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Business needs driving IT decisions - using feature analysis and stakeholder evaluation in Rolls-Royce

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Business Needs Driving IT Decisions - Using Feature Analysis and Stakeholder Evaluation in Rolls-Royce

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Abstract

This experience paper is a follow-on from an experience paper presented at last year's EASE conference which looked at the use of feature analysis to support strategic IT decision-making within an engineering support function in Rolls-Royce [1].

The feature analysis tool is exceedingly powerful and informative, particularly appreciated by senior managers. The graphical output enabled senior managers to make strategic decisions quickly and effectively. The tool was extended by the creation of different views of the business, of which the feature and system comparison view has been by far the most useful. The other views proved interesting, but did not ultimately have the impact of the feature and system comparison.

Feature analysis is an informative and effective tool for managers and developers but is not complete in itself. A stakeholder analysis also proved extremely useful and powerful. It can concisely summarise who has influence and why. The analysis focussed thinking on how to manage the stakeholders. Feature analysis combined with stakeholder analysis proved to be particularly effective.

Introduction

This experience paper is a follow-on from an experience paper presented at last year's EASE conference. The original paper looked at the use of feature analysis to support strategic IT decision-making within an engineering support function in Rolls-Royce [1]. Part of Rolls-Royce's tactical strategy has been to extract the maximum amount of benefit from existing legacy IT systems. In order to present a structured, objective recommendation to the business, methods were required to support the evaluation of what the various legacy IT systems applications did, and where they were perceived to be insufficient to meet user needs. Feature analysis was one of the methods used in support of defining existing functional capability and future identified needs.

As part of the original paper's conclusions, there were several areas that the authors were going to further explore. The feature analysis matrix was to be expanded, referencing requirements to process, requirements to strategic intent, and requirements to cost. This would create a multidimensional matrix, which would then be used to fully evaluate system requirements with regard to through life cost, process, and strategic direction.

Work has continued on using the feature analysis tool, and much experience has been gained from it. The main lesson this experience has taught is that feature analysis is

an extremely useful tool, but its real benefit is only unlocked when used in conjunction with other tools to construct analytical views of business requirements.

The main principle underlying the use of all the tools is that business needs must drive the IT decisions. Business needs were derived and defined by developing several simple tools that help extract business requirements, and assist in prioritising them. The tools, by necessity, support the elicitation and representation of requirements in conjunction with expert business representatives.

Methodology

Feature Analysis

To enhance the level of support to the company's current business and enable expansion into new business, Rolls-Royce have been evaluating possible systems and options for tactical and strategic approaches. Central to these considerations was the role of product life cycle management. For this purpose several business IT systems were considered, but it was apparent that three were the front runners, in terms of the required business solution. Three systems were analysed in detail. One was a bespoke legacy system, another was a bespoke system from a collaborating company, and the third was a COTS product.

The feature analysis uses a similar methodology to those used by Kitchenham *et al* [2]. Functionality requirements for a 'dream system' were developed from several sources. Firstly, functional requirements were identified, as specified for the development and enhancement of the existing legacy system. Secondly, interviews were conducted with key business representatives, users and system developers, using requirements identified in the first stage as a "straw man."

Derived functionality requirements were then divided into groups. The groups represented several levels of abstraction. At the top level (Level 0), only generic functional topic areas were addressed, such as 'configuration management' and 'change control.' Level 1 requirements included areas such as 'Record Change Control Decisions' and 'Manage Maintenance View.' Level 1 requirements embody more detailed functionality than Level 0. Level 2 requirements embody more detail still. The present study stops at identifying Level 2 requirements, but there is a plan to drill down further to Level 3 requirements, which would identify the 'nuts and bolts' of the system.

To enable the relative significance of each requirement to be evaluated, weightings were added to the Level 2 requirements on a 1 – 10 scale:

- 1-3: Useful
- 4-7: Important
- 8-10: Essential

The weightings for each requirement were determined from the information provided by the users and developers interviewed and based upon significance to the business being effective.

Having a classification below "useful" was not considered to be informative, as identified requirements would, by definition, be useful. The extent to which each is prioritised is given by its weighting. Level 1 and Level 0 weightings were determined

by using the modal average of the requirements that they enclose. Changes to the higher level weightings were permitted if users/developers felt that the modal average did not reflect the importance (or lack of importance) attached to that group. This only happened for one Level 1 requirement. For example, a major requirement for Product Configuration Management was moved from a weight of 7 to a weight of 9 as it was considered to be the “raison d’etre” for the whole system.

The feature analysis was extended by creating a number of different views of the business:

Analysis of Feature vs. Systems

It was then a matter of determining what requirements were fulfilled by each of the three systems under evaluation. The weightings allowed each of the systems to be evaluated graphically, on the various levels. Several categories of acceptance were used:

- Yes – the system had functionality that satisfied the requirement
- TBD – To Be Done; the system, at present, does not have that functionality, but there are plans that have already been put in motion to satisfy that requirement
- No – the system does not have the functionality, and there are no plans to implement this functionality in the near future.

The inclusion of the TBD acceptance allows a very quick ‘planned functionality’ measure to be evaluated, allowing a look beyond the status quo. This is especially significant in terms of planning for future capability requirements.

Analysis of Feature vs. Process

The feature analysis matrix was then expanded, referencing requirements to process, requirements to strategic intent, and requirements to cost. The processes were pre-existing within Rolls-Royce. The processes have defined areas of responsibility, and it was then a matter of matching up the functionality to the process for which it was required.

Analysis of Feature vs. Strategic Intent

The strategic intent was described in several Rolls-Royce internal reports. The intent was commonly in terms of capability – “we will expand the business to include . . .” Refining the capability into features required the use of other tools. Once these tools had been used, and required features extracted, each feature could be mapped to an intent, including a timeframe for completion, as there are always long term strategic and short term tactical aims.

Analysis of Feature vs. Cost

The cost aspect was intended to inject a financial element to each feature, and thus provide a useful tool for managers to determine exactly where the expenditure was going to be required to develop and deliver a functional capability.

Stakeholder Analysis

Feature analysis is a powerful requirements identification and prioritisation tool. However, other tools were used in the course of IT systems requirement capability evaluation in Rolls-Royce. As part of any requirements capture exercise, identification of stakeholders is a key activity. However, the creation and collation of

a list of stakeholders does not take the process far enough. Analysis of the stakeholders to determine the levels of interest and influence on the project under review renders their identification as purposeful.

This analytical method was developed and trialled by Rolls-Royce in support of a strategic business development exercise. Stakeholders were identified at a brainstorming session attended by key business personnel, resulting in a listing of stakeholders. The stakeholder listing was evaluated according to their interest (in the project) and their influence (on the project) and divided into a quadrant. Each quadrant was identified by a combination of high/low interest/influence. Figure 1 shows a sample quadrant distribution:

<p style="text-align: center;">High Interest/High Influence</p> <ul style="list-style-type: none"> •Stakeholder A •Stakeholder B •Stakeholder C 	<p style="text-align: center;">High Interest/Low Influence</p> <ul style="list-style-type: none"> •Stakeholder D •Stakeholder E
<p style="text-align: center;">Low Interest/High Influence</p> <ul style="list-style-type: none"> •Stakeholder F •Stakeholder G 	<p style="text-align: center;">Low Interest/Low Influence</p> <ul style="list-style-type: none"> •Stakeholder H •Stakeholder I •Stakeholder J

Figure 1: Stakeholder matrix

Following the exercise to allocate stakeholders into the quadrants, it was decided to further concentrate on those stakeholders with high influence potential on the project. Half the quadrant diagram, with respect to the high influence stakeholders, was then subjected to further analysis. The analysis proceeded by determining the various roles and functions of the stakeholders. The differentiation between roles and functions were as follows: a stakeholder was defined by its role, whereas a function was defined and determined by the stakeholder.

When applied, the team defined four roles and four functions for the analysis. The defined roles were:

- Provider – the stakeholder provided goods to Rolls-Royce
- Acquirer – the stakeholder purchased goods from Rolls-Royce
- Authorise/accept – the stakeholder authorised or accepted various actions by Rolls-Royce
- Define requirements – the stakeholder defined binding requirements to which Rolls-Royce had to operate to

The functions were:

- Programme – the stakeholder influenced the in-service use of the product
- Procurement – the stakeholder could influence procurement activities

- Support - the stakeholder could influence the support of the RR product
- Design – the stakeholder could influence the design of the RR product

Roles were independent of the stakeholder, whereas functions were dependent upon the stakeholders. The roles and functions were not defined to be generic; they were defined to suit the specific project. However, the principles of definition are generic.

The team also found it useful to split the stakeholders between internal and external stakeholders. This provided two benefits. Firstly, it reduced the numbers of stakeholder that had to appear on graphs, and made the graphs less cluttered. Secondly, it was assumed that internal stakeholders could be more easily influenced by the company than the external ones, and the analysis provided an insight into the extent of external and internal stakeholders.

Once the roles and functions had been defined, the stakeholders were then apportioned according to their role or function. This exercise clearly illustrated where and why stakeholders were highly influential.

The analysis is very informative, as it provides a highly valuable means of presenting stakeholder data for strategy development. Stakeholders in influential roles must be negotiated with – the role cannot be subsumed, as the stakeholder is defined by the role. However, the influence of stakeholders in influential functions can be offset through various methods, such as bringing functions in-house, or choosing a different out-source provider.

Results

Feature Analysis

As reported in the previous EASE conference paper, the feature analysis has proved very successful at Rolls-Royce and is now used in several parts of the business. It was originally intended to expand the feature analysis matrix below the second level. However, when this was attempted, it was found that the picture got very complicated, and much more difficult to manage. The power of the technique is in its simplicity, and this was being lost by trying to simplify too much data.

An additional benefit has been found for systems developers. The identified features gives insight into what functionality is important for users, distinguishing between what is needed and frills that excite the users but are not actually necessary. This enables prioritisation and planning of future systems development.

The experience of using different views of feature analysis was as follows:

System vs. Feature

The system/features analysis provided a very useful comparison of what each system could and couldn't do. This was the most useful analysis. It was clear to see where the advantages and disadvantages lay with each system. An example output can be seen below in Figure 2.

Present Functionality 2000 - by High Level Function Group

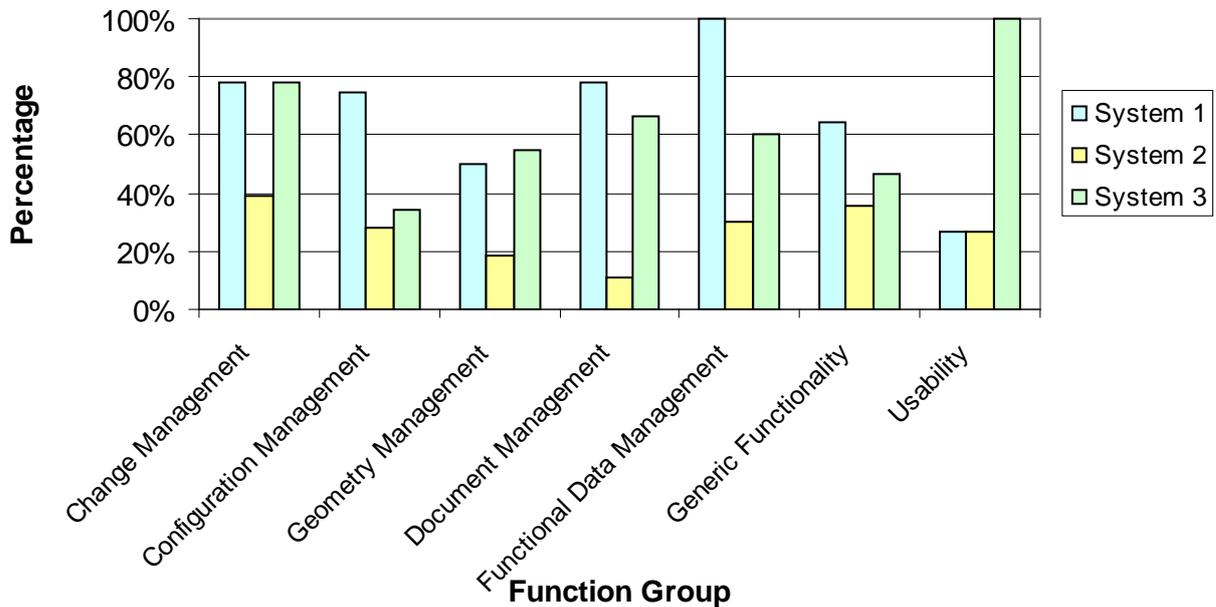


Figure 2: Feature Analysis Comparison Results

The high level view encapsulated by the graph proved to be very useful when explaining why a system would cost more to implement if it did not give the required functionality.

This view is perceived as being very useful, as it encapsulates the strengths and weaknesses of each system in a way that is immediately understandable. It is possible to see at a glance, why some systems are unsuitable. It is also possible to extract features that are essential and examine whether the systems cater for these requirements.

This view was also developed to include a quick glance at the planned functional capability declared by the systems’ developers. This allowed the decisions to take into account the continuous evolving nature of IT systems. This meant that the decision was not constrained by current capability, but could also reference future capability.

Feature vs. Process

This view did not add much detail to the picture. Because of the way in which the Rolls-Royce Business Process Model has been developed, the overwhelming majority of the features were required by most of the main processes. Many of the features were required by more than one process. One process required most of the features recorded. The process of compiling this view was useful in that it did give a better understanding of the process model. However, the output was not as useful as expected.

Feature vs. Strategic Intent

This view provided some interesting information on when improvements had to be scheduled and how vital there were to have in place. The advantages were that it exposed required functionality gaps required to resource plans that were not in line with current business.

The disadvantage was that none of the scheduling was a surprise! The dates for the strategic objectives were set, and unsurprisingly the requirements coincided with these.

The benefit mainly accrued to the developers, who could use the data to prioritise development work. They knew what requirements had to be enabled by when. However, the graphical outputs were not particularly useful in this respect. It was the matrix and the required features and dates that were far more useful.

Feature vs. Cost

This option did not work at all well. Firstly, it was difficult to assign costs to individual features. For example, many usability features would be enabled simply by using a GUI front-end. This was one project, although it enabled many features. Simply dividing up the cost amongst the features did not work very well, and was not informative.

Secondly, it was difficult to assign costs to some features, as some of them had multiple solutions. Which cost would be the correct one to assign the feature? The one that most completely satisfied the feature requirement?

Stakeholder Analysis

The stakeholder analysis was very valuable. It showed exactly which stakeholder(s) were critical to project success. The exercise revealed that there was a predominance of stakeholders with several functions influencing Rolls-Royce. The influence of some of these can be mitigated. The analysis also showed that there were many stakeholders that combined several influential roles. The graphical output produced was also valuable. It shows at a glance where the balance of influence lies. Pie charts (figures 3 and 4) were created, grouping stakeholders by the number of roles or functions that stakeholder possessed. Stakeholders with three or four functions/roles were classified as high impact. Two roles of functions were classified as medium impact, and one role/function was low impact. This was not to say that the stakeholders were not influential. It was just to pinpoint the fact that some stakeholders were influential across the business, whereas others' influence was very focussed to a single area.

External Stakeholder Capability by Function

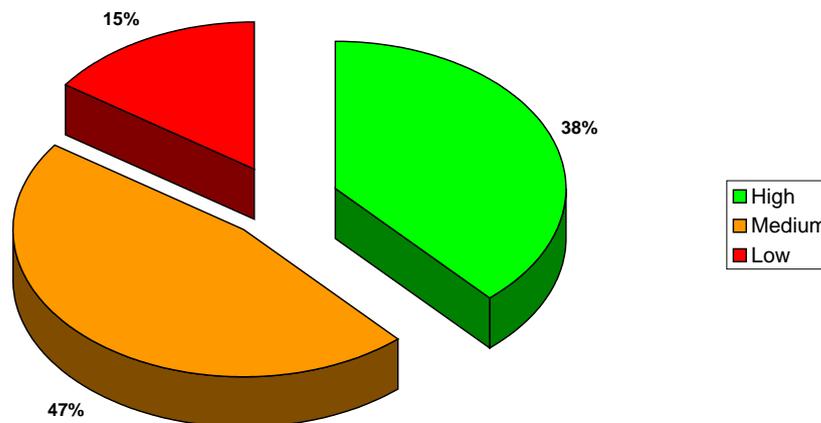


Figure 3: Stakeholder Summary – Functional Stakeholders

External Stakeholder Capability by Role

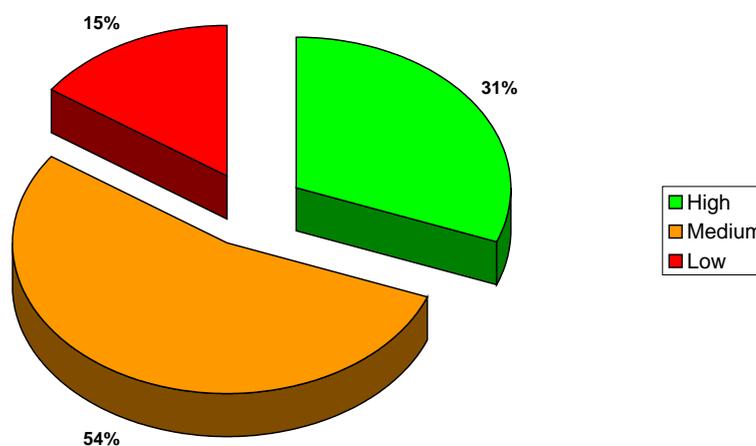


Figure 4: Stakeholder Summary – Stakeholder Roles

Conclusions

The feature analysis tool is exceedingly powerful and informative for business decision makers. This is particularly appreciated by senior managers who found the graphical output intuitive to follow. These managers are continually being asked to read and understand large quantities of data in order to make necessary decisions. Feedback received so far has been that the main advantage is the graphical breakdown that allows a large amount of information to be presented in one picture – “a picture is

worth a thousand words.” The graphical output enabled senior managers to make strategic decisions and evaluations quickly and effectively.

The feature and system comparison view has been by far the most useful. It has been extensively used to provide rigour and a structured approach to the decision making process. The other views proved interesting, but did not ultimately have the impact of the feature and system comparison. The strategic view revealed nothing useful that was not already apparent. The difficulties with apportioning cost to features made the cost analysis less than successful.

The stakeholder analysis was extremely useful. It is simple, in that the entire analysis can be conducted in an afternoon, but the output is extremely informative. It can concisely identify highly influential stakeholders, and why they are influential. The analysis focussed thinking on how to manage the stakeholders, an important part of strategic project management and overall formulation of tactical and strategic policies.

It is to be concluded, therefore, that feature analysis is a useful and effective tool for managers as it assists in decision making, and for developers as it helps prioritise future work. It is not, however, complete in itself. It must be combined with other tools in order to extract the fullest benefit of the tool, in addition to having good access to key business personnel.

In summary, the deployment of various analytical methods and tools have enabled senior business representatives to move from an anecdotal “I think this is the way to go, but I couldn’t tell you why” to a position of substantiation of “This is the way to go, and these are the quantified reasons why.”

References

- [1] “Using a Requirements Matrix and Associated Graphs for Strategic Decision Making at Rolls-Royce,” de Chazal, M. J., and Dawson, R. J., EASE 2001
- [2] “DESMET: a methodology for evaluating software engineering methods and tools,” Kitchenham, B; Linkman, S; Law, D, Computing and Control Engineering Journal; 8 (3) Jun 1997, p.120-6