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SAP® Operational Process Intelligence
Powered by SAP HANA

from
SAP® Process Orchestration: The Comprehensive Guide

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SAP Operational Process Intelligence Powered by SAP HANA

SAP Process Orchestration contains a component that handles process automation (SAP Business Process Management) and one that handles the message flow (SAP Process Integration). After you’ve activated your BPM processes and defined your messages, you’ll have a well-behaved and controllable business process. However, it is the process insight and ability to intervene manually when exceptions such as bottlenecks occur that gives the added value delivering the differentiating factor between companies. The perception of a company is very much based on its operating skill. This is especially evident with respect to the employees’ perception of their own company. It’s the operational excellence, consistency, and ability to smooth over disruption that colors the employees’ corporate pride.

So in addition to automating the business processes and choreographing the message flow, companies have to deliver operational excellence and successively improve on this year after year. Some of this can be achieved by improving the process definitions, but before this happens, a team of operators will be bending over backwards to make sure that the processes work well, come what may. The focus on targets has changed from being a monthly report, to being a daily debriefing to ensure that ever-increasing standards are met.

How long can a company rest on its laurels when it delivers a great product if the customer-facing processes or even the employees’ internal processes fail? There comes a time when the sporadic aggravation caused by the nondelivery of office equipment or delays in handling of headcount replacement have an effect on the employees' attitudes and the way they pursue their daily work. The rot has started from within.

The software to ensure process execution excellence, especially in the case of process management, is SAP Operational Process Intelligence powered by SAP HANA. It’s a long stride beyond automating parts of a process. This is about the complete end-to-end process from start to finish, irrespective of how many software systems, colleagues, and different third-party integrations are involved.
In this appendix, you’ll get an overview of SAP Operational Process Intelligence. We’ll explain the new capabilities for process management that this tool enables, and then we’ll discuss the technical requirements needed. There are two main constituents of SAP Operational Process Intelligence: scenario-specific dashboards in an add-in to SAP HANA called space.me for the business users, and an SAP HANA Studio plugin, which is used by the solution experts to generate these dashboards using the configuration from SAP Process Orchestration. We’ll discuss these in the last part of this chapter. But first, let’s get started by explaining the capabilities that SAP Operational Process Intelligence facilitates.

The Objectives of SAP Operational Process Intelligence

There are three main objectives of SAP Operational Process Intelligence, which we’ll discuss in the following sections:

- Process transparency
- Limitless scenario transparency
- Insight to action

Process Transparency

Enabling process transparency is about making the automated process visible and tangible. This is a visualization that the business users who are responsible for operating and dependent on the processes can easily understand. They want to see both the flow of the process and the key performance figures (including targets, and whether they are met) in a dashboard that is easy to digest. However, this isn’t just a matter of displaying facts and figures; the business operators’ perception of the process is graphic but simple, as shown in Figure 1.

![Figure 1 Business Reality: How Business Users Perceive the Process](image)

This software view is called space.me, because it’s the software region where the process operator goes to have a comfortable view of the whole process or that specific part of the process he is responsible for. We’ll see later that space.me is
generated by using the most modern user interface (UI) paradigms, and it’s based on the underlying process data and the context data. For this to be of use, both the process data (times, instance data, people involved) and the context data (the data indirectly related to the process such as the goods being shipped) are equally as important. And space.me is the one place where both can be viewed at the same time to give the process operator a holistic view of what is going on, and what is or isn’t significant.

Part of the configuration of space.me is mapping the operator’s graphic perception of the process to the complex reality of the underlying automated software processes and subprocesses. This mapping is important so that the operator sees a live pictogram of the process as it flows, giving the operator the chance to correct problems right away, rather than waiting for reports to be calculated in overnight jobs.

**Limitless Scenario Visibility**

Because this tool doesn’t limit the visibility to one part of a process, but encourages visibility to match your business user's needs, you’ll find after you start using it that the visibility spreads well beyond the scope of the single process that you started to visualize. It will quickly show a visibility map of several technical processes, probably spread over different systems or tools. For this reason, we call this map a *scenario* rather than a process dashboard, to make clear the distinction between the boundaries of a single automated process, compared with the boundless business view of the process and context.

It helps to think of this tool as being the GPS of processes in your system. The process view is like a paper map, but the scenario view is like the GPS showing a stylized view of what is happening, not just in terms of routes, but also in terms of the full context (traffic conditions, filtering out irrelevant and distant roads, context such as gas stations, KPIs such as amount of time driven, and predictions such as expected arrival time.)

**Insight to Action**

Having an elevator view of the processes and being able to dive down into the detail, whether context or process, is a very powerful capability. Armed with this, the operator can prevent many a disaster by using traditional interactions such as phone, email, or even yelling. But in larger organizations, a single hero isn’t
enough. The rest of the team has to see what's going on, and they often have to be involved in solving problems collaboratively. So this software brings a set of tools to the operator to smooth the flow of the processes or mitigate issues directly in the system.

Not only are the processes transparent, but the mitigations (whether notifications, actions, tasks or checklists) are also transparent and continue to be pursued even when one of the instigators is absent or handed on to colleagues in round-the-clock operations.

**Prerequisites for Operational Excellence**

The prerequisite for this level of operational excellence is complete access to real-time context and process data. Prior to in-memory databases, this could not be achieved, and operational process intelligence was limited to process fragments because, in practice, the context data and process data was spread over several systems, both SAP (ABAP and Java) and third-party. However, with SAP HANA, consolidating large amounts of data and accessing it without delay can be achieved, so the prerequisite can be met.

The context data has to be replicated immediately and frequently into a single fast database so that the business views see the data and trends virtually in real time with a lag of one or two minutes at most, but not hours or days. SAP standard tooling is used for this in SAP Operational Process Intelligence in order to reuse capabilities and skills.

The process data also has to be replicated. This is trickier, without dedicated tooling, because each tool has its own way of storing and executing process flows. In addition, this process data has to be transformed to a universal description so that process fragments from different tools can be linked together. So it’s a huge bonus that the software already understands SAP Process Orchestration (and SAP Business Workflow and Process Observer for the SAP Business Suite), so the complex transformations are performed automatically. Similarly, the execution data (process events and data) can also be replicated by this software, which understands the underlying SAP Process Orchestration (in this case) mechanisms.

In the following sections, we’ll discuss the software prerequisites to achieve operational excellence.
SAP HANA

The fast database that’s capable of handling these massive amounts of data (big data) and transforming the data on the fly is SAP HANA. SAP HANA is an in-memory database, complete with its own native programming language (XS) for lightning-fast transformations and data access. A huge benefit of the SAP HANA database from the business perspective is the prediction engine, so that process predictions can be made on the fly. For example, even though a process is late for an early stage of the process, it has the ability to catch up later, so predictions are a very important instrument for the operator’s analysis of a process flow, making decisions based on whether or not key performance indicators (KPIs) are likely to be met or not. Predictions are especially important in processes where everything is dynamic. A process prediction based on static data is as unreliable as a weather prediction that's based on a single satellite photograph instead of on time-lapse sequences, combined with local velocity and temperature gradient measurements.

SAP Operational Process Intelligence for SAP HANA

Directly on top of the SAP HANA database is SAP Operational Process Intelligence. This native SAP HANA application has been developed in SAP HANA XS for no-compromise access to the underlying process and context data.

There are two parts to this tool:

1. **space.me**
   The generated workspace that the operators use to track the processes and deal with any issues that arise.

2. **SAP HANA Studio**
   This is where the solution expert generates the UIs based on the underlying processes for the end users and context data.

In the next sections, we’ll discuss how to use these different parts of SAP Operational Process Intelligence.
space.me Dashboards

Before we learn how to generate space.me, with its set of process widgets and dashboards, let’s look at a typical space.me to understand its potential (see Figure 2).

As a whole, space.me is a set of scenario-specific dashboards. As you learned earlier, the scenario spans an area of visibility that’s greater than the process. But the operator may be responsible for several different areas of business, and will require separate dashboards for each.

In addition to the dashboards, there is a WORKBOX for activities being worked on. All of this is rendered in SAPUI5, which is the SAP library for HTML5, the modern way of rendering web pages so that they behave in every way as an application rather than static web pages. This means fluid and aesthetic transitions from screen to screen or widget to widget, and the screen can be updated directly from the gigabytes of data in the SAP HANA database (i.e., the server) without the user having to do anything. This is why SAP HANA and SAPUI5 form a perfect combination.
SAP Operational Process Intelligence goes one step further by using a responsive UI to render the dashboards, which means that the information displayed on the screen automatically adapts to the screen size, resolution, and aspect ratio. This makes it fluent for an operator working on a large desktop screen to hurry off to a production floor with a tablet and then view the same data on a control-tower screen without needing to adjust any settings or configuration. The responsive desktop could not be a more comfortable medium to work in, particularly for someone who can’t afford to let niggling technology get in the way of frequent and speedy decisions.

The beauty of space.me is that the operator can drill down into any of these tiles (KPI, measurements, process phases, etc.), browse the instances causing problems, and inspect the details of any individual instance. Unlike a reporting dashboard, space.me also shows the situation from the process point of view, so the operator can really anticipate whether additional actions are required to make this single scenario instance a success. The operator can even see a prediction (top right-hand corner of Figure 3), based on the SAP HANA data and history of whether this will be a success or not.

![Figure 3 Scenario Instance Detail](image)
For example, an order that is already overdue in one phase may have a good chance of being delivered on time if this is a short phase, and typically, orders of this category catch up further down the process.

However, this is very different from a technical view of the process, because along with the process data, the details of the item are also displayed, which the operator will depend on when deciding whether or not to intervene and what intervention is necessary. Data such as weight, destination, cost, or transport partner are all equally as important as the process data itself.

In the next sections, we’ll discuss the different dashboard widgets that are available for your use. All of these widgets can be combined any number of times, in accordance with the views of the process that are needed to monitor it effectively. They’re generated into the space.me user interface based on the configuration performed by the solution expert (described in Section »SAP HANA Studio«) to meet the business users' needs.

**The Phase Diagram**

The phase diagram shows the process flow of the scenario in a simplified schematic view (see Figure 4). It also shows the basic information about how many scenario instances (think orders, deliveries, approvals, etc.) are in each phase and how well they are performing.

![Figure 4: Phase Diagram](image)

The operator can see at a glance whether a large wave of items is building up in one phase, which could result in problems should the items surge into the next phase in one short time interval. He can also see what percentage is already late, and how many are on time. The KPIs to determine late and on-time items are sophisticated and can depend on the context of the scenarios (e.g., a large order versus a small order). From here, the operator can dive down into the detail and see exactly which items are late (or in danger of being late), or filter the results according to any context, such as geographic region, product, or partner, as shown in Figure 5.
Measurements

The measurements are calculated from the data in the SAP HANA database. They could be times (such as average time to complete a phase), counts (such as items of a certain type), or more complex values such as the total monetary value of all items in a particular phase. Drilling down into a measurements tile shows the historical trends (see Figure 6), so that an operator can compare the results at the start of a month with those of a previous month, search for worrying trends, or anticipate improvements (i.e., no intervention needed) by comparing with other periods.
Measurements can also be process-related depending on the path taken in a process, such as the number of scrap approvals being rejected in the final stage of processing, which is an indicator of wasted human effort.

**Key Performance Indicators**

The KPI tiles show whether or not a KPI is on target, at risk, or failing. These KPIs are set up in SAP HANA Studio according to what the process owner has stipulated as being important. They could be simple time-based KPIs, such as the number of items completing the phase or complete process within the time specified in a service level agreement or the department’s target. But they can also be more sophisticated, such as the sum total of orders reached for the day.

A KPI is built from a measurement and a target, both having previously been configured in SAP HANA Studio. The target has thresholds, so it’s possible to distinguish between KPIs that have failed and KPIs where the target has just barely been reached, so particular caution is needed (see Figure 7).

![Figure 7 KPIs Reached or Failed](image)

Again, by drilling down into the KPI, the operator can see the historical trends and break this down even further by category, location, or any other context.
The operator can even subscribe to particular KPIs so that he is warned as soon as the KPI isn’t met, or is in danger of not being reached.

**Tasks**

Often, the operator will rely on the support of colleagues when intervention is necessary. This can be done using emails or phone calls, but in larger companies, especially where round-the-clock operations need to be guaranteed, this is best done using persistence directly in the operators' space.me. This way, the action can be followed by all colleagues involved, and work isn’t unnecessarily duplicated.

The tasks are assigned to a particular scenario or to a particular scenario instance. It has simple status management (from open, to in-progress, completed, and confirmed by the initiator) so that there is no ambiguity. Collaboration is the center of attention in the task, so the feedback from colleagues (see Figure 8) and the ability to bring in new colleagues to handle a particularly sticky situation are intuitive within the task.

![Figure 8 A Collaborative Task](image_url)
The users access and track their tasks from their My Workbox, where they can see all tasks that they are personally involved in. However, there is another view called Scenario Workbox where the operator sees all tasks currently in process that relate to that particular scenario. This view prevents operators from duplicating activities when several operators are involved in overseeing one large scenario.

**Checklists**

Checklists (shown in Figure 9) are collections of tasks, which at their simplest can represent a best business practice for dealing with disruption or improving the situation when KPIs are in danger. These optional checklists are generated every time a scenario instance is generated, so that the operator can use them whenever the situation arises.

![Figure 9 Checklist](image)

However, checklists are of particular value when the formal automated process has gaps, especially between processes. So, for example, if a business process dealing with relocation approvals leads to a second process configured in SAP...
ERP Human Capital Management (SAP ERP HCM) directly, then the interim phase between approval and setting up office space may have been neglected and requires a lot of manual, email, and phone call driven back-office effort. From the point of view of the individual processes (approval and office space), the processes may work well. But from the point of view of the overall end-to-end scenario, especially from the point of view of the colleague being relocated, the whole thing may well end up slow and messy because of the gap in-between. This is where checklists come in.

It’s easy to design this scenario in three phases: approval, logistics, and office setup. And the logistics phase—visa, transport, schools, housing—could be accomplished using a single checklist of tasks involving collaboration with colleagues. Now the whole scenario flows smoothly, and this will be reflected in the scenario KPIs and relocatee satisfaction. But no backend development was necessary, and no adjustments need to be made in the SAP Process Orchestration process.

Such joins between different automatic processes or message sequences, particularly those involving different tools or different systems, are common. Checklists are a very useful “glue” to improve the situation with minor effort, perhaps leading to additional process automation when resources allow it and the benefit has been proven.

Additional Context Data

Another form of disconnect occurs when there’s a gap between the data that’s required from the business perspective and the data required to make an end-to-end scenario flow. In the preceding example, the number of children that an employee has may not be relevant to the relocation approval or the office-space workflow, but it’s extremely important for the complete end-to-end relocation. Such data can be collected directly in SAP HANA with the use of forms that are generated in the space.me UI, so that the data is visible and editable in the scenario instance details. This data then flows with the process, even though it’s not needed by the backend business systems.

Again, this is a very useful component of the glue required to connect different processes together and improve the end-to-end performance, despite being irrelevant to the individual workflows or process fragments.
As you can see, space.me is a far cry from the mere technical monitoring of a process. It’s a business view of the underlying business processes with interaction enabled to ensure that the operator has everything needed to ensure smooth flow in one place. Now let’s look at how this is configured.

**SAP HANA Studio**

SAP HANA Studio is an Eclipse development environment for SAP HANA. SAP Operational Process Intelligence provides its own SAP HANA Studio plugin, so that the space.me environment can be generated with the process-specific widgets configured from the same workspace. The solution expert performs the rest of the SAP HANA configuration, such as authorizations and views.

Rather than describing the individual features in detail, let’s look at the typical steps involved in generating a space.me for one scenario.

**Context**

The context is the data from the different backend systems that are related to the one scenario. Remember, the scenario is the end-to-end process, irrespective of process tooling and system boundaries. The solution expert will pick the tables from the different backend systems, and identify the fields that need to be displayed as an attribute at the scenario instance level of space.me.

This data will later be replicated every few minutes from the underlying backend systems to SAP HANA, and can be displayed at the detail level or mapped to measurements and KPIs for monitoring in space.me (both historically and predictively). After the tables are selected and fields picked, the views can be generated at the press of a button. This ensures that the SAP HANA in-memory capabilities are used to the maximum for instant access and analysis.

**Processes**

In this section, we’ll discuss the different steps you need to follow to generate the scenario views and widgets in space.me. This is what makes it so different from straightforward data intelligence.
Step 1: Find the Process

The solution expert can use the search capabilities of SAP HANA Studio to find the SAP Process Orchestration processes. To search for the process add a destination of type "SAP Business Process Management" because this is the subset of Process Orchestration that deals with business processes. Once located, just drag and drop the processes to the canvas as shown in Figure 10. You’ll see the processes rendered in Business Process Modeling Notation (BPMN) 2.0, the standard graphical notation for process modeling, and you can simplify from there.

Message flows defined in SAP Process Integration can also be imported into the scenario, and are visualized in the BPMN diagram as message flows between two participants.

Your canvas may contain an assortment of process definitions from different process management tools, but the beauty is that they all appear in an identical graphical notation, and the solution expert doesn’t need SAP Process Orchestration skills to massage this complex as-is view of the processes into something that the operators and business users can relate to in their space.

Figure 10  Searching and Adding a Process to the Scenario
**Step 2: Sketch the Processes**

The next step is to sketch the process from the business user's point of view, as a set of sequential phases (Figure 11). It really is as simple as that.

![Sketching the Business View of the Process in Phases](image)

**Figure 11** Sketching the Business View of the Process in Phases

This modeled process does not influence the way the processes flow in the SAP Process Orchestration environment, but provide an operational map of the processes that is used in exactly the same way as the descriptive processes based on SAP BPM (or SAP Business Workflow or Process Observer). So in the studio environment the solution expert is shielded from any differences between the underlying process or messaging behavior and configuration.

**Step 3: Selecting the Events**

Now the solution expert selects the events that end one phase and start the next phase, as shown in Figure 11. These can be OR-ed with each other so that complex conditions are possible. The suggested events come from the SAP Process Orchestration configuration itself as part of step 1 (processes or message flows), or they can come from the other process-management tooling (such as SAP Business Workflow) or SAP Business Suite (through the Process Observer). This is the mapping between the complex technical processes and the business view. It also
defines the correlation between different process fragments and application data, for example, how an SAP Business Workflow and an SAP Process Orchestration process relate to each other to become part of a single big-picture scenario instance.

The process-data and business events are also replicated during runtime every few minutes so after the system is live, the events continuously trigger new scenario instances as well as show the movement of the scenarios from one phase to another in space.me.

Thanks to the process-intelligence built into SAP Operational Process Intelligence, and the fact that it’s savvy to the different SAP process-management tools, these three simple steps have eliminated the need for years of custom development.

**Measurements, Indicators, and Everything Else**

From this point on, the configuration is very straightforward. Define the measures (see Figure 12), and, where needed, assign them targets (breaking these down into targets for different categories if required) to use them as indicators that graphically show how your scenario is performing, and allow them to receive notifications about targets being missed or endangered.

![Figure 12 Defining Measures](image-url)
If you want to use checklists, then create a set of tasks by entering a name and description, and these will be generated every time a scenario is instantiated. The tasks won’t show up in the workbox (My Workbox) until someone assigns someone to the task or starts working on the task so they don’t get in the way, but can be used when needed. You can also define navigation actions, which the operator can invoke when needed to access items outside of SAP Operational Process Intelligence and perform actions directly.

**Activating the Scenario**

Finally, after all this is done, click **Generate**, and the SAP HANA database tables, views, and procedures are generated, and the scenario is added to space.me. All users with the authorization to access this scenario will now see the widgets that were described earlier, and can dive into the detail of the scenario flow. You can even limit the authorization to have different levels of visibility depending on the scenario context. So one operator might see the KPIs and instances for one geographic area or product category, while another sees it for a different range.

The software that performs the periodic replication of the data to SAP HANA is included in the basic SAP HANA delivery. This can be done using the SAP Landscape Transformation (SLT), which is fully described by SAP HANA documentation. However, this can also be done using SAP Processing Orchestration directly, which simplifies your administration and system landscape so this is most likely your preferred option. Once configured and activated, the dashboards generated will be fully operational.

**Next Steps**

Now that the process operators have a much improved business view of the complete end-to-end scenario, you can quietly continue the revolution. You can broaden the boundaries of this scenario by bringing in process fragments from other SAP systems, or even third-party software systems. And you can very quickly add improvements to the more murky parts of the scenario by providing comfortable support, such as checklists or additional context data.
But best of all, the process operations turn into an active, transparent, and real-time capability, with the improvements your operators and those involved in the processes perform being instantly apparent, rather than simply filed in monthly reports without consequence or improvement. This in turn leads to tactical improvements and the immediate evidence of good tactical decisions.

All of this is achieved in a repeatable manner, which can be applied scenario by scenario throughout the company, without disrupting or reengineering the underlying process definitions and independent of the tooling involved. But because SAP Process Orchestration is probably one of the most established tools in most large SAP installations, the benefits of this add-on will be most immediately apparent here.

Welcome to the sparkling new world of in-memory SAP HANA opportunities for SAP Process Orchestration.