems of increasing complexity, and requiring a similar level of both efficiency and innovation.

Even though scholars introduced a plethora of contextual changes that can bring about and facilitate adaptive responses (i.e., the mediators in Table 3.1), the empirical studies predominantly investigated responses to single changes, and did not report about inhibiting contextual factors. Another gap that we noticed is that, even though scholars reported degrees of novelty and a related amount of adaptation required to be important, the empirical research so far only scarcely explicated what exactly makes a working context or expertise domain to be ‘novel’ (cf. Bohle Carbonell *et al.* 2014). As we discuss in the section regarding RQ3, the extent to which workers interpret a situation as ‘novel’ partly depends upon their personal inputs.

RQ2: Personal inputs

Table 3.1 shows the following categories of personal inputs that appeared to enable adaptive responses to the aforementioned contextual changes: adaptive capabilities, personal drivers, problem-solving capabilities, expertise bases, and metacognition.

Adaptive capabilities comprise a worker’s adaptive experiences, and adaptive dispositions (i.e., the propensity of workers to adapt in a reactive or proactive manner). De Arment and colleagues (2013, p. 222) defined four categories of adaptive dispositions. First, workers need to maintain an ‘epistemic distance’ between their

prior knowledge and the problem at hand. Second, it is helpful when workers have a predisposition to view the world as complex, messy, irregular, and dynamic. Third, workers should have the comfort or willingness to work at the limits of their own know-how. Fourth, adaptivity is fostered when workers are more focused on learning rather than merely applying their knowledge, for example by perceiving themselves as continuous learners (Boaler and Selling 2017; Trinh 2019), or by viewing their career as a “never-ending journey of ongoing professional discovery” (Turner *et al.* 2012, p. 324) or a “continuing process of becoming” (Dall’Alba 2018, p. 35).

Personal drivers relate to career motivators such as a calling or role orientation. A calling comprises “purposeful, meaningful, and passion-driven engagement in a career that one feels drawn to pursue” (Lysova *et al.* 2018, p. 261), described by flexperts as a personal mission (Frie *et al.* 2019). Similarly, a role orientation can be the grounding for identifying with a career path related to one’s area of expertise (Park 2016). A ‘gold-star orientation’ concerns a focus on gaining authority, partly through their expertise, in order to climb “well-institutionalized paths of career advancement” (Park 2016, p. 35), whereas a ‘north-star orientation’ is driven by learning new expertise for building a community around solving specific complex, societal problems.

Problem-solving capabilities comprise cognitive skills and abilities that may facilitate workers to approach novel problems in a flexible manner. Example of these capabilities are flexible problem-solving (e.g., Dane 2010) and cognitive flexibility (e.g., De Arment *et al.* 2013).

The expertise bases address the domain- and context-relevant knowledge and skills, acquired through learning and practice experience. More specifically, the degree to which an individual is knowledgeable about a specific domain (i.e., knowledge depth) or of multiple domains (i.e., knowledge breadth) can positively influence the generation of ideas when encountering a novel situation (Mannucci and Yong 2018). Furthermore, expertise in multiple domains may foster workers to innovate throughout their careers (Brown 2016).

Metacognition is perceived as one of the characteristics that distinguish adaptive experts from routine experts (Bohle Carbonell *et al.* 2014; Hatano and Inagaki 1986). In particular, the aforementioned metacognitive skills (Van der Heijden 2000) enable workers to evaluate the strengths and limits of their know-how.

The included review studies also reported mixed findings (e.g., absent, positive, or negative effects) about the influence of personal factors upon the worker’s ability to

adapt. This differential influence was assumed to depend on the type of contextual change, enactment context, and the outcome measurements used, particularly so when looking at the effects of personality, self-regulation, and self-efficacy measures on adaptive performance indicators (Bohle Carbonell *et al.* 2014; Jundt *et al.* 2015). Given the variety of working contexts and expertise domains in which adaptive responses were investigated, we could not safely conclude which contextual factors specifically account for these differential effects. As another lacuna, we found only limited evidence for the positive influence of collaboration and communication skills (Kua *et al.* 2021) and market know-how (Ruiner and Liebhart 2018) on adaptive responses.

RQ3: Mediators

Mediators address *how* an individual responds to contextual changes along with shifting personal needs. It concerns the adaptation processes that are applied either reactively or proactively (Van der Heijden *et al.* 2018), involving both intra-individual changes over time and social responses (Gruber and Harteis 2018). Table 3.1 shows the categories of mediators that we outline below: perceiving a need or opportunity for adaptation, exploiting expertise, redeveloping expertise, developing confidence in new expertise field, adjusting identity, and building social recognition.

Perceiving a need or opportunity for adaptation

This mediator category comprises the strategies by which individuals make sense of contextual changes and take decisions on how to respond to these (Kong 2018; Ward *et al.* 2018). According to DeRue *et al.* (2012), workers make sense of situations through cognitive simulations, applying counterfactual thinking, dropping inappropriate lessons and detachment. Based on Weick (1995), Snowden (2011) described sensemaking as an effort to create order and to make sense of what has happened. By using anticipatory thinking, experts consider multiple options of what could happen (Klein *et al.* 2011). Through a unique combination of personal input-related factors (see RQ2), workers understand contextual changes in personalized ways (Fazey *et al.* 2005) [cf. the aforementioned ‘personal base’ of occupational expertise (Billett *et al.* 2018)]. It appeared to be beneficial for workers’ understanding of novel problems if they automatized some of their cognitive processes by developing routines to create ‘cognitive space’ for progressive problem-solving and idea generation (Dane 2010; Kalyuga *et al.* 2010; Weisberg 2018).

With regards to the generation of ideas, Paletz *et al.* (2013) distinguished between novelty, creativity, and innovation. Novelty involves generating ideas about some kind of new outcome. Creativity involves novelty and an evaluation of how well novel ideas might fit with any contextual opportunities and constraints. These

ideas can range from incremental to radical ones. According to Dane (2010), the latter involves 'transformational creativity' of experts. Innovation is an even broader construct (Paletz *et al.* 2013) as it comprises both novelty and creativity, as well as the implementation of ideas (see the section on 'Exploiting expertise').

In addition to intra-individual processes, we identified examples of how social interactions influenced a worker's understanding of changes. Tancig (2009) conceptualized this as a process of creating shared meaning among team members who face unexpected, complex, and ambiguous problems. Analogously, Frie *et al.* (2019) identified that flexperts tend to check the feasibility of possible solutions for identified problems through dialogues, especially with experts outside their own domain. Such sensemaking with experts from other disciplines appeared to be valuable in multiple domains (Frodeman *et al.* 2017; Keestra 2017). For example, it helped teaching professionals to expand their horizon of possibilities in their field (Cinkir and Kurum 2015; Ermeling and Yarbo 2016), and supported members of a R&D team to come up with novel and creative ideas for solving their domain-specific problems (Huang *et al.* 2014).

Sensemaking of a changed situation, and generating ideas for possible solutions, can be the basis for setting execution goals (Ward *et al.* 2018). Schwartz *et al.* (2005) theorized that adaptive experts make a balanced decision to either focus on efficiency or innovation through a metacognitive awareness of what is needed in their domain practice, to deliberately consider how this fits with their own know-how, and to act accordingly. Review studies found empirical support for this conceptualization of adaptive expertise in the field of special education (De Arment *et al.* 2013), and among medical students and practitioners (Croskerry 2018; Mylopoulos and Woods 2009; Pusic *et al.* 2018). Next to identifying a goal for how to exploit one's expertise, a worker might perceive a need to develop a new area of expertise and/or to (re)attain the social recognition of their (new) stakeholders (Kingham *et al.* 2017). Frie *et al.* (2019) found that flexperts made a well-thought-out decision to focus on one or a limited number of goals that were fitting their capabilities and personal mission, and for which they received support from stakeholders.

Altogether, our review disclosed that workers understand what changes imply for themselves and for others through sensemaking, creating cognitive space, idea generation, and goal setting, partly optimized through interaction with workers who have dissimilar expertise. These processes may trigger the exploitation one's expertise in a novel way, the redevelopment of one's expertise, and/or the need to (re)attain social recognition.

Exploiting expertise

A worker's understanding of what changes imply could be the start of an exploitation process where adaptive experts turn an idea into practice (Mylopoulos and Farhat 2015), or put their 'expertise into action' (Guile and Unwin 2020), also described as implementation or materialization of expertise (Frie *et al.* 2019). These responses can range from endeavors to make one's practices more efficient (i.e., routinization) (e.g., Pusic *et al.* 2018), to adjusting one's practices by finding workarounds (e.g., Varpio *et al.* 2009), to the invention of new practices (i.e., innovation) (e.g., Syer *et al.* 2003). For routinization, one needs to recall and apply existing domain-specific knowledge and skills (Schwartz *et al.* 2005). Innovation, on the other hand, requires that workers restructure their thinking to improve the response to a problem (Schwartz *et al.* 2005). Glăveanu (2012) distinguished between improvisational creativity, prompted by a problem or difficulty in execution, and innovative creativity, being a result of worker's conscious intention to generate novelty in response to a problem. The ability to consciously invent new practices is specifically essential in emerging fields where the expertise domain itself is still in development and where workers need to cross the boundaries of different fields (Hytönen *et al.* 2016), such as transgender healthcare (Shuster 2016) or climate adaptation (Tøsse 2014). When workers enact their expertise in a novel context, they need to gain 'social fluency' by acting in ways that other group members perceive as appropriate (Collins and Evans 2018). However, the successful enactment of one's expertise can only be achieved if a specific context enables workers to exploit or sell their know-how (Van der Heijden 2003). If not, workers will have to self-regulate their environmental settings to the extent that they can influence these (Tancig 2009; Zimmerman 2006).

We identified different strategies that workers used to craft the contextual conditions for exploiting their expertise. Flexperts created this 'space' through organizing time, money, and access to professionals with complementary skills (Frie *et al.* 2019). Ruiner and Liebhart (2018) reported how 'multi-optional experts' created working opportunities in their field by combining employment and self-employment modes. Three studies addressed the crafting strategy of deploying the expertise of others by considering differences in function or working context. Scholars described this as 'portable integration expertise' (Skilton 2003), 'cross-member expertise' (Bechky and Okhuysen 2011), and, following Engeström *et al.* (1995), 'horizontal expertise' (Fortney and Yamagata-Lynch 2013).

In sum, our review revealed that workers can exploit their (new) expertise by routinizing, adjusting and innovating practices within and across their professional domain(s). These processes are strengthened if they can craft the necessary

conditions and attune their actions to the needs of their co-workers, specifically the ones with dissimilar expertise.

Redeveloping expertise

Redeveloping expertise concerns the acquisition of new knowledge and skills within and across the boundaries of one's current expertise domain(s) (Grenier and Kehrhahn 2008) and integrating these into one's existing expertise bases. This process has also been labelled as ongoing expertise development (Wallin *et al.* 2019), maintenance of expertise (Gruber and Harteis 2018), or expertise renewal (Frie *et al.* 2019). Wallin *et al.* (2019) integrated empirical findings regarding ongoing expertise development into five 'expert learning' elements: 1) problem-solving of ill-defined and non-routine problems, 2) reflection on learning and practice experiences [see for example Siklander and Impiö (2019)], 3) knowledge transformation and integration, 4) learning from errors, and 5) boundary crossing. Concerning the latter element, Swan *et al.* (2020) asserted that when workers experience that their current expertise base fails to account for a novel or complex problem, they can generate new knowledge by investigating novel responses outside their domain. Expertise redevelopment can also involve unlearning ingrained routines (e.g., DeRue *et al.* 2012).

As mentioned earlier, Grenier and Kehrhahn (2008) theorized that expertise redevelopment takes place along cyclic processes of dependence, independence, and transcendence. Along these processes, workers become less dependent upon external knowledge resources and increasingly rely on themselves by means of the internalization of their new expertise, which strengthens their confidence in a new field. It appeared that the time involved for gaining expertise in a new domain, after one has attained expertise in an adjacent domain, can be shorter than the seminal ten-year rule for acquiring expertise through deliberate study and practice (Ericsson 2006; Ericsson *et al.* 1993). For example, nurse practitioners needed on average one year to acquire expertise in a new domain after having realized an expert level in a related medical field (Cusson and Strange 2008).

The redevelopment of expertise raises the question which expertise workers need to develop to protect or preferably further enhance their (future) career sustainability (De Vos *et al.* 2020; Van der Heijden *et al.* 2020). Multiple studies demonstrated that a proper balance is required between maintaining expertise within one's current domain and developing expertise across domains to safeguard one's employability (Van der Heijden 2003; Van der Heijden *et al.* 2016). For example, Johansson (2012) described this tension as the 'skills paradox' in the field of music teaching and Njoku *et al.* (2010)

outlined that accountants, that are teaching in academia, need to possess a proper ‘fusion of expertise’. Analogously, Alda (2018) showed that pension fund managers were high performers when displaying both skill specialization and diversification. Finally, Mylopoulos *et al.* (2012) set out that excelling in only one domain is insufficient for physicians to be exceptional. When workers face difficulties in safeguarding a sufficient level of expertise, one option is to take up a more generic role such as a managerial function, thus leaving their position as domain-specific expert [i.e., Ha (2015) who studied the careers of IT workers dealing with swift knowledge growth].

Goller (2017) identified that exercising agency is crucial for expertise development to happen throughout a career, in specific through job enrichment (i.e., by taking over additional responsibilities from supervisors or other colleagues on a higher hierarchical level), and deliberate participation in institutionalized learning activities. Similarly, Frie *et al.* (2019) identified that flexexperts craft the conditions for renewing their expertise, for example by arranging time and money for studying.

We conclude that workers can sustain the value of their expertise across their entire career by maintaining a proper balance between safeguarding the possession of up-to-date expertise in at least one domain, and expanding their expertise by gaining know-how in new working contexts and expertise domains. By applying expert learning strategies and going through an expertise redevelopment process when needed, workers can increasingly rely on internalized know-how, and gain expertise in a new domain in a shorter time frame than the acquisition of initial expertise typically requires.

Developing confidence in new expertise field

This category of mediators addresses the emergent states (cf. Mathieu *et al.* 2008) that may arise during exploitation and redevelopment of one’s expertise. When workers make a transition to a new expertise domain or working context, this often coincides with unsettling feelings, such as distress, anxiety, and a feeling of ‘sink or swim’ (Kingham *et al.* 2017), or imposter thoughts (Cherrstrom and Bixby 2018). Unsettling feelings can be functional, such as a certain level of doubt, to prevent inflexibility or ‘cognitive entrenchment’ in problem-solving (Dane 2010; Glăveanu 2012). However, adapting to new expertise needs appears to require that workers overcome these unsettling feelings and experience a growing feeling of confidence in a new field through positive practice experiences and feedback from surrounding stakeholders (Kingham *et al.* 2017), and/or through internalizing new know-how (Grenier and Kehrhahn 2008). When a growing confidence leads to overconfidence, it may have rigidifying effects when it prevents workers from being sufficiently critical

about their own know-how (Alderson 2010; De Arment *et al.* 2013; Trinh 2019). However, overconfidence can be beneficial for improving a worker's self-esteem that, in turn, increases the likeliness of being promoted to a higher status in terms of power and social ladders (Liu *et al.* 2016).

In sum, workers need to overcome possible unsettling feelings and thoughts that may emerge during an adaptive response by developing confidence in a new exploitation context and/or expertise area, while at the same time preventing to lose their critical stance.

Adjusting identity

A growing confidence in a new field can fuel an individual's belief to become an expert (Grenier and Kehrhahn 2008; Wallin *et al.* 2019). This may involve an adaptation process by which workers adjust their 'expert identity' (Browne *et al.* 2018; Supramaniam *et al.* 2020), change their 'definition of self' (Cusson and Strange 2008), or build an identity of being an effective insider in a new domain (Kingham *et al.* 2017). Such an identity change, in turn, may impact how workers approach the exploitation and further development of their expertise (Mylopoulos and Woods 2009; Valkeavaara 1999).

Only one of the included studies reported about experts who hold multiple identities. Robertson and Swan (2003) reported how experts in consulting roles grounded their sense of being an expert in their high level of scarce know-how and the autonomy this brought to them. However, when confronted with circumstances in which they were more controlled by the norms of the client, they 'cognitively switched' towards the identity of a consultant. In this way, they could uphold their expert identity, even though the circumstances did not fully allow them to act in the expert ways they originally identified themselves with.

To summarize, workers may adjust their identities after gaining confidence about being able to contribute to a new practice and/or mastering new domains. This, in turn, may trigger them to act upon building their social recognition in line with their adjusted (expert) identity.

Building social recognition

As mentioned before, being an expert requires the social recognition of one's expertise and contributions to practice by surrounding stakeholders. Along with evolving expectations of these stakeholders, workers need to act upon attaining or retaining social recognition. This can for example happen when making the leap to

a new expertise domain (Browne *et al.* 2018; Cusson and Strange 2008) or when the workers' claim of having know-how is being questioned (Broom 2005; Collins and Evans 2018).

The included studies inquired different strategies that workers use to (re)gain social recognition. Frie *et al.* (2019) reported that flexperts claimed a new area of expertise by broadcasting it to stakeholders before others would claim this area. This even happened before they had full confidence themselves in their new know-how, yet experienced a growing internal belief that one becomes an expert in a new field. This claiming helped them to 'create ambassadors' who endorsed further implementation of ideas and expansion of expertise bases. In a novel setting, this requires a deliberate strategy not to lose credibility whilst still learning during one's socialization process. To deal with this so-called 'learning-credibility tension', Bourgoin and Harvey (2018) described face-saving strategies of management consultants, such as providing already available and relevant knowledge to appear competent, using proximal language and their clients' insights to gain acceptance, and sharing activity proofs to display productivity. Like flexperts (Frie *et al.* 2019), these management consultants communicated a certain expertise level to sustain their professional image, but only when they had the confidence to meet clients' expectations. Similarly, Park (2016) showed how leaders used their status and knowledge from previous jobs as currency to legitimize their claim of being able to cross sector boundaries. When workers start operating in emerging fields, they can build their reputation by, for example, developing professional standards and educational structures (Mieg 2009).

A final strategy for building social recognition is the process by which workers transform and disseminate their knowledge to make it usable for others (Chen and McQueen 2010; Engeström 2018; Kudaravalli 2010), for example through the role of teaching colleagues (Ha 2015; Mahant *et al.* 2012). The effectiveness of strategies for building social recognition supports the finding that well-communicating workers were more likely to be perceived as having expertise, regardless of their actual performance level (Treem *et al.* 2017).

Next to the importance of attuned communication, gaining social recognition requires that workers see themselves as contributors to a practice. Mylopoulos and Scardamalia (2008) showed that medical workers who perceived themselves as knowledge users, rather than as knowledge producers, overlooked the value of communicating their adaptations, ideas, and new knowledge among their community of practice. As such, these workers left some of the opportunities for gaining social recognition unused.

Overall, it seems that strategies for building social recognition among existing and new stakeholders can support workers to attain and retain their expert(ise) recognition. This can be realized by claiming to have new expertise, building credibility in new social settings, and by translating and disseminating one's know-how to different audiences.

Lacunae regarding mediators

We identified several lacunae regarding our understanding of the adaptation processes that enable workers to effectively respond to changing expertise needs as summarized in Table 3.1 in terms of six mediator categories. Given the variety of working contexts and samples of workers, we could not sort out whether certain strategies or responses are applicable across working contexts and/or expertise domains. We assume though that the domain-generic viewpoint applies here as multiple studies showed how the workers' adaptation processes were applicable when crossing the boundaries of their working contexts and/or expertise domain(s). However, as only one of the included studies reported how workers specifically adjust their identity when building up expertise in multiple working contexts and expertise domains, the domain-generic claim for this adaptation process is not sufficiently grounded in the included studies.

RQ4: Contextual outcomes

Contextual outcomes address how adaptation processes (i.e., the mediators) materialize at a team or an organizational level, or across organizational boundaries (Baard *et al.* 2014; Frie *et al.* 2019). Above, we described how adaptive experts make a deliberate decision to focus on, and subsequently, to act upon, resulting into routinized, adjusted, or novel practices (Schwartz *et al.* 2005). A new practice, invented by an individual expert, can be the starting point for the usage of this practice as a routine by other workers (Goodnow *et al.* 2007; Mieg 2009). Frie *et al.* (2019) reported that flexexperts make their new expertise valuable by translating their know-how into tangible products and embedding these into organizational processes and systems (i.e., embedded products). This study also showed that this materialization triggered flexexperts to search within and across their working context for new opportunities to adapt, as a result of their drive to learn something new.

RQ5: Personal outcomes

Following Jundt *et al.* (2015), we differentiated between proximal and distal outcomes of adaptation processes. Proximal outcomes relate to personal outcomes that are attainable within a relatively short time, whereas distal outcomes take longer to attain. The personal outcomes that the included studies disclosed, were measured

predominately at a proximal level. Examples are measurements of performance in novel tasks (Bohle Carbonell *et al.* 2014), or the result of learning new knowledge and skills through vocational education (Wallin *et al.* 2019). Frie *et al.* (2019) found that a new expert reputation, an enhanced social network, 'space' for expertise renewal, a contribution to one's personal mission, and a positive expert performance evaluation can all be personal outcomes during a flexperts' renewal episode. At a more distal level, developing new and socially recognized expertise and applying one's expertise in new working contexts appears to contribute to an individual's employability (Rothman and Perrucci 1970; Ruiner and Liebhart 2018; Van der Heijden 2003; Van der Heijden *et al.* 2016). We detected that the included studies did not report about assessments of idiosyncratic expertise (i.e., the personal base), and limitedly addressed how adaptation leads to *both* contextual and personal outcomes. They neither reported about when and how workers alter their perception of a need or opportunity to adapt after materializing their expertise.

3.4 Findings synthesized into a dynamic process model of flexpertise

In the previous sections, we reviewed conceptualizations regarding flexible or adaptive forms of expertise (see Figure 3.1 and Appendix 3.1) and integrated the related studies into an IMO framework (see Table 3.1). We have used this knowledge integration as the foundation for building a dynamic process model of flexpertise. Our review has revealed six categories of adaptation processes that involve intra-individual changes and social interactions over time (findings regarding RQ3: Mediators), and partly address *how* one is able to meet a variety of new expertise needs. By following the conventions for visualizing system dynamics (Cronin and Vancouver 2019; Vennix 1996), we have used these categories as variables, and renamed them as nouns, to build our dynamic process model. Figure 3.3 shows the connection between these variables by means of arrows. A + sign on top of an arrow indicates a positive relationship, meaning that if one variable increases/decreases the connected variable increases/decreases. A - sign indicates an opposite relationship, meaning that if one variable increases the connected variable decreases, or vice versa. Solid arrows represent annotated relationships, meaning that they are based upon existing process models and/or empirical findings for answering RQ1-5. Dashed arrows indicate that we assume a relationship to exist. Through these arrows, the model depicts feedback loops (i.e., causal chains between variables). Our model contains four balancing loops (negative feedback loops; indicated by a B), meaning cycles of adaptation processes that have a self-correcting effect on a change. Furthermore, it depicts one reinforcing

loop that expresses an iterative strengthening process (positive feedback loop; indicated by an R). The numbering of the feedback loops does not indicate a specific order as there is no specific start- or endpoint in the model, yet it represents ongoing changes (cf. Cronin and Vancouver 2019).

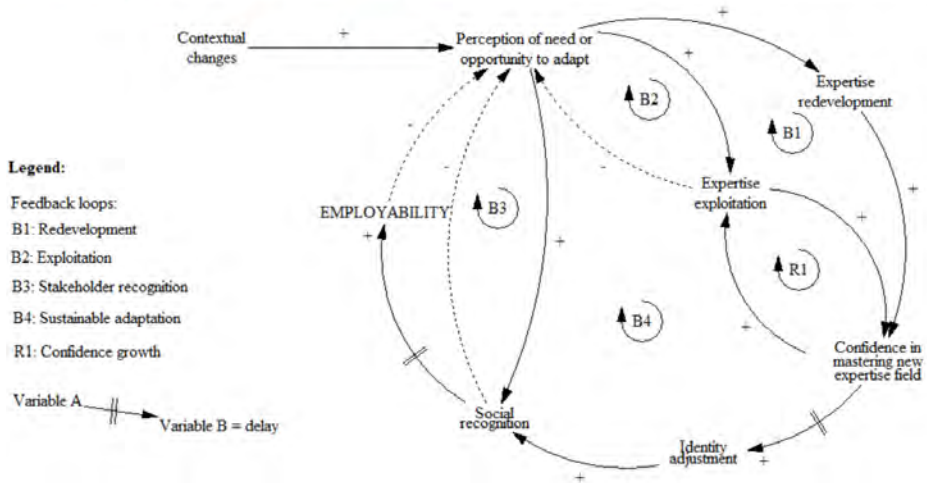


Figure 3.3 Dynamic process model of flexexpertise

Loop B1 'Redevelopment' represents that when a worker perceives an increased need for adaptation, this may put in motion a process of redeveloping one's expertise. The know-how that is gained during this redevelopment process may strengthen one's confidence, which in turn stimulates exploiting this expertise through the routinization, adjustment, or innovation of practices and embedded products (as addressed by RQ4). Subsequently, this may reduce the perceived need for adaptation. Loop B2 'Exploitation' shows that a worker might also interpret a change as a need for exploiting one's current expertise in a novel context. Similarly as in loop B1, if this leads to the required routinization, adjustment or innovation of practices, it may diminish the workers' perceived need for adaptation that triggered this loop. Loop R1 'Confidence growth' represents that when gaining positive experiences with, and feedback on, exploiting one's (new) expertise, this may also strengthen the confidence in one's expertise which, in turn, signals the worker to continue exploiting this expertise. Loop B3 'Stakeholder recognition' shows that a worker might interpret a contextual change as a need to (re)build social recognition among surrounding stakeholders. Consecutively, realizing social recognition may diminish the perceived need for this adaptation. Loop B4 'Sustainable adaptation' entails that after one has redeveloped one's expertise and starts to gain confidence in being able to contribute to a new field, a worker may start adjusting one's expert identity

after a while (in SD terminology, a delay indicated by a || sign on an arrow in Figure 3.3). In turn, this may trigger an individual to build social recognition in line with this adjusted identity, for example by communicating about one's new expertise and related contributions to practice. As having expertise and its social recognition were found to positively contribute to one's employability (Van der Heijde and Van der Heijden 2006), we added 'Employability' as a variable to the model. Employability is capitalized indicating that it has inertia (also known as a stock or level variable). This means that employability has a certain level which persists until some force acts to change it, making it a critical element of our system (Cronin and Vancouver 2019). With regards to the impact of social recognition on employability, in line with our analysis that employability is a distal outcome of adaptation processes (see RQ5), we assume another delay in the model. Furthermore, we assume that being employable reduces the individual's short-term need for adaptation. However, when encountering new contextual changes (i.e., being an exogenous variable in the model), a worker might perceive a novel need for adaptation to safeguard their employability. We expect that in practice feedback loops may occur simultaneously as workers have to deal with multiple changes at the same time.

In line with the domain-generic assumption underlying the conceptualizations in Figure 3.1, we assume that our model is applicable across working contexts and expertise domains and in different phases of an individual's adaptation process. However, following Dall'Alba (2018) and Frie *et al.* (2019), we suppose that the way in which the adaptation processes manifest will vary between episodes in a worker's career, between working contexts, as well as between workers. Specifically, there may be variation in terms of type, duration and order of adaptation processes, as well as number of feedback loop iterations. These variations arise as a result of differences in the type, degree and number of contextual changes (as addressed by RQ1). In addition, adaptation processes are influenced by the individual's unique set of experiences, knowledge, skills, and values (Billett *et al.* 2018) (as addressed by RQ2). As an illustration, we assume that 'Social recognition' involves a necessary adaptation process across working contexts and expertise domains. However, the kind of strategy that an individual will employ for building social recognition is dependent upon the different criteria that their stakeholders use for granting them an expert status (as addressed by RQ1). Furthermore, the personal qualities (as addressed by RQ2) influence the type of strategy one is able or willing to adopt (see Table 3.1: RQ3 for examples of strategies) and may positively influence one's employability (as addressed by RQ5). Worded differently, we assume that our domain-generic model manifests itself at an individual level by means of idiosyncratic adaptation paths, making it an adaptive model.

We argue that workers need to manifest all categories of the adaptation processes (i.e., the variables in the model) to effectively meet new expertise needs throughout their careers. Moreover, our review work revealed that during each adaptation process, workers' maladaptation may take place. Maladaptation can be the result of a working context that does not sufficiently support or constrain an individual worker to adapt (see RQ1 for an overview of facilitating conditions). A worker may also lack the personal qualities that are needed to adapt (as addressed by RQ2). Examples of maladaptation are workers who have a too superficial understanding of what changes imply (Kimball and Holyoak 2000), do not make deliberate choices to focus on a defined number of execution goals (Frie *et al.* 2019), become overly precise (Kang and Kim 2022), have too much 'entrenched' or rigidly applied routines (Dane 2010; Glăveanu 2012), are reluctant to make their expertise visible to relevant stakeholders (Frie *et al.* 2019), have too much specialization or 'experience concentration' (Hoyer 1987; Thijssen and Van der Heijden 2003; Van der Heijden 2002a, 2002b), deploy complementary expertise insufficiently when perceiving this expertise as a threat to one's professional authority (Sousa and Costa 2010; Wilson 2016), or neglect a broader set of career opportunities given a strong calling (Lysova *et al.* 2018). These examples of maladaptation may imply that an adaptation process is seized, and as such does not trigger subsequent adaptation processes. Ultimately, this may decrease one's employability and/or lead to the persisting need for adaptation to a specific contextual change. The different forms of maladaptation may require interventions to reignite specific adaptation processes, which we address in practical implications below.

3.5 Discussion

3.5.1 Theoretical Implications

We posit that the proposed dynamic process model of flexpertise extends current expertise theories by integrating elements regarding conceptualizations of flexible or adaptive forms of expertise that are adopted in a variety of disciplines. Our model may open venues for future empirical work shifting the research paradigm from how to become an expert (Ericsson 2018; Feltovich *et al.* 2018) to the quest how to secure and further enhance the value and recognition of one's occupational expertise and, through this, to protect one's career sustainability (Van der Heijden *et al.* 2020). The model captures the interrelatedness of the adaptation processes that are required when working contexts, expertise domains, and audiences evolve, and demands for new knowledge, skills and contributions to practice arise within one's own, adjacent and radically different fields. Besides, the model incorporates that workers

need to make sure that their expertise matters in multiple working contexts in which stakeholders have different expectations regarding their knowledge and skills' base. It further implies that the ability to meet new expertise needs is an ongoing and idiosyncratic process involving the six categories of interlinked adaptation processes that were explained above.

3.5.2 Limitations and avenues for future research

Even though we aimed to gain a thorough overview of the scholarly literature by conducting a broad and systematic search, an even broader search, including additional keywords like transfer, maintenance, and sustainment of expertise, might have led to the inclusion of additional studies. However, given the high number of studies ($n = 107$) we reviewed in-depth, including twenty review studies, we assume to have covered a considerable and highly relevant portion of expertise research in multiple disciplines.

As a second methodological limitation, we identified that indisputable criteria regarding novelty of one's working context or expertise domain were difficult to define. This is in line with the lacuna regarding the scholarly understanding of which type of novelty requires adaptive expertise (Bohle Carbonell *et al.* 2014). Therefore, by evaluating the inter-rater agreement scores in the review process, we took the utmost care to cope with the difficulties related to a well-thought out basis for the decisions that we made during our selection and knowledge integration phases (see online supplementary information).

Another limitation is that previous research predominately focused on the individual's adaptations in response to changes within one's current working context or expertise domain only, and limitedly addressed social interactions. We should therefore be cautious in generalizing the findings regarding the adaptation processes of workers who crossed the boundaries of their working context or expertise domain, or who applied 'social' strategies such as building social recognition and crafting environmental settings, as these insights were derived from a more limited number of studies.

We also acknowledge the limitation that the included literature focused on higher educated jobs in which workers had a certain power and control over organizational resources, as indicated by examples of crafting strategies. In some of these jobs, elite groups set the standards for becoming an expert, making the domain esoteric and not necessarily accessible for each individual to contribute (Collins and Evans 2018; Eyal 2013). This research focus left other occupational levels, that are not defined by

elite groups or relatively lower educated jobs, relatively unattended, and therefore cautiousness about the generalizability of our model is needed.

As a final limitation, we acknowledge that we used empirical studies that predominantly focused on studying an adaptive response to one specific change only, and on the measurement of one outcome only, mostly at a proximal and individual level, and studies that limitedly addressed social interactions. This approach left unaddressed that naturalistic settings involve multiple changes and outcomes at multiple levels (Baard *et al.* 2014; Cronin and Vancouver 2019), and imply elaborate social interactions (Kim 2021). Therefore, follow-up research is required to validate the dynamic process model of flexpertise in contexts that represent nowadays'VUCA working contexts (Baran and Woznyj 2020; Bennett and Lemoine 2014).

Notwithstanding these limitations, we argue that the dynamic process model of flexpertise forms a grounded basis for future research on how individuals can meet the plethora of changes they encounter in their work along with their evolving personal needs. Further quantitative research should investigate the identified lacunas in the extant literature, such as our limited understanding of what makes a worker's context novel, the mixed findings regarding the influence of personal inputs (see RQ2), the contextual factors and social dynamics that inhibit effective execution of specific adaptation processes, or the assumed negative relationships in the model of flexpertise. Through deploying longitudinal studies, we can increase our knowledge about which specific sequences of adaptive processes are most effective to. Such longitudinal work could increase our understanding regarding the assumption that there is a certain order in the development of flexibility-related competencies that are needed for one's employability (cf. Froehlich *et al.* 2018). Specifically, it might shed light on the number of iterations regarding the feedback loop 'Redevelopment' that is required before workers start adjusting their identity (i.e., a delay in the model). Similarly, this type of research might reveal the number of cycles of the feedback loop 'Stakeholder recognition' that is needed before it enhances an individual's employability. For this endeavor, we propose to develop a computational version of our dynamic model of flexpertise to further interpret its dynamics and to simulate what-if scenarios (Crielaard *et al.* 2022). To summarize, through our dynamic process model, novel research questions on what accounts for differences in a worker's ability to meet new expertise needs throughout their career, and the effects of adaptation processes over time, may emerge.

We recommend validating, extending, and refining the proposed model of flexpertise by conducting qualitative research as well, in specific Group Model Building (GMB).

This method involves a structured group-decision making process that scholars use to collect a variety of practice experiences and to build consensus regarding the dynamics of a complex phenomenon (Rouwette *et al.* 2011; Vennix 1996). It is advised to conduct a GMB study with HR/D practitioners to identify so-called leverage points (Riechers *et al.* 2022; Vennix, 1996). These are the elements in the dynamic process model where a small effort can realize a big change through providing HR/D interventions or specific resources. Identifying such leverage points may provide new insights on how to prevent obsolescence of a worker's expertise (Cherrstrom and Bixby 2018; Kaufman 1979), to overcome career inaction (Verbruggen and De Vos 2020), or to repulse a decreasing level of expert performance (Feltovich *et al.* 1997). Furthermore, we recommend conducting social network analysis to further our understanding about the influence of a worker's network on specific adaptation processes (Brass 2022).

3.5.3 Practical implications

The dynamic process model of flexexpertise highlights that meeting new expertise needs involves intra-individual adaptations and social exchanges with networks of key stakeholders to realize beneficial contextual and personal outcomes on the short and long run. This requires a system wherein the individual career holder, being the most important agent of their career, interacts with surrounding stakeholders to build up competencies that enable the individual to adapt to the ever-increasing amount of changes in the labor market and society at large (Fugate *et al.* 2021). We posit that the shifting paradigm, from a focus on attaining expert performance in a specific domain towards fostering the individual to adapt on an ongoing basis across expertise domains and working contexts, requires an approach wherein multiple stakeholders take their share (cf. De Vos *et al.* 2020).

As discussed in the section above on recommendations for future research, our model forms the starting point for defining leverage points for stakeholders to provide resources that enable workers to adapt. These stakeholders can be the supervisors who arrange the conditions for exploiting and redeveloping one's expertise, such as a learning and innovation climate (Bohle Carbonell *et al.* 2014) and networks of professionals with complementary expertise (Frie *et al.* 2019). Moreover, HR/D professionals can support ongoing expertise development through designing development programs for becoming a 'flexpert', initially based upon 'expert learning' knowledge (Wallin *et al.* 2019). Such a program might include a focus on identity adjustments through narrative writing techniques (Meijers and Lengelle 2012), specifically when crossing domain boundaries. Additionally, an outline of workforce scenarios of upcoming needs for upskilling and reskilling can

be beneficial to help workers to identify needs and opportunities to enhance the organizations' competitive advantage and to contribute to complex organizational and societal transitions and innovations (Authors, in press; Moats 2021). To conclude, if all organizations and institutions invest in promoting the adaptation processes underlying flexexpertise, more workers will become and/or stay happy, healthy and productive (Van der Heijden 2005) throughout their working life (De Vos *et al.* 2017).

References

- Aite-Peña, A. (1990). *Expertise of ageing managers: Its development and flexibility*. Published as working paper. Enschede, The Netherlands: University of Twente.
- Akkerman, S.F. and Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, **81**, pp. 132-169.
- Alda, M. (2018). Pension fund manager skills over the economic cycle: The (non-) specialization cost. *The European Journal of Finance*, **24**, pp. 36-58.¹
- Alderson, D. (2010). Developing expertise in surgery. *Medical Teacher*, **32**, pp. 830-836.^a
- Authors (in press). Fostering career sustainability: Renewal bundles of HR/D practices for flexexpertise development. In T.S. Rocco, M.L. Morris and R.F. Poell (eds), *2024 Handbook of Human Resource Development*.
- Baard, S.K., Rench, T.A. and Kozlowski, S.W.J. (2014). Performance adaptation: A theoretical integration and review. *Journal of Management*, **40**, pp. 48-99.^b
- Baran, B.E. and Woznyj, H.M. (2020). Managing VUCA: The human dynamics of agility. *Organizational Dynamics*, 100787. Advance online publication. <https://doi.org/10.1016/j.orgdyn.2020.100787>.
- Barnett, S.M. and Koslowski, B. (2002). Adaptive expertise: Effects of type of experience and the level of theoretical understanding it generates. *Thinking & Reasoning*, **8**, pp. 237-267.²
- Barney, J.B. and Wright, M.P. (1998). On becoming a strategic partner: The role of human resources in gaining competitive advantage. *Human Resource Management*, **37**, pp. 31-46.
- Bechky, B.A. and Okhuysen, G.A. (2011). Expecting the unexpected? How SWAT officers and film crews handle surprises. *Academy of Management Journal*, **54**, pp. 239-261.³
- Bell, E., Horton, G., Blashki, G. and Seidel, B.M. (2012). Climate change: could it help develop 'adaptive expertise'? *Advances in Health Sciences Education*, **17**, pp. 211-224.⁴
- Bell, B.S. and Kozlowski, S.W.J. (2010). Toward a theory of learner-centered training design: An integrative framework of active learning. In S.W.J. Kozlowski and E. Salas (eds), *SIOP organizational frontiers series. Learning, training, and development in organizations*. New York: Routledge, pp. 263-300.
- Bennett, N. and Lemoine, G.J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, **57**, pp. 311-317.
- Bereiter, C. and Scardamalia, M. (1993). *Surpassing ourselves. An inquiry into the nature and implications of expertise*. Chicago: Open Court.
- Billett, S., Harteis, C. and Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance*, 2nd edn. Cambridge: Cambridge University Press, pp. 105-126.⁵
- Birney, D.P., Beckmann, J.F. and Wood, R.E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, **22**, pp. 563-574.⁶
- Boaler, J. and Selling, S.K. (2017). Psychological imprisonment or intellectual freedom? A longitudinal study of contrasting school mathematics approaches and their impact on adults' lives. *Journal for Research in Mathematics Education*, **48**, pp. 78-105.⁷
- Boeije, H.R. (2009). *Analysis in qualitative research*. Thousand Oaks, CA: Sage.

- Bohle Carbonell, K., Könings, K.D., Segers, M. and Van Merriënboer, J.J.G. (2016). Measuring adaptive expertise: Development and validation of an instrument. *European Journal of Work and Organizational Psychology*, **25**, pp. 167-180.⁸
- Bohle Carbonell, K., Stalmeier, R.E., Könings, K.D., Segers, M. and Van Merriënboer, J.J.G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, **12**, pp. 14-29.^c
- Bourgoin, A. and Harvey, J.F. (2018). Professional image under threat: Dealing with learning-credibility tension. *Human Relations*, **71**, pp. 1611-1639.⁹
- Brass, D.J. (2022). New developments in social network analysis. *Annual Review of Organizational Psychology and Organizational Behavior*, **9**, pp. 225-246.
- Brooks, L.A. (2009). *Learning and transfer in a complex professional development setting: A cross-case analysis of the perceptions and practices of science teachers*. Doctoral dissertation, A&M University, Texas. Retrieved from <https://api.semanticscholar.org/CorpusID:155957476>¹⁰
- Broom, A. (2005). Medical specialists' accounts of the impact of the Internet on the doctor/patient relationship. *Health*, **9**, pp. 319-338.¹¹
- Brown, A. (2016). The role of career adaptability and flexible expertise in developing individual innovative behaviour. In S.H. Budhwar, P. Sparrow and A. Brown (eds), *Human resource management, innovation and performance*. London: Palgrave Macmillan, pp. 249-265.¹²
- Browne, J., Webb, K. and Bullock, A. (2018). Making the leap to medical education: a qualitative study of medical educators' experiences. *Medical Education*, **52**, pp. 216-226.¹³
- Chen, J. and McQueen, R.J. (2010). Knowledge transfer processes for different experience levels of knowledge recipients at an offshore technical support center. *Information Technology & People*, **23**, pp. 54-79.¹⁴
- Cherrstrom, C.A. and Bixby, J. (2018). Construct of expertise within the context of HRD: Integrative literature review. *Human Resource Development Review*, **17**, pp. 440-464.^d
- Chi, M.T.H., Glaser, R. and Farr, M.J. (eds). (1988). *The nature of expertise*. Hillsdale, NJ: Lawrence Erlbaum.
- Cinkir, S. and Kurum, G. (2015). Discrepancy in teacher employment: The problem of out-of-field teacher employment. *Educational Planning*, **22(1)**, pp. 29-47.¹⁵
- Collien, I. (2021). Concepts of power in boundary spanning research: A review and research agenda. *International Journal of Management Reviews*. doi: 10.1111/ijmr.12251
- Collins, H. and Evans, R. (2007). *Rethinking expertise*. Chicago: University of Chicago Press.¹⁶
- Collins, H. and Evans, R. (2018). A sociological/philosophical perspective on expertise: The acquisition of expertise through socialization. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance*, 2nd edn. Cambridge: Cambridge University Press, pp. 21-32.¹⁷
- Covey, S. (1989). *The seven habits of highly successful people*. New York: Simon & Schuster.
- Crielaard, L., Uleman, J. F., Châtel, B. D. L., Epskamp, S., Sloot, P. M. A., and Quax, R. (2022). Refining the causal loop diagram: A tutorial for maximizing the contribution of domain expertise in computational system dynamics modeling. *Psychological Methods*. Advance online publication. <https://doi.org/10.1037/met0000484>
- Cronin, M.A. and Bezrukova, K. (2019). Conflict management through the lens of system dynamics. *Academy of Management Annals*, **13**, pp. 770-806.

- Cronin, M.A. and Vancouver, J.B. (2019). The only constant is change: Expanding theory by incorporating dynamic properties into one's models. In S.E. Humphrey and J.M. LeBreton (eds), *The handbook of multilevel theory, measurement, and analysis*. Washington, DC: American Psychological Association.
- Croskerry, P. (2018). Adaptive expertise in medical decision making. *Medical Teacher*, **40**, pp. 803-808.^e
- Cusson, R.M. and Strange, S.N. (2008). Neonatal nurse practitioner role transition: The process of reattaining expert status. *The Journal of Perinatal & Neonatal Nursing*, **22**, pp. 329-337.¹⁸
- Dall'Alba, G. (2018). Reframing expertise in its development: A lifeworld perspective. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance*, 2nd edn. Cambridge: Cambridge University Press, pp. 33-39.¹⁹
- Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, **35**, pp. 579-603.^f
- Daniels, K. (2019). Guidance on conducting and reviewing systematic reviews (and meta-analyses) in work and organizational psychology. *European Journal of Work and Organizational Psychology*, **28**, pp. 1-10.
- Davies, E.M.M., Van der Heijden, B.I.J.M. and Flynn, M. (2017). Job satisfaction, retirement attitude and intended retirement age: A conditional process analysis across workers' level of household income. *Frontiers in Psychology*, 8:891.
- De Arment, S.T., Reed, E. and Wetzal, A.P. (2013). Promoting adaptive expertise: A conceptual framework for special educator preparation. *Teacher Education and Special Education*, **36**, pp. 217-230.⁹
- De Meuse, K.P. (2019). A meta-analysis of the relationship between learning agility and leader success. *Journal of Organizational Psychology*, **19**, pp. 25-34.
- De Vos, A., Forrier, A., Van der Heijden, B. and De Cuyper, N. (2017). Keep the expert! Occupational expertise, perceived employability and job search: A study across age groups. *Career Development International*, **22**, pp. 318-33.
- De Vos, A., Van der Heijden, B.I.J.M. and Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, **117**, 103196.
- DeRue, D.S., Ashford, S.J. and Myers, C.G. (2012). Learning agility: In search of conceptual clarity and theoretical grounding. *Industrial and Organizational Psychology*, **5**, pp. 258-279.^h
- Downey, R.V. (1996). *A study in stand up: Roles and behaviors of excellent trainers*. Doctoral dissertation, Syracuse University, NY. Retrieved from <https://www.proquest.com/openview/f36847d2e51d5207abeb920c9f73bd51/1?pq-origsite=gscholar&cbl=18750&diss=y>.
- Dreyfus, H.L. and Dreyfus, S.E. (1986). *Mind over machine: The power of human intuition and expertise in the age of the computer*. Oxford: Basil Blackwell.
- Dreyfus, H.L. and Dreyfus, S.E. (2008). Beyond expertise: Some preliminary thoughts on mastery. In K. Nielsen (ed), *A qualitative stance; Essays in honor of Steiner Kvale*. Aarhus, Denmark: Aarhus University Press, pp. 113-124.
- Engeström, Y. (2018). *Expertise in transition: Expansive learning in medical work*. Cambridge: Cambridge University Press.²⁰
- Engeström, Y., Engeström, R. and Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction*, **5**, pp. 319-336.
- Ericsson, K.A. (1999). Creative expertise as superior reproducible performance: Innovative and flexible aspects of expert performance. *Psychological Inquiry*, **10**, pp. 329-361.
- Ericsson, K.A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K.A. Ericsson, N. Charness, P.J. Feltovich and R.R. Hoffman (eds), *The Cambridge handbook of expertise and expert performance*. Cambridge: Cambridge University Press, pp. 683-703.

- Ericsson, K.A. (2014). Adaptive expertise and cognitive readiness: A perspective from the expert-performance approach. In H.F. O'Neil, R.S. Perez and E.L. Baker (eds), *Teaching and measuring cognitive readiness*. New York: Springer, pp. 179-197.²¹
- Ericsson, K.A. (2018). An introduction to the second edition of The Cambridge handbook of expertise and expert performance: Its development, organization, and content. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance*, 2nd edn. Cambridge: Cambridge University Press, pp. 3-20.²²
- Ericsson, K.A., Krampe, R.T. and Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, **100**, pp. 363-406.
- Ericsson, K.A. and Lehmann, A.C. (1996). Expert and exceptional performance: Evidence of maximal adaptation to task constraints. *Annual Review of Psychology*, **47**, pp. 273-305.
- Ericsson, K.A., Roring, R.W. and Nandagopal, K. (2007). Giftedness and evidence for reproducibly superior performance: An account based on the expert performance framework. *High Ability Studies*, **18**, pp. 3-56.
- Ericsson, K.A. and Smith, J. (1991). *Toward a general theory of expertise. Prospects and limits*. Cambridge: Cambridge University Press.
- Ermeling, B.A. and Yarbo, J. (2016). Expanding instructional horizons: A case study of teacher team-outside expert partnerships. *Teachers College Record*, **118**, pp. 1-48.²³
- Eyal, G. (2013). For a sociology of expertise: The social origins of the autism epidemic. *American Journal of Sociology*, **118**, pp. 863-907.
- Fazey, I., Fazey, J.A. and Fazey, D.M.A. (2005). Learning more effectively from experience. *Ecology and Society*, **10**, pp. 4.²⁴
- Feltovich, P.J., Prietula, M.J. and Ericsson, K.A. (2018). Studies of expertise from psychological perspectives: Historical foundations and recurrent themes. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn. Cambridge: Cambridge University, pp. 59-83.²⁵
- Feltovich, P.J., Spiro, R.J. and Coulson, R.L. (1997). Issues of expert flexibility in contexts characterized by complexity and change. In P.J. Feltovich, K.M. Ford and R.R. Hoffman (eds), *Expertise in context: Human and machine*. Menlo Park, CA: AAAI/MIT Press, pp. 125-146.²⁶
- Fortney, K.S. and Yamagata-Lynch, L.C. (2013). How instructional designers solve workplace problems. *Performance Improvement Quarterly*, **25(4)**, pp. 91-109.²⁷
- Frie, L.S., Potting, K.C.J.M., Sjoer, E., Van der Heijden, B.I.J.M. and Korzilius, H.P.L.M. (2019). How flexexperts deal with changing expertise needs: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, **30**, pp. 61-79.²⁸
- Frodeman, R., Klein, J.T. and Pacheco, R.C.D.S. (eds). (2017). *The Oxford handbook of interdisciplinarity*. Oxford: Oxford University Press.²⁹
- Froehlich, D.E., Liu, M. and Van der Heijden, B.I.J.M. (2018). Work in progress: the progression of competence-based employability. *Career Development International*, **23**, pp. 230-244.³⁰
- Fugate, M., Van der Heijden, B., De Vos, A., Forrier, A. and De Cuyper, N. (2021). Is what's past prologue? A review and agenda for contemporary employability research. *Academy of Management Annals*, **15**, pp. 266-298.
- Glăveanu, V.P. (2012). Habitual creativity: Revising habit, reconceptualizing creativity. *Review of General Psychology*, **16**, pp. 78-92.¹
- Goller, M. (2017). *Human agency at work: An active approach towards expertise development*. Wiesbaden, Germany: Springer.³¹

- Goodnow, J.J., Peterson, C. and Lawrence, J.A. (2007). Culture and cognitive development: Giyoo Hatano's insights and the questions they open. *Human Development*, **50**, pp. 16-22.³²
- Grant, M.J. and Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, **26**, pp. 91-108.
- Grenier, R.S. (2013). Finding the abstract from the concrete: Considering the use of popular culture artefacts to examine the Model of Expertise Redevelopment. *Human Resource Development International*, **16**, pp. 357-365.³³
- Grenier, R.S. (2021). Identifying and measuring expertise in organizations. In M. Germain and R.S. Grenier (eds), *Expertise at Work: Current and Emerging Trends*. Cham, Switzerland: Palgrave Macmillan, pp. 57-69.
- Grenier, R.S. and Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, **7**, pp. 198-217.³⁴
- Gruber, H. and Harteis, C. (2018). *Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise*, vol. 24. Cham, Switzerland; Springer.³⁴
- Guile, D. and Unwin, L. (2020). Expertise as a 'capacity for action': reframing vocational knowledge from the perspective of work. *Journal of Vocational Education & Training*. doi:10.1080/13636820.2020.1858939.³⁵
- Guimarães, M.H., Pohl, C., Bina, O. and Varanda, M. (2019). Who is doing inter-and transdisciplinary research, and why? An empirical study of motivations, attitudes, skills, and behaviours. *Futures*, **112**, 102441.³⁶
- Ha, T.S. (2015). Learning stories from IT workers – Development of professional expertise. *Studies in Continuing Education*, **37**, pp. 79-98.³⁷
- Hall, D.T. (1976). *Careers in Organizations*. Pacific Palisades, CA: Goodyear.
- Hammerness, K., Darling-Hammond, L. and Bransford, J. (2005). How Teachers Learn and Develop. In L. Darling-Hammond and J. Bransford (eds), *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco: Jossey-Bass, pp. 358-389.³⁸
- Hatano, G. and Inagaki, K. (1984). Two courses of expertise. Research and Clinical Center for Child Development Annual Report, **6**, pp. 27-36.
- Hatano, G. and Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma and K. Hakuta (eds), *Child development and education in Japan*. San Francisco: Freeman, pp. 262-272.³⁹
- Hesketh, B. (1997). Dilemmas in training for transfer and retention. *Applied Psychology*, **46**, pp. 317-339.^k
- Hoffman, R.R. (1998). How can expertise be defined? Implications of research from cognitive psychology. In R. Williams, W. Faulkner and J. Fleck (eds), *Exploring expertise: Issues and perspectives*. London: Palgrave Macmillan, pp. 81-100.
- Holyoak, K.J. (1991). Symbolic connectionism: Toward third-generation theories of expertise. In K. A. Ericsson and J. Smith (eds), *Toward a general theory of expertise. Prospects and limits*. Cambridge: Cambridge University Press, pp. 301-336.
- Hoyer, W.J. (1987). Acquisition of knowledge and the decentralization of "g" in adult intellectual development. In C. Schooler & K.W. Schaie (eds), *Cognitive functioning and social structure over the life course*. New York: Ablex Publishing, pp. 120-141.
- Huang, X., Hsieh, J.P., -A. and He, W. (2014). Expertise dissimilarity and creativity: The contingent roles of tacit and explicit knowledge sharing. *Journal of Applied Psychology*, **99**, pp. 816-830.⁴⁰
- Hytönen, K., Palonen, T., Lehtinen, E. and Hakkarainen, K. (2016). Between two advisors: Interconnecting academic and workplace settings in an emerging field. *Vocations and Learning*, **9**, pp. 333-359.⁴¹
- Inagaki, K. and Miyake, N. (2007). Perspectives on the research history of Giyoo Hatano. *Human Development*, **50**, pp. 7-15.⁴²

- Ivancic, K. and Hesketh, B. (2000). Learning from errors in a driving simulation: Effects on driving skill and self-confidence. *Ergonomics*, **43**, pp. 1966-1984.
- Johansson, K. (2012). Experts, entrepreneurs and competence nomads: the skills paradox in higher music education. *Music Education Research*, **14**, pp. 45-62.⁴³
- Jonassen, D.H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development*, **48**, pp. 63-85.
- Jundt, D.K., Shoss, M.K. and Huang, J.L. (2015). Individual adaptive performance in organizations: A review. *Journal of Organizational Behavior*, **36**(S1), pp. S53-S71.¹
- Kalyuga, S., Renkl, A. and Paas, F. (2010). Facilitating flexible problem solving: A cognitive load perspective. *Educational Psychology Review*, **22**, pp. 175-186.^m
- Kanfer, R. and Ackerman, P.L. (1989). Motivation and cognitive abilities: An integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Psychology*, **74**, pp. 657-690.
- Kang, S. and Kim, J.W. (2022). The fragility of experts: A moderated-mediation model of expertise, expert identity threat, and overprecision. *Academy of Management Journal*, **65**, pp. 577-605.
- Kaufman, H.G. (1979). Technical obsolescence: Work and organizations are the key. *Engineering Education*, **69**(8), pp. 826-830.
- Keestra, M. (2017). Metacognition and reflection by interdisciplinary experts: Insights from cognitive science and philosophy. *Issues in Interdisciplinary Studies*, **35**, pp. 121-169.⁴⁴
- Kim, Y. (2021). The changing concepts of expertise and expertise development. In M. Germain and R.S. Grenier (eds), *Expertise at Work: Current and Emerging Trends*. Cham, Switzerland: Palgrave Macmillan, pp. 17-38.
- Kimball, D.R. and Holyoak, K.J. (2000). Transfer and expertise. In E. Tulving and F.I.M. Craik (eds), *The Oxford handbook of memory*. Oxford: Oxford University Press, pp. 109-122.⁴⁵
- Kinghorn, G.R., Halcomb, E.J., Froggatt, T. and Thomas, S.D. (2017). Transitioning into new clinical areas of practice: An integrative review of the literature. *Journal of Clinical Nursing*, **26**, pp. 4223-4233.ⁿ
- Klein, G., Snowden, D. and Pin, C.L. (2011). Anticipatory thinking. In K.L. Mosier and U. M. Fischer (eds), *Informed by knowledge: Expert performance in complex situations*. New York: Psychology Press, pp. 235-245.⁴⁶
- Kong, W. (2018). *Predicting adaptive performance: The components, effect, and training of adaptive expertise*. Doctoral dissertation, George Mason University Fairfax, VA. Retrieved from <https://www.proquest.com/openview/9abf5d570c1e9d0ec38f6348467d776e/1?pq-origsite=gscholar&cbl=18750&diss=y>.⁴⁷
- Kua, J., Lim, W.-S., Teo, W. and Edwards, R.A. (2021). A scoping review of adaptive expertise in education. *Medical Teacher*, **43**, pp. 347-355.^o
- Kudaravalli, S. (2010). *Practices and Strategies of Distributed Knowledge Collaboration*. Doctoral dissertation, University of Maryland: College Park, MD. Retrieved from <http://hdl.handle.net/1903/11234>.⁴⁸
- Kuittinen, M., Meriläinen, M. and Rätty, H. (2014). Professional competences of young psychologists: the dimensions of self-rated competence domains and their variation in the early years of the psychologist's career. *European Journal of Psychology of Education*, **29**, pp. 63-80.
- Lahn, L.C., Thijssen, J., Tikkanen, T., & van der Heijden, B.I.J.M. (1998). *Competence and Training of Older Workers*. Action Research Report to the Project 'Re-integration of Older Workers into the Labour Market'. Maastricht: Driekant & DGV, European Commission,
- Lahn, L.C. (2003). Competence and learning in late career. *European Educational Research Journal*, **2**, pp. 126-140.

- LePine, J.A., Colquitt, J.A. and Erez, A. (2006). Adaptability to changing task contexts: Effects of general cognitive ability, conscientiousness, and openness to experience. *Personnel Psychology*, **53**, pp. 563-593.
- Liberati, A., Altman, D.G., Tetzlaff, J. Mulrow, C., Gøtzsche, P.C., Ioannidis, J.P.A., Clarke, M., Devereaux, P.J., Kleijnen, J. and Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Journal of Clinical Epidemiology*, **62**, pp. e1-e34.
- Liu, X., Stoutenborough, J. and Vedlitz, A. (2016). Bureaucratic expertise, overconfidence, and policy choice. *Governance*, **30**, pp. 705-725.⁴⁹
- Lombardo, M.M. and Eichinger, R.W. (2000). High potentials as high learners. *Human Resource Management*, **39**, pp. 321-329.
- Lysova, E.I., Jansen, P.G.W., Khapova, S.N., Plomp, J. and Tims, M. (2018). Examining calling as a double-edged sword for employability. *Journal of Vocational Behavior*, **104**, pp. 261-272.⁵⁰
- Mahant, S., Jovcevska, V. and Wadhwa, A. (2012). The nature of excellent clinicians at an academic health science center. *Academic Medicine*, **87**, pp. 1715-1721.⁵¹
- Mannucci, P.V. and Yong, K. (2018). The differential impact of knowledge depth and knowledge breadth on creativity over individual careers. *Academy of Management Journal*, **61**, pp. 1741-1763.⁵²
- Marand, A.D. and Noe, R.A. (2017). Facilitating the development of expertise: An individual to organizational perspective. In K.G. Brown (eds), *The Cambridge handbook of workplace training and employee development*. New York: Cambridge University Press, pp. 38-74.
- Mathieu, J., Maynard, M. T., Rapp, T. and Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, **34**, pp. 410-476.
- Meijers, F. and Lengelle, R. (2012). Narratives at work: The development of career identity. *British Journal of Guidance & Counselling*, **40**, 157-176.
- Mieg, H. A. (2009). Two factors of expertise? Excellence and professionalism of environmental experts. *High Ability Studies*, **20**, pp. 91-115.⁵³
- Mieg, H.A. and Evetts, J. (2018). Professionalism, science, and expert roles: A social perspective. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn. Cambridge: Cambridge University Press, pp. 127-148.⁵⁴
- Moats, J. (2021). Preparing for the Future of Work and the Development of Expertise. In M. Germain and R.S. Grenier (eds), *Expertise at Work: Current and Emerging Trends*. Cham, Switzerland: Pelgrave Macmillan, pp.197-224.
- Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, S., Stewart, L. A. and PRISMA-P Group (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, **4**, 1.
- Morgan, R.L., Whaley, P., Thayer, K.A. and Schünemann, H.J. (2018). Identifying the PECO: A framework for formulating good questions to explore the association of environmental and other exposures with health outcomes. *Environment International*, **121** (Pt 1), pp. 1027-1031.
- Mylopoulos, M. and Farhat, W. (2015). "I can do better": exploring purposeful improvement in daily clinical work. *Advances in Health Sciences Education*, **20**, pp. 371-383.⁵⁵
- Mylopoulos, M., Lohfeld, L., Norman, G.R., Dhaliwal, G. and Eva, K.W. (2012). Renowned physicians' perceptions of expert diagnostic practice. *Academic Medicine*, **87**, pp. 1413-1417.⁵⁶
- Mylopoulos, M. and Scardamalia, M. (2008). Doctors' perspectives on their innovations in daily practice: implications for knowledge building in health care. *Medical Education*, **42**, pp. 975-981.⁵⁷
- Mylopoulos, M. and Woods, N.N. (2009). Having our cake and eating it too: seeking the best of both worlds in expertise research. *Medical Education*, **43**, pp. 406-413.^P

- Niessen, C. and Lang, J.W.B. (2021). Cognitive control strategies and adaptive performance in a complex work task. *Journal of Applied Psychology*, **106**, 1586-1599.
- Njoku, J.C., Van der Heijden, B.I.J.M. and Inanga, E.L. (2010). Fusion of expertise among accounting faculty: towards an expertise model for academia in accounting. *Critical Perspectives on Accounting*, **21**, pp. 51-62.⁵⁸
- Noordegraaf, M. (2020). Protective or connective professionalism? How connected workers can (still) act as autonomous and authoritative experts. *Journal of Professions & Organization*, **7**, pp. 205-223.⁵⁹
- Paletz, S.B.F., Kim, K.H., Schunn, C.D., Tollinger, I. and Vera, A. (2013). Reuse and recycle: The development of adaptive expertise, routine expertise, and novelty in a large research team. *Applied Cognitive Psychology*, **27**, pp. 415-428.⁶⁰
- Park, P. (2016). *Gold star vs. north star leaders: Role orientations and arbitrage in crossing sector boundaries*. Doctoral dissertation, Harvard Business School, Boston. Retrieved from <https://dash.harvard.edu/handle/1/32744401>.⁶¹
- Perelman, L.J. (1984). *The Learning Enterprise. Adult Learning, Human Capital, and Economic Development*. Report of the Council of State Policy and Planning Agencies, Washington, DC.
- Perkins, D. (2010). Tomorrow's learning: the place of information, knowledge and wisdom. In E. De Corte and J.E. Fenstad (eds), *From information to knowledge: From knowledge to wisdom*. London: Portland Press, pp. 5-17.
- Pulakos, E.D., Arad, S., Donovan, M.A. and Plamondon, K.E. (2000). Adaptability in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology*, **85**, pp. 612-624.
- Pusic, M.V., Santen, S.A., Dekhtyar, M., Poncelet, A.N., Roberts, N.K., Wilson-Delfosse, A.L. and Cutrer, W.B. (2018). Learning to balance efficiency and innovation for optimal adaptive expertise. *Medical Teacher*, **40**, pp. 820-827.⁹
- Riechers, M., Fischer, J., Manlosa, A.O., Ortiz-Przychodzka, S., and Sala, J.E. (2022). Operationalising the leverage points perspective for empirical research. *Current Opinion in Environmental Sustainability*, **57**, 101206.
- Robertson, M. and Swan, J. (2003). 'Control—what control?' Culture and ambiguity within a knowledge intensive firm. *Journal of Management Studies*, **40**, pp. 831-858.⁶²
- Rothman, R.A. and Perrucci, R. (1970). Organizational careers and professional expertise. *Administrative Science Quarterly*, **15**(3), pp. 282-293.⁶³
- Rouwette, E.A.J.A., Korzilius, H., Vennix, J.A.M. and Jacobs, E. (2011). Modeling as persuasion: the impact of group model building on attitudes and behavior. *System Dynamics Review*, **27**, pp. 1-21.
- Ruiner, C. and Liebhart, U. (2018). How multi-optional experts maintain and enhance their employability. *German Journal of Human Resource Management*, **32**, pp. 52-74.⁶⁴
- Schwartz, D.L., Bransford, J.D. and Sears, D. (2005). Efficiency and innovation in transfer. In J. Mestre (eds), *Transfer of learning: Research and perspectives*. Greenwich: Information Age Publishing, pp. 1-51.
- Shuster, S.M. (2016). Uncertain expertise and the limitations of clinical guidelines in transgender healthcare. *Journal of Health and Social Behavior*, **57**, pp. 319-332.⁶⁵
- Siklander, P. and Impiö, N. (2019). Common features of expertise in working life: implications for higher education. *Journal of Further and Higher Education*, **43**, pp. 1239-1254.⁶⁶
- Simonton, D.K. (1996). Creative expertise: A life-span developmental perspective. In K.A. Anderson (ed), *The road to excellence. The acquisition of expert performance in the arts and sciences, sports, and games*, Mahwah, NJ: Lawrence Erlbaum, pp. 227-253.
- Simonton, D.K. (2003). Expertise, competence, and creative ability: The perplexing complexities. In R.J. Sternberg and E.L. Grigorenko (eds), *The psychology of abilities, competences, and expertise*. Cambridge: Cambridge University Press, pp. 213-238.

- Skilton, P. F. (2003). Portable integration expertise as the foundation of flexible integration capability. *The International Journal of Organizational Analysis*, **11**, pp. 319-338.⁶⁷
- Smith, E.M., Ford, J.K. and Kozlowski, S.W.J. (1997). Building adaptive expertise: Implications for training design strategies. In M.A. Quiñones and A. Ehrenstein (eds), *Training for a rapidly changing workplace: Applications of psychological research*. Washington, DC: American Psychological Association, pp. 89-118.
- Snowden, D. (2011). Naturalizing sensemaking. In K.L. Mosier and U.M. Fischer (eds), *Informed by knowledge: Expert performance in complex situations*. London: Psychology Press, pp. 223-234.⁶⁸
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, **104**, pp. 333-339.
- Sousa, L. and Costa, T. (2010). The multi-professional approach: Front-line workers' behaviours and interactions. *International Journal of Social Welfare*, **19**, pp. 444-454.⁶⁹
- Supramaniam, K., Md Razak, M. and Arumugam, N. (2020). Changing identities in community of practice: Expert teachers to novice researchers. *Asian Journal of University Education*, **16**, pp. 59-68.⁷⁰
- Sutton, A., Clowes, M., Preston, L. and Booth, A. (2019). Meeting the review family: exploring review types and associated information retrieval requirements. *Health Information & Libraries Journal*, **36(3)**, pp. 202-222.
- Swan, R.H., Plummer, K.J. and West, R.E. (2020). Toward functional expertise through formal education: identifying an opportunity for higher education. *Educational Technology Research & Development*, **68**, pp. 2551-2568.⁷¹
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, **12**, pp. 257-285.
- Syer, C.A., Jad-Moussa, R., Pelletier, S. and Shore, B.M. (2003). Adaptive-creative versus routine-reproductive expertise in hypermedia design: An exploratory study. *Cognition, Technology & Work*, **5**, pp. 94-106.⁷¹
- Tancig, S. (2009). Expert team decision-making and problem solving: Development and learning. *Interdisciplinary Description of Complex Systems*, **7(2)**, pp. 106-116.⁷²
- Thijssen, J.G.L. and Van der Heijden, B.I.J.M. (2003). Evaporated talent? Problems with talent development during the career. *International Journal of Human Resources Development and Management*, **3**, pp. 154-170.
- Tøsse, S.E. (2014). Concern and confidence. Architects making sense of climate adaptation. *Environment and Planning B: Planning and Design*, **41**, pp. 24-38.⁷³
- Tranfield, D., Denyer, D. and Smart, P. (2003). Toward a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, **14**, pp. 207-222.
- Treem, J.W. and Leonardi, P.M. (2017). Recognizing expertise: Factors promoting congruity between individuals' perceptions of their own expertise and the perceptions of their coworkers. *Communication Research*, **44**, pp. 198-224.
- Trinh, M.P. (2019). Overcoming the shadow of expertise: How humility and learning goal orientation help knowledge leaders become more flexible. *Frontiers in Psychology*, **10**, doi: 10.3389/fpsyg.2019.02505.⁷⁴
- Turner, D., Nelson, L. and Potrac, P. (2012). The journey is the destination: Reconsidering the expert sports coach. *Quest*, **64**, pp. 313-325.⁷⁵
- Unsworth, R. (2016). Meet the Flexperts! How to bring in expert contributions around the contract in support of commercial interests. *Journal of Strategic Contracting and Negotiation*, **2**, pp. 101-118.

- Valkeavaara, T. (1999). "Sailing in Calm Waters Doesn't Teach": constructing expertise through problems in work—the case of Finnish human resource developers. *Studies in Continuing Education*, **21**, pp. 177-196.⁷⁶
- Van der Heijde, C.M. and Van der Heijden, B.I.J.M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, **45**, pp. 449-476.
- Van der Heijden, B.I.J.M. (1998). *The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch workers*. Doctoral dissertation, University of Twente, the Netherlands. Retrieved from <https://hdl.handle.net/2066/127534>.
- Van der Heijden, B.I.J.M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, **11**, pp. 9-39.⁷⁷
- Van der Heijden, B.I.J.M. (2002a). Individual career initiatives and their influence upon professional expertise development throughout the career. *International Journal of Training and Development*, **6**, pp. 54-79.⁷⁸
- Van der Heijden, B.I.J.M. (2002b). Prerequisites to guarantee life-long employability. *Personnel Review*, **31**, pp. 44-61.
- Van der Heijden, B.I.J.M. (2002c). The relationship between employee initiatives and occupational expertise throughout the career in small- and medium-sized enterprises in The Netherlands. *Career Development International*, **7**, pp. 322-338.⁷⁹
- Van der Heijden, B.I.J.M. (2003). The relationship between career mobility and occupational expertise: A retrospective study among higher-level Dutch workers in three age groups. *Employee Relations*, **25**, pp. 81-109.⁸⁰
- Van der Heijden, B.I.J.M. (2005). 'No one has ever promised you a rose garden'. On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Open University of the Netherlands, Heerlen. Assen: Van Gorcum.
- Van der Heijden, B.I.J.M. and De Vos, A. (2015). Sustainable careers: introductory chapter. In B.I.J.M. Van der Heijden and A. De Vos (eds), *Handbook of research on sustainable careers*. Cheltenham, U.K.: Edward Elgar, pp. 1-19.
- Van der Heijden, B.I.J.M., De Vos, A., Akkermans, J., Spurk, D., Semeijn, J., Van der Velde, M. and Fugate, M. (2020). Sustainable careers across the lifespan: Moving the field forward. *Journal of Vocational Behavior*, **117**, 103344.
- Van der Heijden, B.I.J.M., Gorgievski, M.J. and De Lange, A.H. (2016). Learning at the workplace and sustainable employability: a multi-source model moderated by age. *European Journal of Work and Organizational Psychology*, **25**, pp. 13-30.⁸¹
- Van der Heijden, B.I.J.M., Notelaers, G., Peters, P., Stoffers, J.M.M., De Lange, A.H., Froehlich and Van der Heijde, C.M. (2018). Development and validation of the short-form employability five-factor instrument. *Journal of Vocational Behavior*, **106**, pp. 236-248.
- Varpio, L., Schryer, C.F. and Lingard, L. (2009). Routine and adaptive expert strategies for resolving ICT mediated communication problems in the team setting. *Medical Education*, **43**, pp. 680-687.⁸²
- Vennix, J.A.M. (1996). *Group model building: Facilitating team learning using system dynamics*. Chichester: Wiley
- Verbruggen, M. and De Vos, A. (2020). When people don't realize their career desires: Toward a theory of career inaction. *Academy of Management Review*, **45**, pp. 376-394.
- Wallin, A., Nokelainen, P. and Mikkonen, S. (2019). How experienced workers develop expertise in work-based higher education: a literature review. *Higher Education*, **77**, pp. 359-378.⁵
- Ward, P., Gore, J., Hutton, R., Conway, G.E. and Hoffman, R.R. (2018). Adaptive skill as the *conditio sine qua non* of expertise. *Journal of Applied Research in Memory and Cognition*, **7**, pp. 35-50.¹

- WEF (2020). *The future of jobs report*. Retrieved from <https://www.weforum.org/reports/the-future-of-jobs-report-2020/in-full>.
- Weick, K.E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.
- Weisberg, R.W. (2006). Modes of expertise in creative thinking: Evidence from case studies. In K.A. Ericsson, N. Charness, P.J. Feltovich and R.R. Hoffman (eds), *The Cambridge handbook of expertise and expert performance*. Cambridge: Cambridge University Press, pp. 761-787.⁸³
- Weisberg, R.W. (2018). Expertise and structured imagination in creative thinking: reconsideration of an old question. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn. Cambridge: Cambridge University, pp. 812-834.⁸⁴
- Wilson, A.J. (2016). *Behavioral perspectives on organizational change: Practice adoption, product culling, and technological search*. Doctoral dissertation, Duke University, Durham. Retrieved from <https://hdl.handle.net/10161/12211>.⁸⁵
- Yukawa, J. (2015). Preparing for complexity and wicked problems through transformational learning approaches. *Journal of Education for Library and Information Science*, **56**, pp. 158-168.⁸⁶
- Zimmerman, B.J. (2006). Development and adaptation of expertise: The role of self-regulatory processes and beliefs. In K.A. Ericsson, N. Charness, P.J. Feltovich and R.R. Hoffman (eds), *The Cambridge handbook of expertise and expert performance*. Cambridge: Cambridge University Press, pp. 705-722.⁸⁷

Appendices

Appendix 3.1 Chronological overview of conceptualizations regarding flexible or adaptive forms of expertise

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Hatano and Inagaki (1984, 1986)	The ability of experts to deal with novel situations. Adaptive experts not only understand the 'know-what' and 'know-how', but also possess the knowledge of why and under which conditions certain methods need to be used or when new procedures must be invented. Learning takes place as "a new problem situation is assimilated into pre-existing knowledge, and this results in accommodation of the knowledge" (Hatano and Inagaki 1984, p. 27).	• Coined in field of primary education. • Widely adopted in field of vocational learning and development (Inagaki and Miyake 2007; Goodnow et al. 2007; Hesketh 1997), specifically regarding medical education and practice (Mylopoulos and Woods 2009).	• <i>Adaptive experts:</i> Possess adaptive expertise, thereby building upon their routine, or classic expertise. • <i>Routine expertise:</i> Involves mastering procedures where individuals perform flawlessly in familiar situations. • <i>Routine experts:</i> "Are outstanding in terms of speed, accuracy and automaticity of performance, but lack flexibility and adaptability to new problems" (Hatano and Inagaki 1984, p. 31).
Flexpertise Perelman (1984)	"The ability continually to adapt individual knowledge and skill" (Perelman 1984, p. xvi).	Concept referenced by practitioner books regarding (continuous) higher education and literature regarding learning organizations (e.g., Downey 1996).	• <i>Flexible human capital:</i> Flexpertise is a dimension of flexible human capital that enterprises require to meet new business demands. • <i>Expertise:</i> Contrasted with expertise that Perelman (1984) associated with educational degrees.
Flexible expertise Hoyer (1987)	Knowledge with a high degree of generality across situations and tasks.	Cited in studies regarding vocational learning, career development and ageing (e.g., Thijssen and Van der Heijden 2003).	• <i>Specialized expertise:</i> • Based on a relatively narrow domain of knowledge. • In contrast to flexible expertise, may have the effect that employees tend towards intense specialization, making them increasingly incapable of acquiring other types of expertise.

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Flexible expertise Aite-Peña (1990)	"Flexible expertise is the combination of the possession of abilities, accumulated knowledge, fast recognition of problems and finding adequate solutions in broad job-related domains, which enable a generalized thinking in fields related to the area of knowledge" (Aite-Peña 1990, p. 3).	Not cited by other studies.	NA
Expertise involves adaptation Bereiter and Scardamalia (1993) Ericsson and Lehmann (1996) Holyoak (1991)	Scholars posited that adaptation is a defining attribute of expertise or of being an expert, as captured by the following definitions: • "Experts are favored with a trait of flexibility" (Bereiter and Scardamalia 1993, p. 109) • "Expert performance is an extreme adaptation to task constraints mediated through deliberate practice" (Ericsson and Lehmann 1996, p. 291) • "An expert will have succeeded in adapting to the inherent constraints of the task" (Holyoak 1991, p. 309).	This perspective has widely adopted in the field of expertise research (Ericsson 2014; Ericsson <i>et al.</i> 2006, 2018).	In this stream of research, scholars contrasted experts with: • <i>Laymen</i> • <i>Non-experts</i> • <i>Novices</i>
Adaptive expertise Smith <i>et al.</i> (1997)	"Adaptivity or adaptive expertise is evidenced when the individual responds successfully to changes in the nature of trained tasks" (Smith <i>et al.</i> 1997, p. 93).	See the review study of Baard <i>et al.</i> (2014) for the application of this concept in empirical research that covers a variety of expertise domains.	<i>Routine expertise:</i> Contrasted with routine expertise following the conceptualizations of adaptive expertise (Hatano and Inagaki 1986) and expertise (Holyoak 1991; Smith <i>et al.</i> 1997).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Flexpertise Van der Heijden (1998, 2000)	"The ability to maintain a certain amount of expertise under changing circumstances and in different situations, and also the mastery of certain learning strategies and learning skills to reach a certain level of expertise in any domain" (Van der Heijden 1998, p. 69).	Used as foundation for domain-generic measurement of adaptive expertise (Bohle Carbonell <i>et al.</i> 2016; Grenier 2021).	• <i>Occupational expertise</i> Building upon previous conceptualizations of expertise [see appendix Van der Heijden (1998)], the author operationalized the ability to adapt as a defining element of occupational expertise. • <i>Adaptive/flexible vs. routine/specialized expertise</i>: Van der Heijden used the flexpertise concept to elaborate on the 'growth and flexibility' dimension of occupational expertise, thereby building upon the distinctions between routine and adaptive expertise (Hatano and Inagaki 1986), and specialized and flexible expertise (Aite-Peña 1990; Hoyer 1987). • <i>Expertise development / performance</i>: The flexpertise concept added the expertise development and expert performance in adjacent and radically different fields to the adaptive expertise concept of Hatano and Inagaki (1986). • <i>Creative expertise</i>: Expertise development in the definition of flexpertise (Van der Heijden 1998) includes the creation of new expertise (Kim 2021), also known as creative expertise (Simonton 1996).
Flexpertise Lahn <i>et al.</i> (1998) Lahn (2003)	"Older workers who have a biography of occupational mobility are said to be in possession of flexpertise" (Lahn 2003, p. 135).	Lahn (2003) has been cited in the field of continuous education, professional development and ageing, however without specific reference to this flexpertise concept.	Protean careers: • Careers that are driven by the individual and not by the organization (Hall 1976), and these could lead to flexpertise (Van der Heijden 1998). • Flexpertise among older workers contradicts with the finding that they tended to be moved to margins along their protean career (Lahn 2003).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Ivancic and Hesketh (2000)	"The capacity to modify a response to suit changed conditions or invent new strategies when required" (Ivancic and Hesketh 2000, p. 1967)	Used to understand the value of error training for learning (Ivancic and Hesketh 2000) See the review study of Baard <i>et al.</i> (2014) for the application of this concept in empirical research that covers a variety of expertise domains.	Concept based upon Smith <i>et al.</i> (1997) <i>Adaptability and transfer:</i> Adaptive expertise involves adaptability and transfer. "Adaptability can involve recognizing that a rule or strategy learned in one context can be applied to an analogous situation. More challenging tests of adaptability require individuals to modify a learned procedure to invent a new solution strategy, which will be termed adaptive transfer" (Ivancic and Hesketh 2000, p. 1967). Concept was not contrasted with routine expertise as was done in the aforementioned conceptualizations of adaptive expertise.
Learning agility Lombardo and Eichinger (2000)	Defined as "the willingness and ability to learn new competences in order to perform under first-time, tough, or different conditions" (Lombardo and Eichinger 2000, p. 323). Learning agility involves the dimensions people, results, mental and change agility.	- Coined in field of Human Resource Management - Adopted in field of management and organization (De Rue <i>et al.</i> 2012).	<i>Development of new knowledge and skills:</i> - Authors did not explicitly referred to expertise. - Learning agility is included in this overview as it addresses how people deal with the novelty of a situation, sometimes requiring the development of new knowledge and skills.

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Schwartz <i>et al.</i> (2005)	Building upon Hatano and Inagaki (1986), these scholars defined adaptive expertise as the ability by which workers make a balanced decision whether efficiency or innovation of practices is required, and to act accordingly.	Predominately applied in field of vocational education, specifically: • Teacher development (Hammerness <i>et al.</i> 2005) • Special teacher education (De Arment <i>et al.</i> 2013) • Health professionals' education (Pusic <i>et al.</i> 2018)	This definition of adaptive expertise involves the following concepts: • <i>Efficiency</i>: Standardization for which <i>routine expertise</i> is required • <i>Innovation</i>: Breaking ground and deviation from routines.
Expertise redevelopment Grenier and Kehrhahn (2008)	• Grenier and Kehrhahn (2008) defined the concept by their Model of Expertise Redevelopment (MER) involving cyclic processes by which an expert goes through stages of dependence, independence and transcendence. • In this transition across stages, experts become less dependent upon external knowledge resources and can increasingly rely on themselves by the internalization of their new expertise.	Conceptual studies in which expertise redevelopment was applied to: • Sports coaching (Turner <i>et al.</i> 2012) • Cultural artefacts (Grenier 2013). Following a review of the HRD literature, Cherrstrom and Bixby (2018) concluded: • Model of Expertise Redevelopment not widely adopted in HRD field, however, addressed an emergent area within expertise research.	• <i>Flexpertise and career</i>: Grenier and Kehrhahn (2008) positioned expertise redevelopment into a broader career perspective by referring to the flexpertise concept (Van der Heijden 2000). • <i>Expertise is not an endpoint</i>: Expertise redevelopment concept addresses how one retains expertise within a certain domain, and continues to develop expertise in other domains by making references to the concepts flexpertise (Van der Heijden 2000, 2002a) and adaptive expertise (Hatano and Inagaki 1986). • <i>Similar stage model</i>: We noted that the literature review by Alderson (2010) described similar stages as Grenier and Kehrhahn (2008) for expertise development, i.e., dependence, independence and interdependence (cf. Covey 1989).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Bell and Kozlowski (2010)	Defined as the “ability to flexibly adjust one’s learning when the task becomes more difficult, complex and dynamic” (Bell and Kozlowski 2010, p. 92). Developed through enhancing the cognitive, motivational and affective self-regulatory processes during training, and becomes manifest in adaptation, or near or far transfer.	See the review study of Baard <i>et al.</i> (2014) for the application of this concept in empirical research that covers a variety of expertise domains.	• Conceptualization based upon Smith <i>et al.</i> (1997) and Ivancic and Hesketh (2000). • Contrasted with <i>routine expertise</i>.
Flexible expertise Kalyuga <i>et al.</i> (2010)	Defined by its essential attributes: medium knowledge generality, i.e., a “sensible compromise between generality and power,” well-developed self-regulation and metacognitive skills (Kalyuga <i>et al.</i> 2010, p. 178).	Introduced as a domain-generic concept in literature review regarding flexible problem-solving that is required when dealing with novel information (Kalyuga <i>et al.</i> 2010).	• <i>Cognitive load</i>: Kalyuga <i>et al.</i> (2010) addressed the role of working memory limits when dealing with novel information, thereby building upon the cognitive load theory (Sweller 1988). • <i>Routine knowledge and skills</i>: • Contrasted flexible expertise with routine knowledge and skills, partly through making references to Hatano and Inagaki (1986).
Flexpertise Perkins (2010)	Introduced as a play on words, and described as “a more restless and rangy quality of knowing” (Perkins 2010, p. 11).	Perkins (2010) has been cited in the field of education, however without specific reference to this flexpertise concept.	• Expertise / over-specialization: Contrasted with expertise as “a traditional and important target of university education, but expertise can easily veer toward overspecialization” (Perkins 2010, p. 11). • We noted that this differentiation resembles the distinction made by Perelman (1984).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Flexible expertise Birney <i>et al.</i> (2012)	The “context appropriate, balanced cluster of learning oriented, self-regulatory and metacognitive processes that moderate and mediate the application of abilities and previously acquired knowledge to problem solution, future knowledge acquisition...” (Birney <i>et al.</i> 2012, p. 573).	In their literature review, Birney <i>et al.</i> (2012) applied this concept to leadership development.	<i>Routine expertise:</i> Birney <i>et al.</i> (2012) perceived flexible expertise as qualitatively different from routine expertise, without citing previous distinctions between adaptive and routine expertise.
Habitual creativity Glăveanu (2012)	Mastery of expertise involves the highest level of habitual action associated with the highest level of creative expression within a domain, together reflecting habitual creativity.	Concept based upon literature review regarding: - expert performance (e.g., Ericsson 1999) and, - creativity (e.g., Simonton 2003).	<i>Inflexibility:</i> - Glăveanu (2012) opposed the view that gaining mastery in expertise necessarily coincides with an increased inflexibility as a result of habits or routines [cf. Dane (2010) and Kalyuga <i>et al.</i> (2010)]. <i>Improvisation / innovation:</i> - Specifically, he posited that experts need to constantly adjust in a dynamic context, making transitions between routines, and by combining different routines, thereby perfecting their practices partly as a result of improvisation and innovation. <i>Adaptive expertise:</i> - From Glăveanu’s (2012) theoretical outline, we concluded that the co-occurrence of habitual action and improvisation or innovation seems to resemble the balance act between efficiency and innovation as proposed by Schwartz <i>et al.</i> (2005) in the context of adaptive expertise.

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Learning agility	DeRue <i>et al.</i> (2012, pp. 262-263) redefined Lombardo and Eichinger's (2000) concept, based upon their literature review, as the "ability to come up to speed quickly in one's understanding of a situation and move across ideas flexibly in service of learning both within and across experiences".	- Positioned as a domain-generic concept (DeRue <i>et al.</i> 2012). - See furthermore De Meuse (2019) for a meta-analysis of learning agility research in the context of leadership development.	<i>Adaptive experts:</i> We noted that the focus of DeRue <i>et al.</i> (2012) on speed could relate to Hatano and Inagaki's (1986) proposition that adaptive experts can quickly overcome novelty.
Flexpertise	"To resolve complicated problems through creative and innovative interventions" (Kuittinen <i>et al.</i> 2014, p.65)	- Introduced in the context of a measurement of domain-specific key competencies of psychologists. - Not adopted by other fields.	<i>Competence:</i> Flexpertise is approached as an example of a competency in the context of the following definitions: "Competence can refer either to minimal competencies required in a profession or to aspirational goals striving toward the highest level of competence and expertise" (Kuittinen <i>et al.</i> 2014, p. 64). "Competence is a universal concept that refers to knowledge, skills and attitudes, whereas competencies are actual elements of competence. Competencies are discernible, assessable, containable, feasible, derived by experts and adaptable, and they are all essential for professional practice" (Kuittinen <i>et al.</i> 2014, p. 66).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Bohle Carbonell <i>et al.</i> (2014)	Bohle Carbonell <i>et al.</i> (2014) refined Hatano and Inagaki's (1986) definition by the factors that differentiate adaptive experts from routine experts. These are the knowledge representation (i.e., higher degree of organization and abstraction of their knowledge), a higher level of analogical problem-solving abilities and a higher self-efficacy to perform a task.	- Bohle Carbonell <i>et al.</i> (2014) reviewed antecedents and performance indicators of adaptive expertise in educational and professional settings covering various expertise domains. - Their review was used as the foundation for a measurement instrument of adaptive expertise (Bohle Carbonell <i>et al.</i> 2016).	<i>Flexexpertise and career:</i> Bohle Carbonell <i>et al.</i> (2014) referred to the flexexpertise concept (Van der Heijden 2000) to position their adaptive expertise concept into a broader career perspective. <i>Occupational expertise:</i> According to Bohle Carbonell <i>et al.</i> (2014), citing Van der Heijden (2000), adaptive expertise is a form of occupational expertise that should be studied by solving unfamiliar and realistic problems in a social context involving the need for social recognition. <i>Expert performance:</i> As such, adaptive expertise research differs from scholarly work on expert performance that focuses on the adaptations that an individual makes to attain reproducible, objective and superior performance on relatively standardized tasks which are representative of a domain irrespective of social appreciation (e.g., Ericsson 1999, 2014; Ericsson and Lehmann 1996; Ericsson <i>et al.</i> 2007). <i>Routine expertise:</i> Bohle Carbonell <i>et al.</i> (1984) contrasted adaptive expertise with routine expertise following Hatano and Inagaki (1984).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Adaptive expertise Baard <i>et al.</i> (2014)	Adaptive expertise is a form of <i>performance adaptation</i> which was defined as the “cognitive, affective, motivational and behavioral modifications made in response to the demands of a new or changing environment, or situational demands” (Baard <i>et al.</i> 2014, p. 50).	Baard <i>et al.</i> (2014) provided an overview of adaptive expertise conceptualizations that were used in empirical research and covering a variety of expertise domains (see their Table 3 and 4).	• <i>Performance change:</i> Concept positioned within the stream of research focusing on performance change, rooted in the field of expertise acquisition (e.g., Holyoak 1991) and skill acquisition (e.g., Kanfer and Ackerman 1989). • <i>Routine performance:</i> Baard <i>et al.</i> (2014) contrasted this form of performance adaptation with routine performance. • <i>Adaptive performance:</i> We noted that Jundt <i>et al.</i> (2015, p. S55) similarly positioned adaptive expertise as a form of adaptive performance, defined as “task-performance-directed job behaviors individuals enact in response to or anticipation of changes relevant to job-related tasks”.
Adaptive expertise Hytönen <i>et al.</i> (2016)	Defined as “a professional’s personal efforts aimed at deliberately improving his or her professional competence, seeking alternative solutions for existing professional practices and becoming an active knowledge-building and networking actor in his or her professional field in order to reach the highest levels of professional competence” (Hytönen <i>et al.</i> 2016, p. 337).	Cited in review study of Wallin <i>et al.</i> (2019) regarding continuous development of occupational expertise through work-based higher education.	• <i>Expertise:</i> Hytönen <i>et al.</i> (2016) referenced Hatano and Inagaki (1986) and previous conceptualizations of expertise (e.g., Bereiter and Scardamalia 1993). • <i>Routines:</i> Contrasted adaptive expertise with routines, similar to distinction between adaptive and routine expertise (Hatano and Inagaki 1986).
Flexpertise Unsworth (2016)	“The open-minded application of expert knowledge, frequently challenged to ensure that it converges towards an ‘official’ view on contract clauses – reflecting the multiplicity required because of the real-life application of expert knowledge in multiple contexts” (Unsworth 2016, p. 114).	• Authors derived the terms flexpert and flexpertise from their ‘expert corporation’ in contracting processes. • Study not cited by other studies.	<i>Flexpert:</i> A worker with flexpertise is named a flexpert, defined as “a new breed of experts with open minds and cooperative attitudes” (Unsworth 2016, p. 105).

Appendix 3.1 Continued

Concept	Definition/conceptualization	Field(s) in which concept was adopted (citations checked in Google Scholar until November 2021)	Positioning of concept within nomological network of related concepts and models (i.e., relation to previously introduced concepts, and relation to higher order, similar and contrasting concepts)
Expertise as the <i>sine qua non</i> of expertise	Ward <i>et al.</i> (2018, p. 37) defined expertise as the “skilled adaptation to complexity” and as a “process of continual learning and development”. As such, expertise is a “process of adaptation and the ability to deal with change”.	Based upon literature review, specifically addressing studies regarding Naturalistic Decision Making (Ward <i>et al.</i> 2018).	• <i>Expertise involves adaptation:</i> Conceptualization in line with aforementioned scholars perceive adaptation to be an essential attribute of expertise or being an expert (e.g., Ericsson and Lehmann 1996). • <i>Journeyman:</i> Contrasted experts with a journeyman, i.e., “an experienced person who has practiced until he can reliably get it right more often than not and can perform competently without supervision” (Ward <i>et al.</i> 2018, p. 38).
Expertise renewal	Defined as the ability of flexperts to renew their expertise along their career.	Labeled as an emerging concept in expertise research (Kim 2021).	• <i>Flexpertise:</i> Concept based upon flexpertise concept (Van der Heijden 1998, 2000). • <i>Flexperts:</i> Workers with relatively high levels of flexpertise (Frie <i>et al.</i> 2019). • <i>Innovation / expertise creation:</i> Flexpertise definition incorporates the usage of expertise for innovation and the creation of new areas of expertise (Kim 2021).
Generative expertise	Generative expertise involves a critical reexamination of one’s procedural, conditional and conceptual knowledge. If workers recognize that the current domain does not account for a novel or complex instance, they will investigate novel responses “outside their domain to expand the own domain” (Swan <i>et al.</i> 2020, p. 2561).	Concept based upon literature review regarding the nature and development of expertise in different expertise domains.	• <i>Master / adaptive expert:</i> Swan <i>et al.</i> (2020) outlined that the highest level of expertise in expertise development models (Dreyfus and Dreyfus 1986, 2008; Hoffman 1998), i.e., being a master, is associated with endeavors to set new standards in a domain likewise adaptive experts tend to do (Hatano and Inagaki 1984).

Appendix 3.2 Supporting information: Method including detailed PECOS framework

To be published online only after acceptance of paper

This document contains supplementary information regarding the search and selection processes as summarized by Figure 3.2 in the article. The Appendix A in this document contains the detailed description of the inclusion and exclusion criteria we defined by using the PECOS framework.

Search process

Our search for literature regarding flexible or adaptive forms of expertise that workers need to meet new expertise needs in their dynamic and social working contexts, consisted of three steps.

Step 1: Systematic searches

We first conducted a systematic search in databases covering the aforementioned scholarly fields, using a search string of flexibility, expertise, and working context keywords (Denyer and Tranfield 2009). We used the following search syntax: (flex* OR adapt* OR agil* OR inflex* OR non?flex* OR redevelop* OR <subject heading / thesaurus term>) AND (expertise OR <subject heading / thesaurus term at same level as term expertise> OR speciali?ation) AND (work* OR profession* OR employ* OR job* OR occupation* OR personnel* OR labor OR labour). As we aimed for a broad literature search, we used the following databases: EBSCO (Academic Search Ultimate, Business Source Complete, EconLit, Psychological and Behavioral Sciences Collection), OVID (ERIC, PsychInfo), and Web of Science. We did not set any restrictions regarding the publication date, and searched for literature published up to and including December 2020. We identified 10,584 records through this systematic search.

Step 2: Searches through other means

In addition to the systematic search, we conducted a snowballing search (Wohlin 2014) for books containing potentially relevant chapters. We searched for books with “expertise” in either the title or used as a keyword in the extensive international library database of a Dutch research university. If available, we reviewed the abstract or table of contents for tentatively relevant chapters. Similarly, we searched in dissertation databases (i.e., Narcis and OATD¹) for potentially relevant dissertations. Furthermore, we conducted a manual search for possible relevant articles in the reference list of studies that we identified when scoping our review. This search resulted in the identification of 46 additional records.

¹ Narcis is a Dutch research database. OATD is an open access thesis and dissertations database.

Step 3: Storage of search results into one EndNote database

We stored the output lists of the two search strategies into an Endnote database containing 10,630 records and used this database for the next phase, that is the selection process.

Selection process

Throughout the selection process, we used the PECOS framework (Daniels 2019; Morgan *et al.* 2018²) for the systematic selection of suitable studies. The PECOS elements refer to the Population, Exposure, Comparators, Outcomes and Study designs which studies address. Appendix A outlines per PECOS element which criteria we used to include or exclude studies that we identified through our search process. A study was only included if all inclusion criteria were met. Below, we describe our selection process that consisted of four steps.

Step 1: Leaving out duplicates and records that did not fit publication language and type

We started the selection process with removing 2,912 duplicates from the EndNote database. Next, we screened the records using the information regarding the publication language and publication type from EndNote. We excluded 675 non-English publications, and 609 records that, although comprising English language publications, did not fit the categories of peer-reviewed articles, academic books (chapters), and dissertations.

Step 2: Selection of records based on information from title, keywords, and abstract

Subsequently, we screened the relevance of the remaining 5,545 records by comparing title, keywords, and abstract content with the inclusion and exclusion criteria from Appendix A. This resulted in the categorization of records: “include” (114), “maybe include” (302), and “exclude” (6,018). Next, consistency and transparency of screening the inclusion criteria were checked by the research assistant who reviewed a stratified random sample of 8,7% of the records (i.e., peer-reviewed articles, books, and dissertations) categorized as “maybe include” (Snape *et al.* 2017). The interrater agreement was 94.4% and Cohen’s kappa (k) was .58, indicating fair agreement (Cicchetti 1994). Cohen’s k per publication type was: articles = .55; book chapters = .54; doctoral dissertations = .77. There was a difference in sensitivity (i.e., the proportionate accuracy of positive cases: $P_{\text{pos}} = .58$) and specificity (i.e., the proportionate accuracy of negative cases: $P_{\text{neg}} .97$; Cicchetti and Feinstein 1990).

² This article describes how to use the PECOS framework for reviews covering multiple types of research designs.

This indicates that there was less agreement about the identification of studies that needed to be included (i.e., the sensitivity) than about the identification of studies that should be excluded (i.e., the specificity). It implied that in this step of the selection process (screening the title, keywords, and abstract of each record), we might have included studies that, after close reading of the whole text, were nevertheless excluded later on. These outcomes were therefore in line with our goal not to miss possibly relevant studies.

The research team discussed the records with differing ratings and an exemplifying sample of 15 “maybe include” records. We noticed that the ambiguity pertained to studies dealing with the definition of novelty as discussed by Bohle Carbonell *et al.* (2014), and identified that novelty ranged from changes within one’s domain or within one’s actual working setting to the development and application of expertise in radically different fields or working contexts (Van der Heijden 2002). During the scoping of our review, we identified that responses to changes within one’s expertise domain and within one’s current working context were extensively covered in the selected review studies. Therefore, we decided to refine our selection criteria by only including records that addressed the acquisition of a new expertise domain and/or the enactment of expertise in a novel working context during the following steps of the selection process.

Step 3: Selection based on full-text review

As a subsequent selection step, the first author conducted a full-text review of the records rated as a “include” and “maybe include” (comprising in total 416 publications), and re-rated the records as “include”, “maybe include”, and “exclude”. Again, the inter-rater agreement was assessed using a subsample of 28 peer-reviewed articles rated as “maybe include”, resulting into an inter-rater agreement of 85.7% and a Cohen’s k of .62 showing good agreement (Cicchetti 1994). The first and second author discussed the differences in rating, and reviewed an additional sample of 10 “maybe include” cases. We made a final decision about which studies to include based on the full review of the text and informed consent. We excluded an additional amount of 265 studies that did not fit the content criteria. Another 19 studies were excluded as they were not fitting the type of studies in our review scope, e.g., articles that were not peer-reviewed (18) and one conference paper. Twenty-six studies were neither accessible through our databases nor through the interlibrary loan system.

Next, we checked for overlap between dissertations, book(chapters), and peer-reviewed articles. In case of overlapping content, we selected the peer-reviewed article and excluded the dissertation or book(chapter) given the underlying,

independent, editorial decision process in case of peer-reviewed articles, leading to the exclusion of an additional 7 records.

Step 4: Classification of final sample

The selection process resulted into a final database of 107 studies. This database consisted of 80 peer-reviewed articles and 6 dissertations and 21 books and book chapters³. Finally, we classified peer-reviewed articles as either a review study (20), conceptual study (12), or empirical study (48). Analogous to Grant and Booth (2009), we noticed that a variety of review types is used among scholars. In particular, depending on the research field, different review approaches are applied, using different typologies for similar approaches and similar review names for different approaches. Similarly to what Grant and Booth (2009) concluded, many review studies reported little or nothing about the search, appraisal, synthesis and analysis processes, and the characteristics of the review samples. Therefore, the review approach was difficult to assess as well as the distinction between a review and conceptual article. Based on informed consent in the review team, we used the broad criteria of Foster and Jewell (2017) to differentiate between review and conceptual studies. We labelled a study as a review study if it either fitted the category of systematic reviews or literature reviews of Foster and Jewell (2017, pp. 6-7): "Systematic reviews provide synthesized information, built on other studies but providing new insight into a phenomenon, topic, or situation [...] they are reviews of the research literature using systematic and transparent methods". "Literature reviews are usually written for one of three potential purposes: as an introduction to a primary research article, as evidence justifying the case made in a proposal, or as a general overview of a topic." We selected the publications providing a general overview of a topic as literature review. We labelled a certain study as conceptual if it did not include the author(s)' claim of having conducted a review or if it was not published in a journal focused on review studies.

³ In case of an edited academic book, we counted the selected chapters as separate publications, leading to a total number of 21 books and book chapters.

References

- Billett, S., Harteis, C. and Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn. Cambridge: Cambridge University Press, pp. 105-126.
- Bohle Carbonell, K., Stalmeier, R.E., Könings, K.D., Segers, M. and Van Merriënboer, J.J.G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, **12**, pp. 14-29.
- Cicchetti, D.V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment*, **6**, pp. 284-290.
- Cicchetti, D.V. and Feinstein, A.R. (1990). High agreement but low kappa: II. Resolving the paradoxes. *Journal of Clinical Epidemiology*, **43**, pp. 551-558.
- Dall'Alba, G. (2018). Reframing expertise in its development: A lifeworld perspective. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn. Cambridge: Cambridge University Press, pp. 33-39.
- Daniels, K. (2019). Guidance on conducting and reviewing systematic reviews (and meta-analyses) in work and organizational psychology. *European Journal of Work and Organizational Psychology*, **28**, pp. 1-10.
- Denyer, D. and Tranfield, D. (2009). *Producing a systematic review*. In D.A. Buchanan and A. Bryman (eds), *The Sage handbook of organizational research methods*. Thousand Oaks, CA: Sage, pp. 671-689.
- Foster, M.J. and Jewell, S. T. (eds). (2017). *Assembling the pieces of a systematic review: A guide for librarians*. London: Rowman & Littlefield.
- Frie, L.S., Potting, K.C.J.M., Sjoer, E., Van der Heijden, B.I.J.M. and Korzilius, H.P.L.M. (2019). How flexexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, **30**, pp. 61-79.
- Grant, M.J. and Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, **26**, pp. 91-108.
- Grenier, R.S. and Kehrnhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, **7**, pp. 198-217.
- Mieg, H.A. and Evetts, J. (2018). Professionalism, science, and expert roles: A social perspective. In K.A. Ericsson, R.R. Hoffman, A. Kozbelt and A.M. Williams (eds), *The Cambridge handbook of expertise and expert performance* 2nd edn., Cambridge: Cambridge University Press, pp. 127-148.
- Morgan, R.L., Whaley, P., Thayer, K.A. and Schünemann, H.J. (2018). Identifying the PECO: A framework for formulating good questions to explore the association of environmental and other exposures with health outcomes. *Environment International*, **121 (Pt 1)**, pp. 1027-1031.
- Njoku, J.C., Van der Heijden, B.I.J.M. and Inanga, E.L. (2010). Fusion of expertise among accounting faculty: towards an expertise model for academia in accounting. *Critical Perspectives on Accounting*, **21**, pp. 51-62.
- Snape, D., Meads, C., Bagnall, A., Tregaskis, O. and Mansfield, L. (2017). *What works wellbeing: A guide to our evidence review methods* (Project report). London: What works Centre for Wellbeing. Retrieved from <http://eprints.leedsbeckett.ac.uk/3660/>
- Van der Heijden, B.I.J.M. (1998). *The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch professionals*. Doctoral dissertation, University of Twente, the Netherlands. Retrieved from <https://hdl.handle.net/2066/127534>

- Van der Heijden, B.I.J.M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, **11**, pp. 9-39.
- Van der Heijden, B.I.J.M. (2002). Prerequisites to guarantee life-long employability. *Personnel Review*, **31**, pp. 44-61.
- Wohlin, C. (2014). Guidelines for snowballing in systematic literature studies and a replication in software engineering. In *Proceedings of the 18th international conference on evaluation and assessment in software engineering*. New York: Association for Computing Machinery, pp. 1-10.

Appendix A PECOS framework

Table 3.2 below shows the inclusion and exclusion criteria per PECOS element, that we defined for the systematic selection of studies.

Table 3.2 PECOS framework

Inclusion criteria	Exclusion criteria
Population	
<i>Workers with occupational expertise:</i> Workers, including experts, who work in dynamic and social working contexts, performing at different levels of occupational expertise in their domain(s). Experts are workers who possess relatively high levels of occupational expertise (Van der Heijden 1998, 2000, p. 17).	<i>Novices/students:</i> Studies will be excluded in cases where they only focus on novices who are in the process of developing occupational expertise and have not yet enacted this expertise as a worker in a professional context. Furthermore, studies addressing how students develop flexible or adaptive expertise in an educational setting will be excluded, unless the application of this form of expertise development is addressed in a dynamic and social working context. <i>Workers with non-work-related illnesses / pathology:</i> Our focus is on understanding an individual's functioning in response to changing expertise needs in their dynamic and social working contexts. This implies that, for example, studies regarding burn-out as a result of an insufficiency to cope with changing job or expertise needs will be included. However, studies regarding non-work-related handicaps or illnesses (e.g., physical disabilities) which impact how individuals can work, in general, will be excluded. <i>Expert systems:</i> Studies regarding expert systems (i.e., software simulating human cognitive processes) will be excluded, as our primary interest is in human adaptation processes in naturalistic settings. <i>Animal studies:</i> Studies regarding flexible expertise of animals will be excluded because of our interest in human expertise.

Table 3.2 Continued

Inclusion criteria	Exclusion criteria
Exposure <i>Exposure to changing expertise needs:</i> Studies addressing the exposure to one or more new expertise needs in a working context, as a result of changes in one's enactment context(s), expertise domain(s), and/or the audiences (stakeholders) who need to recognize one's expertise and/or contributions to practice (Frie <i>et al.</i> 2019; Grenier and Kehrhahn 2008), and/or studies addressing the individual's desire to enact one's expertise in a novel context and/or to develop new expertise after having attained initial expertise. Studies addressing dynamic and social working contexts, referring to the volatile workplace(s) in which the individual is working in social interaction with others (Billett <i>et al.</i> 2018; Dall'Alba 2018; Mieg and Evetts 2018). <i>Specific criterion for inclusion of empirical studies in peer-reviewed journal articles, book (chapters), and dissertations:</i> Need to address the enactment of one's expertise and/or redevelopment of expertise across the boundaries of one's working context and/or expertise domain, and/or addressing the individual's adaptation processes in dynamic and social working contexts. An illustrative example is an accountant becoming a university teacher (e.g., Njoku <i>et al.</i> 2010). This requires an individual to develop a new field of expertise (in this case didactics) and to learn how to enact one's expertise in a new organizational setting (university instead of business).	<i>Changes that do not impact one's area of expertise:</i> Studies that address type of changes which do not specifically influence an individual's expertise enactment or redevelopment. For example, studies dealing with stress or new procedures not related to a worker's specific area of expertise will be excluded. <i>Performance at isolated tasks without considerable task variation:</i> Studies that address the process of learning to master a single task without considerable task variation will be excluded, as this does not require substantial adaptation and social interaction (e.g., learning of motor skills, such as the handstand, or perceptual recognition). <i>Non-workplace settings:</i> Studies that do not involve or represent a dynamic and social working context will be excluded (e.g., laboratory studies analyzing the performance on isolated tasks or simulations). <i>Specific criterion for exclusion of empirical studies in peer-reviewed journal articles, book (chapters), and dissertations:</i> Studies solely addressing responses to changes <i>within</i> an expertise domain or <i>within</i> a current working context will be excluded. An example of 'within changes' is a teacher who is dealing with unexpected classroom events or with a curriculum update.
Comparators <i>Inter- and intra-individual differences:</i> Studies addressing degrees or variations in level of competence or ability to respond flexibly or adaptively to changing expertise needs. The selected studies should address inter-individual and/or intra-individual differences.	<i>Flexible or adaptive team or organization expertise:</i> Studies that solely address how teams or organizations deal with changing expertise needs are excluded, unless they describe how individuals respond flexibly or adaptively in relation to their area of expertise.

Table 3.2 Continued

Inclusion criteria	Exclusion criteria
Outcomes	
All outcome measures related to individual, organizational, and societal outcomes.	No predefined criteria to exclude studies based upon outcome measures.
Study designs	
<i>Review, conceptual, and empirical studies (quantitative and qualitative):</i> Published in peer-reviewed journal articles, academic books (chapters) or PhD dissertations addressing flexible or adaptive forms of expertise that are needed in dynamic and social working contexts.	<i>Other publication types:</i> Other publication types: e.g., conference papers, book reviews, news items, reports, practice handbooks, study guides, commentaries, and editorials. <i>Not main topic:</i> Peer-reviewed articles, books (or book chapters) or PhD dissertations in which the flexible or adaptive forms of expertise are not the major topic of study. For example, when the specific record reports that adaptive expertise is required by citing the source of the concept without further elaboration, or studies that describe that workers need to have flexibility without an elaboration of what this flexibility entails.

4

What enables workers to meet new expertise needs throughout their careers:

A group model building approach with HR/D practitioners

This chapter is submitted for publication in a peer-reviewed HRD journal as:

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Abstract

Complex transitions at the organizational and societal level require that workers upskill and reskill by developing new expertise within and across the boundaries of their current domain(s). This may also require workers to materialize their expertise in novel settings in interaction with stakeholders who hold different expectations regarding the workers' know-how and contributions. These shifting expertise needs require worker adaptivity to create beneficial outcomes for themselves and their surrounding stakeholders, as captured by the so-called *flexpertise* concept. Thus far, expertise research largely did not address how workers adapt in naturalistic settings in which they encounter various new expertise needs through intra-individual changes over time and social interactions. To increase our understanding of the dynamic nature of this system of iterative cycles of adaptation processes, we conducted a Group Model Building study with HR/D practitioners. Through this structured group facilitation method, these practitioners co-created a dynamic process model, based upon their varied experiences in practice regarding the individual's ability to meet new expertise needs. Our newly developed model portrays how workers make balanced decisions to adapt, go through loops of learning-by-mistakes and successes, and ultimately turn their new know-how into outcomes, with or without impact, that lead to new cycles of adaptation. Furthermore, leverage points were defined where the adaptivity of an individual can be stimulated through providing HR/D practices. This detailed understanding of the flexpertise phenomenon may set the agenda for future expertise and employability research, and provides the foundation for designing bundles of HR/D practices to foster flexpertise.

KEYWORDS: adaptive performance, adaptivity, expertise, flexpertise, employability, GMB, HRD, system dynamics.

4.1 Introduction

Complex organizational and societal transitions require workers to collaborate in multi-disciplinary teams across the boundaries of their organizations and to realize innovative solutions for complex problems (Martins et al., 2019; Van Mierlo & Beers, 2020). Furthermore, workers may encounter new labor demands due to developments such as the transition to a green economy, application of advanced technology or new international legislation, that create a need for the upskilling or reskilling of their current expertise (Moats, 2021; WEF, 2023). More specifically, these shifting demands may require workers to develop new know-how within and across the boundaries of their domain(s) of expertise, to materialize their expertise in novel settings, and to (re)gain recognition for their know-how and contributions by surrounding stakeholders to stay employable (Frie et al., 2019; Grenier & Kehrhahn, 2008). The term *flexpertise* was coined to describe the adaptive ability required from workers to meet these new expertise needs throughout their career (Van der Heijden, 1998, 2000). Flexpertise is assumed to necessitate an interplay of intra-individual changes over time as well as social interactions with surrounding stakeholders, manifesting in the creation of beneficial outcomes for the workers themselves and relevant third parties (authors, sixth resubmission round; Frie et al., 2019; Gruber & Harteis, 2018).

Although workers are expected to fulfill new expertise needs to an increasing extent (Germain, 2021; WEF, 2023), doing so is not an easy process and not necessarily something every worker aspires to do or masters (Van der Heijden, 2005). Research has shown that workers could become inflexible in their thinking and acting and experience a more limited motivation to adapt because of ingrained routines, habits or beliefs, which may lower their expert performance (Dane, 2010; Feltovich et al., 1997; Lysova et al., 2018). In the long term, this may result in the employability of individuals being at stake if they are not able to proactively or reactively respond to shifting expertise needs (Van der Heijde & Van der Heijden, 2006; Van der Heijden, 2002). We argue that the HR/D function should play an important role in fostering the adaptivity that workers across expertise domains and job roles need to display, so that they may aid in overcoming or preventing such inflexibility (e.g., Jang & Ardichvili, 2020). More specifically, the HR/D function can support workers in the ongoing adaptation and expertise redevelopment that they must effectuate to safeguard their required level of expert performance (Cherrstrom & Bixby, 2018; Grenier & Kehrhahn, 2008; Wallin et al., 2019) in working contexts that are volatile, unexpected, complex, and ambiguous (VUCA) (Baran & Woznyj, 2020; Bennett & Lemoine 2014).

Thus far, we have only a limited understanding of how workers can meet new expertise needs on an ongoing basis, and of which HR/D practices may help them to prevent their adaptivity from being hampered. This limited understanding is partly because various concepts regarding flexible or adaptive forms of expertise were introduced in different scholarly disciplines (authors, sixth resubmission round). Examples of these concepts are adaptive expertise (Cupido et al., 2022; Hatano & Inagaki, 1986; Pelgrim et al., 2022; Schwartz et al., 2005), expertise redevelopment (Grenier & Kehrhahn, 2008), expertise renewal (Frie et al., 2019) and flexible expertise (Birney et al., 2012). Thus far, most empirical research has focused on the traits or competencies that enable adaptive responses to single changes within the current working context and their outcomes at an individual level (Bohle Carbonell et al., 2014), as well as the effectiveness of HR/D practices and vocational education for learning new knowledge and skills for ongoing development within the area of expertise (Cherrstrom & Bixby, 2018; Wallin et al., 2019). In contrast, the influence of social interactions with stakeholders with varying needs and expectations (Jundt et al., 2015; Kim, 2021), as well as the extent to which the expertise of an individual materializes at a team or an organizational level, has been underexposed in empirical research (Baard et al., 2014; Marand & Noe, 2017). More specifically, increasing our understanding about multi-level outcomes is required given the notion that beneficial outcomes for the individual workers and their surrounding stakeholders are both needed to safeguard the workers' career sustainability (Van der Heijden & De Vos, 2015). A few scholars already proposed process models, describing how an individual adapts through iterative cycles of adaptation processes, to illustrate the ability of the individual to meet new expertise needs (Frie et al., 2019). Notwithstanding their promising approach, we posit that these models have limitations as they focus on specific adaptive processes such as decision-making in naturalistic settings that involve ongoing change (Ward et al., 2018), and the learning stages that underly expertise redevelopment (Grenier & Kehrhahn, 2008). As such, these models do not represent the full range of adaptation processes and their interplay, which range and interplay are both needed in real-life workplace settings. Building upon retrospective interviews with flexexperts, the Model of Expertise Renewal (Frie et al., 2019) contained multiple types of adaptation processes, but was limited in terms of generalizability due to the small sample size. This means that more research is needed in order to close this knowledge gap, and to increase our understanding of the flexexpertise phenomenon.

To summarize, the segmented focus in the field created a lacuna in our understanding of *how* workers can adapt in naturalistic work settings; accordingly, the aim of this study is to gain more insight into the different types of dynamic adaptation

processes that an individual worker engages in when dealing with a complex interplay of ongoing changes in their working context that leads to a plethora of new expertise needs (Grenier & Kehrhahn, 2008; Ward et al., 2018). Furthermore, we aim to identify which HR/D practices may foster adaptive ability, given the role that the HR/D function has in ongoing expertise development and unleashing this expertise for the purpose of improving organizational performance (Swanson & Holton, 2001). Before describing the research questions and the Group Model Building method that we used in this empirical work, we first outline the theoretical lens that underpins the foundation of our research approach.

4.2 A domain-generic and system dynamics lens

Expertise development and superior expert performance involve processes and competencies that are applicable across expertise domains and working contexts (Bereiter & Scardamalia, 1993; Chi et al., 1988; Ericsson & Smith, 1991; Grenier, 2021; Van der Heijden, 2000). In line with this reasoning, scholars approached the adaptivity that is required to meet new expertise needs from a domain-generic viewpoint (Bohle Carbonell et al., 2014; Grenier & Kehrhahn, 2008; Ward et al., 2018). At the same time, scholars also acknowledged that the way in which the adaptations of workers manifest is dependent upon their unique know-how, motivations, experiences, and the opportunities and constraints of their working contexts (Billet et al., 2018; Dall'Alba, 2018; Zimmerman, 2006). In line with the foregoing, we presume that the ability to meet new expertise needs involves generic adaptation processes, yet that these are made manifest in idiosyncratic and attuned ways in a specific context.

Besides the domain-generic view on expertise and context-dependent manifestations of the phenomenon, we assume that the ability to meet new expertise needs is not a straightforward process, but rather that it involves an interplay of intra-individual adaptations and social interactions (cf. Gruber & Harteis, 2018). Therefore, and in line with the aforementioned process models regarding the workers' adaptation processes, we assume that this adaptive ability cannot be characterized as a linear process (i.e., a sole causal relationship between antecedents, adaptive responses, and specific outcomes). It entails adaptation processes that are mutually linked, whereby the outcome of an adaptation process serves as input for subsequent adaptation processes (Frie et al., 2019; Ward et al., 2018). To address these dynamics over time, and to act on the plea by employability researchers to adopt a dynamic perspective for moving the field forward (Fugate et al., 2021), we applied a system dynamics (SD)

lens (Vennix, 1996) to the flexpertise phenomenon. Using this SD lens, we presume that the ability of the individual to meet a multiplicity of new expertise needs does not have a single starting- or ending point. This ability should be described as a dynamic process model consisting of causal loops that can have a reinforcing or balancing effect, which altogether form a dynamic system characterized by ongoing change (Cronin & Vancouver, 2019). Within such a dynamic process model, leverage points can be identified where a small intervention can cause a large effect on the dynamics of the system (Meadows, 1999).

Based upon the domain-generic and SD perspective on the flexpertise phenomenon, we formulated the following research questions:

RQ 1: What are the experiences of HR/D professionals, represented in a dynamic process model, regarding a worker's ability to meet new expertise needs in naturalistic work settings?

RQ2: What are the leverage points in the dynamic process model?

RQ3: In relation to the leverage points, which practices are identified by HR/D professionals to enhance a worker's ability to meet new expertise needs?

4.3 Method

To answer our research questions, we conducted a Group Model Building (GMB) study. This is a structured group facilitation and decision-making process for building dynamic models of strategic or 'messy' problems based on SD principles (Andersen et al., 1997; Vennix, 1996). During GMB, a facilitation team supports participants in constructing a mental model (Rouwette et al., 2002; Vennix, 1996) that visualizes the dynamic structure of the problem. Based on the model, interactive exercises are designed to promote and discuss ways to influence the dynamics that are identified, and to come up with potential solutions to the problem encountered (Antunes et al., 2015). In particular, we conducted GMB with a group of HR/D professionals to collect their perspectives as regards to which factors shape the ability of a worker to meet new expertise needs, in order to co-create a dynamic process model including leverage points based upon these perspectives, and to define HR/D practices that may influence the dynamics of the system to foster the required adaptivity (Rouwette & Vennix, 2006; Scott et al., 2016; Vennix, 1996, 1999).

4.3.1 Participants: HR/D professionals

We selected a convenience sample of HR/D professionals through the first- and second-line networks of practitioners of the authors and formed a group of participants that represents a varied and diverse set of perspectives on the flexpertise phenomenon (Vennix, 1996). We approached 29 professionals, out of which ten people were available for participation. Given the domain-generic view on the flexpertise phenomenon, we selected a group of HR/D professionals with experiences in various organizational contexts wherein they supported workers who differed in terms of expertise domains, job responsibilities, and flexibility in dealing with new expertise needs. To mitigate the possible influence of cultural differences in evaluations of what makes an expert (Yuan et al., 2013), we selected professionals with international work experience and different nationalities (i.e., eight Dutch professionals, one Indian professional, and one German professional). Furthermore, we selected professionals who had reached a similar level of mandate and position level in their careers to prevent possible effects of power differences that may obstruct the required equality in the group (Vennix, 1996). The final group consisted of eight female and two male participants. Eight of these 10 participants (six female, two male) completed a demographic questionnaire. All participants completed tertiary education. Their mean age was 49.1 years ($SD = 7.1$) and the participants had, on average, 15.4 years ($SD = 8.2$) of working experience in the field of HR/D. On average, the participants had worked for three different companies ($SD = 2.3$) as HR/D professionals. In their HR/D roles, three participants had exclusively worked in for-profit organizations and one exclusively in non-profit/not-for profit organizations. The fields that the participants have worked in include education, energy, agriculture, retail, telecommunications & IT, labor/trade union, NGO, insurance, and recruitment/employment agencies.

4.3.2 Approach of the GMB sessions

The HR/D professionals were requested to participate in a series of three GMB sessions of around three hours, each taking place at the university campus of the first author. All participants signed an informed consent form and indicated to allow anonymous publication of the results. Given the limited availability of some participants, we conducted the first GMB session twice: first with six participants on location at the university campus, and the second with four participants online via MS Teams.

Throughout the campus sessions, a facilitator stimulated the brainstorming and decision-making processes following scripts that were developed by the facilitation team (see below). A modeler captured the consensus regarding the dynamics underlying the ability to meet new expertise needs in a causal loop diagram (Vennix,

1996) by using Vensim 9.3.0. A recorder made notes of the group discussions and the flow of the GMB process. A wall builder clustered the output of the participants during wallpaper exercises. Besides these standard GMB roles (Scriptapedia, 2023; Vennix, 1996), the facilitation team consisted of two logistic supporters. The online session was guided by a facilitator and by another researcher who was the modeler and recorder.

We designed the three GMB sessions by making use of tested GMB scripts, which are protocols for structured small group exercises (Hovmand et al., 2011; Scriptapedia, 2023¹). The resulting approach, including their follow-up, was approved by the Ethical Committee of the University of the first author. We conducted the GMB sessions during the period from 15 December 2022 to 24 January 2023, using approximately a 2-week period in between the sessions. All sessions were conducted in English and fully audiotaped and videotaped. Each session was closed by collecting key take-aways (script: key take-away) and an outline of follow-up actions (script: next steps and closing). After each session, the facilitation team documented the discussions and output in a workbook. Digital copies of the workbook were shared with the participants after each session. The participants were asked to check if the process and output was summarized correctly. None of the participants proposed amendments to any of the workbooks. Below, we describe the flow of each GMB session in more detail.

Session 1: divergent brainstorming

The first GMB session was designed to induce divergent brainstorming about factors related to the ability to meet new expertise needs. This session started with an introduction of the facilitation team, the participants, research goals, session objectives and principles of SD. Next, the participants made a *graph over time* regarding their own expertise development to bring the topic of flexexpertise alive (refer to the Findings section for an example of a *graph over time*). They visualized and shared how the value and recognition of their own expertise domain(s) evolved over the past five years, and what they predicted to happen in the coming year (script: graph over time). Subsequently, the group brainstormed about possible factors that play a role in the ability to meet new expertise needs based upon their experiences with workers in various organizations and expertise domains (script: nominal group technique). This was followed by a group discussion about the extent to which these factors should be approached as a cause or an effect of the ability to meet new expertise needs. The facilitator captured this discussion in a causal loop diagram model on a flip chart (script: causal mapping with seed structure), and the modeler entered this in Vensim.

¹ Henceforth, we will mention Scriptapedia script names in brackets.

After the campus and online versions of the first GMB session were conducted, the facilitation team merged the output of the brainstorm session on variables into one list of variables, clustering the variables in preparation for the second GMB session. Furthermore, the facilitation team reviewed which session's group discussions were not incorporated into these models yet, and after identifying the overlap and differences between the output of the two subgroups, they formulated questions regarding the two causal loop diagrams.

Session 2: further developing the model

The second GMB session started with an introduction of the eight participants², next the SD principles were reiterated, followed by a summary of how the output of the campus and online version of the first GMB session was combined by the facilitation team. This was followed by a plenary discussion on the questions of the facilitation team regarding the two models (script: transferring group ownership from one image to another). Subsequently, four subgroups were created that each drew a causal loop diagram on a flip chart using the list of clustered variables as a source of inspiration (script: connecting circle). Next, each subgroup presented their causal loop diagram, while the modeler and one logistic supporter visualized this in Vensim, after which the group discussed the possible connections and overlap between the four loops. The modeler visualized the outcomes of this discussion in Vensim as well (script: creating causal loop diagram from connecting circles). After this session, the facilitation team brainstormed about possible ways of integrating the four loops based upon the group discussions, clustering the constraints and enablers at the personal and contextual levels that the participants proposed throughout the first and second GMB sessions, and by detecting deviations from SD principles (e.g., variables with a plus and minus sign, or variables that were not linked to other variables). This resulted in a refined model in Vensim.

Session 3: finalizing the model and defining leverage points and HR/D practices

The third GMB session was held with nine participants³. The group started by reflecting on the integration of the four loops and clustering of variables, as proposed by the facilitation team (script: model review). This involved a facilitated group discussion by which they refined the model through adding, removing, and renaming variables and adjusting connections between them. Up to this point, the GMB sessions were designed for answering RQ1. Next, the participants brainstormed about possible leverage points (script: nominal group technique), thereby addressing

² Two participants could not join due to work demands, and also did not report amendments to the workbook.

³ One participant was unable to join due to illness.

RQ2. The leverage points were assigned a score based on their ranking by the participants. Ranks 1, 2, and 3 received 3, 2, and 1 point(s), respectively. Next, the participants brainstormed about possible HR/D practices that could be provided at these leverage points to enhance the ability to meet new expertise needs of workers across organizations and expertise domains (script: action ideas), thereby addressing RQ3. The participants were asked to discuss in groups of three what kind of practice they would propose, and where in the model. These could be practices they had seen to be effective in real-life settings, or novel practices that they deemed to be effective.

After the final GMB session, the facilitation team again reviewed the model proposed, and the same procedure was followed after the second session. In the workbook, they included the model that was generated during the third session, as well as a list of 12 open-ended questions. This workbook was shared with the participants by e-mail. Next, the members of the facilitation team asked the individual participants to go through the questions in the workbook, and to enter their answers in an Excel spreadsheet. These answers were processed into a final model of the ability to meet new expertise needs that we describe in the Findings section.

4.3.3 Conventions for visualizing system dynamics

Throughout the GMB process, we visualized the group discussion by means of a dynamic process model following SD conventions (Vennix, 1996). In the model, variables are depicted as text and their interrelatedness is visualized through connecting arrows. The + sign on top of an arrow indicates a positive relationship between variables, meaning that if one variable increases/decreases the connected variable increases/decreases as well. A - sign indicates a negative (i.e., opposite) relationship, meaning that if one variable decreases the connected variable increases, or vice versa. Balancing loops are indicated by a B, meaning a causal loop that has a self-correcting effect on a change (i.e., a loop that includes an uneven number of negative relationships). Reinforcing loops are indicated by an R and involve loops consisting of only positive relationships and/or an even number of negative relationships. These reinforcing loops express an iterative strengthening process. The top 3 leverage points are indicated by the  sign in Figure 4.2.

4.4 Findings

In this section, we summarize the outcomes of the Graph over Time exercise, followed by a description of the model that was co-created by the group of HR/D

professionals. This is followed by an outline of the leverage points and HR/D practices that were proposed.

4.4.1 Graph over time

Figure 4.1 provides an illustration of a graph over time that the participants developed as the start of their process to jointly define a dynamic model. As intended, this exercise stimulated their thinking of what the ability to meet new expertise needs constitutes. The graph provoked discussions on what expertise constitutes, in which case expertise is valuable and recognized, and what causes this valuable and recognized expertise to increase or decline.

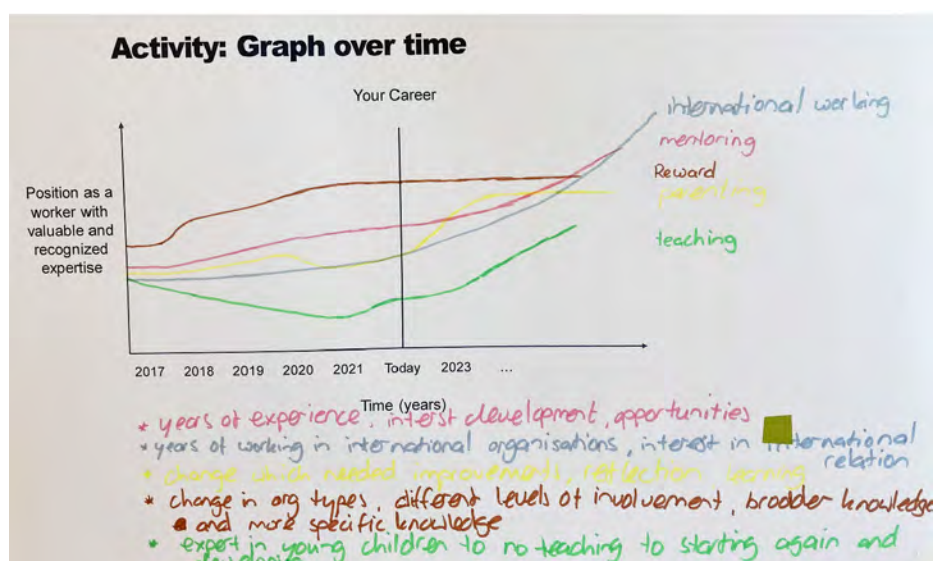


Figure 4.1 Example of a graph over time

4.4.2 The dynamic process model of the ability to meet new expertise needs

Figure 4.2 depicts the dynamic process model resulting from the previously described GMB process. According to the participants, this model reflects the ability to meet new expertise needs. We identified seven reinforcing loops, five balancing loops, and three leverage points. The participants focused on these model components in their group discussions (see respectively Appendices 1 and 2 for more details regarding these causal loops, and the leverage points that the participants proposed). Below, we describe what this model entails in practice according to the group of HR/D professionals. In the text sections where we explain a variable, we include the variable name in *italics*.

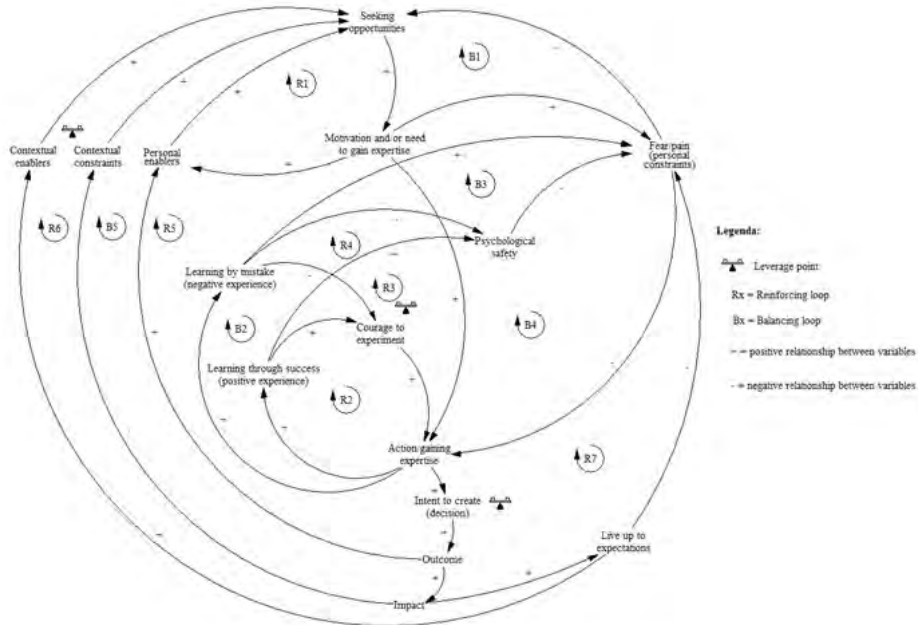


Figure 4.2 The dynamic process model of the ability to meet new expertise needs

4.4.3 Personal/contextual constraints and enablers

Throughout the three GMB sessions, the HR/D professionals had in-depth discussions on how a worker comes to a decision to develop new expertise. They reached a consensus, i.e., that this decision is influenced by personal factors (labelled *internal* in a group discussion on the clustering of variables) and contextual factors (which the group labelled *external*) that feed the opportunities sought, as summarized in Table 4.1.

They named various personal qualities that have a positive relationship with this process of seeking opportunities. In Table 4.1, these personal factors are described as *personal enablers* that represent the individual worker directing his attention outwards to look for ways to meet new expertise needs. Out of this list of personal enablers, specifically a *growth mindset* and *curiosity* were perceived as having a strong positive influence on seeking opportunities. For example, Respondent 8 formulated the influence of a growth mindset as follows: "... you're open for new ideas, new knowledge, [...]. And if that's not the case - if it's fixed - then it's probably pretty difficult to meet new expertise needs. Because then you're stuck to what you know already." Respondent 6 described the influence of curiosity as follows: "curiosity can be like a prerequisite [...] for the growth mindset. [...] it's a pre-condition that needs to exist. Because if somebody is not curious [...] to learn, or has an internal

trigger, then it stops there.” This positive influence of different personal enablers may be reduced by so-called *personal constraints*. These constraints relate to *fear* or *pain*, involving feelings and concerns that, when growing, have a diminishing effect on the process of seeking opportunities. Such constraining factors may arise for example due to previous negative learning experiences, but also due to certain personality traits and/or a fixed mindset.

Table 4.1 Personal/contextual constraints and enablers

Personal constraints	Personal enablers	Contextual constraints	Contextual enablers
• Fixed mindset • Negative learning experiences • Flight or freeze reaction when experiencing stress • Personality (e.g., people that tend to block when encountering change)	• Growth mindset • Curiosity • Positive learning experiences • Fight reaction when having stress • Knowledge • Ability to reflect on oneself • Ambition • Own capabilities/talents/needs • Personality (e.g., people that tend to move/float when encountering change)	• Negative peer pressure/learning culture • Threats (albeit these can be an enabler for someone if valued as an opportunity) • Urgency (need to move/take action, no choice) • Risks • Limitation of resources (e.g., time)	• Positive peer pressure/encouragement of close others/positive learning culture • Safe environment/trust • Supportive leader • Resources to change outcome into impact • Opportunity to apply one's know-how • Needs from others

In addition to these individual factors, both contextual constraints and contextual enablers may have a positive relationship with Seeking opportunities. *Contextual constraints* are circumstances that create a certain urgency, such as when the worker is confronted with a necessity to develop new expertise or more generally a need to adapt. Respondent 2 illustrated this relationship as follows: “[if] for instance you don’t get air, you’re going to do something to get air, because you want to breathe.” They noted that, even though contextual constraints in the context of work are not as urgent as not being able to breathe, they can still create an urgency to act. *Contextual enablers* were described as contextual opportunities to adapt whereby individual workers have the option to consider whether they are willing to act upon it or not.

4.4.4 Loops identified

Influenced by the four variables described above, *Seeking opportunities* entails the process of considering opportunities to gain new expertise. This evaluation may lead to the *motivation and/or need to gain expertise*, that represents the decision to develop new expertise because one wants or needs to act. Regarding this decision,

Respondent 9 noted: “I also need to make choices [...] because I can’t do everything [...] what do I learn, where do I have the most benefit from, or impact, or where does my time allow me?”

From here, multiple pathways are possible. First, this variable connects back to the behavior of seeking opportunities via personal enablers, creating the R1 reinforcing loop. Another possibility is that motivation and/or need to gain expertise will lead to fear or pain (personal constraints). This will decrease the engagement in seeking opportunities and creates the B1 balancing loop. If the person experiences sufficient motivation, or if they perceive a strong enough need to gain expertise, this will lead to the action phase, starting at *action/gaining expertise*. Respondent 8 summarized it as “a balancing act” between the personal or contextual constraints and enablers, as well as the necessity and the motivation of the individual, based on which a decision is made whether or not to act.

From the point of action/gaining expertise, one can have positive or negative learning experiences. A *positive experience (learning through success)* relates to those situations wherein the person feels to have learned something that they themselves, as well as the persons in their direct work environment, value as positive. This can also be learning from mistakes, evaluated as something positive in the environment of the workers. Respondent 9 described this as follows: “If you actually create an environment where making a mistake is a success, then you start learning from it [the mistake].” If the individual workers learn from their successes this will give them *courage to experiment*, encompassing daring to try out new things. This connects back to action/gaining expertise to set another learning cycle in motion. Here we see another reinforcing loop (R2). These positive learning experiences also contribute to the *psychological safety* of the individual, as the individual feels that trying out new things and making mistakes during learning and work is permitted. That in turn reduces possible *fear/pain*. This effect is part of the R3 reinforcing loop.

In contrast, the *negative experience (learning by mistake)* was described as workers experiencing the perception of their mistakes and failures to be negative. Respondent 3 noted that negative learning experiences in the past, for example in school, may make it difficult for someone to imagine themselves engaging in studying later in life. They may see these negative experiences as confirmation that learning is not for them. Such a negative experience will decrease the courage to experiment of the individual, leading to less action/gaining expertise. This results in a balancing loop (B2). An increase in learning by mistake (negative experience) does not only feed into a decreased courage to experiment but may also increase fear/pain both directly

(see B3) and indirectly via a decreased sense of psychological safety (see R4). Both these pathways once again lead to a decreased likelihood that the individual will seek new opportunities as well as a decrease in action/gaining expertise.

Besides these two types of learning cycles, taking action/gaining expertise may result in an *outcome*⁴ when taking the pathway via *intent to create*. This represents taking a decision to produce some kind of tangible output, which can take the form of a physical product or new knowledge. The production of output can have a positive effect on the individual, for example by boosting one's self-confidence or by providing a positive experience. This would fall within the category of the personal enablers that make it more likely that an individual looks for even more opportunities and start the cycle once more. In other words, these personal enablers reinforce the loop (see R5). This effect may be counterbalanced by the possible influence of fear and pain (see for details the causal loop B4 in Appendix 4.1).

If the context is changed because of the outcomes created, we can say that the outcome has *impact*. It may even take away some contextual constraints, such as threats to the employability of a worker due to changes produced in their working context. If there are fewer constraints such as these threats, the need to look for opportunities to meet new expertise needs is decreased. This therefore forms a balancing loop (see B5). The difference between outcome and impact was illustrated by the example of a musician. A musician can create music out of intrinsic motivation, which would be an example of an outcome. If nobody likes the music produced by the musician and nobody listens to it, there is no impact. To create an impact, the musician would have to listen to one's (potential) audience and adjust the music so that it aligns with what the audience wants. Only then can the outcome creates an impact. Alternatively, an outcome may become impactful if demands change. This was illustrated by the example of Vincent van Gogh. During his lifetime, there was not a very high demand for his paintings, so the output he created did not have much impact. After his passing, the demand for his paintings became much higher and the impact of his art is now significant, even though the art itself has not changed.

Impact, once created, will be noticed by others, e.g., the supervisor of the individual. The impact the individual makes may be proof of good performance, which may help a worker to *live up expectations* of others. Once they do this, others may be more likely to help them by providing resources and opportunities (i.e., contextual enablers)

⁴ During the group sessions, one participant noted that the word "Output" would be more apt to use as variable name. However, the group decided to keep the word Outcome.

that may, subsequently, help them seek more opportunities. This therefore creates a reinforcing loop (see R6). Additionally, if a worker lives up to the expectations of others, this person may feel less fear, which may also help to seek new opportunities. This also creates a reinforcing loop (see R7).

4.4.5 Leverage points

After defining the model, the participants proposed 14 leverage points where, in their view, an HR/D practitioner could intervene to foster the ability of a worker to meet new expertise needs. Summing up the number of different leverage points proposed by each participant, the group distinguished 11 different leverage points, and selected the following top three based on priorities (see Table 4.2).

Table 4.2 Top 3 leverage points

Priority	Leverage point	Points granted by the group of HR/D professionals
1	Courage to experiment	8
2	Personal/Contextual Enablers & Personal/Contextual Constraints	7,5
3	Intent to create	5

The *courage to experiment* variable was perceived as being the point where it is not “easy to switch it on, but when it’s on ... off you go” (Respondent 4). It was said that without the courage to experiment, a person has no outcome or impact at all. In practice, people may experience a tension between having the courage to experiment and expectations of “First time right”. The participants stated to believe that this comprises an opportunity to intervene that can result in “getting a fire started” (Respondent 3).

The participants named the combination of contextual constraints and enablers as a second leverage point. An example of this leverage point is an HR/D professional who can support the individual worker by removing constraints or creating conditions that provide new opportunities for them. Specifically, this can help in making them feel psychologically safe after they experienced that learning by making mistakes is okay.

A third leverage point is where people have an intent to create. The participants assumed that everyone has a certain intent, or feels an urge, to create something. In the model, this is the place to intervene in a similar way as the aforementioned leverage points: to set the individual into motion.

4.4.6 Intervention by means of HR/D practices

The participants that were separated into three subgroups came up with the following practices to foster the ability of the worker to meet new expertise needs: job crafting, onboarding, and fostering a learning culture.

Job crafting was explained as a way to create your own job within an organization by changing tasks and responsibilities. This may take away some of the contextual constraints or create opportunities, adding to the contextual enablers. An HR/D professional can support an individual worker in determining what their ideal job entails, to what extent the context can serve as an enabler for this goal, and how some constraints can be removed.

The second subgroup perceived *onboarding* as an effective practice when it comes to learning by mistakes. This practice should lead to the perception that learning by mistakes is a natural aspect of working within the organization (i.e., something that is part of the organizational culture). It could involve working in smaller peer groups in which experiences could be exchanged with colleagues at the same seniority level. In this way, onboarding functions as a safe space in which colleagues can learn from each other's mistakes. In general, it requires that employees are given the time for this type of learning. Furthermore, they should be trained to make visible what their (limiting) beliefs are. It helps when employees discuss these beliefs with each other, and that they see from the very start that doing so is seen as the normal thing to do. One participant added that this could change *fear* into a helping factor, integrating it into the process, instead of it being a disconnected response. In general, this type of group learning should be something that continues after onboarding, ideally across departments.

Finally, the third group proposed *fostering a learning culture*, which is in line with the continuation of group learning that was part of the onboarding process as proposed by the second subgroup. An organization needs a learning culture instead of a *blaming culture* to continually improve business operations. This fosters cycles of learning through success. The participants in the third group brought interventions like action learning labs or bi-weekly demos to the table, where experts can present a new project. These can be visited by other experts or leaders. They also noted lunch and learn sessions and world cafés as practices to foster such a learning culture. In practice, there needs to be someone to organize these practices, otherwise they are not likely to be held, with all the consequences not doing so has for the learning culture. The suggestion was made that the model may be a tool to seek the support of others on the necessity of such a role.

As a final finding, Respondent 5 noted that the model can be a useful tool to make visible what the ability of a worker to meet new expertise needs entails and could, for example, be used to clarify when to make decisions and when acting is possible. The view that the model as a whole is valuable to use as the basis for HR/D practices, was reflected in the fact that, partly due to time constraints, the group did not reach a consensus as regards which leverage points the proposed practices should be offered. Throughout their discussions, the idea emerged that HR/D professionals typically intervene at a contextual level (constraints and enablers) and, even though not labelled as a high priority leverage point, at the moments when workers experience pain or fear.

4.5 Discussion

In this GMB study, a group of HR/D professionals co-created a dynamic process model that reflects the complex interplay of adaptation processes that individual workers need to undertake to meet a variety of new expertise needs. These novel needs arise because of changing demands and opportunities at work, as well as the evolving needs, motivations, experiences, and know-how of workers themselves. Our newly developed dynamic process model reflects that this ability, known as flexpertise in the scholarly literature (Van der Heijden, 2000), consists of reinforcing and balancing loops that as a whole, and in interaction with each other, represent what is meant by the adaptivity required of workers. Such an SD lens implies that there are leverage points for intervention in order to prevent or to overcome the hampering of this dynamic system (Vennix, 1996). In the model proposed, these leverage points indicate that fostering the ability to meet new expertise is not so much a matter of providing support in developing new know-how, but should rather focus for example on influencing the decision-making processes of individual workers and their regulation of feelings of discomfort such as pain and fear. Such an SD perspective on the required individual adaptivity sets the stage for the HR/D function to design practices that are based on the notion that change is a constant within the individual worker as well as their working contexts (Cronin & Vancouver, 2019; Ward et al., 2018).

4.5.1 Limitations related to the GMB method

Even though we designed a GMB process that rests on evidence-based practices (McCardle-Keurentjes, 2015; Rouwette et al., 2011; Scott et al., 2016), the method has some limitations. First of all, the quality of the output is highly dependent upon the facilitation skills in the team (Vennix, 1996). By setting up a facilitation team of

five members with predefined and complementary roles and through the usage of testified GMB scripts, we aimed to ensure that the sessions led to the intended outcomes. Nevertheless, this did not preclude less time being available for the brainstorm on the leverage points and HR/D practices than originally planned.

Furthermore, the quality of the output of GMB sessions is highly dependent upon the experience and perceptions of the participants regarding the flexpertise phenomenon and their understanding of SD. In this respect, we acknowledge that our selection of participants might have brought some limitations. Even though we aimed to select HR/D professionals with experience in different sectors and expertise domains, international work experience and a diverse cultural background, there may be a bias towards the Dutch culture in the group despite the participants having ample experience with working in international settings. Another point of attention regarding the selected group of HR/D professionals is their strong focus on learning and development processes, given their profession. This may imply that the resulting model does not cover the full range of adaptation processes. For example, using consulting supervisors as a stakeholder group (Torraco & Lundgren, 2020) could have resulted in a different choice of variables, leverage points and beneficial HR/D practices. This is likely, given the important role that supervisors have in fostering the required adaptivity when new demands arise at work (Bohle Carbonell et al., 2014). Notwithstanding these limitations, we proclaim that the dynamic model that was developed in this GMB study provides the grounding for future studies regarding the flexpertise phenomenon.

4.5.2 Theoretical implications and recommendation for future research

Thus far, our understanding of how an individual becomes an expert is more advanced than our knowledge of the flexibility needed to cope with shifting expertise demands (Frie et al., 2019; Kim, 2021). By applying an SD lens to the ability to meet new expertise needs, our study provides new avenues for theoretical research in the field of adaptive or flexible forms of expertise. Rather than the prevalent research approach of studying the linear relationships between antecedents (i.e., personal qualities such as a growth mindset), mediators (i.e., adaptive responses to single changes or learning processes as part of a training and education), and outcomes (i.e., performance on novel tasks or the learnings after a training session), the proposed model provides the possibility of approaching this phenomenon as an ongoing and dynamic process. Core SD concepts, such as positive and negative relationships, reinforcing and balancing loops, and leverage points, provide the entities footing to study intra-individual and inter-individual differences and the

role of social interactions (Gruber & Harteis, 2018). To externally validate the model, we propose to develop a computational version of the model to further interpret its dynamics and to simulate what-if scenarios (Crielaard et al., 2022). Doing so may introduce new research questions such as: what level of fear makes workers less inclined to have the courage to experiment even though the context enables workers to make mistakes? What level of psychological safety is needed to induce loops of positive learning experiences? What kind of impact (i.e., the output through which a worker effectuated a change in his working context) enables workers to seek new opportunities which, in turn, lead to the motivation to gain new expertise?

To increase our insight into intra-individual differences in flexexpertise over time, we recommend investigating the possible effects of age-related changes as well. The participant group in this GMB study discussed that age of the individual seems to influence the ability to meet new expertise needs throughout an individual's career. However, they did not come to an agreement on how this could be incorporated in the model. Age is an important factor to consider when the retirement age increases, as the need for professionals to constantly adapt to stay employable throughout their careers also increases (Fugate et al., 2021). The systematic review by De Lange et al. (2021) showed negative relationships between age and employability. Specifically, stereotyping and discrimination appeared to effect the employability of a professional negatively, as these phenomena lead to a lower appreciation of older workers and to reduced efforts to invest in future career advancements. In line with these works cited, we recommend scholars to conduct research on the relationship between age-related changes and the interplay of adaptation processes that the proposed model revealed. Such an approach may help to explain intra-individual changes in the ability to meet changing expertise demands across the working lifespan.

To summarize, taking a dynamic perspective on the flexexpertise phenomenon is in line with the plea from employability scholars to advance theorizing and empirical work in this field, by taking a dynamic perspective on the exchanges between the individual workers and their surrounding stakeholders (Fugate et al., 2021).

4.5.3 Practical implications

This study provides HR/D practitioners and managers with insights into what the ability to meet new expertise needs constitutes, and when and how this ability can be stimulated through their proposed practices. We argue that our SD approach to this ability may shift the paradigm in expertise development practices. Thus far, the HR/D practice focused upon expertise development to foster upward mobility

that starts with being a novice and ends with being an expert, or a worker with a high level of expertise in a specific field (Dreyfus & Dreyfus, 1986) and from there on, on how to maintain this position (Gruber & Harteis, 2018; Kooij et al., 2014). However, this way of looking at expertise development does not fit contemporary reality, where workers need to develop expertise in multiple domains and need to have impact in different working contexts involving stakeholders with various needs and expectations. In line with our proposal to shift the research paradigm from a linear approach towards an SD approach, a similar line of reasoning may apply to the HR/D practice that aims to foster more flexible forms of expertise development, i.e., flexpertise. Rather than a sole linear, upward approach to expertise development, HR/D practitioners should also focus on fostering the ongoing adaptation of the individual which is needed in VUCA contexts, and provide the contextual conditions enabling this adaptation such as an onboarding process and learning culture that makes workers to feel psychologically safe. In line with the proposed model, we argue for HR/D practices that enable individuals to make deliberate decisions on the opportunities they have to develop new expertise, to foster cycles of learning that are experienced as positive, and to facilitate workers' ability to translate outcomes of learning and action into a positive impact on multiple stakeholders which, in turn, creates new opportunities for the individual worker to renew their expertise (cf. Frie et al., 2019).

As we outlined in our introduction, being able to meet new expertise demands is not an easy task and requires the support of the surrounding stakeholders if an individual is not able to adapt sufficiently. The proposed model may be the framework to shed new light on ways to realize Sustainable Development Goal 8, which is to "promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" (UN, 2023). It is precisely this goal where HR/D can make the difference by fostering flexpertise in a human-centered way.

References

- Andersen, D. F., Richardson, G. P., & Vennix, J. A. M. (1997). Group model building: adding more science to the craft. *System Dynamics Review: The Journal of the System Dynamics Society*, 13(2), 187-201.
- Antunes, P., Stave, K., Videira, N., & Santos, R. (2015). Using participatory system dynamics in environmental and sustainability dialogues. In M. Ruth (Ed.), *Handbook of research methods and applications in environmental studies* (pp. 346-374). Edward Elgar.
- Authors (sixth resubmission round). How workers meet new expertise needs throughout their careers: An integrative review revealing a dynamic process model of expertise.
- Baard, S. K., Rench, T. A., & Kozlowski, S. W. J. (2014). Performance adaptation: A theoretical integration and review. *Journal of Management*, 40, 48-99.
- Baran, B. E., & Woznyj, H. M. (2020). Managing VUCA: The human dynamics of agility. *Organizational Dynamics*, 100787. Advance online publication. Doi.org/10.1016/j.orgdyn.2020.100787.
- Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, 57, 311-317.
- Bereiter, C., & Scardamalia, M. (1993). *Surpassing ourselves. An inquiry into the nature and implications of expertise*. Open Court.
- Billett, S., Harteis, C., & Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed.) (pp. 105-126). Cambridge University Press.
- Birney, D. P., Beckmann, J. F., & Wood, R. E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, 22, 563-574.
- Bohle Carbonell, K., Stalmeier, R. E., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, 12, 14-29.
- Cherrstrom, C. A., & Bixby, J. (2018). Construct of expertise within the context of HRD: Integrative literature review. *Human Resource Development Review*, 17, 440-464.
- Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (1988). *The nature of expertise*. Lawrence Erlbaum.
- Crielaard, L., Uleman, J. F., Châtel, B. D. L., Epskamp, S., Sloot, P. M. A., & Quax, R. (2022). Refining the causal loop diagram: A tutorial for maximizing the contribution of domain expertise in computational system dynamics modeling. *Psychological Methods*. Advance online publication. <https://doi.org/10.1037/met0000484>
- Cronin, M. A., & Vancouver, J. B. (2019). The only constant is change: Expanding theory by incorporating dynamic properties into one's models. In S. E. Humphrey & J. M. LeBreton (Eds.), *The handbook of multilevel theory, measurement, and analysis*. American Psychological Association.
- Cupido, N., Ross, S., Lawrence, K., Bethune, C., Fowler, N., Hess, B., ... & Schultz, K. (2022). Making sense of adaptive expertise for frontline clinical educators: a scoping review of definitions and strategies. *Advances in Health Sciences Education*, 27, 1213-1243.
- Dall'Alba, G. (2018). Reframing expertise in its development: A lifeworld perspective. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed.) (pp. 33-39). Cambridge University Press.
- Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, 35, 579-603.

- De Lange, A. H., Van der Heijden, B., Van Vuuren, T., Furunes, T., De Lange, C., & Dikkers, J. (2021). Employable as we age? A systematic review of relationships between age conceptualizations and employability. *Frontiers in Psychology*, 11, 605684.
- Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the age of the computer*. Basil Blackwell.
- Ericsson, K. A., & Smith, J. (1991). *Toward a general theory of expertise. Prospects and limits*. Cambridge University Press.
- Feltovich, P. J., Spiro, R. J., & Coulson, R. L. (1997). Issues of expert flexibility in contexts characterized by complexity and change. In P. J. Feltovich, K. M. Ford, & R. R. Hoffman (Eds.), *Expertise in context: Human and machine* (pp. 125-146). AAAI/MIT Press.
- Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, 30, 61-79.
- Fugate, M., Van der Heijden, B., De Vos, A., Forrier, A., & De Cuyper, N. (2021). Is what's past prologue? A review and agenda for contemporary employability research. *Academy of Management Annals*, 15(1), 266-298.
- Germain, M. L. (2021). The impact of changing workforce demographics and dependency on technology on employers' need for expert Skills. In M. Germain & R. S. Grenier (Eds.), *Expertise at Work: Current and Emerging Trends* (pp. 177-195). Palgrave Macmillan.
- Grenier, R. S. (2021). Identifying and measuring expertise in organizations. In M. Germain, & R. S. Grenier (Eds.), *Expertise at Work: Current and Emerging Trends* (pp. 57-69). Palgrave Macmillan.
- Grenier, R. S., & Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, 7, 198-217.
- Gruber, H., & Harteis, C. (2018). *Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise*, vol. 24. Springer.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262-272). Freeman.
- Hovmand, P. S., Rouwette, E., Andersen, D. F., Richardson, G. P., Calhoun, A., Rux, K., & Hower, T. (2011). *Scriptapedia: a handbook of scripts for developing structured group model building sessions*. <https://repository.ubn.ru.nl/bitstream/handle/2066/95406/95406.pdf>
- Jang, S., & Ardichvili, A. (2020). The role of HRD in CSR and sustainability: a content analysis of corporate responsibility reports. *European Journal of Training and Development*, 44, 549-573.
- Jundt, D. K., Shoss, M. K., & Huang, J. L. (2015). Individual adaptive performance in organizations: A review. *Journal of Organizational Behavior*, 36, S53-S71.
- Kim, Y. (2021). The changing concepts of expertise and expertise development. In M. Germain, & R. S. Grenier (Eds.), *Expertise at Work: Current and Emerging Trends* (pp. 17-38). Pelgrave Macmillan.
- Kooij, D. T., Jansen, P. G., Dikkers, J. S., & De Lange, A. H. (2014). Managing aging workers: A mixed methods study on bundles of HR practices for aging workers. *The International Journal of Human Resource Management*, 25(15), 2192-2212.
- Lysova, E. I., Jansen, P. G. W., Khapova, S. N., Plomp, J., & Tims, M. (2018). Examining calling as a double-edged sword for employability. *Journal of Vocational Behavior*, 104, 261-272.

- Marand, A. D., & Noe, R. A. (2017). Facilitating the development of expertise: An individual to organizational perspective. In K. G. Brown (Eds.), *The Cambridge handbook of workplace training and employee development* (pp. 38-74). Cambridge University Press.
- Martins, V. W. B., Rampasso, I. S., Anholon, R., Quelhas, O. L. G., & Leal Filho, W. (2019). Knowledge management in the context of sustainability: Literature review and opportunities for future research. *Journal of cleaner production*, 229, 489-500.
- McCardle-Keurentjes, M. H. F. (2015). *Facilitated modelling and hidden profiles: an experimental evaluation of group model building* [Doctoral dissertation]. Radboud University, the Netherlands.
- Meadows, D. H. (1999). *Leverage points: Places to intervene in a system*. The Sustainability Institute.
- Moats, J. (2021). Preparing for the future of work and the development of expertise. In M. Germain, & R. S. Grenier (Eds.), *Expertise at Work: Current and Emerging Trends* (pp. 17-38). Pelgrave Macmillan.
- Pelgrim, E., Hissink, E., Bus, L., Van der Schaaf, M., Nieuwenhuis, L., Van Tartwijk, J., & Kuijer-Siebelink, W. (2022). Professionals' adaptive expertise and adaptive performance in educational and workplace settings: an overview of reviews. *Advances in Health Sciences Education*, 27, 1245-1263.
- Rouwette, E. A. J. A., & Vennix, J. A. M. (2006). System dynamics and organizational interventions. *Systems Research and Behavioral Science: The Official Journal of the International Federation for Systems Research*, 23(4), 451-466.
- Rouwette, E. A. J. A., Vennix, J. A. M., & Van Mullekom, T. (2002). Group model building effectiveness: a review of assessment studies. *System Dynamics Review: The Journal of the System Dynamics Society*, 18, 5-45.
- Rouwette, E. A. J. A., Korzilius, H., Vennix, J. A. M., & Jacobs, E. (2011). Modeling as persuasion: the impact of group model building on attitudes and behavior. *System Dynamics Review: The Journal of the System Dynamics Society*, 27, 1-21.
- Schwartz, D. L., Bransford, J. D., & Sears, D. (2005). Efficiency and innovation in transfer. In J. Mestre (Eds.), *Transfer of learning: Research and perspectives* (pp. 1-51). Information Age Publishing.
- Scott, R. J., Cavana, R. Y., & Cameron, D. (2016). Recent evidence on the effectiveness of group model building. *European Journal of Operational Research*, 249, 908-918.
- Scriptapedia (2023). <https://en.wikibooks.org/wiki/Scriptapedia>
- Swanson, R. A., & Holton, E. F. (2001). *Foundations of Human Resource Management*. Berrett-Koehler.
- Torraco, R. J., & Lundgren, H. (2020). What HRD is doing—What HRD should be doing: The case for transforming HRD. *Human Resource Development Review*, 19, 39-65.
- UN (2023). <https://sdgs.un.org/goals/goal8>
- Van der Heijde, C. M., & Van der Heijden, B. I. J. M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, 45, 449-476.
- Van der Heijden, B. I. J. M. (1998). *The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch professionals* [Doctoral dissertation]. University of Twente, the Netherlands. <https://hdl.handle.net/2066/127534>
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9-39.
- Van der Heijden, B. I. J. M. (2002). Prerequisites to guarantee life-long employability. *Personnel Review*, 31, 44-61.
- Van der Heijden, B. I. J. M. (2005). 'No one has ever promised you a rose garden'. On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Open University of the Netherlands. Van Gorcum.

- Van der Heijden, B. I. J. M., & De Vos, A. (2015). Sustainable careers: introductory chapter. In B. I. J. M. Van der Heijden & A. De Vos (Eds.), *Handbook of research on sustainable careers* (pp. 1-19). Edward Elgar.
- Van Mierlo, B., & Beers, P. J. (2020). Understanding and governing learning in sustainability transitions: A review. *Environmental Innovation and Societal Transitions*, 34, 255-269.
- Vennix, J. A. M. (1996). *Group model building: Facilitating team learning using system dynamics*. John Wiley & Sons.
- Vennix, J. A. M. (1999). Group model-building: tackling messy problems. *System Dynamics Review: The Journal of the System Dynamics Society*, 15, 379-401.
- Wallin, A., Nokelainen, P., & Mikkonen, S. (2019). How experienced professionals develop expertise in work-based higher education: a literature review. *Higher Education*, 77, 359-378.
- Ward, P., Gore, J., Hutton, R., Conway, G. E., & Hoffman, R. R. (2018). Adaptive skill as the conditio sine qua non of expertise. *Journal of Applied Research in Memory and Cognition*, 7, 35-50.
- WEF (2023). *The future of jobs report*. https://www.weforum.org/reports/the-future-of-jobs-report-2023?_gl=1*59svdr*_up*MQ..&gclid=Cj0KCQjwj_ajBhCqARIsAA37s0yuFOW-gG4wMw_3uimMZss46bvpISHepuP45K4FGD_A6z6Mf8fh638aAitREALw_wcB
- Yuan, Y. C., Bazarova, N. N., Fulk, J., & Zhang, Z. (2013). Recognition of expertise and perceived influence in intercultural collaboration: A study of mixed American and Chinese groups. *Journal of Communication*, 63, 476-497.
- Zimmerman, B. J. (2006). Development and adaptation of expertise: The role of self-regulatory processes and beliefs. In K. A. Ericsson, N. Charness, P. J. Feltovich & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 705-722). Cambridge University Press.

Appendices

Appendix 4.1 Overview of causal loop diagrams

The loop numbers in the first column refer to the loops that are included in Figure 2.

Table 4.3 Reinforcing and balancing loops

Loop	Variables and relationships between variables
R1	Seeking opportunities + motivation and/or need to gain expertise + personal enablers +
R2	Learning through success (positive experience) + courage to experiment + action/gaining expertise +
R3	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + learning through success (positive experience) + psychological safety - fear/pain (personal constraints) -
R4	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + learning by mistake (negative experience) - psychological safety + fear/pain (personal constraints) -
R5	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + intent to create (decision) + outcome + personal enablers +
R6	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + intent to create (decision) + outcome + impact + live up to expectations + contextual enablers +
R7	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + intent to create (decision) + outcome + impact + live up to expectations - fear/pain (personal constraints) -
B1	Seeking opportunities + motivation and/or need to gain expertise + fear/pain (personal constraints) -
B2	Action/gaining expertise + learning by mistake (negative experience) – courage to experiment +
B3	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + learning by mistake (negative experience) + fear/pain (personal constraints) -
B4	Seeking opportunities + motivation and/or need to gain expertise + fear/pain (personal constraints) - action/gaining expertise + intent to create (decision) + outcome + personal enablers +
B5	Seeking opportunities + motivation and/or need to gain expertise + action/gaining expertise + intent to create (decision) + outcome + impact - contextual constraints +

Appendix 4.2 Overview of leverage points

This appendix includes the leverage points that the participants identified, and their scores after ranking their importance for developing the ability to meet new expertise needs.

Table 4.4 Leverage points that received a ranking score

Ranking	Leverage point	Score
1	• Courage to experiment	8
2	• (Personal/contextual) enablers • (Personal/contextual) constraints ⁵	7,5 ⁶
3	• Intent to create	5
4	• Live up to expectations • Impact	4
5	• Psychological safety & fear	3
6	• Seeking opportunities ⁷ • Action/gaining expertise	2
7	• Ability to meet new needs	1
8	• Motivation/need to gain expertise • Learning by mistake • Learning through success • Curiosity	0

⁵ After the definition of leverage points, the participants made amendments to the model. This involved splitting up the two variables of *personal constraints/enablers* and *contextual constraints/enablers* into four variables (see Table 1). This also involved clustering *curiosity* under *personal enablers*.

⁶ *Personal/contextual enablers* and *Personal/contextual constraints* were mentioned on one post-it note by one of the participants and received three points altogether. These points were split up so each leverage point received half of the points (1.5 point).

⁷ Was mentioned once without rank/score.

5

Fostering career sustainability:

Renewal bundles of HR/D practices for
flexpertise development

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Abstract

For decades, HR/D practitioners have been supporting workers in the development and maintenance of their expertise based upon the scholarly knowledge of what makes an expert. In nowadays' volatile, unexpected, complex, and ambiguous (VUCA) working contexts, this question evolved into how workers are able to meet new expertise needs throughout their career. These VUCA working contexts require that workers are able to adapt to a variety of changes in their expertise domains, working contexts, and surrounding set of stakeholders. This adaptive ability, known as flexpertise, requires an extension and transformation of current HR/D practices. This chapter outlines what the transition from expertise to flexpertise development implies by introducing renewal bundles of HR/D practices.

KEYWORDS: expertise, experts, expert development, flexpertise, flexperts, adaptive performance, adaptivity, HRD practices, HRM innovation, sustainable career.

5.1 Introduction

For decades, the question ‘What makes you an expert?’ has drawn the attention of scholars and practitioners alike to understand what is needed to become an outstanding performer in a specific domain (Feltovich et al., 2018). In nowadays’ volatile, unexpected, complex, and ambiguous (VUCA) working contexts (Baran & Woznyj, 2020), this question evolved into how workers are able to meet new expertise needs throughout their career (Kim, 2021). Van der Heijden (2000) introduced the concept of flexpertise to refer to this phenomenon and defined it as “the ability to maintain a certain amount of expertise under changing circumstances and in different situations, and also the mastery of certain learning strategies and learning skills to reach a certain level of expertise in any domain” (p. 69). This need for flexpertise requires that the HR/D profession extends and transforms current expertise development practices (Moats, 2021). This chapter outlines what the transition from expertise to flexpertise development implies for the scholarly field of HR/D and its practitioners by introducing ‘renewal’ bundles of HR/D practices, based upon an integrative review of studies regarding flexible and adaptive forms of expertise (Frie et al., sixth resubmission round).

5.1.1 What makes an expert?

Individual workers become experts when they solve domain-specific problems better and faster in comparison with novices (Feltovich et al., 2018). In well-defined domains, such as music and sports, it requires on average ten years of deliberate study and practice to reach this expert performance level (Ericsson et al., 1993), so gaining expertise is no sinecure. In one stream of research, scholars defined performance criteria that are applicable across working contexts in order to rule out the influence of social dynamics on the individual’s performance evaluation (Collins & Evans, 2018). Another stream of expertise research included a social aspect, stating that expertise is partly an attribution of relevant stakeholders (i.e., their recognition of the expert’s knowledge and skills) (Grenier, 2021; Mieg, 2009; Van der Heijden, 2000). Van der Heijden (1998) incorporated these two perspectives on expertise in her operationalization of the ‘occupational expertise’ construct into five dimensions, based upon empirical research in a variety of expertise domains and working contexts. In her view, occupational expertise involves: 1. domain-specific knowledge, 2. domain-specific skills, 3. meta-cognitive skills by which workers understand the strengths and limits of their know-how, 4. social recognition of stakeholders, and 5. the ability to foresee new developments in one’s own, adjacent, or radically different fields (i.e., the ‘growth and flexibility’ dimension; Van der Heijden, 1998). Workers who were labelled as experts in their organization had elevated levels on all five dimensions of occupational expertise (Van der Heijden, 2000).

For organizations, it is important to attract and retain workers with high levels of occupational expertise, as this comprises the core human capital for sustaining the competitive advantage of an organization (De Vos et al., 2017). As such, expertise is an important theme for HRD academics and practitioners (Cherrstrom & Bixby, 2018). Swanson and Holton (2001) defined HRD as “a process for developing and unleashing human expertise through organization development and personnel training and development for the purpose of improving performance” (p. 4). In this process, the role of HRD is “to understand, nurture, and honor employee expertise” (Kim, 2021, p. 31). As we will outline in this chapter, HR/D practices that support workers in their (ongoing) expertise development (e.g., Swanson & Holton, 2001) require extension and transformation into bundles of HR/D practices that enable them to become flexible in meeting new expertise needs across the boundaries of their expertise domain and working context.

5.1.2 How does one sustain an expert position?

Being an expert today does not mean automatically that one can sustain this position throughout one's entire career. The performance of experts decreases when they develop too many ‘entrenched’ routines or habits over time (Dane, 2010). For example, some experts tend to propose solutions from their own expertise position that proved to be successful in the past, but that may not be the best ones for current problems (Feltovich et al., 1997; Glăveanu, 2012). Another example is the tendency of some experts to find the perfect solution for a problem, making them overly precise (Trinh, 2019). Such over-precision makes it hard to propose a solution for a work-related problem encountered since they do not consider the solution to be a hundred percent correct yet. In a similar vein, some workers with a strong calling might be hindered as they only want to develop expertise that is in line with their main career driver (Lysova et al., 2018), possibly putting the individual's expert performance at stake, and through this their employability (Van der Heijden, 2002), and career sustainability (De Vos et al., 2020).

We posit that career sustainability in today's VUCA environments demands that experts sufficiently counterbalance or supplement their previously developed routine expertise with adaptive responses, as addressed in the growth and flexibility dimension of occupational expertise (Van der Heijden, 2000). Experts must deal with a decreasing half-life of their knowledge (Park & Kim, 2020), which makes their expertise obsolete (Kaufman, 1979) at an increasing speed. For example, psychologists were expected to become roughly half as knowledgeable in seven years, and in some specific fields even already in three years, in the absence of any new learning (Neimeyer et al., 2012). Moreover, organizations or occupational sectors must deal with complex transitions, such as the need for a more sustainable

business, which creates so-called 'wicked problems' (Yukawa, 2015). In particular, these transitions may require reskilling and upskilling of worker's expertise (WEF, 2020), development of expertise in multiple domains (Frodeman et al., 2017), or to create new areas of expertise to foster innovation (Gruber & Harteis, 2018). Altogether, the increasing complexity of problems in one's expertise domain and newly evolving expertise domains imply that workers need to flexibly enact their (new) expertise in novel contexts. In these new environments, they also encounter new stakeholders who handle different criteria of what it means to be an expert. New expertise needs require that workers display 'flexpertise'. Therefore, the central aim of this contribution is to reveal a valuable bundle of HR/D practices that can foster flexpertise in favor of the worker's career sustainability. Before outlining those practices, we will go deeper into our core construct of flexpertise.

5.1.3 Flexpertise defined

Flexpertise refers to the ability by which workers fulfill new expertise needs (within and across the boundaries of their expertise domains and working contexts) or develop or create new expertise in line with their own needs and capabilities (Frie et al., sixth resubmission round; Van der Heijden, 2000). Other scholars introduced related concepts to address aspects of this ability, such as adaptive expertise (Hatano & Inagaki, 1986), expertise redevelopment (Grenier & Kehrhahn, 2008), expertise renewal (Frie et al., 2019), flexible expertise (Birney et al., 2012) and learning agility (Lombardo & Eichinger, 2000). In line with domain-generic theories of expertise (Bereiter & Scardamalia, 1993; Chi et al., 1998; Van der Heijden, 2000), research in this field studied adaptive qualities and responses that individuals can apply across working contexts and expertise domains. Based upon an elaborate literature review on the phenomenon of flexpertise, Frie et al. (third resubmission round) integrated the empirical findings regarding intra-individual and social adaptations into the following six clusters of adaptation processes underlying flexpertise:

1) *'Perception of need or opportunity to adapt'* concerns the expert's ability to understand the personal and contextual significances of changes (Ward et al., 2018). Experts need to figure out whether changes require them to enact their expertise in novel ways, and which new expertise they need to develop. In this process, they consider a wider range of executive responses if they liaise with experts from other disciplines (Tancig, 2009). These responses range from endeavors to routinize practices (i.e., making them more efficient) to innovation of practices (Schwartz et al., 2005). Moreover, 'flexperts' (i.e., experts that are capable of timely meeting new expertise needs) make a deliberate choice to focus on one or a limited number of changes to increase the likeliness of materializing their new expertise (Frie et al., 2019).

2) '*Expertise exploitation*' concerns the ability to attune the enactment of one's (new) expertise to situational possibilities and constraints (Dall'Alba, 2018) when routinizing, adjusting, or innovating practices (Schwartz et al., 2005). If the given circumstances do not sufficiently support this materialization of one's expertise, flexexperts are the ones who are able to craft the required conditions (Frie et al., 2019). For example, they deploy crafting strategies such as organizing time, money, and access to professionals with supplementary expertise (Frie et al., 2019), or enhance the possibility to exploit their expertise through combining employment and self-employment modes (Ruiner & Liebhart, 2018).

3) '*Expertise redevelopment*' concerns how experts continue to develop new know-how within and across the boundaries of their domains. Grenier and Kehrhahn (2008) described this as an expertise redevelopment process involving the stages of dependence, independence, and transcendence. During this redevelopment process, an expert can increasingly rely on internalized know-how. When mastery of multiple domains of expertise is required, experts need to find a balance between safeguarding the existing expertise in their current domain and developing expertise in a new field (Thijssen & Van der Heijden, 2003).

4) '*Social recognition*' addresses the strategies by which experts build up social recognition for their newly enacted or developed expertise. Different strategies can be effective, such as timely claiming of a new area of expertise (Frie et al., 2019), translating one's know-how in a way that is understandable for people who are not knowledgeable in one's field (Engeström, 2018), or building credibility when socializing in a new work setting (Bourgoin & Harvey, 2018).

5) '*Identity adjustment*' means that workers might need to adjust the story about their expert or professional identity when developing new expertise or enacting their expertise in novel ways (Kingham, 2017). A new story could prevent an internal conflict with how workers perceive themselves and what they manifest as their novel know-how (Meijers & Lengelle, 2012).

6) '*Confidence in mastering new expertise field*' addresses when experts are adapting to a new expertise domain or working context, they might feel like a novice again. This can coincide with unsettling feelings such as anxiety, distress, and imposter thoughts. Once individuals develop themselves in terms of occupational expertise, they gain more confidence through experiencing an increasing level of proficiency and by receiving positive feedback from their peers and supervisors about their contributions and growing know-how (Grenier & Kehrhahn, 2008; Kingham et al., 2017).

For experts to display these six adaptation processes, a variety of personal qualities are needed (Frie et al., sixth resubmission round) such as adaptive dispositions (i.e., the propensity to adapt to contextual changes), flexible and rich knowledge representations (i.e., knowledge breadth and depth that allows one to approach problems flexibly), meta-cognitive skills (i.e., the understanding of the limits and strengths of one's know-how), and a certain degree of routine expertise (i.e., the routines that one has developed within one's expertise domain). A true flexpert will be recognized as the one who continues to expand expertise in one or more domains, and who deploys this know-how in line with their own personal needs and the needs of surrounding stakeholders (Frie et al., 2019). Herewith, flexpertise contributes to their career sustainability, being reflected in happy, healthy, and productive workers (Van der Heijden, 2005; Van der Heijden et al., 2020). This productivity can stem from the fact that the workers routinized, adjusted, or innovated practices in their working context (Schwartz et al., 2005). Figure 5.1 summarizes the six adaptation processes comprising flexpertise, their main personal and contextual antecedents, and their outcomes [see Frie et al., (third resubmission round) for a detailed list of adaptation processes, antecedents and outcomes, and a dynamic process model of flexpertise that depicts how the distinguished adaptation processes are interrelated by means of feedback loops].

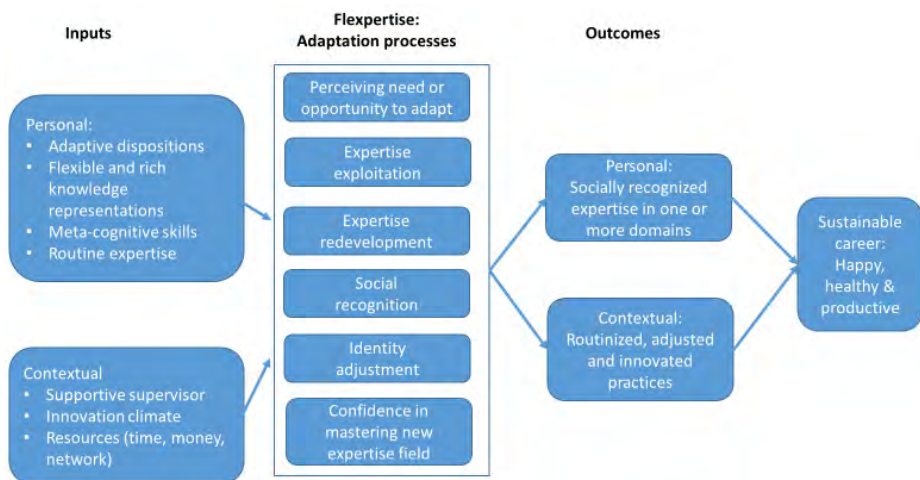


Figure 5.1 Flexpertise and its antecedents and outcomes

5.2 The transition in HR/D: from expertise to flexpertise development

The adaptation processes comprising flexpertise reflect that primarily supporting individuals to reach, maintain, and retain expert performance in a specific domain is not sufficient when workers need to deal with shifting expertise needs. The latter rather requires an extension of current expertise development practices to foster the flexibility of workers (Moats, 2021). Figure 5.2 outlines what the transition from expertise to flexpertise development implies for the HR/D profession in terms of (re) designing their practices.

To outline this transition, we will first describe the HR/D practices that were prevalent in the era of the expert development approach. Next, we will describe a renewal bundle of practices that HR/D could consider when concentrating on developing flexpertise.

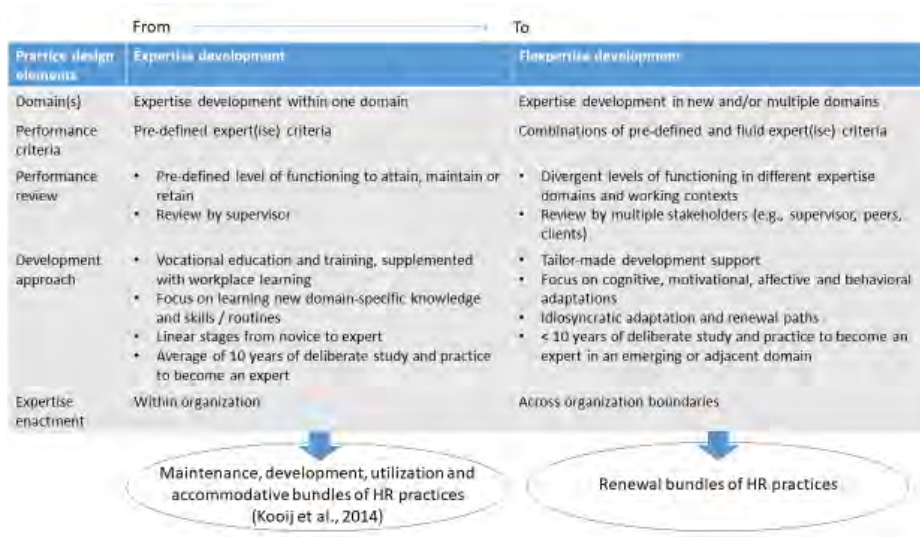


Figure 5.2 The transition in HR/D from expertise to flexpertise development

5.2.1 HR/D practices aimed at expertise development

A common assumption underlying expertise development practices is that there is a predefined level of functioning in a certain domain that one needs to attain, maintain, or retain through deliberate study and practice in order to be labelled an expert (Feltovich et al., 2018). In relatively protected professions, such as the medical field and accounting, institutions predefine performance criteria and practice standards (Collins & Evans, 2018). Within organizations, levels of functioning are typically captured by career frameworks in which more senior levels are linked to higher salaries, and it is the supervisor who reviews the individual's performance in the light of this framework (Dohmen, 2004). In this paradigm, expertise development starts with being a novice, and is followed by stages of being an advanced beginner, having competence, having proficiency, and finally being an expert (Dreyfus & Dreyfus, 1986). To foster this development, organizations offer bundles of HR practices that are considered superior to individual best practices (Subramony, 2009).

Based on a review of bundles of HR practices for supporting the individual's development across the lifespan, Kooij and colleagues (2014) distinguished development, maintenance, utilization, and accommodative bundles of practices. We used these four types of bundles to categorize HR/D practices that are specifically related to functioning within an expertise domain. Development practices typically aim to raise the individual's level of functioning through vocational education training to increase the individual's domain-specific knowledge and skills (Swanson & Holton, 2001; Veth et al., 2019; Wallin et al., 2019). Workers can build deep specialization in a field through training and practice focused on developing domain-specific routines and adapting and fine-tuning these routines using on-the-job learning and developmental job assignments (Ford et al., 2018). Maintenance practices are meant to help the individual workers to maintain their current level of functioning in the light of upcoming changes (Kooij et al., 2014). In relatively protected professions, this can imply that experts need to follow obligatory courses for keeping their expert status, which institutions affirm through diplomas and (re)certification. Utilization practices can help individual workers to return to former levels of functioning after their performance decreases (Kooij et al., 2014), for example, when experts become too rigid in their thinking, acting, or motivation (Feltovich et al., 1997). In case an individual is not capable of returning to an earlier level of functioning, accommodative bundles of HR practices, such as demotion, reduced workload, and early retirement, aim to ease functioning at lower levels (Kooij et al., 2014). Overall, these bundles of HR/D practices (e.g., Grenier & Germain, 2014), can safeguard the expert's ongoing functioning within an expertise domain, specifically when these domains are well-specified in terms of expert criteria and practices.

Flexpertise indicators

- Expertise in new or multiple domains
- Routinized, adjusted and innovated practices
- Social recognition of individual's unique cocktail of expertise by different stakeholder groups.

Flexpertise HR/D practices

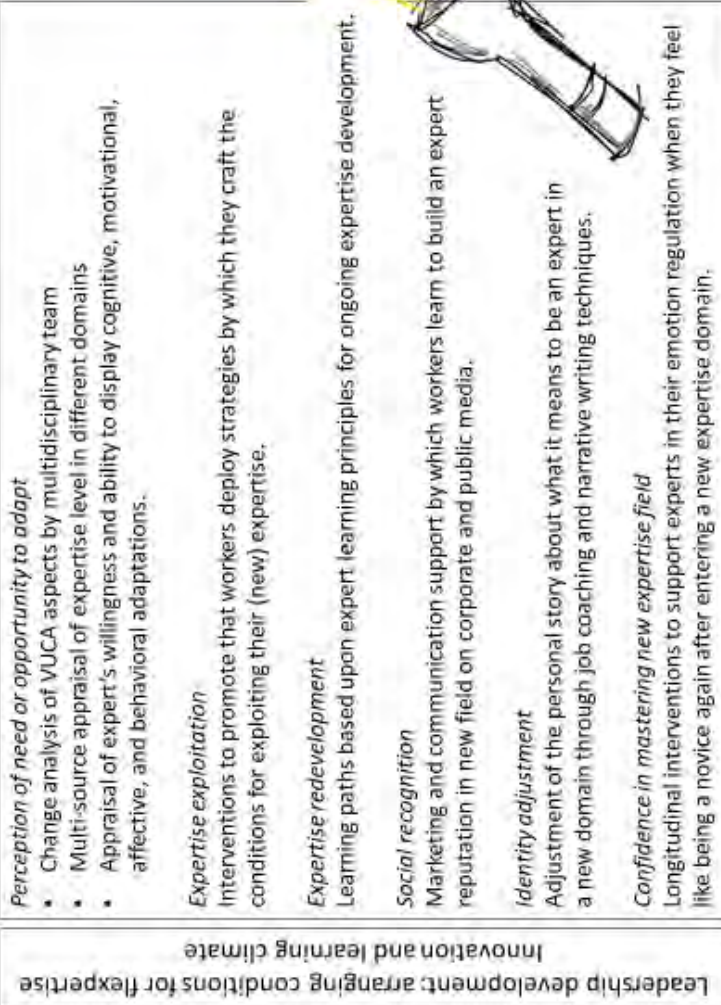


Figure 5.3 A renewal bundle of HR/D practices to foster flexpertise

5.2.2 A renewal bundle of HR/D practices aimed at flexpertise development

As indicated before, flexpertise is especially required when experts are challenged to develop expertise in new and/or multiple domains, and to materialize their expertise in novel working contexts involving different stakeholders. This means that, when designing practices to foster flexpertise, HR/D should take into account that workers might encounter different and fluid expert(ise) criteria depending upon the specific domains and working contexts in which they operate. Furthermore, this could mean that one is perceived as an expert by one stakeholder, whereas other stakeholders have their doubts about a worker's expertise (e.g., Valkeavaara, 1999). In addition, HR/D professionals should acknowledge that flexpertise becomes manifest in idiosyncratic adaptation or renewal paths (Frie et al., 2019). This is the result of the unique combination of what workers know, can do, and value based upon what they experienced and learnt throughout their career (Billet et al., 2018) as well as the opportunities and constraints of the specific working contexts in which their expertise takes shape (Collins & Evans, 2018). Obviously, this requires practices that are tailored to the individual's needs and capabilities, and the specific working context. These practices should not only focus on extending the domain-specific knowledge and skills base, but in addition consider the required interplay of cognitive, motivational, and affective adaptations and social interactions with surrounding stakeholders. Regarding the length of a development trajectory, HR/D should consider that acquiring expertise in emerging domains can take less time than the ten-year average because of less competition and know-how of other experts (Ericsson, 2006). Developing expertise in an adjacent domain requires around a year because one can build upon existing expertise (e.g., Cusson & Strange, 2008), and utilize a network of people that provides resources and support by giving recognition of the worker's achievements (Frie et al., 2019).

Building on these different elements for designing practices, we propose a 'renewal' bundle of HR/D practices to foster flexpertise (see Figure 5.3). Below, we describe per adaptation process examples of practices which have developmental value for flexpertise among workers, supplemented with generic supportive conditions.

Practices regarding the development of specific adaptation processes

Perception of need or opportunity to adapt: To facilitate the broadening of experts' horizons to deal with changes HR/D may provide support using different strategies. HR/D could arrange that multidisciplinary expert teams analyze complex organization problems and decide how to solve them (Tancig, 2009). Such an analysis can unravel which new expertise an individual or team needs to develop to deal with future organizational and societal challenges. When experts need to develop

expertise in a new domain, multiple measurements of occupational expertise and of adaptive expertise (Grenier, 2021) can be used (Van der Heijden, 2000) in order to receive feedback from different stakeholders and through this information on the individual's social recognition in the field. We call for more multi-source (i.e., experts and their supervisor) scholarly work aimed at increasing our understanding of what is needed for the expert's willingness and ability to display the required adaptation processes (Frie et al., sixth resubmission round). HR/D can use this growing understanding of what change is required from workers in nowadays'VUCA environment to decide which practices might support them in becoming a flexpert.

Expertise exploitation: As discussed before, flexperts can effectively exploit their (new) expertise by routinizing, adjusting and innovating practices, when they deploy strategies to craft the required conditions for being able to adapt. These strategies can be the crafting activities that we exemplified before, such as the arrangement of time and money, and a supportive network. Correspondingly, HR/D could make use of best practices to design interventions that promote workers to deploy these 'job crafting' strategies (Devotto & Wechsler, 2019).

Expertise redevelopment: Job coaches could support experts in renewing their expertise by finding a balance between safeguarding expertise in their current domain and developing expertise in a new domain. Based upon a review of how experts continue to learn, Wallin and authors (2019) distilled the following five elements of 'expert learning': learning through solving ill-defined and non-routine problems, reflection on learning and experiences, knowledge transformation and integration, learning from errors, and exposure to boundary crossing situations. HR/D scholars can build upon this knowledge when designing learning paths for ongoing expertise development.

Social recognition: When experts have gained new expertise, marketing and communication professionals could support them by demonstrating how to broadcast their new expertise to different audiences using corporate and public media to build an expert reputation (Jacovi et al., 2014).

Identity adjustment: Adjusting one's identity in line with new expertise demands can require in-depth introspection to build a new story about oneself (Meijers & Lengelle, 2012). Job coaches could help experts to reflect on identity change when developing expertise in a new domain. In addition, using a narrative writing technique (Meijers & Lengelle, 2012), can promote managing identity as an expert with a newly developed and enacted expertise, and appreciating the value brought to themselves and their surrounding environment.

Confidence in mastering new expertise field: HR/D could consider offering personalized longitudinal interventions to improve emotion regulation efficacy (Denny, 2020) to deal with change. Emotion regulation may help experts cope with unsettling feelings that arise, and to regain confidence when feeling like a novice again upon entering a new expertise domain.

Leadership development: arranging conditions for flexpertise

The adaptive ability of experts is facilitated by supportive supervisors (Bohle Carbonell et al., 2014). In leadership development trajectories, HR/D can make supervisors aware of the role they play during the adaptation and renewal paths of experts by providing the conditions to unleash their new expertise. For example, supervisors can learn to facilitate experts crossing organizational boundaries through job rotation (Cutler White, 2014). Supervisors create 'space' by offering resources such as time and money and being ambassadors for the expert's renewal process (Frie et al., 2019).

Innovation and learning climate

Finally, an organizational climate in which errors are accepted and innovative ideas are welcomed, assists experts to be adaptive and to learn from applying one's expertise to novel situations (Bohle Carbonell et al., 2014). HR/D can play its part by setting the conditions and structure for learning to occur across domains and working contexts (Hannah & Lester, 2009; Park & Rothwell, 2009).

5.3 Concluding remarks

In this chapter, we outlined the transition that HR/D needs to make when shifting the focus from expertise to flexpertise development. By offering bundles of practices that foster flexpertise, HR/D could support workers in meeting current and future labor market needs and facilitate safeguarding expert career sustainability. The renewal bundle of HR/D practices proposed can facilitate discussion among multiple actors regarding how flexpertise can manifest in an organization. Fugate and colleagues (2021) argued that the interests of individual workers as well as their employer should be aligned to enhance both the individual's career success and organizational performance. In doing so, the authors advocate a social exchange perspective (Blau, 1964), which in our view is needed for stimulating flexpertise development and through this career sustainability. When the interests of both the individual career holder and their employer are taken into account, the exchange relationship is optimized, both parties are willing to go the extra mile, and future expertise and career needs are taken care of, over and above performance in the here-and-now (Fugate et al., 2021).

References

- Baran, B. E., & Woznyj, H. M. (2020). Managing VUCA: The human dynamics of agility. *Organizational Dynamics*, 20, 100787.
- Bereiter, C., & Scardamalia, M. (1993). *Surpassing ourselves. An inquiry into the nature and implications of expertise*. Open Court.
- Billett, S., Harteis, C., & Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed.) (pp. 105-126). Cambridge University Press.
- Birney, D. P., Beckmann, J. F., & Wood, R. E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, 22, 563-574.
- Blau, P. M. (1964). *Exchange and power in social life*. Wiley.
- Bohle Carbonell, K., Stalmeier, R. E., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, 12, 14-29.
- Bourgoin, A., & Harvey, J. F. (2018). Professional image under threat: Dealing with learning-credibility tension. *Human Relations*, 71, 1611-1639.
- Cherrstrom, C. A., & Bixby, J. (2018). Construct of expertise within the context of HRD: Integrative literature review. *Human Resource Development Review*, 17, 440-464.
- Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (1988). *The nature of expertise*. Lawrence Erlbaum.
- Collins, H., & Evans, R. (2018). A sociological/philosophical perspective on expertise: The acquisition of expertise through socialization. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed) (pp. 21-32). Cambridge University Press.
- Cusson, R. M., & Strange, S. N. (2008). Neonatal nurse practitioner role transition: The process of reattaining expert status. *The Journal of Perinatal & Neonatal Nursing*, 22, 329-337.
- Cutler White, C. (2014). An integrative literature review to introduce socio-networked learning: a new theoretical framework for HRD. *Human Resource Development Review*, 13(3), 276-292.
- Dall'Alba, G. (2018). Reframing expertise in its development: A lifeworld perspective. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed.) (pp. 33-39). Cambridge University Press.
- Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, 35, 579-603.
- De Vos, A., Forrier, A., Van der Heijden, B., & De Cuyper, N. (2017). Keep the expert! Occupational expertise, perceived employability and job search: A study across age groups. *Career Development International*, 22, 318-33.
- De Vos, A., Van der Heijden, B. I. J. M., & Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, 117, 103196.
- Denny, B. T. (2020). Getting better over time: A framework for examining the impact of emotion regulation training. *Emotion*, 20(1), 110-114.
- Denyer, D., & Tranfield, D. (2009). Producing a systematic review. In D.A. Buchanan & A. Bryman (Eds.), *The Sage handbook of organizational research methods* (pp. 671-689). Sage.

- Devotto, R. P. D., & Wechsler, S. M. (2019). Job crafting interventions: systematic review. *Trends in Psychology*, 27, 371-383.
- Dohmen, T. J. (2004). Performance, seniority, and wages: formal salary systems and individual earnings profiles. *Labour Economics*, 11(6), 741-763.
- Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the age of the computer*. Basil Blackwell.
- Engeström, Y. (2018). *Expertise in transition: Expansive learning in medical work*. Cambridge University Press.
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683-703). Cambridge University Press.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363-406.
- Feltovich, P. J., Prietula, M. J., & Ericsson, K. A. (2018). Studies of expertise from psychological perspectives: Historical foundations and recurrent themes. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed.) (pp. 59-83). Cambridge University Press.
- Feltovich, P. J., Spiro, R. J., & Coulson, R. L. (1997). Issues of expert flexibility in contexts characterized by complexity and change. In P. J. Feltovich, K. M. Ford, & R. R. Hoffman (Eds.), *Expertise in context: Human and machine* (pp. 125-146). AAAI/MIT Press.
- Ford, J. K., Webb, J. M., & Showler, M. (2018). Building deep specialization through intentional learning activities. In K. G. Brown, *The Cambridge handbook of workplace training and employee development* (pp. 228-255). Cambridge University Press.
- Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, 30, 61-79.
- Frie, L. S., Van der Heijden, B. I. J. M., Korzilius, H. P. L. M., & Sjoer, E. (sixth resubmission round). How workers meet new expertise needs throughout their career: An integrative review revealing a dynamic process model of flexpertise.
- Frodeman, R., Klein, J. T., & Pacheco, R. C. D. S. (Eds.). (2017). *The Oxford handbook of interdisciplinarity*. Oxford University Press.
- Fugate, M., Van der Heijden, B., De Vos, A., Forrier, A., & De Cuyper, N. (2021). Is what's past prologue? A review and agenda for contemporary employability research. *Academy of Management Annals*, 15(1), 266-298.
- Glăveanu, V. P. (2012). Habitual creativity: Revising habit, reconceptualizing creativity. *Review of General Psychology*, 16, 78-92.
- Grenier, R. S. (2021). Identifying and measuring expertise in organizations. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 57-69). Palgrave Macmillan.
- Grenier, R. S., & Germain, M. (2014). Expertise through the HRD lens. Research, trends and implications. In N. E. Chalofsky, T. S. Rocco, & M. L. Morris (Eds.), *Handbook of human resource development* (pp. 183-200). John Wiley.

- Grenier, R. S., & Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, 7, 198-217.
- Gruber, H., & Harteis, C. (2018). Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise, vol. 24. Springer.
- Hannah, S. T., & Lester, P. B. (2009). A multilevel approach to building and leading learning organizations. *The Leadership Quarterly*, 20(1), 34-48.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262-272). Freeman.
- Jacovi, M., Guy, I., Kremer-Davidson, S., Porat, S., & Aizenbud-Reshef, N. (2014, February). The perception of others: inferring reputation from social media in the enterprise. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing* (pp. 756-766).
- Kaufman, H. G. (1979). Technical obsolescence: Work and organizations are the key. *Engineering Education*, 69(8), 826-830.
- Kim, Y. (2021). The changing concepts of expertise and expertise development. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 17-38). Pelgrave Macmillan.
- Kinghorn, G. R., Halcomb, E. J., Froggatt, T., & Thomas, S. D. (2017). Transitioning into new clinical areas of practice: An integrative review of the literature. *Journal of Clinical Nursing*, 26, 4223-4233.
- Kooij, D. T., Jansen, P. G., Dikkers, J. S., & De Lange, A. H. (2014). Managing aging workers: A mixed methods study on bundles of HR practices for aging workers. *The International Journal of Human Resource Management*, 25(15), 2192-2212.
- Lombardo, M. M., & Eichinger, R. W. (2000). High potentials as high learners. *Human Resource Management*, 39, 321-329.
- Lysova, E. I., Jansen, P. G. W., Khapova, S. N., Plomp, J., & Tims, M. (2018). Examining calling as a double-edged sword for employability. *Journal of Vocational Behavior*, 104, 261-272.
- Meijers, F., & Lengelle, R. (2012). Narratives at work: The development of career identity. *British Journal of Guidance & Counselling*, 40(2), 157-176.
- Mieg, H. A. (2009). Two factors of expertise? Excellence and professionalism of environmental experts. *High Ability Studies*, 20, 91-115.
- Moats, J. (2021). Preparing for the future of work and the development of expertise. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 17-38). Pelgrave Macmillan.
- Neimeyer, G. J., Taylor, J. M., Rozensky, R. H., & Cox, D. R. (2014). The diminishing durability of knowledge in professional psychology: A second look at specializations. *Professional Psychology: Research and Practice*, 45(2), 92-98.
- Park, S., & Kim, E. J. (2020). Exploring linkages between unlearning and human resource development: Revisiting unlearning cases. *Human Resource Development Quarterly*, 31(2), E6-E16.
- Park, Y., & Rothwell, W. J. (2009). The effects of organizational learning climate, career-enhancing strategy, and work orientation on the protean career. *Human Resource Development International*, 12(4), 387-405.
- Ruiner, C., & Liebhart, U. (2018). How multi-optional experts maintain and enhance their employability. *German Journal of Human Resource Management*, 32, 52-74.
- Schwartz, D. L., Bransford, J. D., & Sears, D. (2005). Efficiency and innovation in transfer. In J. Mestre (Eds.), *Transfer of learning: Research and perspectives* (pp. 1-51). Information Age Publishing.
- Subramony, M. (2009). A meta-analytic investigation of the relationship between HRM bundles and firm performance. *Human resource management*, 48(5), 745-768.
- Swanson, R. A., & Holton, E. F. (2001). *Foundations of Human Resource Management*. Berrett-Koehler.

- Tancig, S. (2009). Expert team decision-making and problem solving: Development and learning. *Interdisciplinary Description of Complex Systems*, 7(2), 106-116.
- Thijssen, J. G. L., & Van der Heijden, B. I. J. M. (2003). Evaporated talent? Problems with talent development during the career. *International Journal of Human Resources Development and Management*, 3, 154-170.
- Trinh, M. P. (2019). Overcoming the shadow of expertise: How humility and learning goal orientation help knowledge leaders become more flexible. *Frontiers in Psychology*, 10.
- Valkeavaara, T. (1999). "Sailing in Calm Waters Doesn't Teach": constructing expertise through problems in work—the case of Finnish human resource developers. *Studies in Continuing Education*, 21, 177-196.
- Van der Heijden, B. I. J. M. (1998). The measurement and development of professional expertise throughout the career: A retrospective study among higher level Dutch professionals [Doctoral dissertation]. University of Twente, the Netherlands.
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9-39.
- Van der Heijden, B. I. J. M. (2002). Prerequisites to guarantee life-long employability. *Personnel Review*, 31, 44-61.
- Van der Heijden, B. I. J. M. (2005). 'No one has ever promised you a rose garden'. On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Open University of the Netherlands, Heerlen/Assen: Van Gorcum.
- Van der Heijden, B. I. J. M., De Vos, A., Akkermans, J., Spurk, D., Semeijn, J., Van der Velde, M., & Fugate, M. (2020). Sustainable careers across the lifespan: Moving the field forward. *Journal of Vocational Behavior*, 117, 103344.
- Veth, K. N., Korzilius, H. P. L. M., Van der Heijden, B. I. J. M., Emans, B. J. M., & De Lange, A. H. (2019). Which HRM practices enhance employee outcomes at work across the life-span? *The International Journal of Human Resource Management*, 30(19), 2777-2808.
- Wallin, A., Nokelainen, P., & Mikkonen, S. (2019). How experienced professionals develop expertise in work-based higher education: a literature review. *Higher Education*, 77, 359-378.
- Ward, P., Gore, J., Hutton, R., Conway, G. E., & Hoffman, R. R. (2018). Adaptive skill as the conditio sine qua non of expertise. *Journal of Applied Research in Memory and Cognition*, 7, 35-50.
- WEF (2020). The future of jobs report. .
- Yukawa, J. (2015). Preparing for complexity and wicked problems through transformational learning approaches. *Journal of Education for Library and Information Science*, 56, 158-168.



Discussion

We conclude this PhD dissertation with a summary and critical reflection on the contributions of this PhD dissertation to the scholarly knowledge, the research methods that we deployed, and in what way our research may be used in practice by workers who need to deal with evolving expertise needs and by the leaders and HR/D professionals, and other stakeholders, that may support them. This is followed by an outline of the implications this increased understanding of the flexpertise phenomenon has on future research. This chapter ends with an ethical consideration on whether every worker can and must be a flexpert.

6.1 Contributions to scholarly knowledge

As we outlined in the Introduction chapter, we aimed to make a significant theoretical and empirical contribution to the fields of expertise and career sustainability by increasing the understanding of the adaptive ability by which workers meet new expertise needs throughout their careers. In this section, we describe how we contribute to these fields by providing conceptual clarity, the introduction of an IMO framework, and three process models on the interplay of adaptation processes of individual workers.

6.1.1 Conceptual clarity

In different scholarly fields, such as HRD, HRM, management and organization, psychology, and vocational training and education, scholars introduced different concepts to describe aspects of the flexpertise phenomenon. As we outlined in our Introduction chapter, examples of these concepts include adaptive expertise (Hatano & Inagaki, 1986), expertise redevelopment (Grenier & Kehrhahn, 2008), flexible expertise (Birney et al., 2012), and learning agility (Lombardo & Eichinger, 2000). The variety of concepts coined in different scholarly fields led to a segmented understanding of the flexibility that workers need to manifest after attaining an initial level of occupational expertise. This segmentation reflects that flexpertise should be approached as a multi-faceted phenomenon (Bell et al., 2012) and requires a multi-disciplinary approach to further theoretical research in this field. Building upon this approach, we provided conceptual clarity by outlining how concepts are interrelated. In our review study, we came up with an historical overview of concepts regarding flexible or adaptive forms of expertise through our conceptual map (see Figure 3.1). This map outlines the variety of concepts by decade of introduction, by aspect(s) of the flexpertise phenomenon addressed, and by how scholars built upon previous concepts to further theoretical research (see Appendix 3.1 for the background information used in defining this conceptual map). Through identifying

the similarities and differences between the concepts distinguished, we provided conceptual clarity in this multi-disciplinary field. Supplemented with the insights gained through our four flexpertise studies, we propose the following detailed and refined definition of flexpertise to lay the groundwork for follow-up research in this field:

Flexpertise is the adaptive ability by which a worker meets new expertise needs throughout their career. More specifically, this ability consists of an interplay of dynamic intra-individual and social adaptation processes over time, by which a worker meets a variety of new expertise needs within and across the boundaries of their expertise domain(s) and working context(s) through creating beneficial outcomes for oneself, as well as outcomes that are recognized as valuable by one's surrounding stakeholders, to safeguard one's career sustainability.

6.1.2 Integration of antecedents, mediators and outcomes into an IMO framework

Another indication of the segmentation in the field that we aimed to examine, was the fact that scholars deployed different theoretical approaches to study the flexpertise phenomenon (cf. Baard et al., 2014) (see the section on “The need for an evidence-based and dynamic process model” in Chapter 3 for more details). This segmentation is reflected in empirical studies that focus on identifying specific antecedents (contextual and personal inputs as addressed by RQ2.1 and RQ2.2), adaptive responses (i.e., the mediators that are addressed by RQ2.3), and/or the outcomes at contextual and personal level (as addressed by RQ2.4 and RQ2.5 respectively). The twenty review studies included in our integrative review reflect both this segmentation as well as the scholarly lenses used, such as HRD (e.g., Cherrstrom & Bixby, 2018), innovation (e.g., Pusic et al., 2018), or decision-making processes (Ward et al., 2018).

In addition to providing the aforementioned conceptual clarity, we contributed to the scholarly knowledge in this field by integrating the literature on the inputs, mediators and outcomes across disciplines into an IMO framework, in the form of categories (cf. Mathieu et al., 2008) (see Table 3.1). All of these factors (i.e., the categories of inputs, mediators and outcomes) may contribute to the ability of a worker to meet new expertise needs. This framework reconfirmed our previous assertion that flexpertise should be regarded as a multi-faceted phenomenon that requires a multiple-disciplinary approach to fully understand what this adaptive

ability entails. The IMO framework furthermore showed that the understanding of how the different IMO factors are interrelated when workers meet a multiplicity of new expertise needs within and across the boundaries of their expertise domain(s) and working context(s) was limited. Through integrating previous research, we identified that flexexpertise involves intra-individual adaptations and interactions with surrounding stakeholders (cf. Gruber & Harteis, 2018), and that these adaptation processes seemed to be intertwined when applied in a VUCA working context (Baran & Woznyj, 2020; Bennett & Lemoine, 2014). We have been able to capture this dynamic interplay by means of the development of process models.

6.1.3 Interplay of adaptation processes captured in dynamic process models

In this PhD project, we developed three process models to outline the flexexpertise phenomenon, that is the Model of Expertise Renewal (see Figure 2.2), the dynamic process model of flexexpertise (see Figure 3.3), and the GMB model (see Figure 4.2). These models are based upon three different sources of data, i.e., retrospective interviews with flexexperts, an integration of the scholarly literature, and the experiences of a group of HR/D practitioners with supporting employees in their ongoing professional development. These models increased our understanding of how workers are able to deal with new expertise needs throughout their career. This process approach was addressed by RQ1.1, RQ2.3, and RQ3.1. In this section, we briefly summarize the value of each model for increasing the scholarly understanding of the flexexpertise phenomenon, followed by a summary of the similarities and differences between the models in Table 6.1.

Model of Expertise Renewal

Our Model of Expertise Renewal was the start of a process aimed at increasing our understanding of the dynamic interplay of adaptation processes that workers need to manifest to meet new expertise needs throughout their careers. For this model, we had flexexperts reflect on the episodes during which they developed and materialized a new area of expertise in their careers, whether within or across the boundaries of their current domain(s). We collected these reflections through retrospective interviews. As we outlined in the Discussion section of Chapter 2, these flexexperts mentioned processes that resembled the empirical findings on entrepreneurial behavior and the manifestation of this behavior as an employee in organizations (i.e., intrapreneurship). More specifically, the flexexperts predominantly mentioned how they proactively identified opportunities to renew their expertise as part of going through a process of generating ideas, rather than giving more reactive responses to shifting expertise needs. The flexexperts focused on developing new areas of expertise

that could lead to beneficial outcomes for themselves as well as their surrounding stakeholders. This process of exploring a new expertise domain involved the subprocesses of testing and acquiring new knowledge and skills through training, self-study and reflection on testing. Through these subprocesses, flexperts were able to build up new knowledge and skills in their own, adjacent and/or radically different fields. Furthermore, the process of creating stimulating context reflects the assumption that ongoing expertise development is the result of both individual agency (Goller, 2017) and the opportunities and constraints imposed by the working context which shapes their expertise (Zimmerman, 2006). The subprocesses of creating networks of ambassadors and creating space reflect what is known in the literature as job crafting strategies (Tims et al., 2012; Tims et al., 2016; Zhang & Parker, 2019). Based on the Model of Expertise Renewal that our analysis of the interview data revealed, we proposed to add claiming idea or new expertise to the typology of job crafting strategies proposed by Tims et al. This claiming allowed flexperts to get social recognition for their new expertise and related contributions. This in turn facilitated the gaining of resources by flexperts so they could follow up on their actions through which they developed and materialized their new area of expertise. The Model of Expertise Renewal ultimately shows how flexperts materialized their new expertise by means of tangible products, that they fine-tuned and embedded in existing processes and systems, whilst ensuring that this materialization process creates beneficial outcomes for themselves as well.

The value of the Model of Expertise Renewal is that it describes in detail how 'high-end' flexperts can deal with a variety of new expertise needs by which they realize multi-level outcomes. As such, this model can be used as a frame of reference, or theoretical building block, for the development of workers towards becoming flexperts. At the same time, we should also be critical about the value of the model, as it is based upon interviews with a limited sample of ten Dutch renowned experts. As these are experts with a high level of flexpertise, our sample might set the bar too high for the average worker. This limits the generalizability of our findings as it leaves unaddressed how the model applies to workers with varying levels of occupational expertise (see the discussion section of Chapter 2 and the methodological reflection hereinafter for more details).

The Model of Expertise Renewal shows that the ability to meet new expertise needs involves iterative cycles of intra-individual and social adaptation processes (cf. Gruber & Harteis, 2018), whereby the outcome of a subprocess can serve as input for a subsequent subprocess. Furthermore, we revealed that flexpertise does not involve a linear process, yet is rather a process of going back and forth between different (sub)

processes. As such, this model acted as the foundation necessary to further investigate what this interplay of processes and changes over time entails through adopting a system dynamics (SD) approach (Vennix, 1996) to the flexpertise phenomenon. In the two models that we briefly summarize below, we adopted this SD lens.

Dynamic process model of flexpertise

By virtue of applying a SD lens, we have been able to develop a new theoretical model that builds upon and transcends the integration of literature on flexible or adaptive forms of expertise, captured in the aforementioned IMO framework (see Table 3.1). As Cronin and Bezrukova (2019, p. 789) outlined, “applying the SD framework has the capacity to leverage existing research in ways that linear causality alone cannot,” and takes into account that “the only constant is change” (Cronin & Vancouver, 2019, p. 89). This SD lens provided us with the language to better explicate what the interplay between processes involves, and what dealing with ongoing change(s) in the environment of the worker entails, requiring continuous adaptations of the worker as well. In the Method section and in the section entitled ‘Findings synthesized into a dynamic process model of flexpertise’ in Chapter 3, we describe in more detail the SD concepts and principles that we used for building and visualizing our dynamic process model of flexpertise (see Figure 3.3). Below, we highlight the SD aspects that we incorporated in the model.

The dynamic process model of flexpertise that we have built is endogenous¹ (i.e., it is supposed to contain all adaptation processes that make up the ability of the individual to deal with a multiplicity of new expertise needs). Furthermore, the model has no single starting or ending point (i.e., the interplay of processes is ongoing and processes may run in parallel). Additionally, the variables in the model may change over time. In comparison to the Model of Expertise Renewal, this dynamic process model was defined at a higher level of aggregation and as such the adaptation processes are fewer in number (i.e., depicted as variables in the model). We distinguished six variables that represent clusters of adaptation processes, namely perception of need or opportunity to adapt, expertise redevelopment, expertise exploitation, confidence in mastering new expertise field, identity adjustment, and social recognition. These variables are a high-level summary of the adaptation processes that we identified in the IMO framework in Table 3.1 (the middle column listing the categories of mediators). Employability was incorporated as a stock variable in the model and identified as a distal outcome (i.e., delay effect) of the aforementioned adaptation processes (see the Findings synthesized into a dynamic process model of flexpertise subsection in Chapter 3 for an explanation of stock

¹ The variable Contextual changes was approached as an exogenous variable in the model.

variables and delay effects). In the model, these variables are connected by means of reinforcing and balancing loops. In Table 6.1 below, we outline how the variables in this model can be mapped out to form the (sub)processes that we distinguish in our Model of Expertise Renewal.

The value of the dynamic process model of flexpertise lies in its simplicity, which makes it a valuable tool for further theoretical research and subsequent empirical work on this matter. The model allows scholars to formulate testable hypotheses on the effects of adaptation processes over time, and on the influence of contextual and individual factors that may limit or enable an individual to effectively deal with a variety of new expertise needs (also refer to the Implications and recommendations for future research subsection below).

GMB model regarding ability to meet new expertise needs

Aligning with the dynamic process model of flexpertise that we derived from our integrative review, we deployed SD principles for building a model of the ability to meet new expertise needs with a group of HR/D practitioners using a Group Model Building (GMB) approach (Vennix, 1996). This GMB model was developed based upon the consolidation of the experiences of these HR/D professionals with workers who varied in level of occupational expertise and flexibility when dealing with current and upcoming expertise needs. In line with the argumentation underpinning the previous two models, these professionals identified that workers make a balanced decision to develop a new area of expertise based on internal (i.e., personal) enablers and constraints as well as external (i.e., contextual) enablers and constraints (see Table 4.1 for a list of these enablers and constraints). Furthermore, they distinguished two types of learning cycles: learning by success and learning by mistake. The latter comprises the learning in an environment where mistakes are not or less accepted, reducing the psychological safety of the individual which reduced psychological safety may in turn induce or strengthen feelings of fear and pain. In contrast to the previous two models, this GMB model does not incorporate the creation of conditions for developing and materializing expertise, the adjustment of identity, and the effects of adaptation on employability. However, the participants reported in their discussions that the latter two variables play a role in the ability to meet new expertise needs.

Similar to the dynamic process model of flexpertise, the value of this GMB model lies in the explication of feedback loops that allow further theoretical research in this field, specifically with regards to our understanding of what hampers the system dynamics. Another strength of this model is that it incorporates leverage points

where small interventions can have a large positive effect on the ability to meet new expertise needs. The identification of these leverage points may shed new light on HR/D research on how to foster ongoing expertise development by providing renewal bundles of HR/D practices as addressed in Chapter 5.

Interpretation of similarities and differences between process models

To conclude, the three process models summarized in this subsection address overlapping aspects of the flexpertise phenomenon, albeit each worded differently in light of the different sources in which they are rooted, differences in level of detail of the adaptation processes, and the adoption of SD terminology in the dynamic process model of flexpertise and GMB model. Table 6.1 summarizes the similarities and differences between the three process models. It shows how model components address similar and distinctive aspects of the flexpertise phenomenon in terms of (sub)processes, variables, reinforcing loops (indicated by an R), and balancing loops (indicated by a B). Details regarding the model components can be found in the Chapters 2, 3, and 4.

In conclusion, our process models contribute to scholarly knowledge on how workers are able to meet new expertise needs throughout their career in general and, more specifically, respond to the recent plea in employability research for taking up a SD lens for making significant theoretical contributions to this field (Fugate et al., 2021). Before outlining directions for future research, we now reflect on the research methods that we deployed.

Table 6.1 Similarities and differences between three flexpertise process models

Model components			Model comparison	
Model 1: Model of Expertise Renewal	Model 2: Dynamic process model of flexpertise	Model 3: GMB model of the ability to meet new expertise needs	Similarities	Differences
Process: Generating ideas Subprocess: Focusing	Variable: Perception of need or opportunity to adapt	Feedback loop R1 includes variable <i>Motivation and/or need to gain expertise</i>	All models cover: - Trade-off decision by which workers evaluate how to fulfill their own needs and the needs from surrounding stakeholders given the existing constraints and opportunities of their own and their surrounding context. - This may lead to a decision which new expertise one aims to develop and/or which contribution to practice one aims to make.	- Model 1 includes the focus of flexperts on proactively seeking opportunities (i.e., the changes they want to act upon), whereas the Models 2 and 3 put a similar weight to changes one has to deal with (i.e., representing an urgency or a necessity). - In addition to the choice to develop a new area of expertise and/or contribution to practice, Models 1 and 2 also incorporate the deliberate decision of a worker to (re)gain social recognition.
Subprocesses: - Testing - Acquiring new knowledge and skills	Variable: Expertise redevelopment	Feedback loops containing variables: - Learning by mistake (R4, B2, B3) - Learning by success (R2, R3)	All models cover: - Learning processes that involve learning from failures as a result of experimenting/trying out/testing, and learning from successes. - Informal learning at the workplace and formal learning activities. - Learning through crossing the boundaries of one's expertise domain and working context. - The need for a safe and/or supportive climate. - Individual and social learning.	- Models 1 and 2 incorporate the process of integrating new expertise into the existing knowledge base by which a worker develops a new and unique 'cocktail of expertise'. - Only Model 3 incorporates the influence of negative learning experiences at school/university that inhibits future learning.

Table 6.1 Continued

Model components				Model comparison	
Model 1: Model of Expertise Renewal	Model 2: Dynamic process model of flexpertise	Model 3: GMB model of the ability to meet new expertise needs	Similarities	Differences	
Process: <i>Materializing idea and new expertise</i> Subprocesses: • <i>Fine-tuning products</i> • <i>Embedding products</i>	Variable: <i>Expertise exploitation</i> (see Table 3.1 for possible contextual outcomes)	Feedback loops containing variable <i>Impact (R6, R7, B5)</i>	All models cover: How the individual's adaptations lead to outcomes that are beneficial for the stakeholders/the context in which one operates. This has been described as materializing, exploiting, or implementing one's expertise.	• Only Model 1 incorporates the embedding of products in existing processes and procedures to ensure that a change persists after a flexpert starts a new expertise renewal episode. • Only Model 2 incorporates that contributions to practice can range from incremental changes to radical changes. • Only Model 3 incorporates a distinction between an outcome (tangible product without a change in one's environment) and impact (change in one's environment). It addresses that workers may not strive for an impact but are satisfied with an outcome for their own benefit only.	
Process: <i>Creating stimulating context</i> Subprocesses: • <i>Claiming idea or new expertise</i> • <i>Creating networks of ambassadors</i> • <i>Creating space</i>	Variable: <i>Exploiting expertise</i> (see Table 3.1 for examples of job crafting strategies)	Similar aspects not addressed in the model.	Models 1 and 2 incorporate processes by which flexperts/workers create conditions for developing and materializing their (new) expertise, also described as job crafting strategies.	In addition to the job crafting strategies of Model 1, Model 2 also includes the following crafting strategies: • Combining employment and self-employment modes. • Adjusting expertise enactment by using understanding of how people with dissimilar expertise areas tend to work.	

Table 6.1 Continued

Model components			Model comparison	
Model 1: Model of Expertise Renewal	Model 2: Dynamic process model of flexpertise	Model 3: GMB model of the ability to meet new expertise needs	Similarities	Differences
Subprocess: <i>Claiming idea or new expertise</i>	Variable: <i>Confidence in mastering new expertise field</i>	Feedback loops containing variable: <i>Personal constraints (Fear/pain) (R3, R4, R7, B1, B3, B4)</i>	All models deal with the fact that adapting to new expertise needs involves unsettling feelings that one needs to cope with, such as fear, pain, and imposter thoughts. In Model 1, this is part of the process of claiming expertise in a stage of not yet fully mastering the new field.	Only Model 3 describes how these unsettling feelings may reduce one's inclination to seek new opportunities.
Subprocess: <i>Claiming idea or new expertise</i>	Variable: <i>Social recognition</i>	Feedback loops containing variable: <i>Living up to expectations (R6, R7)</i>	All models deal with the need to fulfill the expectations of relevant stakeholders in the process of gaining new expertise and after making contributions to practice.	Only Models 1 and 2 address specific strategies that workers use to build social recognition.
Subprocess: <i>Claiming idea or new expertise</i>	Variable: <i>Identity adjustment</i>	Similar aspects not addressed in the model.	Models 1 and 2 address that flexperts, or more generally workers, adjust their identity when they feel a growing confidence in their new expertise and/or new contributions to practice.	Only Model 2 covers the notion that experts may hold multiple identities.

Table 6.1 Continued

Model components			Model comparison	
Model 1: Model of Expertise Renewal	Model 2: Dynamic process model of expertise	Model 3: GMB model of the ability to meet new expertise needs	Similarities	Differences
<i>Personal outcomes:</i> • New knowledge and skills • Expert reputation • Enhanced social networks • Space • Contribution to personal mission • Positive expert performance evaluation	Variable: <i>Employability</i>	Feedback loops containing <i>Personal enablers (R1, R5, B4)</i> . (see Table 4.1 for a list of personal enablers)	All models address that effectively dealing with changes in one's surrounding context may lead to beneficial personal outcomes.	• In Model 2, employability was defined as a multi-dimensional concept based upon Van der Heijde and Van der Heijden (2006). This employability is perceived as a distal (long term) outcome as opposed to a proximal outcome (short term). This distal outcome is the result of a delay effect in the dynamic model. • Models 1 and 3 do not distinguish between these short- and long-term effects.

6.2 Methodological reflections

This section reflects on the strengths and limitations of the research methods that we applied in the first three studies of this PhD project.

6.2.1 Retrospective interviews to perceive a career as a succession of renewal episodes

In our first study, we interviewed ten flexperts, taking into account reaching the point of saturation while doing so (Anderson, 2017). The richness of the qualitative data that this retrospective interview approach generated is one of the strengths of this method (see Figure 2.1 and the Findings section in Chapter 2 for detailed descriptions of the input provided by the flexperts). This richness laid the foundation for the conceptualization and operationalization of the flexexpertise topic in our subsequent studies. Furthermore, the interviewees reported a beneficial side effect of this method when we individually checked the validity of the concept version of our Model of Expertise Renewal. In particular, they expressed that reflecting on their career from an expertise renewal perspective, rather than describing it as a sequence of jobs or roles, provided them new insights into their own strengths and why others may have problems with the level of flexibility that they were able to attain.

Our interview approach also had its limitations (see the Discussion section of Chapter 2 for more details). For ethical reasons, we did not want to select a sample of experts that were labelled as less flexible. This limited certainty on whether or not the processes distinguished in the Model of Expertise Renewal are unique for flexperts. Another limitation of our study was the fact that retrospective interviews were based on the ability of the individual to reflect on one's previous thinking, motivations, and actions. Even though we followed the recommendation to deploy this research method for recollecting expertise development processes (Sosniak, 2006) and supplemented it with a member validation (Anderson, 2017, p. 129; Boeije, 2010, p. 177), conducting a multi-method study (Morse, 2003) with additional data sources would have been apt to cross-validate the recollections of the flexperts and to collect data on how flexperts differentiate themselves from less flexible experts. Notwithstanding these limitations, we argue that retrospective interviews are a valuable method to further our understanding of the expertise renewal processes of workers.

6.2.2 Integrative review to encompass segmentation in the field

Through our integrative review, we aimed to synthesize a comprehensive body of knowledge from multiple scholarly disciplines. Following the recommendations put forward by scholars in the field of business management and social sciences (Daniels,

2019; Denyer & Tranfield, 2009; Tranfield et al., 2003), we adopted the guidelines for a systematic search and selection process that originated in the field of medical sciences (Liberati et al., 2009; Moher et al., 2015). In the method section and Appendix 3.2, we describe in detail how we applied these principles to our integrative review. In line with Tranfield et al. (2003), we encountered that these principles from the medical field cannot be fully applied to the scholarly field of flexpertise as there is a lack of consensus regarding the concepts, definitions, and operationalizations required, as is reflected in the previously described segmentation in the literature. This made it difficult to define clear criteria on what counts as novelty in our search and selection process, as already concluded by Bohle Carbonell and authors (2014), among other issues. Notwithstanding this limitation, following a structured approach helped us to maximize the transparency and reliability of our review work.

As a first step in the analysis of the selection of 107 studies, we aimed to integrate the findings from the twenty selected review studies by means of an umbrella review (Grant & Booth, 2009). However, as these review studies reported nil insights into their search and selection processes, their sample of studies selected, and their approach for data analysis, we were not able to fully determine the overlap and differences between the review studies as well as the reliability and validity of their claims. We hope that the high level of transparency of our review approach inspires scholars on future review work and acts as a valuable source of reference for conducting reliable and valid review studies.

As a final remark, submitting a review protocol for a blind peer review process before conducting a review study is common practice in the medical field (PRISMA, 2023). This process has been introduced to safeguard the quality of review studies and to prevent potential overlap with other review studies. By the time we were setting up our review study, this was not a common approach in the field of business management and social sciences. However, we recommend that this practice becomes more common in these fields as it may prevent reporting about the review process being limited and the high number of partly overlapping review studies that we identified in our systematic search process and after conducting our review study (e.g., Cupido et al., 2022; Park & Park, 2021; Pelgrim et al., 2022).

Notwithstanding these limitations, we posit to have incorporated and integrated a comprehensive body of review, empirical and conceptual studies, through which we synthesized our findings by adopting a system dynamics lens. As far as we are aware, we are the first scholars in expertise research to incorporate this lens in a review study to advance the field.

6.2.3 Group Model Building for understanding complex human phenomena

Thus far, Group Model Building has been widely adopted in the field of business management and in the context of policy making (McCardle, 2015; Rouwette et al., 2010; Scott et al., 2016) and, as mentioned before, is based upon a system dynamics principles. The latter aspect formed the justification to select this method for our third flexpertise study with a group of HR/D professionals (see Chapter 5). As far as we know, this method has not been deployed in the field of HR/D so far. The GMB method proved to be a valuable method to collect the perspectives of a group of HR/D professionals regarding the flexpertise phenomenon, and to reach consensus among its members in terms of a dynamic model of the ability to meet new expertise needs. For this study, we made use of open source workshop scripts that were developed and evaluated by an international community of GMB scholars (Scriptapedia, 2023). These scripts provided a robust and reliable basis for designing our three GMB sessions, albeit they required some rework to make them fully applicable to our study with HR/D practitioners. To further build competence in conducting GMB studies in the field of HR/D, we recommend scholars to contribute to the know-how that is shared on Scriptapedia. Given the contribution of our GMB study to the scholarly knowledge in this field, we proclaim that the GMB-method is promising for future studies in HR/D in which the development of workers is addressed in the context of complex problems and organizational transitions and understood from an SD lens.

6.3 Contributions to practice

This dissertation is of practical relevance given the fact that it increased our understanding of the ability to deal with the shifting expertise needs as outlined in the introduction sections of the previous chapters, and which represent the current reality of workers worldwide. Workers will have to deal with these new demands to an increasing extent due to trends such as globalization, digitalization, AI, and sustainability transitions (WEF, 2023a). More specifically, an upward trend is predicted in terms of the need for upskilling and reskilling (e.g., OECD, 2022). This entails that workers will need to develop and materialize new know-how to safeguard their employability both short- and long term. This need is made more urgent by the retirement age increasing in some countries (Davies et al., 2017), which implies that workers need to work longer, and this will increase the likelihood that they will need to deal with evolving expertise needs.

As we also outlined in more detail in the respective introduction subsections, effectively dealing with new expertise needs is by no means an easy process (cf. Van der Heijden, 2005) and not something each and every worker masters or aspires to do. In practice, this unwillingness or inability to adapt to new needs may become visible in maladaptation that may put the employability of the worker at stake in the long run (for more details, refer to the discussion section in Chapter 3). Maladaptation may manifest itself as ingrained routines or habits that are hard to change, even though in many situations such change is urgently needed (Chi, 2006). This requires that a worker develops or reignites their ability to adapt. Put differently, changing needs demand that a worker develops or enhances their flexpertise.

In Chapter 5, we outlined the paradigm shift from expertise development to flexpertise development, and what it entails for the HR/D function, in terms of design principles for what we coined renewal bundles of HR/D practices for flexpertise development (see Figure 5.3). This shift may require renewal of the HR/D function in organizations and the development of innovative HR tools and processes as current expertise development practices require extension and transformation (Moats, 2021). It implies that an upward and linear approach towards expertise development should be superseded by the view that flexpertise involves periods of professional growth and temporary stagnation. It furthermore entails that an individual can be an expert in a certain field, but a relative novice in an adjacent and/or radically different field that one aims to master. This requires that HR/D practices should give room for unsettling feelings such as fear, insecurity, and imposter thoughts that may arise when crossing the boundaries of one's field. This also implies that current performance evaluation practices should take into account that a worker will have varying performing levels across domains. This dissertation furthermore provides new language to talk about flexibility in organizations. Rather than expressing that workers need to be more flexible, our process models provide the means to discuss flexibility in a more nuanced way, given the notion that flexpertise involves a complex interplay of multiple adaptation processes. Altogether, the shift from expertise development to flexpertise development may necessitate the renewal of the HR/D function and the prevention of ineffective copying of best practices on expertise development (Ullrich et al., 2012).

Throughout this dissertation, we outlined that there are multiple stakeholders that should bear part of the burden in fostering flexpertise development among workers. We stressed the role of leaders and HR/D professionals in fostering flexpertise development in the section on practical implications in the Chapters 2 and 3. HR/D should involve and educate leaders, as they have an important role

to play in providing the conditions for enabling workers to be flexible, as outlined throughout this dissertation (specifically refer to the suggestions for leadership development fostering leading flexexpertise). In Chapter 4, we outlined the places where HR/D professionals could intervene in the process of adaptation of a worker (i.e., the leverage points in the dynamic model as depicted in Figure 4.2). These leverage points show that the root cause of the inability to meet new expertise needs might not be a lack of expertise, but rather whether or not a worker took the mental decision to create something that impacts his surrounding context or has the courage to experiment when feeling psychologically safe. Leaders and HR/D professionals can use the three process models to discuss development needs with workers who have to renew their expertise. More specifically, our process models may provide a framework to reflect on how workers can cope with new expertise demands to ensure that their expertise is up-to-date, relevant, rewarding, and meaningful. It illustrates that, just like organizations may need to reinvent themselves (Laloux, 2015), the same applies to workers who need to reinvent themselves throughout their careers.

Furthermore, we would like to stress the value of using a GMB method to address complex organizational problems. The HR/D professionals in our GMB study reported the added value of this method, as it facilitated their learning from the diverse perspectives that were shared in the group and to approach their HR/D practice problems from a system dynamics angle. This method has the potential for use in the identification of other types of HR/D challenges within and across organizations.

From a labor market perspective, fostering flexexpertise may be a valuable angle to approach the war of talent (WEF, 2023b), given the mismatch between available and required human capital. We recommend higher education institutes to integrate the development of flexexpertise in their curricula. This can for example be realized by students experiencing the value of crossing boundaries of the domains in which they develop a growing mastery (Wallin et al., 2019), teaching them to recognize the labor opportunities of new expertise demands (Baggen et al., 2017), and learning them to materialize their growing expertise by means of tangible output, even before graduation (Losse, 2018). This requires a learning environment that supports such flexibility (Potting et al., 2018). These educational interventions may foster that students are timely equipped with the skill set they need to become future professionals who build up a career in which they will frequently renew their expertise.

6.4 Implications and recommendations for future research

Our research may inspire scholars to conduct follow-up research on the flexexpertise phenomenon given the conceptual clarity and the new theoretical paradigm in expertise research that we introduce. In the respective discussion sections, we outlined the lacunas in our understanding that still exist, specifically with regards to intra- and inter-individual differences in the ability to meet new expertise needs, and how our process models provide directions for future research to resolve these knowledge gaps. More specifically, the system dynamics perspective on the ability of an individual to sustain one's position as a worker with valuable and recognized expertise sets new avenues for empirical studies. Through deploying longitudinal studies, using the dynamic process model of flexexpertise as a theoretical framework, we can increase our understanding about whether specific sequences of adaptive processes are most effective, which adaptive processes may require more time for an individual to realize (so-called delay effects in SD), and about the influence of personal factors (as outlined in Table 3.1 – Personal inputs, and Table 4.1 – Personal enablers/constraints) on the effectiveness of adaptive processes that an individual needs to manifest. Through identifying additional grounding in the literature for specific feedback loops of the dynamic model of flexexpertise, scholars can define annotated causal loop diagrams (Crielaard et al., 2022). This can provide the basis for developing a computable version of the distinguished causal loop diagrams to further interpret the dynamics of the modelled system, and to simulate what-if scenarios.

Furthermore, we call for more empirical work to develop and validate a measurement instrument for the flexexpertise construct. This can enable scholars and practitioners to assess the level of flexexpertise of an individual, which can be the starting point for designing HR/D interventions at individual and group levels. Similar to the validation research on the measurement instrument for occupational expertise (Van der Heijden 2000, 2002, 2003), we advise adopting a multi-source approach to enable data collection among professionals and their surrounding stakeholders, to increase insight into differences of perspectives and what this means for career development opportunities. Besides, a multi-source approach can help to avoid common-method bias that may occur when both the independent and dependent variables are obtained from the same person and in the same measurement context (Podsakoff et al., 2012).

Our interview, review and GMB studies indicate that professionals move through idiosyncratic adaptation and renewal paths in response to contextual changes. The

specific type of these paths partly depends upon contextual factors that enable adaptation, such as a supportive climate that promotes innovative ideas and the acceptance of errors, as well as the supportive role of a supervisor (Bohle Carbonell et al., 2014). As we outline in more detail in our review and GMB study, the response of individuals also depends on their unique set of experiences, knowledge, skills, and values (Billett et al., 2018), which influences the choices they make regarding how to enact and further develop their expertise (see Table 3.1 and Table 4.1 for an enumeration of contextual and personal factors that may influence flexexpertise). Retrospective interviews, as used in our interview study (Frie et al., 2019), may shed light on which factors prevent workers from effectively sustaining their expertise which, in turn, leads to obsolescence (Cherrstrom & Bixby, 2018; Kaufmann 1979) or career inaction (Verbruggen & De Vos, 2020). Our scholarly contribution reveals that maladaptation may take place during different adaptation processes, including workers' understanding of a multiplicity of changes being too superficial or fixed (Feltovich et al., 1997), professionals becoming overly precise (Kang & Kim, 2021), not making deliberate choices regarding how to enact their expertise (Frie et al., 2019), or restricting themselves to only developing new expertise within their own domain (Thijssen & Van der Heijden, 2003). We therefore also call for qualitative inquiry aimed at exploring when and how professionals get stuck in their adaptation and development processes amidst the turmoil of changes at work. This type of research may explain the mixed findings pertaining to personal antecedents of adaptive performance indicators from earlier research on adaptive expertise (Bohle Carbonell et al., 2014).

To increase our insight into intra-individual differences in flexexpertise over time, we recommend investigating possible mediating and moderating effects of age-related changes as well. As the retirement age increases, the need for professionals to constantly enact and further develop their expertise to stay employable throughout their careers also increases (Fugate et al., 2021). The systematic review by De Lange et al. (2021) showed negative relationships between age and employability. Specifically, stereotyping and discrimination appeared to have negative effects on the employability of older workers as these phenomena lead to a lower appreciation of these workers and reduced efforts to invest in future career advancements. In line with these authors, we call on future researchers to investigate the relationship between age-related changes and the adaptation processes that came up in our work, and to build upon the knowledge about the influence of HR/D practices on the employability of older workers (Veth et al., 2019). Such an approach may help to explain intra-individual changes in the ability to meet changing expertise demands across the working life-span.

Given the fact that the social perspective on the flexpertise phenomenon has been underexposed thus far (Kim, 2021), we recommend conducting social network analyses to further our understanding of the role of social networks in adaptation processes. Moreover, given the limited reporting on contextual factors that constrain the ability of an individual to adapt, we encourage examining the role of negative, multiplex and dormant ties in the network of workers (cf. Brass, 2022). Negative ties refers to an “enduring, recurring set of negative judgments, feelings, and behavioral intentions toward another person” (Labianca & Brass, 2006, p. 597). Multiplex ties refers to the fact that actors can be connected in multiple ways, for example by being both friends and work colleagues (Methot & Rosado-Solomon, 2019). Dormant ties comprise past connections that have become inactive and represent a potential to reactivate (Brass, 2022). Insight into these ties might provide leverage points to improve the adaptivity of an individual by means of contextual interventions as the HR/D professionals proposed in our GMB study.

With regards to the conceptual clarity provided in this study, we noticed that new concepts such as anti-fragility (Taleb, 2014) continue to be adopted to increase understanding of what the adaptivity entails that workers need to convey. As addressed before, it is furthermore the case that review studies on typologies of concepts continue to be published from one specific scholarly lens (Cupido et al., 2022; Park & Park, 2021; Pelgrim et al., 2022). We hope that our renewing dynamic paradigm sets the stage for future work, and for adopting our conceptualization and dynamic process model of flexpertise in further theoretic research in this field, as it encompasses the dynamic interplay of adaptation processes and is rooted in the multiple disciplines in which the flexpertise phenomenon is studied. This broad interest in the phenomenon reflects that flexpertise deserves aligned follow-up research to deal with the question of whether to be, or not to be, a flexpert.

6.5 To be, or not to be, a flexpert: that’s the question

Can anyone be a flexpert? Along this PhD project, we have received this question by quite some scholars and practitioners alike. The simple answer to this question is no. Being a flexpert requires a wide variety of personal qualities that not everyone is equipped with and/or able to develop. It furthermore requires access to resources such as time, money, and social capital. It is a fallacy to believe that each person has access to those kinds of resources when needed. Therefore, this dissertation concludes with reflections on why we should be cautious in asserting that everyone can become a flexpert, starting with the perspective of the individual.

The scholarly knowledge building on the flexexpertise phenomenon has followed decades of scientific expertise research that is rooted in the field of psychology as well as multidisciplinary research on what expertise entails. In research on expert performance, scholars adopted the premise that expertise can be developed through deliberate study and practice (Ericsson, 2018). However, this view has been criticized. For example, the meta-analysis of Macnamara et al. (2014) showed that the so-called ten-year rule of deliberate study and practice is not as strong as many expertise researchers proclaim. Specifically in ill-defined domains such as education, there is unexplained variance in expert performance. In some of these domains, general intelligence appeared to be a stronger predictor of expert performance than deliberate study and practice. As intelligence is an individual quality that is influenced by both environmental and genetic influences (Bartels et al., 2022; Petrill & Wilkerson, 2000), this illustrates that expertise cannot always be developed as scholars assumed it to be. Next to elaborating on expertise research, we have built upon studies on the flexibility or adaptivity of workers that is needed to cope with shifting expertise demands. This research was rooted in a variety of disciplines and enabled us to provide a comprehensive overview of the personal qualities that enable workers to effectively adapt. Table 3.1 shows why meeting new expertise needs is not an easy process (Van der Heijden, 2005). It requires adaptive capabilities, motivations to change (i.e., personal drivers), problem-solving capabilities, an expertise to build upon, and metacognitive awareness. From our literature review, we identified that, given the limited focus on the social perspective in this field (cf. Kim, 2021), scholars limitedly reported about the social skills that are also required to become a flexpert, given the need for social interactions for meeting new expertise needs (Kua et al., 2021). To some extent, these various personal qualities can be developed, but it would be wrong to assume that each and every individual will be able to reach the required level of these personal qualities (Furnham, 2012). Thus, by demanding both a high level of expertise and flexibility of each and every worker, some people will be excluded from being able to build up a happy, healthy and productive career (cf. Van der Heijden, 2005). Therefore, we plea for a critical debate regarding the extent to which organizations, and more generally society, can demand that workers reskill and upskill their expertise, and display flexibility at any time. In line with the debate regarding neurodiversity at the workplace (e.g., Stenning et al., 2021), we therefore posit that scholars and practitioners should critically reflect on the question what they consider to be a 'normal' person at work, and to what extent this view excludes valuable talent when striving for a workforce of flexexperts.

Other scholars stressed the importance of approaching expertise as a social construct, rather than an attribute that is possessed by the individual (Carr, 2010;

Eyal, 2013). From this perspective, scholars should have an eye for environments that are only accessible by privileged persons (Collins & Evans, 2018). Those environments may exclude some people to become an expert in certain domains whereas they could make valuable contributions to the field. In a similar vein, scholars in the field of sociology are challenging the lines of thinking in the field of positive psychology (Van Zyl et al., 2023). Positive psychology is based upon the premise that human beings are self-organizing, self-directed, adaptive entities (Seligman & Csikszentmihalyi, 2000). This field of positive psychology strongly focusses on human agency in attaining well-being, and also appeared to form the basis of a dominant view in research regarding the flexpertise phenomenon. Sociologists have been criticizing this paradigm, as it partly ignores the constraints imposed by the environment in which one is raised, educated, lives, and works (Van Zyl et al., 2023).

To conclude, when striving for a labor market and workplaces that promote economic growth that is inclusive and sustainable, and that includes full and productive employment and decent work for everyone [see SDG 8 (UN, 2023)], scholars, policymakers, leaders, and HR/D practitioners should focus on the opportunities and limitations of each worker, challenge them to be agent of their own career, and provide them with resources that enable them to have a sustainable career (i.e., the multiple stakeholder approach of De Vos et al., 2020). Only in case shared responsibility for fostering and further enhancing one's expertise is taken, and for stimulating boundary crossing, the ground for flexpertise is laid.

References

- Anderson, V. (2017). Criteria for evaluating qualitative research. *Human Resource Development Quarterly*, 28(2), 125–133.
- Baard, S. K., Rench, T. A., & Kozlowski, S. W. J. (2014). Performance adaptation: A theoretical integration and review. *Journal of Management*, 40, 48–99.
- Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J.A., Lans, T., & Mulder, M. (2018). Development and application of the opportunity identification competence assessment test (OICAT) in higher education. *Innovations in Education and Teaching International*, 55, 735–745.
- Baran, B. E., & Woznyj, H. M. (2020). Managing VUCA: The human dynamics of agility. *Organizational Dynamics*, 20, 100787.
- Bartels, M., Rietveld, M. J. H., Van Baal, G. C. M., & Boomsma, D. I. (2002). Genetic and environmental influences on the development of intelligence. *Behavior Genetics*, 32, 237–249.
- Bell, E., Horton, G., Blashki, G., & Seidel, B. M. (2012). Climate change: could it help develop 'adaptive expertise'? *Advances in Health Sciences Education*, 17, 211–224.
- Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, 57, 311–317.
- Billett, S., Harteis, C., & Gruber, H. (2018). Developing occupational expertise through everyday work activities and interactions. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 105–126). Cambridge University Press.
- Birney, D. P., Beckmann, J. F., & Wood, R. E. (2012). Precursors to the development of flexible expertise: Metacognitive self-evaluations as antecedents and consequences in adult learning. *Learning and Individual Differences*, 22, 563–574.
- Boeije, H. (2010). *Analysis in qualitative research*. Sage.
- Bohle Carbonell, K., Stalmeier, R. E., Könings, K. D., Segers, M., & Van Merriënboer, J. J. G. (2014). How experts deal with novel situations: A review of adaptive expertise. *Educational Research Review*, 12, 14–29.
- Brass, D. J. (2022). New developments in social network analysis. *Annual Review of Organizational Psychology and Organizational Behavior*, 9, 225–246.
- Carr, E. S. (2010). Enactments of expertise. *Annual Review of Anthropology*, 39, 17–32.
- Cherrstrom, C. A., & Bixby, J. (2018). Construct of expertise within the context of HRD: Integrative literature review. *Human Resource Development Review*, 17, 440–464.
- Chi, M. T. H. (2006). Two approaches to the study of experts characteristics. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 21–30). Cambridge University Press.
- Collins, H., & Evans, R. (2018). A sociological/philosophical perspective on expertise: The acquisition of expertise through socialization. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 21–32). Cambridge University Press.
- Crielaard, L., Uleman, J. F., Châtel, B. D. L., Epskamp, S., Sloot, P. M. A., & Quax, R. (2022). Refining the causal loop diagram: A tutorial for maximizing the contribution of domain expertise in computational system dynamics modeling. *Psychological Methods*. Advance online publication. <https://doi.org/10.1037/met0000484>

- Cronin, M. A., & Bezrukova, K. (2019). Conflict management through the lens of system dynamics. *Academy of Management Annals*, 13, 770-806.
- Cronin, M. A., & Vancouver, J. B. (2019). The only constant is change: Expanding theory by incorporating dynamic properties into one's models. In S. E. Humphrey & J. M. LeBreton (Eds.), *The handbook of multilevel theory, measurement, and analysis*. American Psychological Association.
- Cupido, N., Ross, S., Lawrence, K., Bethune, C., Fowler, N., Hess, B., ... & Schultz, K. (2022). Making sense of adaptive expertise for frontline clinical educators: a scoping review of definitions and strategies. *Advances in Health Sciences Education*, 27, 1213-1243.
- Daniels, K. (2019). Guidance on conducting and reviewing systematic reviews (and meta-analyses) in work and organizational psychology. *European Journal of Work and Organizational Psychology*, 28, 1-10.
- Davies, E. M. M., Van der Heijden, B. I. J. M., & Flynn, M. (2017). Job satisfaction, retirement attitude and intended retirement age: A conditional process analysis across workers' level of household income. *Frontiers in Psychology*, 8:891.
- De Lange, A. H., Van der Heijden, B., Van Vuuren, T., Furunes, T., De Lange, C., & Dikkers, J. (2021). Employable as we age? A systematic review of relationships between age conceptualizations and employability. *Frontiers in Psychology*, 11, 605684.
- De Vos, A., Van der Heijden, B. I. J. M., & Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, 117, 103196.
- Ericsson, K. A. (2018). An introduction to Cambridge handbook of Expertise and Expert Performance: Its development, organization, and content. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 3-19). Cambridge University Press.
- Eyal, G. (2013). For a sociology of expertise: The social origins of the autism epidemic. *American Journal of Sociology*, 118, 863-907.
- Feltovich, P. J., Spiro, R. J., & Coulson, R. L. (1997). Issues of expert flexibility in contexts characterized by complexity and change. In P. J. Feltovich, K. M. Ford, & R. R. Hoffman (Eds.), *Expertise in context: Human and machine* (pp. 125-146). AAAI/MIT Press.
- Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal. *Human Resource Development Quarterly*, 30, 61-79.
- Fugate, M., Van der Heijden, B., De Vos, A., Forrier, A., & De Cuyper, N. (2021). Is what's past prologue? A review and agenda for contemporary employability research. *Academy of Management Annals*, 15(1), 266-298.
- Furnham, A. (2012). *The psychology of behaviour at work: The individual in the organization*. Psychology press.
- Goller, M. (2017). *Human agency at work: An active approach towards expertise development*. Wiesbaden, Germany: Springer.
- Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, 26, 91-108.
- Grenier, R. S., & Kehrhahn, M. (2008). Towards an integrated model of expertise redevelopment and its implications for HRD. *Human Resource Development Review*, 7, 198-217.
- Gruber, H., & Harteis, C. (2018). Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise, vol. 24. Springer.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262-272). Freeman.

- Kang, S., & Kim, J. W. (2022). The fragility of experts: A moderated-mediation model of expertise, expert identity threat, and overprecision. *Academy of Management Journal*, 65, 577-605.
- Kaufman, H. G. (1979). Technical obsolescence: Work and organizations are the key. *Engineering Education*, 69(8), 826-830.
- Kim, Y. (2021). The changing concepts of expertise and expertise development. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 17-38). Pelgrave Macmillan.
- Kua, J., Lim, W.-S., Teo, W., & Edwards, R. A. (2021). A scoping review of adaptive expertise in education. *Medical Teacher*, 43, 347-355.
- Labianca, G., & Brass D. J. (2006). Exploring the social ledger: negative relationships and negative asymmetry in social networks in organizations. *Academy of Management Review*, 31, 596-614.
- Laloux, F. (2015). *Reinventing organizations*. Nelson Parker.
- Liberati, A., Altman, D. G., Tetzlaff, J. Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Journal of Clinical Epidemiology*, 62, e1-e34.
- Lombardo, M. M., & Eichinger, R. W. (2000). High potentials as high learners. *Human Resource Management*, 39, 321-329.
- Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34, 410-476.
- Losse, M. (2018). *Onderzoekend vermogen ontwikkelen bij studenten. Een methodiek voor hbo-docenten. [Developing research ability of students. A methodology for higher vocational education teachers.]*. Boom.
- Macnamara, B. N., Hambrick, D. Z., & Oswald, F. L. (2014). Deliberate practice and performance in music, games, sports, education, and professions: A meta-analysis. *Psychological Science*, 25, 1608-1618.
- McCardle-Keurentjes, M., Rouwette, E. A. J. A., Vennix, J. A. M., & Jacobs, E. (2009). *Is group model building worthwhile? Considering the effectiveness of GMB*. Albuquerque, New Mexico: The 27th International Conference of the System Dynamics Society.
- Methot, J. R., & Rosado-Solomon, E. (2019). Multiplex relationships in organizations: applying an ambivalence lens. In D. J. Brass & S. P. Borgatti (Eds.), *Social Networks at Work* (pp. 79-103). Routledge.
- Moats, J. (2021). Preparing for the future of work and the development of expertise. In M. Germain, & R. S. Grenier (Eds.), *Expertise at work: Current and emerging trends* (pp. 17-38). Pelgrave Macmillan.
- Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, S., Stewart, L. A., & PRISMA-P Group (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4, 1.
- Morse, J. M. (2003). Principles of mixed methods and multimethod research design. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 189-208). Sage Publications.
- OECD (2022). Digital upskilling, reskilling & finding talent: The role of SME ecosystems. <https://www.oecd.org/cfe/smes/Digital%20Upskilling%20Reskilling%20and%20Finding%20Talent%20-%20Key%20Highlights%20-%20March%202022.pdf>
- Park, S., & Park, S. (2021). How can employees adapt to change? Clarifying the adaptive performance concepts. *Human Resource Development Quarterly*, 32, E1-E15.
- Pelgrim, E., Hissink, E., Bus, L., van der Schaaf, M., Nieuwenhuis, L., van Tartwijk, J., & Kuijer-Siebelink, W. (2022). Professionals' adaptive expertise and adaptive performance in educational and workplace settings: an overview of reviews. *Advances in Health Sciences Education*, 27, 1235-1263.

- Petrill, S. A., & Wilkerson, B. (2000). Intelligence and achievement: A behavioral genetic perspective. *Educational Psychology Review*, 12, 185-199.
- Podsakoff, P.M., MacKenzie, S.B., & Podsakoff, N.P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63, 539-569.
- Potting, K., Frie, L., & Jacobs, F. (2018). Learning landscapes, a breeding ground for sustainable educational innovation: Experiences of teachers working in a context that aims to support innovative behavior. In F. Jacobs & E. Sjoer (Eds.), *Inspired to change: A kaleidoscope of transitions in higher education* (pp. 65-76). The Hague University of Applied Sciences.
- PRISMA (2013). Protocol guidance. <http://prisma-statement.org/Protocols/ProtocolGuidance>
- Pusic, M. V., Santen, S. A., Dekhtyar, M., Poncelet, A. N., Roberts, N. K., Wilson-Delfosse, A. L., & Cutrer, W. B. (2018). Learning to balance efficiency and innovation for optimal adaptive expertise. *Medical Teacher*, 40, 820-827.
- Rouwette, E. A. J. A., Korzilius, H., Vennix, J. A. M., & Jacobs, E. (2011). Modeling as persuasion: the impact of group model building on attitudes and behavior. *System Dynamics Review*, 27, 1-21.
- Scott, R. J., Cavana, R. Y., & Cameron, D. (2016). Recent evidence on the effectiveness of group model building. *European Journal of Operational Research*, 249, 908-918.
- Scriptapedia (2023). Scriptapedia.
- Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction (Vol. 55(1)). American Psychological Association.
- Sosniak, L. A. (2006). Retrospective interviews in the study of expertise and expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 287-302). Cambridge University Press.
- Stenning, A., & Rosqvist, H. B. (2021). Neurodiversity studies: mapping out possibilities of a new critical paradigm. *Disability & society*, 36(9), 1532-1537.
- Taleb, N. N. (2014). *Antifragile: Things that gain from disorder*. New York: Random House.
- Thijssen, J. G. L., & Van der Heijden, B. I. J. M. (2003). Evaporated talent? Problems with talent development during the career. *International Journal of Human Resources Development and Management*, 3, 154-170.
- Tims, M., Bakker, A. B., & Derks, D. (2012). Development and validation of the job crafting scale. *Journal of Vocational Behavior*, 80, 173-186.
- Tims, M., Derks, D., & Bakker, A. B. (2016). Job crafting and its relationship with person-job fit and meaningfulness: A three-wave study. *Journal of Vocational Behavior*, 92, 44-53.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Toward a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14, 207-222.
- Ulrich, D., Younger, J., Brockbank, W., & Ulrich, M. (2012). *HR from the outside in. Six competencies for the future of Human Resources*. McGrawHill.
- UN (2023). <https://sdgs.un.org/goals/goal8>
- Van der Heijde, C. M., & Van der Heijden, B. I. J. M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, 45, 449-476.
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9-39.
- Van der Heijden, B. I. J. M. (2002). Individual career initiatives and their influence upon professional expertise development throughout the career. *International Journal of Training and Development*, 6, 54-79.

- Van der Heijden, B. I. J. M. (2003). The relationship between career mobility and occupational expertise: A retrospective study among higher-level Dutch workers in three age groups. *Employee Relations*, 25, 81-109.
- Van der Heijden, B. I. J. M. (2005). 'No one has ever promised you a rose garden'. On the shared responsibility and employability enhancing strategies throughout career. Inaugural address, Open University of the Netherlands. Van Gorcum.
- Van Zyl, L. E., Gaffaney, J., van der Vaart, L., Dik, B. J., & Donaldson, S. I. (2023). The Critiques and Criticisms of Positive Psychology: A Systematic Review. *Journal of Positive Psychology*, 1-30.
- Vennix, J. A. M. (1996). *Group model building: Facilitating team learning using system dynamics*. John Wiley & Sons.
- Verbruggen, M., & De Vos, A. (2020). When people don't realize their career desires: Toward a theory of career inaction. *Academy of Management Review*, 45, 376-394.
- Veth, K. N., Korzilius, H. P., Van der Heijden, B. I., Emans, B. J., & De Lange, A. H. (2019). Which HRM practices enhance employee outcomes at work across the life-span? *The International Journal of Human Resource Management*, 30(19), 2777-2808.
- Wallin, A., Nokelainen, P., & Mikkonen, S. (2019). How experienced professionals develop expertise in work-based higher education: a literature review. *Higher Education*, 77, 359-378.
- Ward, P., Gore, J., Hutton, R., Conway, G. E., & Hoffman, R. R. (2018). Adaptive skill as the condition sine qua non of expertise. *Journal of Applied Memory and Cognition*, 7, 35-50.
- WEF (2023a). The future of jobs report. https://www.weforum.org/reports/the-future-of-jobs-report-2023?_gl=1*59svdr*_up*MQ.&gclid=Cj0KCQjwj_ajBhCqARIsAA37s0yuFOW-gG4wMw_3uimMZs46bvplSHEpuP45K4FGD_A6z6Mf8fh638aAitREALw_wcB
- WEF (2023b). Putting skills first: A framework for action. <https://www.weforum.org/whitepapers/putting-skills-first-a-framework-for-action/>
- Zhang, F., & Parker, S. K. (2019). Reorienting job crafting research: A hierarchical structure of job crafting concepts and integrative review. *Journal of Organizational Behavior*, 40(2), 126-146.
- Zimmerman, B. J. (2006). Development and adaptation of expertise: The role of self-regulatory processes and beliefs. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 705-722). Cambridge University Press.



Personal reflection

Why a PhD project?

A PhD project is a trajectory of professional growth to become a member of an international community of scientists. It requires that one is able to conduct scientific research independently, to have in-depth knowledge on a specific topic, to justify theoretical and methodological choices, to honor the discipline by building upon previous scholarly work, and to communicate about one's know-how across the boundaries of academia (Petre & Rugg, 2010). In practice, a PhD is also a phase of personal growth as one's own assumptions, beliefs, and values are frequently challenged (Basten & Van Tiggelen, 2013), and in which one's 'frustration tolerance' (dixit Beatrice Van der Heijden) is put to test. One can only fulfill these developmental processes with the support and inspiration of family, colleagues and friends to pursue in what you believe needs to be discovered and conveyed. Therefore, this PhD dissertation ends with a personal reflection of where my interest in flexpertise came from, and ends with my gratitude to those who have been of great support for me to finalize this journey.

The roots of my interest in flexpertise

A PhD research project at a later stage in one's career often starts with a personal desire to consolidate and critically reflect on one's experiences in practice (Basten & Van Tiggelen, 2013). In my case, this happened after twenty years of gaining experience as a HRD professional. Throughout my career, I have been supporting experts in finding out how they can have an inspirational and impactful career based upon their interest in a peculiar field of expertise. This career focus was rooted in my own fascination regarding the question 'What makes an expert?' that already emerged during my university life. It turned into a never-ending endeavor to learn how to foster the ongoing personal and professional development of experts, accompanied with recurring reflections on my own learning and adaptation processes in this respect.

What makes an expert?

My interest in the question 'What makes an expert?' was triggered during my master's studies in Psychology at the Universities of Amsterdam and Tokushima, where I specialized in the field of Cognitive Psychology and Artificial Intelligence. In this specialization, I encountered the seminal work of researchers who studied the development process of experts in fields such as chess, music, sports, science, and IT (Ericsson, 2018). I learned about the ten-year rule of deliberate study and practice that are required to become an expert in these well-defined domains (Ericsson 2006; Ericsson et al., 1993), and the development stages one goes through from starting as a novice towards being a master or even a genius (Dreyfus & Dreyfus, 1986). During

my master thesis project (Frie, 1994), using think-aloud protocols (Ericsson & Simon, 1984), I experienced how difficult it is to unravel the complex problem-solving processes of experts as their thinking is fast and partly automated (Ericsson, 2006). Due to the inspirational work of my thesis supervisor Dr. Ronald Hamel, I experienced the value of crossing the boundaries of your own field. Hamel (1990) combined the fields of Psychology and Architecture to understand the cognitive design processes of architects. It was the start of experiencing the value of creating an expertise niche by combining disciplines to gain renewing perspectives in mature fields (Frie, 1993, 1996). The final source of inspiration regarding the topic of experts during my studies was the participation in the research group 'Perception psychology' of Prof. Cees van Leeuwen PhD in which I learned to look at human phenomena from a system dynamics lens (Haken & Stadler, 1990). This latter became a valuable perspective to increase our understanding of the minds, motivations and behaviors of experts, as we outlined in this manuscript.

The need for selling your expertise without losing yourself

In parallel to my studies, I worked as a training developer at the IT training-institute of Value Added Consultancy that my father had built up through adopting innovative forms of hybrid learning. In this institute, highly educated people, specifically working in the fields of physics, mathematics and biology, were reskilled in personalized training trajectories to become computer programmers. Hearing the stories of these people, I got fascinated by the notion that many of them had brilliant minds but somehow did not manage to be employable in a sustainable way. They reported having problems in conveying their smart observations and ideas to people who were not as knowledgeable as they were in their respective fields, which inhibited them from gaining visibility and recognition for their know-how and from having ample career opportunities.

After my studies, I started to work at Etam Retail Services, PwC and IBM in roles in which I had to capture the complex thinking and decision-making processes of IT-professionals. My job was to translate their IT-knowhow into systems training and development programs for laymen and less experienced peers. Similarly as during my job at the IT-training institute, I experienced that some of these experts were invisible within their organization as they were not able to promote their expertise to others. As such, they were not recognized as having valuable know-how, and therefore less often consulted for problems they could have solved. I also experienced that in some cultures people learn how to 'sell' themselves from their childhood, whereas in other cultures one learns not to show off too much. Altogether, this made me realize that I should focus on the 'hidden pearls' in organizations.

Given the problems that some IT-professionals had with promoting their expertise, I was asked to train their communication skills. By that time, I experienced to have adopted the wrong approach by trying to teach tricks that made these experts feel like losing track of who they are, in other words, depersonalized. It became a guiding principle in my work, that is, to find out how to be impactful in ways that feels in line with how you are 'wired' and your identity as a professional or, more broadly, as a human being. Altogether, these early career experiences reflect the importance of social recognition of one's expertise to stay employable, that we have addressed throughout this dissertation (Van der Heijden, 2000).

The focus on filling the leadership pipeline

As a next step in my career, I started working as a senior HRD-consultant and HR business partner at Deutsche Telekom. I became a member of their international HRD-team that got the task to design a framework for expert careers as a valuable alternative for leadership careers. This request was triggered by the notion that the highest performing experts within a team were often promoted to a leadership position as this was their only way to 'go up' in terms of status, impact, and salary. In practice, this implied that experts, in some cases, got a leadership position they did not like, making them less satisfied with their job. This could also imply that an organization lost business-critical expertise, as a leadership role often did not allow one to stay up to date in one's previous field. When looking for studies on how to support an expert career, I noticed that in daily business and in the scholarly literature, there was, and still is, more focus on leadership careers rather than on expert careers (Charan et al., 2011; Konz, 2014; Lelebina & Gand, 2018). It left me with the open question of what makes an expert career rewarding for both an expert and an organization.

Getting entrenched in your field of expertise

As a follow-up step in my career, I became an entrepreneur. As a program designer, coach and trainer at TalentFirst and founding partner of Expertized!, I experienced that experts can become entrenched in their work due to an overreliance on their specific expertise lens. Examples were experts who refused to adopt new technology, as they saw it as a threat to their professional role. Others were trying to find the perfect solution in their field making it difficult to comply to the needs of their colleagues with different interests and needs. Another example of entrenchment, were experts who tended to exclusively rely on their known problem-solving approaches, neglecting other approaches that could be more effective. These forms of entrenchment prevented them from having the recognition and impact that they were desiring to have. From an organizational perspective, I approached these

negative outcomes of entrenchment as indicators of unused human capital. It raised an additional question in me, namely how to unleash one's expertise with beneficial outcomes for both the individual and one's surrounding stakeholders.

Renewing experts

In parallel to having experiences with experts who faced difficulties in coping with shifting expertise demands and stakeholder expectations, I met experts who frequently renewed their expertise throughout their careers. These were experts who were looking for trends and developments within and across the boundaries of their domains, who deployed new technologies to invent new ways of working, and who realized breakthrough innovations in their field. It raised the question in me what makes these experts decide to renew themselves, and whether insight in what makes them flexible could be of value for experts that face problems in effectively adapting during certain periods in their careers.

The start of a PhD project on flexpertise

In 2013, I joined the Hague University of Applied Sciences (THUAS) as a senior HRM lecturer, where I met Karin Potting PhD. She inspired me to pursue my search for answers regarding the required flexibility of experts as a scientific researcher, and helped me with the stepping stones to make this happen. In 2015, I became a member of the Research Group Sustainable Talent Development of Dr. Ellen Sjoer. In 2016, Karin and I decided to carry out an interview study to explore how experts are able to meet new expertise needs throughout their career. This study formed the basis for a scholarship to conduct a PhD project regarding the flexpertise phenomenon that was granted in 2017 by THUAS. It was also the start of a collaboration with the Institute for Management Research of the Radboud University, and the formation of a supervisory team consisting of my supervisor Prof. Beatrice van der Heijden PhD (Professor in Strategic Human Resource Management, Radboud University), and co-supervisors Dr. Hubert Korzilius (Associate Professor Research Methodology, Radboud University) and Dr. Ellen Sjoer (Professor Sustainable Talent Development, THUAS). This dissertation conveys what this research has taught us about the flexpertise phenomenon, how our research can shape the agenda in expertise research, and how it may be used for the design of innovative HR/D practices for the development of experts into flexexperts that can stand the test of time. As such, this dissertation contributed to my mission to foster the career sustainability of experts by finding out ways that can make their work meaningful, rewarding and inspirational along the life-span, and to enable them to contribute to solving complex organizational and societal problems in a sustainable way too.

References

- Basten, F. M. R. C., & Van Tiggelen, K. B. van (2013). *Handboek Buitenpromoveren. Het oriëntatiepunt voor promoveren naast of na een carrière*. Accent Grave/Nijmegen: Orléon.
- Charan, R., Drotter, S., & Noel, J. L. (2011). *The leadership pipeline: How to build the leadership powered company* (Vol. 391). John Wiley & Sons.
- Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the age of the computer*. Basil Blackwell.
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683-703). Cambridge University Press.
- Ericsson, K. A. (2018). An introduction to Cambridge handbook of expertise and expert performance: Its development, organization, and content. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd. ed.) (pp. 3-19). Cambridge University Press.
- Ericsson, K. A., & Simon, H. A. (1984). *Protocol analysis*. M.I.T. Press.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363-406.
- Frie, L. S. (1993). *Gebruikersvriendelijk ontwerpen voor ouderen* [Master thesis]. University of Amsterdam.
- Frie, L. S. (1994). *Leren tijdens het oplossen van de vijfballenpuzzel* [Master thesis]. University of Amsterdam.
- Frie, L. S. (1996). *De toekomst van de computer in het Montessori onderwijs* [Bachelor thesis]. University of Applied Sciences Amsterdam.
- Haken, H., & Stadler, M. (Eds.) (1990). *Synergetics of cognition*. Springer.
- Hamel, R. (1991). *On designing by architects: A cognitive psychological description of the architectural design process*. AHA Books.
- Konz, A. (2014). Equivalent expert career paths in small-and medium-sized companies – chance to gain and retain good employees or a threat for managers? *Journal of Applied Leadership and Management*, 3, 88-103.
- Lelebina, O., & Gand, S. (2018). Beyond “Hero-based” management: Revisiting HRM practices for managing collective expertise. *Industrial Relations*, 73, 39-66.
- Petre, M., & Rugg, G. (2010). *The unwritten rules of PhD research* (2nd ed.). Open University Press.
- Van der Heijden, B. I. J. M. (2000). The development and psychometric evaluation of a multidimensional measurement instrument of professional expertise. *High Ability Studies*, 11, 9-39.



Appendices

Acknowledgements

Curriculum Vitae

English abstract

Dutch abstract

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En tot slot wil ik mijn familie bedanken. Evelien, lieve grote, kleine zus, na het overlijden van pappa zijn we nog meer naar elkaar toe gegroeid en hebben we elkaar gesteund in alles wat belangrijk voor ons is. Dat jij mijn paranimf bent voelt als een bekroning op onze onaantastbare 'sisterhood'. Lieve Lya, jij nam de rol van mamma over en bleef me tot op de dag van vandaag steunen en waarderen dat ik dit traject heb aangedurfd. Lieve Ton, Clazien, Conny, Puck, Toine, Esther en Daantje, jullie waren voor mij de nieuwe familie, altijd al en nog een beetje extra toen mijn vader aan het begin van mijn promotietraject overleed. Door jullie werd de leegte opgevuld en maakte dat ik me gedragen voelde tijdens dit traject.

Lieve Tes, Lot en Floor, ik ben zo trots op hoe jullie in het leven staan als leuke, lieve, eigenwijze en wijze dochters. Met jullie grappen over mijn nerdy interesses en gebrek aan influencers hielden jullie me een goede spiegel voor dat wetenschap niet alles is. Hopelijk biedt dit proefschrift 'als jullie later groot zijn' inspiratie voor nieuwe wegen in jullie loopbanen als jullie die zoeken. En anders help ik jullie graag met het vinden van een interessant(!) boek, een ronkende zin, nieuwe ideeën of een luisterend oor als het leven even anders loopt dan gehoopt.

Boven alles, wil ik jou, lieve Mars, bedanken. Omdat je er al die jaren voor me was, en je me liet doen wat ik dacht te moeten doen. Je steunde me wanneer ik het nodig had, liet me lekker uitvliegen wanneer ik behoefte had aan ruimte, en hield me met beide benen op de grond door elke dag weer te zien als een nieuw begin. Je bleef mijn luisterende oor, ook al waren het vaak verhalen in de herhaling. Je bracht me koffie met wat lekkers als ik uren op mijn kamer zat, maakte van ons huis een warm nest, en trok me uit mijn hok om leuke dingen samen te doen als ik geen grenzen meer kon trekken. Dat maakt dat ik zoveel van je houd.

Tot slot, lieve pappa en mamma. Jullie zijn niet meer hier, maar ergens heb ik altijd het gevoel gehad dat jullie over mijn schouder meekijken. Jullie hebben me met zoveel liefde alle kansen gegeven om te studeren wat ik wilde, en ervoor gezorgd dat ik niet naast mijn schoenen ging lopen toen ik in mijn werk groeide. En jullie kennende, zijn jullie nu stiekem een beetje heel erg trots (maar zoals Mokummers dat doen, met weinig woorden of met een scherpe grap). Het doet me veel verdriet dat jullie niet bij de ceremonie kunnen zijn en met iedereen om mij heen het leven kunnen vieren. In gedachten blijven jullie altijd bij mij.

Lonneke Frie

Den Haag, Oktober 2023

Curriculum Vitae

Name	Lonneke Sacha
Surname	Frie
Address	Thomas Schwenckestraat 4 2563 BX The Hague the Netherlands
Date of birth	30 September 1970
Place of birth	Wormerveer, the Netherlands
Mobile phone	+31(0)6 – 24 09 73 85
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Work experience

2018 - present	Radboud University, Institute for Management Research PhD Researcher: The influence of flexpertise on career sustainability.
2013 - present	The Hague University of Applied Sciences • Senior researcher: Research Group 'Sustainable Talent Development'. • Co-designer Bachelor program 'The multidisciplinary professional' and internationalization strategies. • Senior Lecturer HRM (Hogeschoolhoofddocent). • Nominated for THUAS Teacher of the year.
2023 - present	Chair - Orakuru foundation Funding of research on HR innovation.
2023 - present	Founding partner - OSHI Evidence-based, strategic business and Human Capital consultancy for individual, team, and organizational renewal.
2016 - present	Senior consultant - Metis Consultants Design and implementation of employee engagement programs for sustainability transitions.
2013 - 2017	Co-founder and Managing Partner - Expertized! International training and consultancy firm specialized in expert impact.
2011 - 2013	Freelance HRD consultant - TalentFirst • Career counsellor specialized in autism and highly intelligent experts. • Leadership trainer.
2005 - 2011	Deutsche Telekom • HR Business Partner Marketing, Corporate Communications, and Finance at T-Mobile: responsible for recruitment, development, and outplacement of employees, and strategic workforce planning. • Senior HRD Advisor at T-Mobile and T-Systems: - Co-design and implementation of: – global expert development framework. – corporate project management approach. – award winning culture integration program as part of merger.
2000 - 2005	IBM Business Consulting Services (previously PwC Consulting) • People manager of Learning & Development consultants team. • Senior Learning & Development consultant – Project manager: design and roll-out of ERP learning programs. – Co-designer of IBM ERP learning portfolio. – Trainer project management skills.

Work experience

- 1998 – 2000

Etam Retail Services, the Netherlands
 - Design and implementation of IT project office.
 - Design and delivery of IT training for retail personnel.
 - Participation in corporate Management Trainee Program.
- 1996 – 1998

University of Amsterdam, the Netherlands
 - Researcher SCO Kohnstamm Institute.
 - Trainer communication skills.
- 1995 – 1996

Value Added Consultancy / EduShare
 - Editor and translator of IT training materials.
 - Software trainer for end users.

Education

- 2006 – 2008

Post graduate program: HR as a Business Partner
Rotterdam School of Management, Erasmus University, the Netherlands
(part of Global Talent Development Program Deutsche Telekom)
- 1994 – 1996

Bachelor Educational Science (Montessori PABO)
University of Applied Sciences Amsterdam, the Netherlands
- 1988 – 1994

Master Cognitive Psychology, MSc
University of Amsterdam (the Netherlands) and
University of Tokushima (Japan), cum laude
- 1982 – 1988

Pre-university education
Bonhoeffer College Castricum, the Netherlands

PhD courses (Radboud)

- System / tools

Atlas.ti
- Method

Design a research project, Systematic reviews
- Skills

Academic writing skills, Perfecting your academic writing skills

Business training

- System

SAP, PeopleSoft HR certified, Siebel.
- Project management

Prince 2 Foundation certified, Project management skills.
- Personal development

E.g. presentation skills, workshop facilitation skills, advisory skills, self-management, personal effectiveness, intercultural competence, Management trainee program (Etam Retail Services), Corporate talent programs (IBM, Deutsche Telekom).
- HRD tools

TSI Insights certified, Lumina Spark.

Language skills

- Dutch

Native
- English

Fluent
- German

Fluent
- French

Basic
- Japanese

Basic



Scientific publications (chronological)

- Frie, L., Sjoer, E., Van der Heijden, B., & Korzilius, H. (chapter to be published in 2024 Handbook of HRD (Eds. Rocco, Morris & Poell). *Fostering Career Sustainability: Renewal Bundles of HR/D Practices for Flexpertise Development*.
- Frie, L. S., Van der Heijden, B. I. J. M., Korzilius, H. P. L. M., & Sjoer, E. (sixth resubmission round). *How workers meet new expertise needs throughout their career: An integrative review revealing a dynamic process model of flexpertise*.
- Frie, L. S., Korzilius, H. P. L. M., Dobbinga, S., Van der Heijden, B. I. J. M., & Sjoer, E. (submitted September 2023). *What makes workers able to meet new expertise needs throughout their careers: A Group Model Building approach with HR/D practitioners*.
- Frie, L., Van der Heijden, B., Korzilius, H., & Sjoer, E. (2023). *Fostering flexpertise through workplace learning: An empirical study using Group Model Building*. 21st EAWOP Congress, 24-27th of May, Katowice, Poland.
- Frie, L. S., Van der Heijden, B. I. J. M., Korzilius, H. P. L. M., & Sjoer, E. (2022). *Understanding the resilience of experts: A Group Model Building approach to unravel the flexpertise phenomenon*. Dutch HRM-Network conference, 9-11th of November, Twente University, the Netherlands.
- Frie, L. S., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2022). *The flexpertise phenomenon: The process by which professionals adapt to new expertise needs*. IMR Research Day, 16th of June, Radboud University, the Netherlands.
- Frie, L. S., Van der Heijden, B. I. J. M., Sjoer, E., & Korzilius, H. (2020). *A systematic review of the nature and application of flexpertise and its influence on career sustainability*. SGM Towards inclusive careers across the lifespan: Integrating HRM and careers perspectives, 9th of March, Amsterdam Business Research Institute, the Netherlands.
- Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. P. L. M. (2020). *A systematic review of flexpertise and its beneficial outcomes for the professional's stakeholders and individual career sustainability*. Academy of Management 1st Careers Division Conference, 14-15th of February, WU Vienna, Austria.
- Frie, L. S., Van der Heijden, B. I. J. M., Sjoer, E., & Korzilius, H. P. L. M. (2020). *A systematic review of flexpertise and its influence on career sustainability*. IMR Research Day, 7th of January. Radboud University, the Netherlands.
- Frie, L. S., Potting, K. C. J. M., Sjoer, E., Van der Heijden, B. I. J. M., & Korzilius, H. P. L. M. (2019). *How flexperts deal with changing expertise demands: A qualitative study into the processes of expertise renewal*. *Human Resource Development Quarterly*, 30, 61-79.
- Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. (2019). *Understanding the processes related to flexpertise: A systematic review of studies regarding flexible and adaptive expertise*. 11th Biennial International Conference of the Dutch HRM Network, 14-15th of June. Tilburg University, the Netherlands.
- Potting, C. J. M., Frie, L. S., & Jacobs, F. (2018). *Een docent gedreven onderwijsinnovatie: wat zorgt er voor dat ideeën in de praktijk worden gebracht?* Poster presentation Onderwijs Research Dagen [Education Research Days], June 14th, Radboud University, the Netherlands.
- Frie, L. S., Sjoer, E., Korzilius, H. P. L. M., & Van der Heijden, B. I. J. M. (2018). *What determines the ability of experts to renew their expertise?* IMR Research Day, 21st of June. Radboud University, the Netherlands.
- Frie, L., Van der Heijden, B., Sjoer, E., & Korzilius, H. (2017). *PhD project plan. Experts in the new economy: How expertise renewal contributes to the sustainability of expert careers*. IMR Research Day, 15th of June, Radboud University, the Netherlands.

Publications in national journals/books

- Frie, L., Potting, K., Sjoer, E., Van der Heijden, B., & Korzilius, H. (2022). Het ontwikkelen van flexpertise. Een nieuwe kijk op duurzame loopbanen. *Loopbaanvisie*, augustus.
- AD (2019). Waarom we in de toekomst allemaal 'flexpert' moeten zijn. Retrieved from <https://www.ad.nl/werk/waarom-we-in-de-toekomst-allemaal-flexpert-moeten-zijn~aa66341b/>
- Potting, K., Frie, L., & Jacobs, F. (2018). Learning landscapes, a breeding ground for sustainable educational innovation: Experiences of teachers working in a context that aims to support innovative behavior. In F. Jacobs & E. Sjoer (Eds.), *Inspired to change: A kaleidoscope of transitions in higher education* (pp. 65-76). The Hague University of Applied Sciences.

PhD research: selection of knowledge dissemination activities

2023:

- Flexpertise workshop for master students of Integral Business program, September 22th
- Keynote speaker 'Flexpertise' at Vitality festival HRM program THUAS, June 23th
- Integration of flexpertise assignment in module on sustainable employability of HRM study program THUAS

2022:

- Lecture Talent Management Radboud University, October 7th
- Workshop 'Flexpertise for your career sustainability' at THUAS THINKFST, November 3rd
- Workshop 'Flexpertise', Alliander, June 8th
- Workshop 'Leading flexpertise' at THUAS leadership conference, May 19th

2021:

- Guest lecturer talent minor HRM study program, January and April
- Host of conference '*HRM-symposium 2019 - HRM of the future: be prepared not scared.*' THUAS, April 16th

2020:

- Workshop managing your PhD project, THUAS, Feb 4th
- Guest lecturer talent minor HRM study program, January and April

2019:

- Workshop Systematic Reviews, Research Group Sustainable Talent Development, April 3rd
- Radio interview RN7 regarding flexpertise research outcomes, March 19th

2018:

- Lecture 'Talent Management' at Radboud University, October 3rd
- Workshop 'How to renew yourself', THUAS, April 21st

2017:

- Lecture 'Talent Management' Radboud University, October 6th
- Workshop 'Topwerkgeverschap is aandacht voor experts', Practitioner conference Top Employers, May 30th
- Workshop LOO-HRM Teacher Day 'De rol van HR bij de effecten van digitalisering op het werk van experts', March, 17th

English abstract

In the turmoil of complex societal and organizational transitions, workers need to adapt in order to meet new expertise needs within and across the boundaries of their expertise domains and working contexts. This labor market need is reflected in a worldwide quest for upskilling and reskilling of workers, as well as the demand for multidisciplinary experts who develop new expertise to foster breakthrough innovations. The growing need for this individual adaptivity is mirrored in a shift in scholarly focus from understanding how one becomes an expert into the question how one can safeguard a worker's position for the future labor market. In this PhD dissertation, we address this latter question by elaborating our understanding of the flexexpertise phenomenon by means of four studies. Flexexpertise concerns the adaptive ability by which individual workers meet new expertise needs of their own and their surrounding stakeholders throughout their career.

Through an interview study with 'flexexperts' [see Chapter 2], we have built a Model of Expertise Renewal that describes the iterative processes by which they develop and materialize new expertise, and gain social recognition for this, within and across the boundaries of their fields. This model laid the groundwork for applying a system dynamics lens in our subsequent integrative review study [see Chapter 3] and Group Model Building (GMB) study [see Chapter 4]. In our integrative review of the scholarly literature regarding flexible and adaptive forms of expertise, we refined and elaborated the aforementioned model into a dynamic process model of flexexpertise. By taking the viewpoint of flexexpertise as an ongoing adaptation process, without a single begin- or endpoint and consisting of reinforcing and balancing loops, we posit to provide a new theoretical framework in expertise research. Next, we evaluated the face validity of the dynamic process model of flexexpertise by means of a Group Model Building process with a reference group of HR/D practitioners. Through a structured group model building process, these practitioners reached consensus regarding a dynamic process model based upon their practice experiences with the flexexpertise phenomenon. Furthermore, this reference group defined leverage points in the model where a small intervention can make a big change in the system through providing HR/D practices. In our final and fourth study, we conceptualized what a transition from expertise to flexexpertise development means for the HR/D function, and why this transition requires bundles of renewal practices in addition to current expertise development practices. In the discussion of this thesis, we outline the theoretical, methodological, and practical value of this PhD project and what this implies for future research. We conclude with the ethical considerations regarding

the question if everyone should and can become a flexpert. In summary, this PhD research has taught us how workers can respond to a changing demand for expertise and how you can promote their adaptability.

Dutch abstract

Door complexe maatschappelijke en organisatorische transitie ontstaat er op de arbeidsmarkt regelmatig behoefte aan nieuwe expertise. Dat vraagt van werkenden dat ze zich voortdurend aanpassen door nieuwe expertise te ontwikkelen, zowel binnen als buiten hun eigen expertisegebied, en deze expertise van waarde te maken in verschillende werkcontexten. Op de arbeidsmarkt is deze veranderende behoefte aan expertise zichtbaar in de vorm van een wereldwijde vraag naar bij- en omscholing, en de roep om multidisciplinaire experts die nieuwe expertise ontwikkelen voor baanbrekende innovaties. Deze groeiende behoefte aan flexibiliteit van werkenden heeft geleid tot een veranderende focus in expertise-onderzoek. Daar waar onderzoekers zich decennialang richtten op de vraag hoe iemand een expert wordt, is het tegenwoordig steeds vaker de vraag hoe je als werkende waarborgt dat jouw expertise waardevol en erkend blijft. In dit proefschrift behandelen we deze laatste vraag met behulp van vier studies naar het zogenaamde flexexpertise fenomeen. Flexexpertise betreft het aanpassingsvermogen waarmee werkenden tijdens hun gehele loopbaan ervoor zorgen dat ze voldoen aan hun eigen behoefte aan nieuwe expertise, en de behoeften van hun stakeholders.

Ons onderzoeksproject startte met een interviewonderzoek met 'flexexperts' op basis waarvan we een 'Model van Expertise Renewal' hebben ontwikkeld [zie Hoofdstuk 2]. Dit model beschrijft de iteratieve processen waarmee deze flexibele experts nieuwe expertise ontwikkelen, deze expertise verzilveren, en daarvoor de erkenning krijgen van verschillende stakeholders. Dit model legde de basis voor het toepassen van een systeem dynamische benadering voor de daaropvolgende twee studies: een 'integratieve review' [zie Hoofdstuk 3] en een Group Model Building (GMB) studie [zie Hoofdstuk 4]. In onze review van wetenschappelijke literatuur over flexibele en adaptieve vormen van expertise hebben we bovenstaand model verfijnd en uitgewerkt tot een 'dynamisch procesmodel van flexexpertise'. In dit model wordt flexexpertise beschouwd als een doorlopend aanpassingsproces, zonder een vaststaand begin- of eindpunt, en bestaande uit elkaar versterkende en balancerende feedback loops. Aan de hand van dit model hebben we een nieuw theoretisch kader ontwikkeld voor expertise-onderzoek. Door middel van een Group Model Building-proces met HR/D-professionals hebben we onderzocht in hoeverre dit dynamische procesmodel wordt herkend in de praktijk. Aan de hand van een groepsmodel bouwproces hebben deze professionals een dynamisch model ontwikkeld dat het aanpassingsproces van individuen beschrijft op basis van hun praktijkervaringen met het fenomeen flexexpertise. Deze groep definieerde vervolgens de 'leverage points' in dit model. Op basis van deze aanknopingspunten kan met een kleine ingreep een

grote verandering in het aanpassingsvermogen van werkenden worden gerealiseerd door het aanbieden van HR/D-interventies. In onze laatste en vierde studie hebben we uitgewerkt wat de transitie van expertise- naar flexexpertise-ontwikkeling betekent voor de HR/D-functie, en waarom deze transitie bundels van 'renewal practices' vereist naast de bestaande HR/D praktijken voor het ontwikkelen van expertise. In de nabeschuiving van dit proefschrift schetsen we de theoretische, methodologische en praktische waarde van onze bevindingen en de implicaties voor toekomstig onderzoek. We sluiten dit proefschrift af met ethische overwegingen over de vraag of iedereen een flexpert moet en kan worden. Samengevat heeft dit promotieonderzoek ons geleerd hoe werkenden kunnen inspelen op een veranderende vraag naar expertise en hoe je hun aanpassingsvermogen kunt bevorderen.

