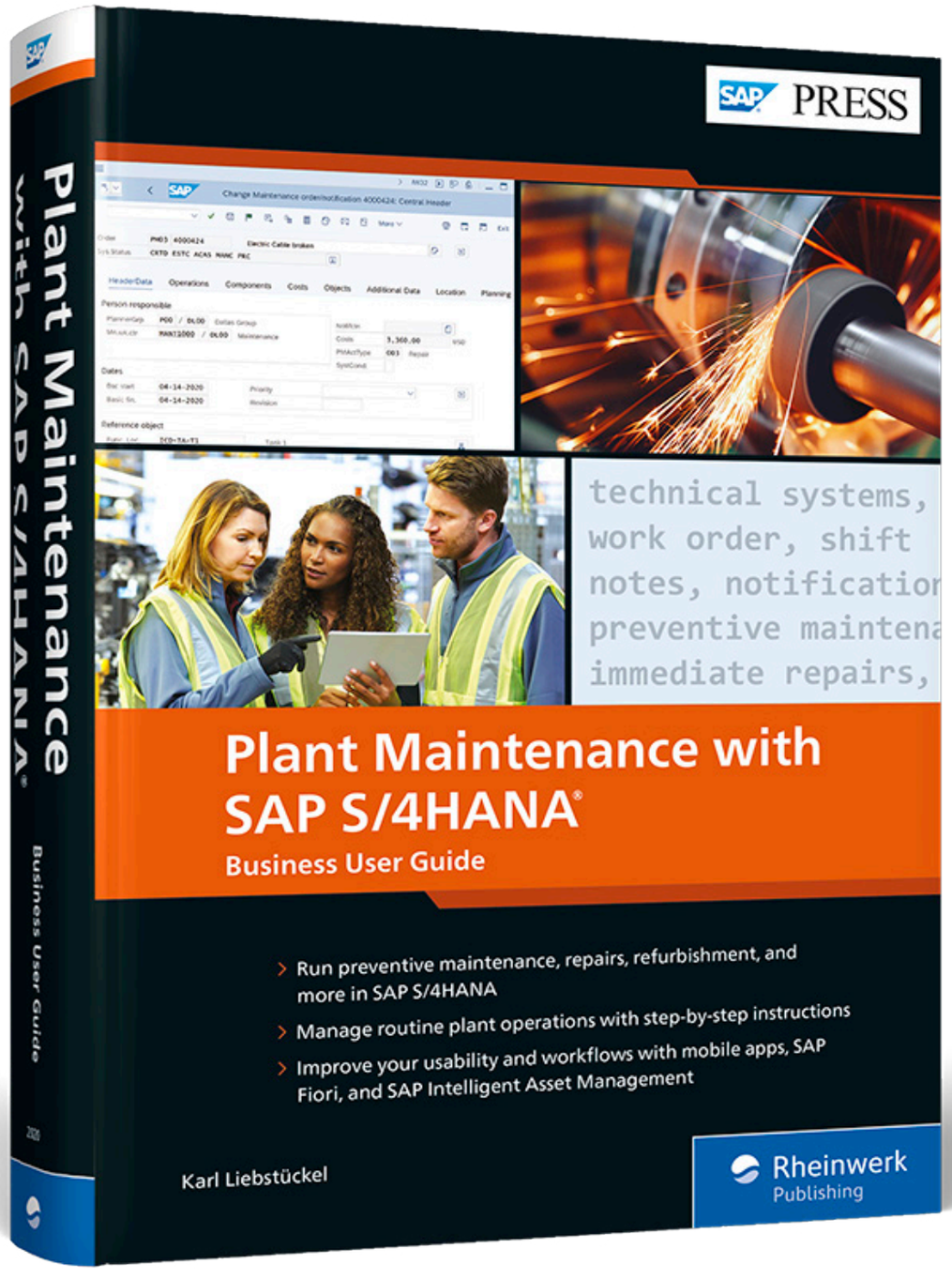


Browse the Book

This sample chapter discusses plant maintenance in its current form and how maintenance strategies have evolved over time. Furthermore, this chapter will introduce you to some important maintenance terminology. It will also discuss how SAP's plant maintenance solutions have evolved and then get into the specifics of SAP S/4HANA and the SAP HANA database. Finally, the chapter will conclude by introducing the three main user interfaces for SAP S/4HANA.

Karl Liebstückel

Plant Maintenance with SAP S/4HANA: Business User Guide

665 Pages, 2021, $79.95
ISBN 978-1-4932-2021-2

www.sap-press.com/5180

Chapter 1

Introduction to Plant Maintenance with SAP S/4HANA

This chapter takes a look at the increasing significance of plant maintenance and the associated change in perspective, which has also given rise to new terminology. It then outlines the environment of SAP's Plant Maintenance component.

In the past few years, plant maintenance has become more and more important for the following business, economic, and technological reasons:

- **Business factors**
  - Rising acquisition values for technical systems
  - A disproportionate increase in costs resulting from losses
  - A higher, modified requirements profile for maintenance activities
  - The need for real-time collaboration with customers and vendors
  - Reduced vertical integration
- **Economic factors**
  - An increasing proportion of maintenance costs attributable to the gross national product (GNP)
  - Continuous growth in the number of people employed in the maintenance sector
  - More stringent environmental regulations and occupational health and safety regulations
  - Globalization of product markets
  - Expansion of the services sector
- **Technological factors**
  - Increased innovation speed
  - Increased automation
  - Increasingly interlinked, complex technical systems

This chapter will closely examine these influencing factors, all of which interact, and the associated changes to plant maintenance. Furthermore, this chapter will introduce the many changes that the maintenance components in the SAP system have undergone. It will also provide an overview of the application system of SAP S/4HANA,

introduce the SAP HANA database, and discuss the three main user interfaces for SAP S/4HANA.

1.1 Plant Maintenance Today: New Ideas Need New Space

More and more companies are abandoning the outdated view that plant maintenance is a necessary evil or simply a cost factor. The ever-increasing pressure to be competitive in terms of quality and productivity is driving companies toward plant maintenance, which today occupies a much higher position in a company's priority list of objectives than ever before. This extends to the realization that a company can sell its plant maintenance services in the market and thus can contribute to increased revenue in addition to reduced costs.

Market globalization is increasingly leading to close collaboration with customers and vendors. Vertical integration is becoming lower and lower. Thus, in the automotive industry in 2015, vertical integration dropped considerably, to just 23%, and to 10% in individual cases, such as for the Porsche Cayenne. That is, the automotive industry produces just 10%–25% of the end product itself, and everything else comes from upstream production stages: the suppliers. As a result, dependency on the availability of technical systems at upstream production levels has increased proportionately.

In the past, a company could take internal countermeasures against malfunctions within the production flow of deeply structured production processes, but these countermeasures are entirely inconceivable for globalized production flows. Consequently, at the present time, two objectives, *prevention of malfunctions* and *increased or guaranteed availability of technical systems*, are coming increasingly to the fore of maintenance objectives.

Preventive maintenance is another goal of today's plant maintenance and can be achieved by changing the design of the technical system or machine. Another important aspect of preventive maintenance for production employees is to share in the responsibility (keyword: total productive maintenance [TPM]) of ensuring that no unscheduled outages occur, if possible. First-line maintenance tasks (on-call services for fault clearance) can also support the process.

In recent years, machines and technical systems have undergone extensive development in terms of their structures and the technology deployed. However, this development also means that recording the condition of individual components or assemblies has become more difficult because modern technical systems have considerably more weak points than previous systems. In addition, design engineers no longer tend toward oversized developments but, rather, favor space-saving, lightweight technical systems. As a result, however, components are more numerous and more sensitive to signs of wear and defects.

Plants and machinery are constructed in a much more modular manner today than previously. Thus, maintenance is applied differently to individual components of a system (component maintenance) and no longer refers to the complete system. Other goals may include the following:

- Increased, optimum use of the lifecycle of technical systems and devices
- Improved quality of finished products
- Improved operating safety
- Optimized operating procedures
- Future-oriented cost planning
- Lower restart costs
- Compliance with legal requirements, in particular environmental regulations
- Compliance with manufacturer guidelines, so you can make a claim under warranty if required

However, other objectives may also interest you, depending on your industry, the objects to be maintained, the size of your company, your company's organization, and other influencing factors. If, for example, you are a maintenance service provider, customer satisfaction will be of primary importance to you. If you work in real estate, maintenance tasks may contribute to strengthening your negotiating position when selling real estate. Therefore, each company should develop clear maintenance objectives and communicate these to everyone involved (for example, employees, customers, and so on).

Two unavoidable consequences resulted from this change within plant maintenance: New maintenance terminology had to be coined for organizations with responsibilities both nationally and internationally, and companies had to react to these challenges by changing their maintenance strategies.

1.2 New Plant Maintenance Terminology

In 2018, the German Institute for Standardization (Deutsches Institut für Normung [DIN]) published a new version of the German standard DIN 31051—Fundamentals of Maintenance—to replace the older version from 1985 and 2003. The older version had to be revised because EN 13306 was published in 2001 (current version EN 13306: 2018-02) and compiled new terminology for plant maintenance. Maintenance is divided accordingly in the current version of DIN 31051:2018-09 into four basic measures (see Figure 1.1).

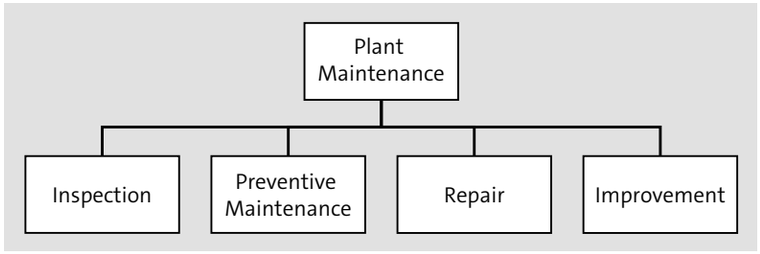


Figure 1.1 Plant Maintenance Terminology

Plant maintenance includes "combinations of all technical and administrative measures as well as of management measures throughout the lifecycle of a unit, which are aimed at preserving or restoring its functional state so that it can perform the required function." Maintenance essentially is comprised of the following four tasks: *inspection*, *maintenance*, *repair*, and *improvement*, each of which is described in more detail in this book. Let's look at each of them briefly:

- **Inspection**
  To ensure both the high availability and operating safety of machines, technical systems, and equipment, regular inspections are required to determine their technical condition and to define the necessary maintenance tasks. The new DIN 31051 defines inspection as all tasks for determining and assessing the actual condition of a unit, including identifying the cause of wear and tear and deducing the consequences necessary to ensure its future use. In contrast, the old DIN 31051 defined inspection as all tasks for determining and assessing the actual condition. The inspection includes the following measures in particular:
  - Checking
  - Measurement
  - Observation
  - Assessment
  - Deriving consequences
- **Preventive maintenance**
  Whereas the old DIN 31051 defined preventive maintenance as all tasks for preserving the target condition, the new DIN 31051 defines maintenance as all tasks for delaying the reduction of the wear reserve. Preventive maintenance tasks include the following tasks in particular:
  - Visual inspection
  - Adjustment
  - Replacement
  - Supplement

  - Lubrication
  - Preservation
  - Cleaning
  - Functional testing

  To obtain the required functional efficiency and availability of machines, technical systems, and equipment, you must implement maintenance tasks regularly, based on the manufacturer guidelines, the maintenance plans, and customer needs, while taking into account the changing operation-specific processes and conditions.
- **Repairs**
  The old DIN 31051 defined repairs as all tasks for restoring the target condition. In contrast, the new DIN 31051 defines as repairs all physical tasks that are carried out to restore the functioning of a faulty unit. Via maintenance and repairs, nonfunctioning components, assemblies, and so on in machinery, plants, and equipment, both unscheduled (fault clearance) and scheduled (planned shutdowns), are replaced, and full functionality is thus restored. Repairs thus consist of the following activities in particular:
  - Unit exchange
  - Restoration of functions
  - Breakdown resolution
- **Improvement**
  New to DIN 31051 are improvement tasks, defined as the combination of all technical, administrative, and management tasks to improve the reliability, maintainability, and/or safety of a unit without changing its original function. The constant improvement of the plant serves to increase the operational and functional safety of machines, plants, and equipment. At the same time, a corresponding potential for improvement is identified, solutions are designed, and specified measures are implemented. Inspections are comprised of the following tasks in particular:
  - Elimination of weak points
  - Improvement in machinery and plant design
  - Optimized business processes
  - Acceleration of the exchange of information

Further Resources

For more information on these four measures, see DIN 31051:2018-09: Fundamentals of Maintenance, issued by Deutschen Institut für Normung (DIN) (German Institute for Standardization), Berlin/Vienna/Zurich: 2018.

Table 1.1 summarizes and compares the old and new versions of DIN 31051.

Activity	DIN 31051:1985-01	DIN 31051:2018-09
Inspection	Tasks for determining and assessing the actual condition	Tasks for determining and assessing the functional condition with determination of the causes of wear and tear and derivation of the necessary tasks
Preventive maintenance	Tasks for maintaining the target condition	Tasks for delaying the reduction of the wear reserve
Repair	Tasks for restoring the target condition	Tasks carried out to restore the functioning of a faulty unit
Improvement		Tasks to improve the reliability and/or maintainability and/or safety of a unit without changing its original function

Table 1.1 Old and New DIN 31051

In 2014, the International Organization for Standardization (ISO) published several asset management standards, including the following three standards:

- ISO 55000 deals with the basic principles of asset management, providing general definitions, explaining benefits for users, and introducing the asset management system. Furthermore, ISO 55000 describes the relationship between asset management and the asset management system.
- ISO 55001 forms the core of the ISO series and describes all critical requirements for asset management systems. ISO 55001 provides the basis for certification and is thus comparable to ISO 9001 in quality management.
- ISO 55002 contains descriptions for implementing an asset management system.

So, in contrast to the German standardization, the ISO standards provide a comprehensive definition of the asset management concept and are not limited to plant maintenance only.

Table 1.2 provides an overview of topics related to ISO 55000 and others.

Area	Tasks
Corporate organization	■ Corporate organization and its context ■ Stakeholders' expectations ■ Goal of the asset management system
Management	■ Management and responsibility ■ Strategy and specifications
Planning	■ Opportunities and risks ■ Objectives and the meeting of objectives

Table 1.2 Spheres of Activity in ISO 55000

Area	Tasks
Support	■ Resources, skills, communication, information, and documentation
Operational tasks	■ Operational planning and control ■ Change management ■ External assignment
Performance assessment	■ Monitoring, assessment, analysis, and evaluation ■ Internal audits ■ Management review
Improvement	■ Corrective measures ■ Preventive measures ■ Continuous improvement

Table 1.2 Spheres of Activity in ISO 55000 (Cont.)

1.3 Maintenance Strategies over Time

Not only have responsible organizations thus responded to changing business conditions, but also, the companies themselves have adopted new challenges posed by their changed maintenance strategies (see Figure 1.2), as follows:

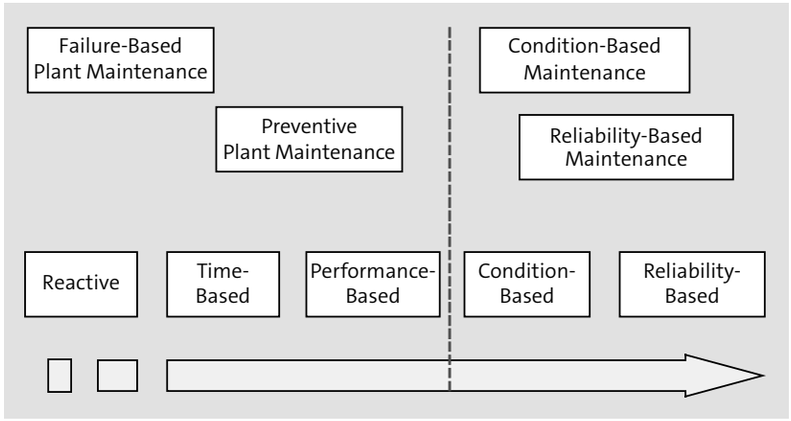


Figure 1.2 Plant Maintenance Strategies over Time

- **From reactive to preventive maintenance**
  New market and technology challenges are reflected in the development of maintenance strategies and concepts. The classic reactive maintenance, which provides for the repair of the plant after downtime, has been successively replaced by preventive maintenance focused on proactive maintenance and inspection tasks. Finally, the "firefighting strategy" had to be replaced with the increased linking of plants, since

the failure of one machine could stop the entire production line and thus result in high standstill costs.

- **Time-based or performance based?**
  Preventive maintenance can be performed in a time-based (that is, calendar-based) or performance-related (that is, counter-based) manner. Why is this distinction so important, especially against the backdrop of the possible use of IT? Performance-related maintenance requires significantly more administrative effort than time-based maintenance.

  With time-related maintenance, you define maintenance plans only with fixed or sequential cycles. SAP S/4HANA Asset Management can thus calculate all maintenance dates and automatically generates an order for the calculated date.

  However, performance-based maintenance requires a counter (kilometers, operating hours, quantities, and so on) and only works correctly if meter readings are recorded at regular intervals. Organization, planning, and recording of meter readings thus lead to an administrative burden that should not be underestimated. The maintenance planning and control system can correctly calculate the updated maintenance schedules only if the current meter readings are available regularly.
- **Ratio of planned to executed maintenance orders**
  For a long time, the ratio of executed to planned maintenance orders was at 90:10 in many companies that followed the "firefighting strategy." For many companies, this ratio may still apply, but numerous companies are already utilizing more and better planning and may thus have reached a ratio of 70:30 or even of 50:50. If you've reached a better ratio in your company, you can be proud of your organization.
- **Condition-based maintenance**
  With this technique, maintenance activities are executed if a measuring point on a technical object has reached a certain condition. Condition-based maintenance requires regular inspections of a plant, including the recording of inspection results, or the presence of upstream systems that constantly monitor the condition of a plant and trigger a notification in SAP S/4HANA Asset Management in the event of an emergency (for example, exceeding or falling below predetermined value limits). Possible upstream systems may be, for example:
  - Mobile data acquisition systems
  - Process control systems
  - Central building control systems
  - Supervisory control and data acquisition systems
- **Reliability-based maintenance**
  This determines the maintenance tasks, operating rules, and structural adjustments that are necessary for the desired reliability of a technical system. Reliability-centered maintenance is a method of analysis that contains rules for the decisions and is based on the analysis of the functions of a machine. Possible malfunctions

and their causes are derived from this analysis. A failure impact assessment is carried out for each cause. This collection of information is called an *information worksheet* and is largely a failure mode and effects analysis (FMEA). A decision diagram is then used for any cause of a failure in the information sheet to check whether a condition-related, preventive, or reactive task is recommended. If none of these measures are useful, design changes or amended operating rules are considered.

1.4 Plant Maintenance over Time in SAP

The history of plant maintenance in SAP dates back to 1986, when the first version of plant maintenance in SAP was put on the market with *RM-INST* within the SAP R/2 system. Subsequent releases of RM-INST appeared in 1988 (4.3) and 1991 (5.0).

In 1994, the first version of the *Plant Maintenance (PM)* module of SAP R/3 was put on the market. SAP R/3 releases then underwent various name changes: from SAP R/3 via SAP R/3 Enjoy and mySAP.com to SAP R/3 Enterprise. The term for plant maintenance remained constant up to the mySAP.com release: PM. In SAP R/3 Enterprise, however, SAP introduced the concept of asset lifecycle management (ALM).

As SAP 2005 launched the first SAP ERP release on the market, we had to adapt yet again to a new term for plant maintenance: *SAP Enterprise Asset Management (SAP EAM)*. The release names changed often since then: First was mySAP ERP 2005, then the *my* disappeared, and the release was renamed SAP ERP 2005. A short time later, SAP replaced the year with the continuous release number; it has been SAP ERP 6.0 since then.

In 2016 when SAP introduced the first SAP S/4HANA version with logistic functions to the market, they came up with a new term for the plant maintenance application: *SAP S/4HANA Asset Management*. This should not be confused with asset accounting, for fixed asset accounting.

Alas, there is no uniform terminology. The definition of terms for the plant maintenance application in SAP S/4HANA is not as consistent as it sounds at first. SAP media on this subject (presentations, online documentation, F1 help, customizing, roadmaps) use different names for the same product. You'll find terms and abbreviations like the following:

- SAP Asset Management
- SAP Digital Asset Management
- SAP S/4HANA Asset Management
- SAP Enterprise Asset Management (SAP EAM)
- SAP Maintenance Management
- SAP Maintenance and Service Management
- SAP Plant Maintenance (SAP PM)

Each of these terms is used synonymously. For a book author, this synonymous use of different labels for identical product is confusing, and so will it be for the reader. This is why a term has to be chosen which excludes any confusion about the product associated with. For the present book, we decided to use the most frequently used term in SAP S/4HANA publications, which is *SAP S/4HANA Asset Management*.

1.5 SAP S/4HANA Application System

In 2016, SAP S/4HANA was released as a successor to SAP ERP 6.0. Just like SAP ERP, SAP S/4HANA is a complete enterprise resource planning (ERP)-system comprised of all enterprise-specific business processes and functions. Unlike the previous SAP ERP system, SAP S/4HANA is exclusively offered on an SAP HANA database. There are no versions available for other database systems.

SAP S/4HANA is offered both on-premise (referred to as SAP S/4HANA) and in the cloud (referred to as SAP S/4HANA Cloud). The utilization of a hybrid scenario is quite conceivable. In this case certain applications are installed on-premise, whereas others will be used in the cloud.

SAP S/4HANA (remember, this means the on-premise edition) is delivered once a year. For SAP S/4HANA Cloud, there is an update every three months (see Figure 1.3).

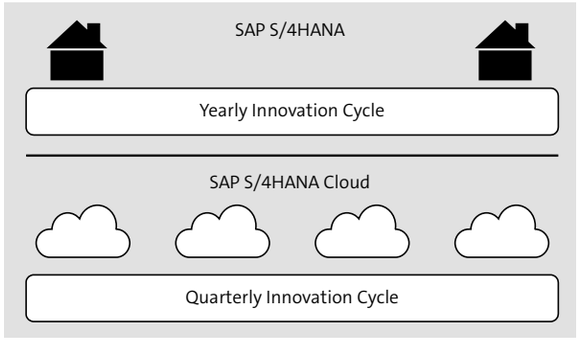


Figure 1.3 SAP S/4HANA Innovation Cycle

All Following Descriptions Refer to the On-Premise Version

In SAP S/4HANA Cloud, only a few possibilities are made available for adjusting the system to the needs of your business. You merely may consume the SAP-defined standard.

In contrast, in SAP S/4HANA, you are given the opportunity to activate business functions, to customize, for additional programming or modification.

The following sections will give you an overview of the functionality available in SAP S/4HANA and the use of enhancement packages.

1.5.1 SAP S/4HANA Overview

SAP S/4HANA offers the following range of functions (as of September 2020, see Figure 1.4):

- Finance (financial accounting, annual accounts, cost center accounting, profitability analysis)
- Human resources (with time recording)
- Sourcing and procurement (with procurement process, contract administration, invoice management)
- Supply chain (production planning, inventory management, warehouse management)
- Manufacturing (with production orders, quality management)
- Marketing
- Sales (with customer order processing and contract management)
- Service (with service handling, service contracts, and spare parts management)
- Asset management (with plant maintenance)
- Research and development (with product development and project management)

	SAP S/4HANA Finance	SAP S/4HANA Human Resources *SAP SuccessFactors* *SAP Fieldglass*	SAP S/4HANA Sourcing and Procurement *SAP Ariba* *SAP Fieldglass*	SAP S/4HANA Manucaturing	SAP S/4HANA Supply Chain
Suite	• Financal Services Network	• Core Human Resourses and Payroll • Talent Management • Time and Attendance Management • Human Captial Analytics	• Supplier collaboration • Business Network • Guided End-User Buying • External Workforce Management		
Products	• Financal Planning and Analysis • Accouting and Financal Close • Treasurey Management • Receiveables Management • Invoice Management and Accounts Payable			• Constrained Production Planning • Production Scheduling	• Extended Warehouse Management • Advanced ATP
Digital Core	• Accouting and Closing Operations • Acccouting • Cost Management and Profitablity Analysis	• Time Recording	• Operational Purchaseing • Collaborative Sourcing and Contract Management • Invoice and Payables Management • Supplier Management • Procurement Analytics	• Production Orchestration and Execution • Quality Management	• Inventory and Basic Warehouse Management • Production Planning
SAP S/4HANA Enterprise Management	• Order and Contract Management	• Service Management* • Service Master Data Managment* • Service Parts Management* • Service Agreement Management*		• Maintenance Management	• Product Development and Project Control* • Production Engineering
Products	• Sales Planning and Performance Management		• Billing and Revenue Innovation Management (BRIM)	• Asset Operations and Maintenance* • Environment, Health, and Safety	• Enterprise Portfolio and Project Management • Commercial Project Management • Complaint Product Lifecycle Management
Suite	*SAP Sales Cloud* **SAP S/4HANA Sales**	*SAP Customer Experience* **SAP S/4HANA Service**	*SAP Marketing Cloud* **SAP S/4HANA Marketing and Commerce**	**SAP S/4HANA Asset Management**	**SAP S/4HANA Research and Development**

**(Partally) Compatibility Scope*

Industries

Figure 1.4 SAP S/4HANA Overview

These applications correspond to the inner dark area in Figure 1.4, often referred to as the *SAP S/4HANA core*.

This range of functions may be supplemented with additional features via interfaces in different places, as follows. This is the *SAP S/4HANA suite*.

- SAP SuccessFactors for human resources department
- SAP Ariba for purchasing department
- SAP Customer Service for sales and service department

1.5.2 Enhancement Packages

Enhancement Packages for SAP S/4HANA are delivered once a year on average. In the past, further developments were exclusively delivered within the scope of a release update, creating a challenge for the customers that they could only tackle by means of migration projects, which meant quite an effort for them.

In contrast to the former release updates, Enhancement Packages ensure careful further development of the SAP system, without causing efforts like migration projects.

Each Enhancement Package contains enterprise extensions or enterprise business functions. With Transaction SFW5 (Switch Framework), they can be activated separately if needed (see Figure 1.5). Some of the functions are reversable; some are not.

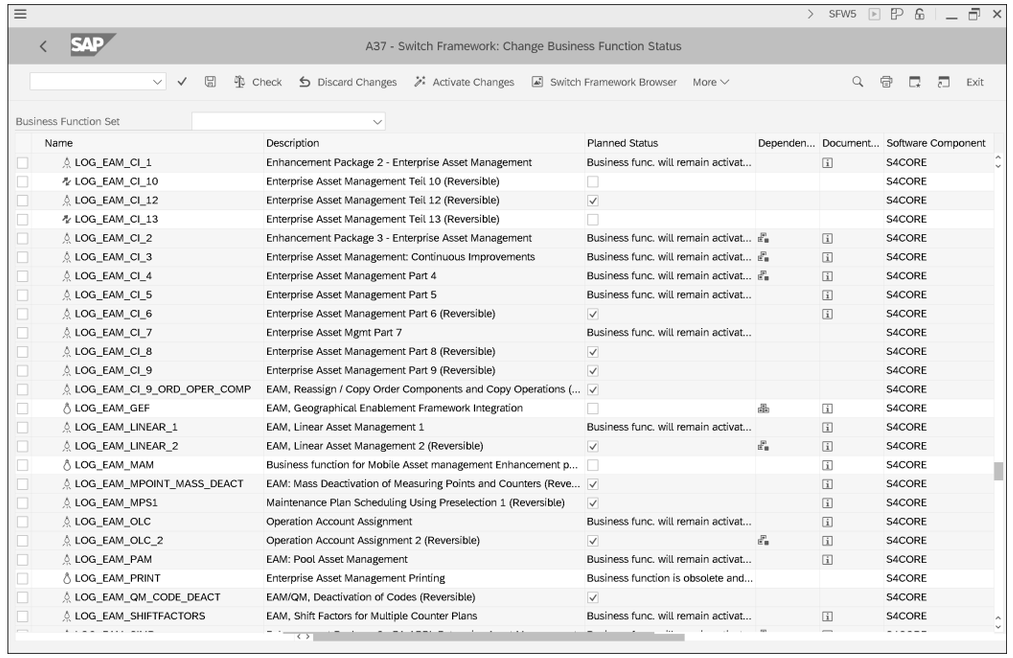


Figure 1.5 Business Functions

For plant maintenance the following business functions mainly come into use:

- /EAMPLM/LOG_EAM_WS (Worker Safety)
- LOG_EAM_CC (Configuration Control Innovations)
- LOG_EAM_CI_1 (e.g., digital signatures)
- LOG_EAM_CI_2 (e.g., new BAPIs and BAdIs)
- LOG_EAM_CI_3 (e.g., inspection rounds)
- LOG_EAM_CI_4 (e.g., inspection round enhancements)
- LOG_EAM_CI_5 (e.g., mass changes for order operations)
- LOG_EAM_CI_6 (e.g., call horizon in days)
- LOG_EAM_CI_7 (e.g., follow order)
- LOG_EAM_CI_8 (e.g., mass availability check)
- LOG_EAM_CI_9 (e.g., authorization groups for maintenance strategies)
- LOG_EAM_CI_9_ORD_OPER_COMP (Copy Order Operations and Components)
- LOG_EAM_CI_10 (e.g., maintenance packages is lists)
- LOG_EAM_CI_11 (e.g., notification mass change enhancements)
- LOG_EAM_CI_12 (e.g., additional texts for non-stock material and external operations)
- LOG_EAM_CI_13 (e.g., end date and reasons for maintenance plans)
- LOG_EAM_LINEAR_1 (Linear Asset Management)
- LOG_EAM_LINEAR_2 (Linear Asset Management part 2)
- LOG_EAM_MPOINT_MASS_DEACT (Mass Deactivation of Measuring Points and Counters)
- LOG_EAM_MPS1 (Maintenance Plan Scheduling with Selection)
- LOG_EAM_OLC (Costs and Accounting on Operation Level)
- LOG_EAM_OLC_2 (Costs and Accounting on Operation Level part 2)
- LOG_EAM_PAM (Pool Asset Management)
- LOG_EAM_PRINT (Print Functions)
- LOG_EAM_QM_CODE_DEACT (Deactivating Codes
- LOG_EAM_SHIFTFACTORS (Shift Factors for Multiple Counter Plans)
- LOG_EAM_SIMP (e.g., flexible order layout)
- LOG_EAM_SIMPLICITY (1-8, Simplified Management of EAM Functions)
- LOG_EAM_VE_INT (Integration with SAP 3D Visual Enterprise)
- EA-PLM (Electronic Parts Catalogs)
- LOG_EAM_POM (Project Oriented Maintenance)
- LOG_EAM_POM_2 (Logbook Innovations)

- LOG_EAM_ROTSUB (Refurbishment & Subcontracting)
- LOG_EAM_ROTSUB_2 (Refurbishment & Subcontracting part 2)
- LOG_MM_SERNO (Serial Numbers in Purchasing with Integration in Inventory Management & Shipping)
- LOG_PP_SRN_CONF (Shift Report and Notes)
- LOG_PP_SRN_02 (Shift Report and Notes part 2)

Activating LOG_EAM_CI Business Functions

It is advisable to activate enterprise business functions LOG_EAM_CI.

They contain small round-offs, making your tasks easier and smarter in the day-to-day business.

You may do so unhesitatingly, as there are no dependencies with other applications.

1.6 SAP HANA Database

SAP has never marketed a product as much as SAP HANA (HANA stands for *high-performance analytic appliance*), a database technology that SAP introduced in 2010. SAP HANA involves a combination of hardware and software to enable higher performance compared to traditional applications by using in-memory technology.

In-memory technology means that the data is stored not on a hard disk but in the computer's memory, thus making access much faster. SAP HANA was developed by SAP to enable large databases (big data) to be browsed more efficiently.

SAP HANA combines techniques from the hardware and software sectors. On the software side, SAP HANA constitutes a hybrid of the column-oriented functioning of in-memory databases and the row-oriented functioning of relational databases (see Figure 1.6).

Due to the direct access option to characteristics or key figure values in columns, the fields can be accessed much faster, because only individual rows, instead of large volumes of data records—as in the case of row-oriented access—are read.

On the hardware side, the system tries to move as much as possible from the hardware memory to the CPU cache and from the disk storage to the main memory to take advantage of the faster access speed in each case (see Figure 1.7).

Country	Plant	Planner group	Orders
USA	Dallas	100	485
USA	Dallas	101	590
Germany	Hamburg	200	635
Germany	Hamburg	201	345

Row-oriented database

Row 1	US	3000	100	485
Row 2	US	3000	101	590
Row 3	DE	1000	200	635
Row 4	DE	1000	201	345

Column-oriented database

Column1	Column2	Column3	Column4
US	3000	100	485
US	3000	101	590
DE	1000	200	635
DE	1000	201	345

Figure 1.6 Row- and Column-Oriented Databases

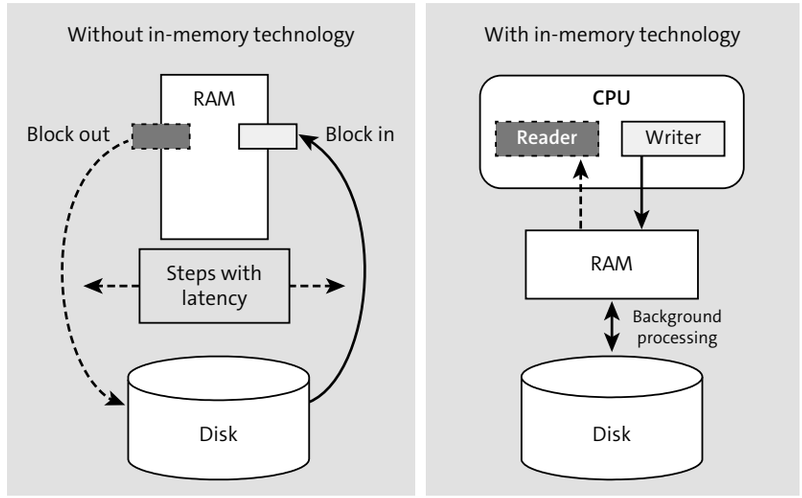


Figure 1.7 SAP HANA Principles

SAP HANA was initially designed for analytical applications (such as profitability analysis, SAP Business Warehouse [SAP BW], or SAP BusinessObjects). Over time, SAP HANA was successively made available for all applications, especially with the release of SAP HANA for SAP Business Suite and, thus, for SAP ERP in 2013. Unlike SAP ERP, which can also be operated on other databases (anyDB), SAP S/4HANA runs exclusively on a HANA database.

1.7 User Interfaces

Via which user interfaces can SAP S/4HANA be accessed? SAP's statement on the matter is:

> *All innovations of SAP S/4HANA have to been made available for the access via user interface of SAP Fiori in order to ensure a uniform desktop for all devices. A customer using the on-premise edition of SAP S/4HANA is still able to use the conventional desktop.*

There are two important statements behind this:

- You may only access SAP S/4HANA Cloud via the SAP Fiori interface
- With SAP S/4HANA, you may access it via SAP GUI or SAP Business Client (as well as SAP Fiori).

If you are using SAP GUI, you will notice hardly any difference between SAP S/4HANA and SAP ERP at the desktop. Accessing plant maintenance, for example, you will find the same routing, files, and transactions as with SAP ERP (see Figure 1.8). This is good news for all of you who are considering changing to SAP S/4HANA for this reason. Don't let yourself get confused: SAP S/4HANA is just a conventional ERP system. With your familiar SAP GUI, you can access the complete functionality of SAP S/4HANA.

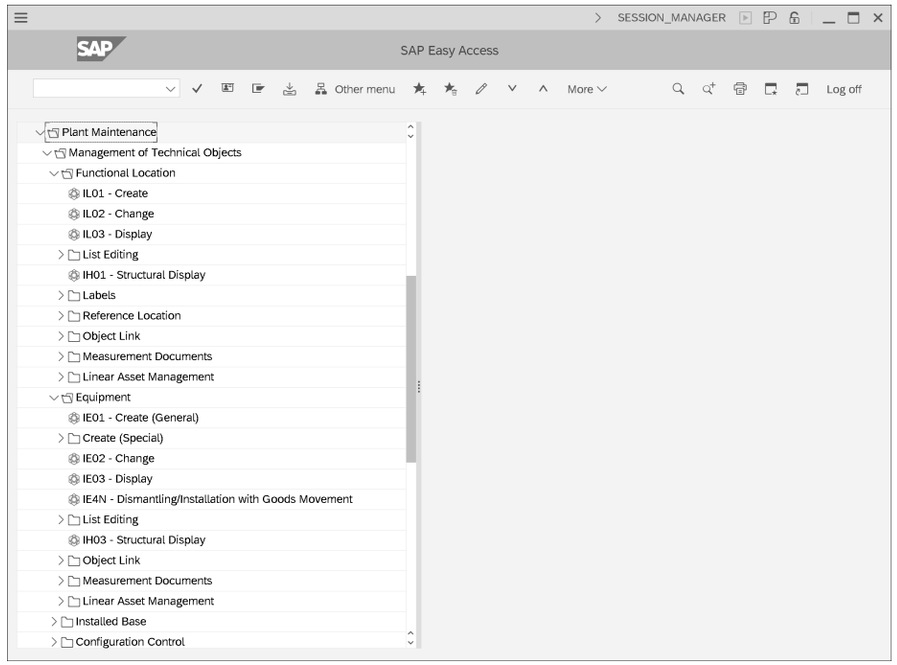


Figure 1.8 SAP S/4HANA with SAP GUI

Let's now look at the three UIs: SAP GUI, SAP Business Client, and SAP Fiori.

1.7.1 SAP GUI

Many readers are likely familiar with the desktop and functionality of SAP GUI. Now I would like to introduce to you some specialities regarding the access to SAP S/4HANA (see Figure 1.9).

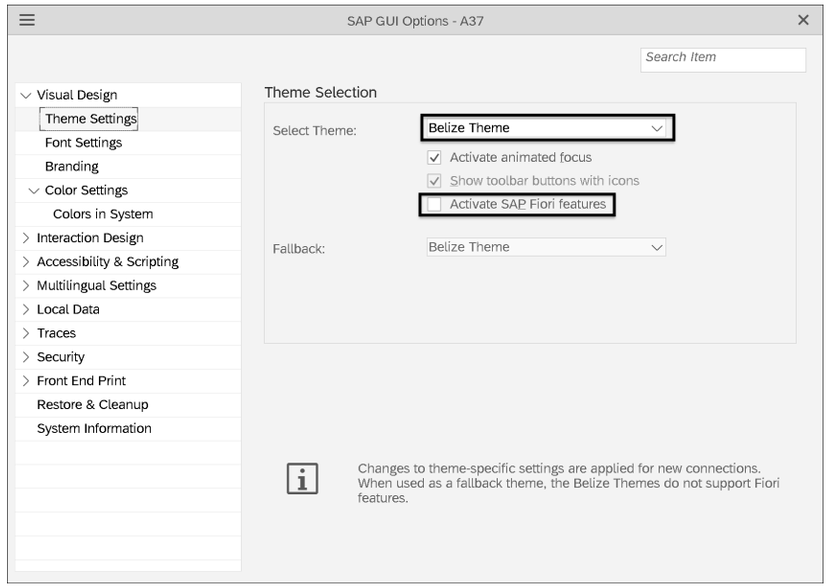


Figure 1.9 SAP GUI Options

As of SAP GUI 7.50, SAP offers the Belize theme. It shows a strong resemblance to the SAP Fiori interface and prettys up the SAP system with a contemporary look. But you can use any other theme for accessing S/4HANA (e.g., the frequently used Signature).

Admittedly, SAP GUI holds a disadvantage with the Belize theme. There are no graphic icons available, only lettered function keys, which makes working a bit cumbersome.

As of SAP GUI 7.60, then, graphic icons are again provided. This is why I recommend that you use this version.

Another recommendation of mine is not to set the switch **Activate SAP Fiori features**. This places important functions like execute and save to the bottom right, making working with the program rather uncomfortable, as all the rest of the functions are placed at the top of the screen. If you don't set the switch, the functions are automatically placed in the usual place at the top of the screen along with all the other functions.

SAP GUI 7.60 without SAP Fiori Features

Using SAP GUI 7.60 with the Belize theme will make your work as comfortable as it could be, except for activating the Fiori features, however.

1.7.2 SAP Business Client

For several years now, SAP has offered SAP Business Client as an alternative. This is a rich client which has to be installed as a desktop application like SAP GUI. It allows the use of portal services, application content, and tasks directly from the backend. The following sections look at your connection options for SAP Business Client and then move on to its general functions.

Connection Options

In contrast to SAP GUI, in SAP Business Client, you have not one, but three different connection options.

First, you can set up a simple *SAPLOGON connection*. If you use this option to log on, the system access is nearly the same as for SAP GUI connections (see Figure 1.10).

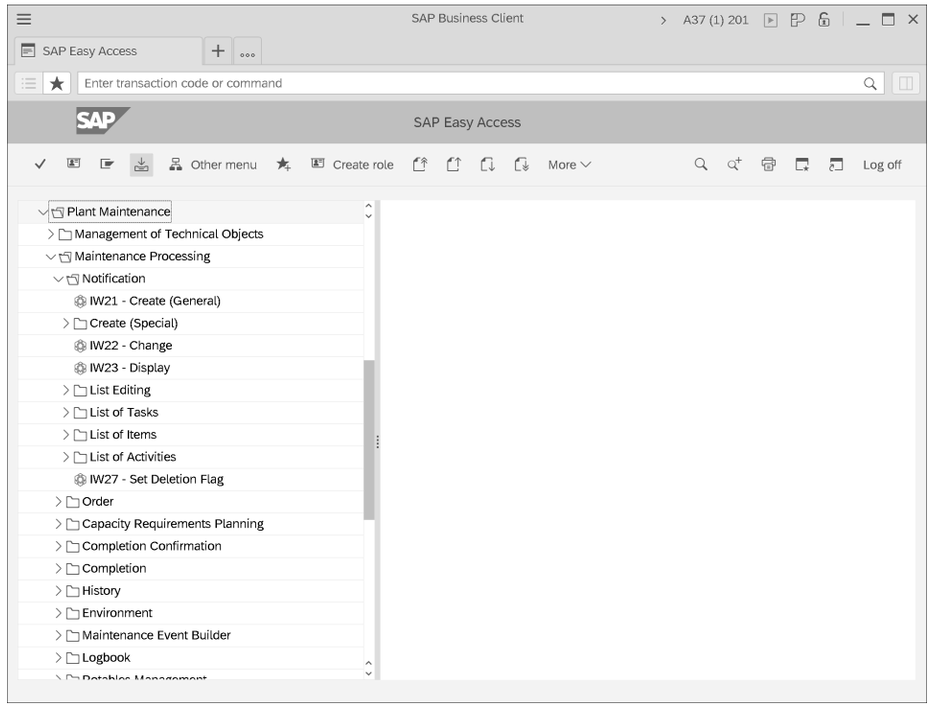


Figure 1.10 SAP Business Client: SAPLOGON Connection

Second, you can set up an original SAP Business Client connection. If you use this option to log on, you'll be able to choose between various options (for example, **Last Opened** or assigned **Work Centers**; see Figure 1.11). Depending on your selection, you can access assigned functions: For example, if you select a work center, you'll navigate to the respective task list.

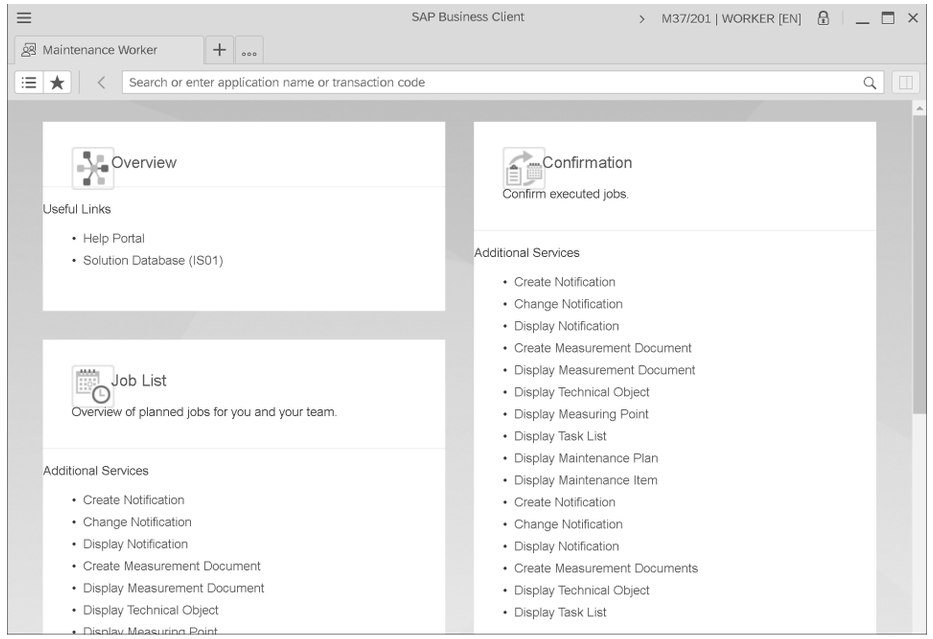


Figure 1.11 SAP Business Client: Business Client Connection

Third, you can call the page with the SAP Fiori apps assigned to you (see Figure 1.13). For more information on SAP Fiori, refer to Chapter 9, Section 9.1.2. This looks exactly like accessing your SAP Fiori launchpad with the browser.

General Functions

The following is an overview of the most important SAP Business Client functions:

- **Using standard SAP transactions**
  In SAP Business Client, you can call and execute all standard SAP transactions.
- **Tabs**
  As you can see in the top bar in Figure 1.10, SAP Business Client uses a tab technology to display all called functions in a single window. As a result, you can access several functions in parallel, without having to open a new window in each case.
- **Search**
  SAP Business Client has three different search options (in the bar below the tabs):
  - Enterprise search: Search in enterprise data.
  - External search engines and encyclopedias: Search via external search engines (such as Google or Yahoo) and encyclopedias (such as Wikipedia).
  - Desktop search: Search in the desktop documents.
- **Roles, task lists, overviews, and reports**
  SAP Business Client also has access to portal roles. Thus, task lists and overviews

form the initial screen, comprised of a menu-like collection of functions that are assigned to a single or composite role. Figure 1.11 shows an example of the initial screen for the *maintenance worker* role.

- **Side panels**
  An important enhancement of SAP Business Client with respect to SAP GUI is the use of side panels. Side panels display additional information about an application in a page area. Such information can be, for example:
  - Key figures, for example, mean time to repair (MTTR) or mean time between repair (MTBR)
  - Analyses from the SAP BW, for example, damage analyses or costs analyses
  - Reports from controlling, for example, cost center reports or internal order reports
  - Graphics from SAP 3D Visual Enterprise
  - Object services

Figure 1.12 shows an example equipment master record with the associated damage analysis in relation to damage codes.

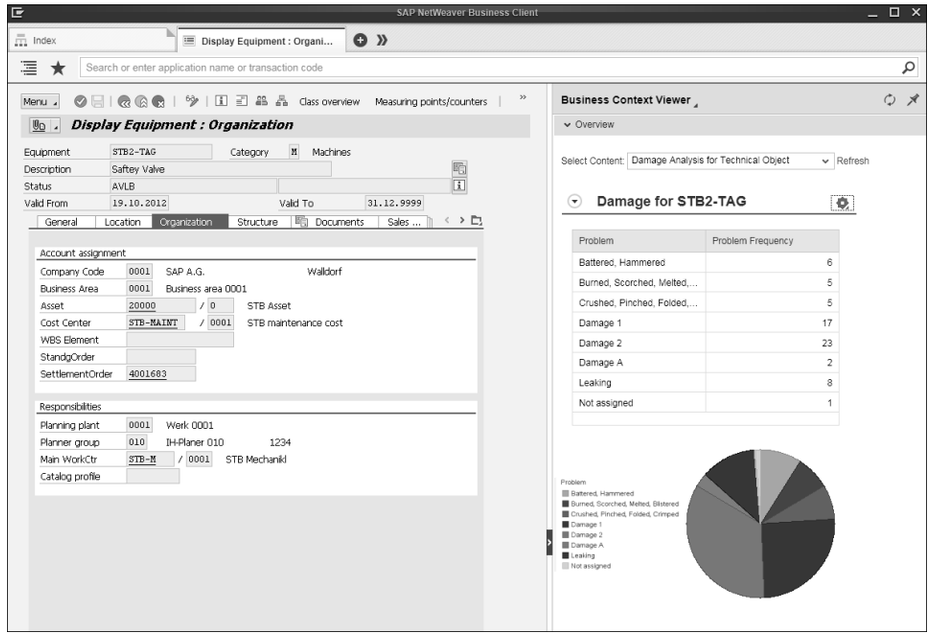


Figure 1.12 SAP Business Client: Side Panel

To use the side panels comprehensively, you must activate the business functions LOG_EAM_SIMP, LOG_EAM_SIMPLICITY, and LOG_EAM_SIMPLICITY_2 through LOG_EAM_SIMPLICITY_9.

Useful Side Panel Information

You can use the side panel in SAP Business Client to display useful additional information about the technical object (for example, damage analyses or key figures).

For more plant maintenance-specific SAP Business Client functions (for example, the Asset Viewer or confirmation of unplanned tasks), refer to the respective chapters.

1.7.3 SAP Fiori

SAP Fiori is SAP's latest user experience (UX) that provides access to SAP systems. SAP Fiori will run on all devices, i.e., accessible not only via desktop or notebook, but on mobile devices like tablets and smartphones as well. Therefore, SAP Fiori is an alternative to SAP GUI, to SAP Business Client, or to SAP's mobile solutions.

The number of SAP Fiori apps offered by SAP is growing rapidly. You can find the current status in the SAP Fiori apps reference library (*https://fioriappslibrary.hana.ondemand.com*). As of June 2020, it currently shows more than 1,800 SAP Fiori apps for SAP S/4HANA. In the area of asset management, there are approximately 200 SAP Fiori apps, including many apps from project management, materials management, and quality management, which all have points of contact with plant maintenance (e.g., apps for inventory in embedded Extended Warehouse Management (EWM) in SAP S/4HANA and for usage decisions in an inspection lot). Approximately 50 SAP Fiori apps are currently available for actual maintenance topics. You'll learn about the most important of these in Chapter 9, Section 9.1.2.

SAP Fiori offers a frontend design with *tiles* that allow for the process of selecting functions and apps (the SAP Fiori launchpad, see Figure 1.13). Users may create their own frontend out of tiles they are entitled to use, which is similar to favorites in SAP GUI.

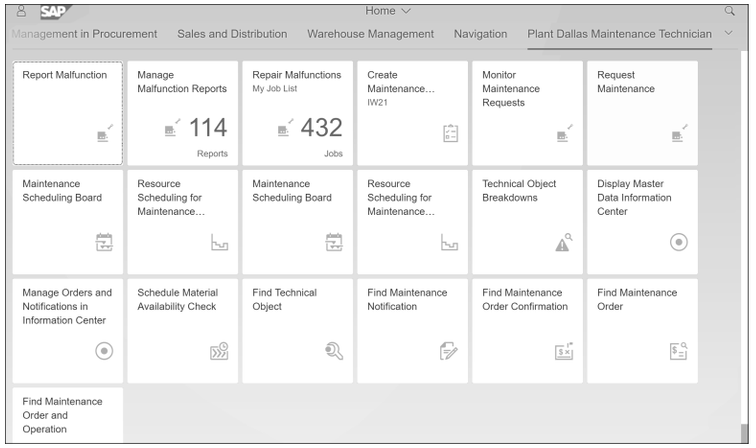


Figure 1.13 SAP Fiori Launchpad

When users click one of these functions or apps, the browser shows the screens as an SAPUI5 frontend (SAPUI5 is based on HTML5). Let's now look at the types of apps and some primary characteristics of SAP Fiori apps.

Types of SAP Fiori Apps

SAP Fiori apps can be distinguished by three features (see Figure 1.14):

- **Content**
  Transactional apps, analytical apps, and factsheet apps (This is the distinction preferred by SAP.)
- **Dynamicity**
  Static apps and dynamic apps (only listing apps)
- **Results**
  Real apps with added value, real apps without added value, and pseudo apps

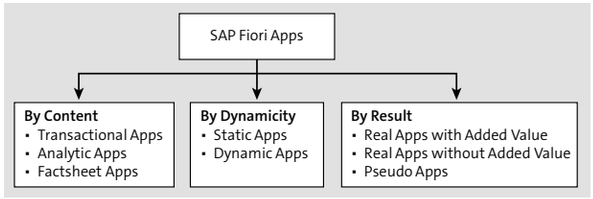


Figure 1.14 SAP Fiori Apps: Types

SAP Fiori Apps Based on Content

According to content, which is the distinction SAP prefers, there are three different kinds of SAP Fiori apps (see Figure 1.15), as follows:

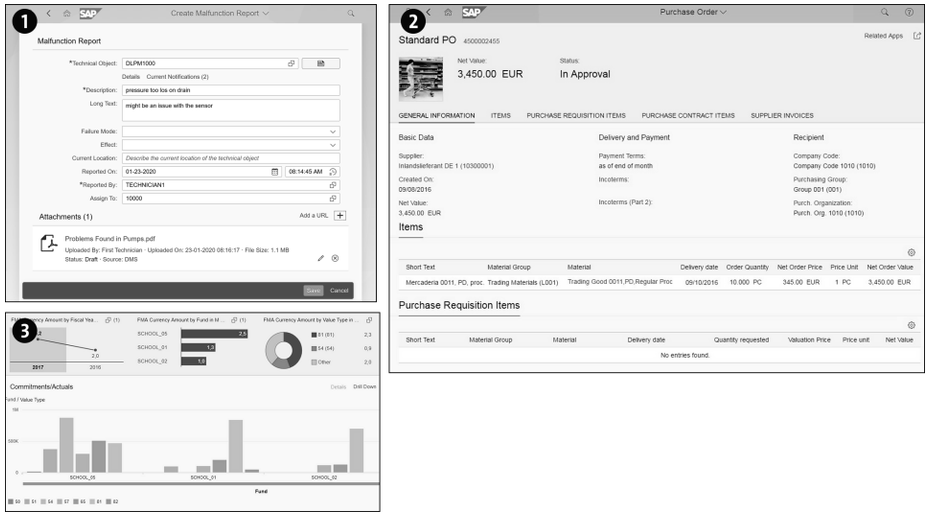


Figure 1.15 SAP Fiori Apps: According to Content

❶ **Transactional apps**
These apps execute certain business processes (e.g., setting up a purchase order, recording a confirmation). These apps can tally 1:1 with a transaction in SAP GUI. In addition, a couple of functions can be combined in one app.

❷ **Factsheet apps**
These apps provide the most important information for one object (e.g., supplier, material master, customer) within one screen display.

❸ **Analytical apps**
These apps can be used to produce evaluations, key figures, statistics, and diagrams for your business processes.

SAP Fiori Apps Based on Dynamicity

SAP Fiori apps that issue lists can be subdivided into static and dynamic apps, as follows:

- **Static apps**
  These apps operate like list transactions in SAP GUI. You enter your selection criterion (e.g., plant) in an upstream selection screen, and the list will show the relevant findings. If you want to change the selection criteria (e.g., another or an additional plant), you return to the selection screen, widen your selection, and subsequently see the new (static) findings.
- **Dynamic apps**
  These apps show the selection area and findings in a template. If you change the selection, the findings are adjusted dynamically. Figure 1.16 shows the My Purchasing Document Items app, for an example.

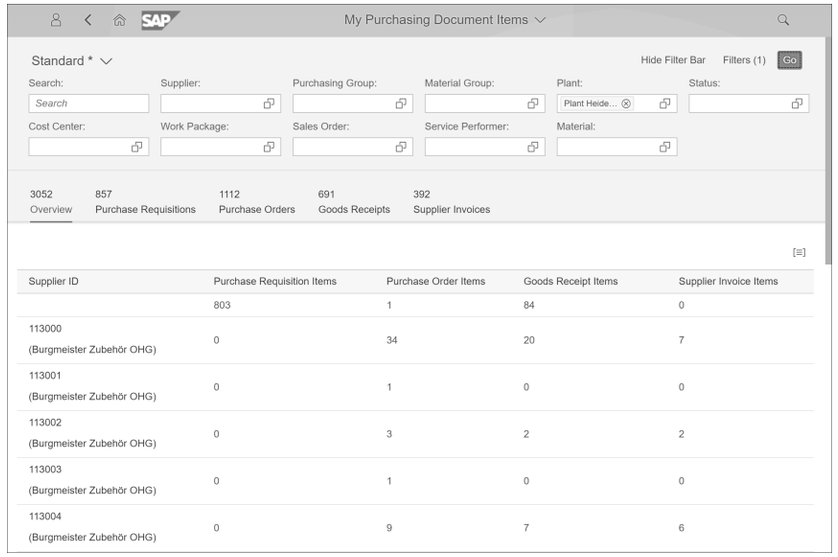


Figure 1.16 SAP Fiori App: My Purchasing Document Items

SAP Fiori Apps Based on Results

Additionally, SAP Fiori apps can be classified according to the result, such as "real" SAP Fiori apps with added value, real SAP Fiori apps without added value, and pseudo SAP Fiori apps.

First, let's define what we mean by a real SAP Fiori app with added value. In essence, these apps use SAPUI5 technology and add value in comparison to using SAP GUI. Added value can mean a number of things, including the following:

- Extracting a single function out of a complex function (e.g., Release Maintenance Orders app and Approve Purchase Orders app)
- Pooling a couple of transaction into just one (e.g., Post Incoming Invoices app)
- Providing functions that don't exist in SAP GUI (e.g., dynamic apps)
- Preparing and consolidating statistics for graphic representation
- Showing results on the SAP Fiori launchpad (see Figure 1.19 later in this section for an example)

Next, real SAP Fiori apps without added value indicates that the app uses SAPUI5 technology but doesn't add any additional value for the user. For example, Figure 1.17 shows the Create Purchase Requisition app, which uses SAP Fiori technology but doesn't provide any added value compared to Transaction ME51N in the SAP GUI.

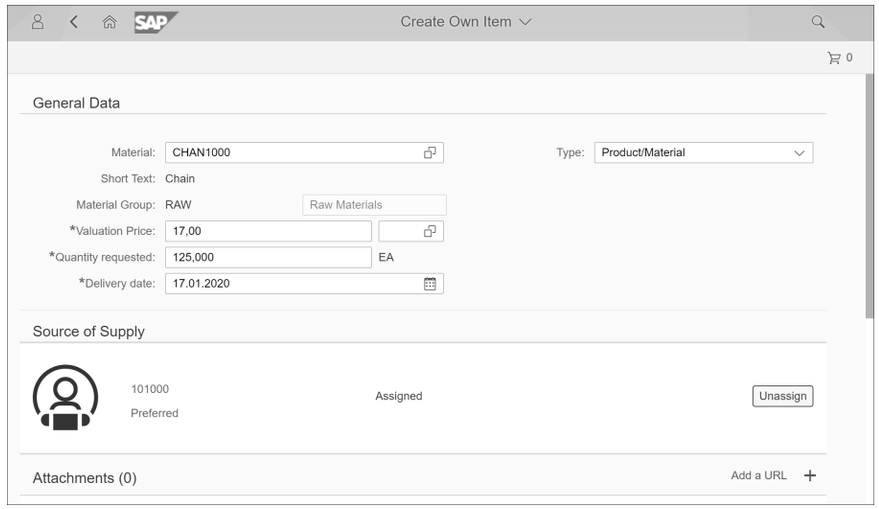


Figure 1.17 SAP Fiori App: Create Purchase Requisition

Finally, "pseudo" SAP Fiori apps refer to SAP Fiori apps that neither use SAPUI5 nor provide any additional value for the user. For example, Figure 1.18 shows the Create Supplier Invoice app, which doesn't use SAPUI5 and only displays Transaction MIRO in an additional window with a Web Dynpro surface. Therefore, there is no additional value for the user.

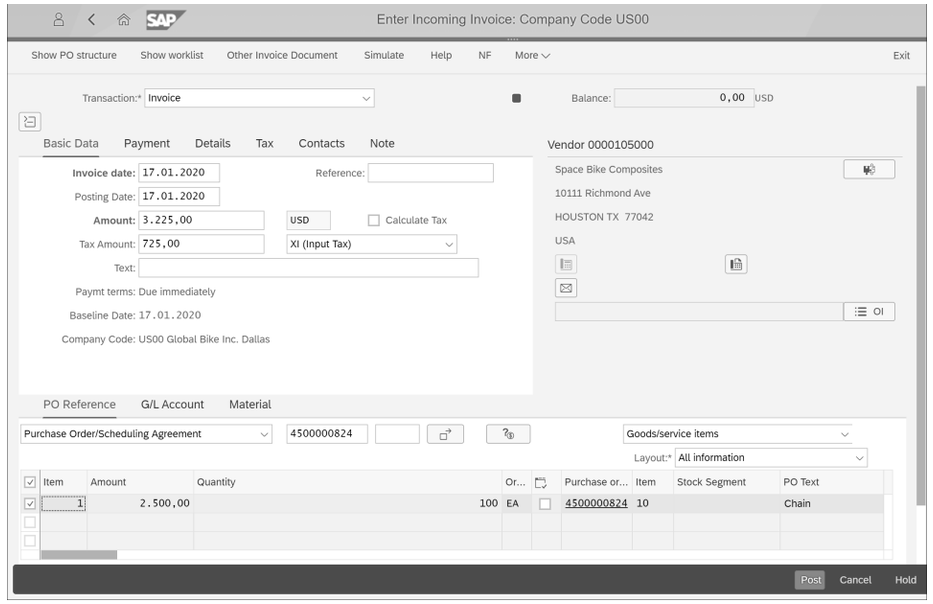


Figure 1.18 SAP Fiori Pseudo App: Incoming Invoice

Characteristics of SAP Fiori

Value-adding apps basing on SAPUI5 facilitate users' work in the following ways:

- The surface is responsive, which means it identifies the terminal device and accessing data and aligns itself to the device.
- The operation is coherent. In all apps, all functions and all devices of the operation are unified. All processes share and are controlled by the same data.
- Just like in SAP GUI, there is a role-based allocation. This is why each user will only find the specific functions personally assigned to him on his SAP Fiori launchpad.
- Just like in SAP GUI, numerous possibilities for personalization are available (e.g., selection variants, field selection).
- Each SAP Fiori app may be used on mobile devices, which enables users to access their data or tasks from anywhere at any time.
- Provision is made for developing specific customer requirements, which means users may integrate their own, self-developed apps within the SAP-provided development workbench (e.g., SAP Web IDE toolkit).

Moreover, these characteristics of SAP Fiori are useful in day-to-day-business:

- If it's necessary or relevant, important key figures will be shown on the SAP Fiori launchpad (see Figure 1.19).
- You can send emails (e.g., to send a list or link for a document) from within each app.
- All lists may be exported to Microsoft Office.

Figure 1.19 SAP Fiori Apps with Key Figures

On the other hand, in everyday business, some aspects can be rather off-putting:

- SAPUI5 surfaces contain a lot of empty space, so they aren't compact, which is also why screen pictures are needlessly big and blind.
- Because SAP GUI uses tab strips, information is assigned according to relevant headlines and then allotted to tab strips. This tab strip technique isn't available at HTML5. Instead of tab strips, information is shown one item below the other in SAP Fiori. In many cases, this creates very long screens that require a lot of scrolling to get the information you want.
- Positioning of functional keys isn't standardized yet.

In Chapter 9, Section 9.1.2, I'll show you what kind of SAP Fiori apps are available for plant maintenance.

1.8 Summary

The following are the major takeaways regarding plant maintenance with SAP in general:

- SAP S/4HANA is the successor to SAP ERP 6.0 as well as a complete ERP system within which all enterprise-specific business processes and functions are included.
- SAP S/4HANA is exclusively offered on the SAP HANA database. Versions for other databases are not available.
- SAP S/4HANA is offered on-premise as well as in the cloud, as follows:
  - In SAP S/4HANA Cloud there are only a few possibilities to adjust the system to your demands. You can only consume the standard defined by SAP.
  - SAP S/4HANA provides a variety of possibilities for activating business functions, for customizing, for add-ons, or for modifications.
- Via activating business functions, you may expand the scope of functions step by step.
  - You should activate the functions LOG_EAM_CI.

  - They contain small round-offs, making your tasks easier and smarter in the day-to-day business.
  - You may do so unhesitatingly, as there are no dependencies with other applications.
- You have three options for accessing your SAP S/4HANA system:
  - SAP GUI, the most widely used version
  - SAP Business Client with additional possibilities, but hard to configure
  - SAP Fiori, most heavily promoted by SAP and made for casual users, but it should be assessed whether a certain app really provides any additional benefit

Contents

Index

C

D

E

F

G

H

I

K

L

M

N

O

P

Q

R

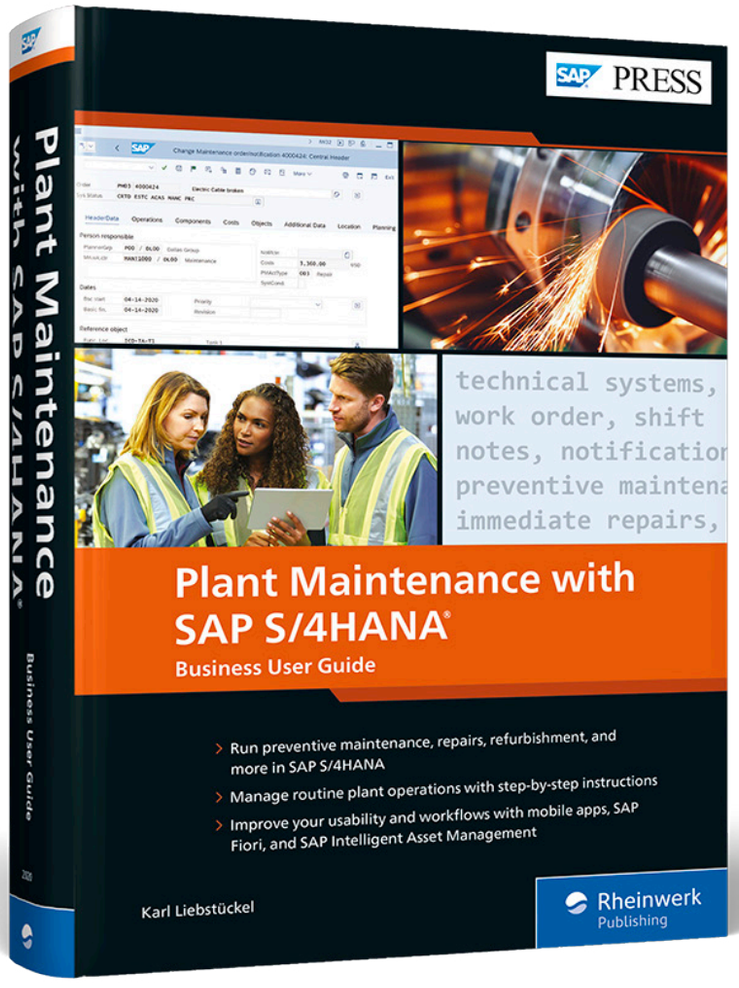
S

T

U

V

W



Karl Liebstückel

Plant Maintenance with SAP S/4HANA: Business User Guide

665 Pages, 2021, $79.95
ISBN 978-1-4932-2021-2

www.sap-press.com/5180

Karl Liebstückel is a professor of information management and business software at the Würzburg-Schweinfurt University of Applied Sciences in Germany. He has more than 30 years of experience with plant maintenance in SAP solutions. Over the course of his career, Dr. Liebstückel has gained extensive practical experience in more than 70 plant maintenance projects. He was a member of the executive board of the German SAP User Group (DSAG) from 2003 to 2012, and its chairman from 2007 to 2012. Furthermore, he presided over its Plant Management and Service Management work group from 2001 to 2008.

Dr. Liebstückel owns his own consulting company and is the author of several books on the topic of logistics. Previously, he worked at SAP AG for 13 years in the areas of development, consulting, and training for plant maintenance and service management.