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DOCUMENT HISTORY

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1 SAP STANDARDS FOR END-TO-END SOLUTION OPERATIONS

IT organizations face new challenges every day as they attempt to remain effective and future safe while also keeping costs for day-to-day operations as low as possible. They are also being challenged more than ever to demonstrate their value to the business. Therefore, it is important to optimize the day-to-day tasks that appear to have less obvious business value and to use KPI and benchmark-based reporting to make IT processes more visible, demonstrating the real value that IT can provide.

In order to minimize the costs of IT, it is necessary to standardize and automate the end-to-end IT processes without reducing the SLAs required by the business, such as stability, availability, performance, process and data transparency, data consistency, IT process compliance, and so on.

Based on the experience gained by SAP Digital Business Services (DBS) while serving more than 36,000 customers, SAP has defined process standards and best practices to help customers set up and run end-to-end solution operations for their SAP-centric solutions.

The Build phase of SAP best practices supports a Build SAP Like a Factory approach, consisting of the following processes:

- Custom code management
- Change, test, and release management
- Incident, problem, and request management
- Solution documentation

During the Run phase of a solution, adapting your IT infrastructure to a Run SAP Like a Factory operation impacts both application operations and business process operations. Therefore, operations processes, such as end-to-end root-cause analysis, system monitoring, system administration, and data volume management need to be optimized to achieve state-of-the-art application operations. In business process operations, the same applies to business process and interface monitoring (including performance optimization), data consistency management, and job management.

Quality management processes and tasks need to be established throughout the lifecycle to guarantee continuous improvement of the end-to-end solution operations processes while simultaneously ensuring the flexibility needed to react to changing requirements.
Figure 1 shows an organizational model for solution operations that aligns SAP best practice topics and SAP standards for End-to-End Solution Operations with SAP’s control center approach. The Operations Control Center executes and controls the Run SAP Like a Factory processes, while the Innovation Control Center ensures optimal custom code management and a smooth transition to production with integration validation procedures. SAP connects to these control centers from the Mission Control Center to ensure that professional support is available to the customer. The following Application Lifecycle Management (ALM) functions are not provided directly in one of the control centers because they must be handled across different areas:

- Change, test, and release management
- Incident, problem, and request management
- Solution documentation

The quality management methodologies are an essential part of SAP's Advanced Customer Center of Expertise (Advanced CCoE) concept and ensure that the KPI-driven processes are continuously improved across all processes and teams. In addition, the quality manager roles ensure consistent and value-centric reporting to the business and management. This unified reporting platform is known as the Single Source of Truth.
1.1 Control Center Approach

The control center approach consists of three components:

- Mission Control Center (MCC)
- Innovation Control Center (ICC)
- Operations Control Center (OCC)

Both the ICC and OCC are made available at your IT facility, while the MCC is located at regional SAP sites. All three approaches are linked together through the SAP Solution Manager application management solution.

Mission Control Center (MCC)

The purpose of SAP Mission Control Centers (MCCs) is to support the ICCs and OCCs at customer locations, enabling proactive identification and fast resolution on critical issues operating the SAP solutions and helping to apply standard SAP software functionality that addresses business requirements. The MCCs are serving as the central inbound channels for all complex and business critical request of our customers. MCCs connecting customers to experts from SAP that are ready to provide support across all solution areas and phases of the application lifecycle. SAP MCCs are located on North America, Latin America, Europe and Asia regions. All MCC’s are networked, use a common infrastructure and service management system, providing 24x7 year around coverage for critical customer situations.

Figure 2: Interaction Between ICC, OCC, and MCC
Innovation Control Center (ICC)

SAP’s Innovation Control Center (ICC) is the delivery framework to deliver mid to long term innovation programs. The ICC combines a set of experts, services, tools and templates and represents a lean front office at the customer location that is connected to all offerings of a very strong back office, called the Mission Control Center (MCC). This ensures access to the expertise of the entire SAP ecosystem in a structured way.

The Innovation Framework is the foundation of an ICC and is led by a certified ICC Lead. The Lead delivers against a long-term, value based roadmap, sets-up collaboration tools and dashboards for the connection to the MCC and creates innovation service plans for the underlying projects. ICC services are available for all phase of innovation projects:

- Discover/Prepare: e.g. Prototyping
- Explore/Design: e.g. Gap Validation or Design Review
- Realization/Deploy: e.g. Integration Validation (Safeguarding)
- Run: Transition to Operations

The overall concept of ICC/MCC establish a long-term relationship to SAP and helps saving implementation costs and time for our customers.

Operations Control Center (OCC)

The Operations Control Center (OCC) is the physical manifestation of the Run SAP Like a Factory philosophy. The Operation Control Center (OCC) is a service of an IT organization that

- creates the relevant transparency to business and other stakeholders along the IT aspects of the seamless execution of E2E critical or core business processes
- provides the relevant transparency on health of the end to end IT landscape and underlying software components
- manages critical exceptions and continuous improvement on the above aspects based on data driven insights
- is supported by standardized IT processes

Figure 3: SAP Mission Control Centers – Customer Innovation Control Center collaboration model
An Operation Control Center is sitting as a layer across / above typical IT departments (who are responsible for the day to day IT operations). It is the job of the OCC to immerse itself in the landscape and processes to fully understand the operational challenges facing the business. Centralized tools and standardized monitoring procedures provide much-needed transparency into these challenges. Meanwhile, a focus on continuous improvement and optimization can improve operations over the long term. As a result, IT departments can realize reduced costs and better capitalize on new opportunities for innovation. To achieve these goals, the OCC relies on a close interaction with both the Innovation Control Center (ICC) and the SAP Mission Control Center (MCC).

The OCC is typically equipped with large screens that display the status of business processes, IT landscape components, as well as exceptions and alerts. If problems occur, a video link can be used to obtain live support from SAP and partners. The customer is responsible for managing the OCC.

The OCC is most effective when closely integrated with other IT processes, such as IT Service Management (ITSM) and Change Management. Central monitors and dashboards based on application and business process operations display the current status of business and IT-related processes. This data can also be used to drive continuous improvement. An effective system monitoring and alerting infrastructure is fundamental to the success of an OCC and feeding the OCC. The OCC is safeguarding all relevant IT aspects, and the execution of the end to end business processes in scope. The OCC reacts and manages on exception along this critical business processes according to predefined error-resolution activities. The OCC manages follow-up activities for error handling if the relevant tasks are not completed within a certain timeframe.
2 OVERVIEW OF THE SAP STANDARD FOR SYSTEM MANAGEMENT

The SAP Standard for System Management comprises the process for System Monitoring as well as the process for System Administration.

2.1 System Monitoring and Alerting

The System Monitoring and Alerting covers monitoring, alerting and reporting of the status of IT solutions. The business units expect that performance problems and errors are detected and resolved proactively before they affect business continuity. To provide transparency to customer business, the IT has to report service levels, capacity trends and solution quality on a regular basis. In order to fulfill the demand of customer business given a limited IT budget, the IT must industrialize and automate monitoring and reporting of the solution.

While Root Cause Analysis (a separate standard) aims at problem resolution, System Monitoring detects incidents automatically. System Monitoring covers all technical components necessary to operate the business processes. It is important to define Key Performance Indicators (KPIs), which can be obtained from the KPI catalog, and a suitable measurement and monitoring in the areas of availability, stability, performance, throughput and security. With help of thresholds, define critical situations for which need to be notified. Based on all data available in monitoring, web reports are defined that focus on service levels, capacity trends or solution quality. This infrastructure allows a unified evaluation of the availability for the whole system landscape. System Monitoring is owned and executed by SAP Technical Operations. Possible results are smoother business execution and optimized total cost of operations.

In its latest version, SAP Solution Manager offers a Monitoring and Alerting Infrastructure, that covers all requirements for an integrated System Monitoring and Alerting concept of the whole SAP solution and non-SAP Solutions. In complex customer environments with different partners and IT service providers involved, it is possible, that also third-party monitoring software can be incorporated into a holistic monitoring concept. In those cases, the SAP Solution Manager still works as a single source of truth for the SAP specific parts of the solution. The gathered information about status and different technical KPIs is then forwarded to other tools, but the original information can still be viewed in SAP Solution Manager.

2.2 Architecture and Configuration with SAP Solution Manager

With the SAP Solution Manager the so-called Monitoring and Alerting Infrastructure (MAI) was introduced as the new standard functionality for monitoring, alerting and reporting of key performance indicators (KPIs). The MAI focuses on the automation of the process of monitoring, checking, reaction on and prevention of critical situations in a system landscape.
2.2.1 Prerequisites

If the System Monitoring plans to be used, SAP Solution Manager needs to be prepared accordingly. The initial configuration of SAP Solution Manager has to be completed. Initial configuration consists of a number of different steps:

System preparation
Checks the current installation and setup of the SAP Solution Manager system e.g. license data, implementation of necessary SAP Notes, and creates users.

Infrastructure preparation
In this step, set up the synchronization of the system landscape directories (SLDs) and SAP Solution Manager, to keep the information about the system landscape up-to-date.

Basic configuration
During this step the user data, connection data and landscape data are maintained in SAP Solution Manager.

Configuration of managed systems
The systems which should be managed and monitored will be connected to SAP Solution Manager. Therefore, the configuration will be checked and important system data are requested. The Work Center Configuration of SAP Solution Manager supports all the configuration steps. It is most important to configure the connection of all systems, which should be monitored and managed with help of the SAP Solution Manager. Depending on the number of managed systems and size of data collection, it is recommended to check the hardware sizing of the SAP Solution Manager host. For this purpose, SAP provides the Quicksizer. ([http://service.sap.com/quicksizer](http://service.sap.com/quicksizer)).
2.2.2 Architecture of MAI

On each managed system and technical component, a SAP Host Agent and a Diagnostics Agent are to be installed. Beside other roles, those agents measure and collect the necessary technical data for the monitoring. In addition, the Introscope Enterprise Manager is used to collect the application data. System Landscape Directory is another technical component, which is used as a data source for technical environment data.

Figure 6: Architecture of MAI

Different data providers are either located in the managed object or in the SAP Solution Manager and provide the data to so-called metrics. With help of the Data Provider Connector, the data will be processed and stored in the BW stores. The Event Calculation Engine processes the metrics and stores events and metrics in the corresponding store. In parallel, the Event Calculation Engine forwards the events to the Alert Consumer Connector for storing generated alerts in the Alert Store. The alert consumer connector hands over the alert to the incident management and the notification management.

2.2.3 Template Concept

SAP delivers preconfigured templates for the collection of monitoring data as well as threshold values for the alerting. SAP delivers so called SAP Standard Templates which consists of standardized metrics, alerts and events already prepared for specific technical systems and instances (like SAP ABAP AS or SAP Java AS), Operating Systems (like Microsoft Windows, Linux, Solaris), and different databases etcetera. The templates include predefined threshold values for alerting as well as preconfigured customizing for the integration with SAP Solution Manager ITSM or automatic notifications. For an own approach, custom templates can be built by adaption of the existing SAP Standard Templates. Those templates can be assigned to multiple managed objects. By adapting the customer-specific template to object specific properties an object specific template can be built.
2.2.4 Further Monitoring Possibilities

Once the standard System Monitoring has been setup, consider an enhancement of the monitoring concept by implementing additional monitoring capabilities in SAP Solution Manager. Examples for those additional monitoring possibilities are:

- SAP Solution Manager Self-Monitoring
- User Experience Monitoring
- Integration Monitoring
- Job Monitoring
- Business Process Monitoring
- Hana and Business Intelligence Monitoring

2.2.5 Technical Analytics and Dashboards

In general, the implementation of a suitable reporting is as well a project, which follows the typical phases of plan, build, run and optimize. In the planning phase, a reporting content should be defined. The Reporting makes only sense if there are follow up processes. Therefore, it is important to assess which process responsible need which KPI reporting, when, and on which aggregation level. From technical point of view, there are several opportunities for the implementation of reporting requests.

Application specific Analytics

SAP Solution Manager 7.1 provided the so-called Interactive Reporting capabilities to gather information about Availability, performance, capacity, usage and exceptions. With SAP Solution Manager 7.2, the embedded analytics are available per application (system monitoring, integration monitoring, Hana and BI monitoring etc.) to display the most important monitoring data for monitored systems centrally. The reports contain various periods, from the current day to the previous year, so you can see both the current, and the long-term development of the performance values. The values for each period are displayed in the appropriate level of detail.

Dashboard Builder

Dashboards can display large amounts of information in a concise form, to give a quick overview of its topics. In SAP Solution Manager 7.2, SAP provides a dashboard framework, the so-called dashboard builder, which allows to use SAP dashboard templates for your own customization. The dashboards comprise several tiles with information, and process an aspect of the topic. Furthermore, you can create own dashboards, KPI groups and tiles, from data provisioning to visualization, on which the following documentation concentrates. The Dashboard builder is a SAPUI5-based, coding-free and easy-to-use tool to enable SAP customers to build a dashboard quickly in order to visualize their data for analysis via configuration. Major features include:

- Easy-to-use template-based tool
- Modern and intuitive user interface
- Can be connected to multiple types of data sources including BW query, function module and Business Process Analytics
- Can run on both desktop and mobile devices.
Focused Insights

Focused solutions on top of SAP Solution Manager deliver ready-to-run solutions for specific sub-market needs. Despite being specific, they still provide an industry standard and thus avoid costly custom code for customers. Focused Insights for SAP Solution Manager provides a set of prepackaged dashboards, which leverage the SAP Solution Manager content and SAP service and support best practices. The Focused Insights offering of SAP allows to create custom-specific, easy-to-use dashboards in minutes. They have pre-packaged content with simplified configuration models with no programming needed. The different dashboards can be used for pre-selected for standard use cases, where you have access to 800+ best-practice KPIs. The dashboards are available for all SAP Solution Manager use cases and you can add real-time or historic metrics. The Focused Insights is ideal to build your Innovation Control Center and Operations Control Center and enable top-level, strategic, KPI-driven management for the business solution for IT and Business.

2.3 System Administration and Guided Procedure

The topic System Administration describes how all SAP technology must be administered to run a customer solution. Administration tasks are mainly executed locally, but can be accessed and triggered from a central system with administration tools like the SAP Solution Manager. This allows a unified access to all SAP technologies. System Administration is owned and executed by SAP technical operations. Possible results are smoother business execution and optimized total cost of operations. System Administration is the term used for more or less manual, technical activities to maintain a solution. System Administration is directly related to the functions IT Operations Management and Technical Management in ITIL. The focus of IT Operations Management are all activities, which are required in the day-to-day business for regular, stable and high available operations. Monitoring is the controlling process of operations. It shall signal critical situations or proactively warn before critical situations can appear. Those alerts or warnings require reactive or proactive activities, which are typical tasks in System Administration. Those activities might require expert knowledge, which has to be outlined in the function Technical Management according to ITIL. This standard on System Administration will discuss how the typical tasks shall be supported by suitable tools and how the knowledge can be made available for. Regular routine tasks are part of a customer's operations manual for technical operations and include performing backups and restarts, managing printers, and performing identity management tasks.

2.4 Basic Concept of System Administration

2.4.1 Architecture and Process Flow

SAP NetWeaver is the foundation of SAP xApps and SAP Business Suite solutions, and powers partner solutions and custom-built applications. Its core component, the SAP NetWeaver Application Server, is the central foundation for the entire SAP software stack. It also provides a platform for other NetWeaver components (Portal, XI etc.), as well as for ABAP and Java applications. An SAP system consists of several application server instances and a database. A dialog instance consists of the following components:
• The Internet Communication Manager (ICM) sets up the connection to the Internet. It can process both server and client Web requests. It supports the protocols HTTP, HTTPS, and SMTP. The SAP Web AS may be a Web server or a client (see SAP Web Application Server: Web Server or Web Client).

• The Dispatcher distributes the requests to the work processes. If all the processes are occupied the requests are stored in the dispatcher queue.

• The Work Processes execute ABAP or Java programs.

• The SAP Gateway makes the RFC interface between the SAP instances available (within an SAP System and beyond system boundaries).

• The Message Server exchanges messages and balances the load in the system.

• In the J2EE component of the SAP NetWeaver AS, there are also components Java Dispatcher, Server Process and Software Deployment Manager.

System Administration must be done for an entire landscape and all technical components belonging to the customer solution locally and landscape wide. SAP Solution Manager provides appropriate tools to support administration activities among the landscape. The most important administration functionalities available on SAP Solution Manager and pure SAP NetWeaver Stacks are listed below.

System Monitoring Standard
Monitoring and Alerting Infrastructure (MAI) provides central access to all important monitoring information. All technical components of system landscape are getting monitored 24*7 and automatically create an incident in the IT Service Management in case of an error occurred. The central entry for the analysis of the incidents is also realized also within the MAI.

Root Cause Analysis
The End to End diagnostics tools provides central and detailed information regarding the workload, exception and changes of components in the landscape to analyze performance gaps and identify root causes of issues and errors. With help of root cause analysis tools you can track activities across the systems with different focus e.g. user specific or restricted on a single process or transaction.

Database Administration
SAP Solution Manager offers a central database cockpit, which centrally offers key administrative functionality like analyzing missing database objects, backup planning, health checks.

User Administration
Central User Administration offers central user maintenance and distribution to the backend landscape.

Transport Management
Transport Management Service controls the distribution of coding and customizing between landscape components (mainly from development to quality assurance to production system) to safeguard productive system availability.

Exception Management
A central log viewer provides access to all key administrative logs of the backend systems.

Change Control Management
All changes in the IT landscape should be covered and controlled by a change control management to ensure technical quality standard for changes in production.
Basic concept of managing landscape meta data

Most System Administration activities and tools require information on meta data of the technical components in a system landscape. The system landscape directory (SLD) is a central infrastructure component by SAP, in which the information on the system landscape is collected and managed. This information comprises the used systems, the used resources, the status of the Support Packages, and much more. The SLD provides a technical description of all components within a customer solution. This is the basis for using different scenarios within the SAP Solution Manager. You capture and manage the system landscape directory centrally in SAP Solution Manager, and use it in change management, customizing synchronization (customizing scout, customizing distribution), and in operational processing.

In addition to SLD SAP Solution Manager builds up an own repository based on SLD data, the Landscape Management Database (LMDB) with specific and additional landscape component information related to the System Monitoring and System Administration. SAP recommends creating the SLD in a dedicated AS Java stack and based on the system landscape administrator's specifications. For more information on the SLD, see the online help in the SAP Service Marketplace or in the SLD installation guide.

Each system in the landscape logs in to the SLD and transmits information on its technical structure, such as the host name of the servers on which it is installed, or the number of installed application servers. Apart from that, it sends information on the installed products and software components. This information is transmitted directly from the SLD into the Landscape Management Database (LMDB), which is directly integrated in SAP Solution Manager.

The synchronization of the SLD to the LMDB is done fully automatically and uses a connection between the two components, so that each insert, change, and delete is directly transmitted to the LMDB and applied there. As a result, the applications in SAP Solution Manager always have current landscape information at their disposal.

However, the Diagnostics Agents, which are installed on the managed systems and ensure the acquisition of information for SAP Solution Manager, directly connect with the SAP Solution Manager system. In addition, the technical maintenance and administration of the agents is done via the direct connection to SAP Solution Manager. The SAP Solution Manager provides the configuration files and updates centrally.

Managing a system landscape is a complex task of significant importance for every company that operates one or more SAP systems. The complexity increases with every additional system, component, or extension. With the monitoring and alerting infrastructure, SAP provides a flexible and universally usable basic infrastructure with which you can manage the entire IT landscape centrally. MAI offers an integrated suite of tools for monitoring and managing SAP components, for automating such operations as resource distribution, and for managing SAP-supported databases.
3 LIFECYCLE OF SYSTEM MANAGEMENT

3.1 Lifecycle of System Monitoring

The Monitoring and Alerting Infrastructure (MAI) allows to monitor a large number of systems, servers and processes. Nevertheless, if you want to take advantage of the monitoring you need to plan and integrate the monitoring into the IT processes. Therefore, the introduction of system monitoring and alerting has to be managed as a project. You will have the same phases (plan, build, run, optimize) for the monitoring solution as known for other solutions. In addition, it is a major requirement to document all decisions and configurations for the monitoring and the surrounded processes in a concept paper. Following figure seven there are the four phases that are important to run through for the scenario implementation. This section will describe the important tasks and information for the four different phases.

3.1.1 Plan phase

The IT process, which is mainly effected by the implementation of the System Monitoring, is the Event Management process in general, which includes several topics on how you handle events, which significance you assign different events, and how you respond to those events. Establishing a comprehensive monitoring concept therefore requires a project planning a management as common for the implementation projects. Monitoring will become an essential element in the daily operations and IT processes. Therefore, you need to plan such an implementation carefully.

3.1.1.1 Project Management

SAP Solution Manager provides an integrated project management (PPM) which can be used for your System Monitoring project as well. The advantage of this integrated project management is that it comes already with best practices, e.g. for SAP S/4 applications. You find the project management in the SAP Solution Manager Launchpad Group “Project and Process Management”. You can choose the desired process Technical Monitoring and Alerting as an entry point. Each process consists of a roadmap which you can follow step by step in the project. SAP provides for each step a general documentation for typical scenarios, which you can reuse and adapt to your needs. You can maintain the estimated effort for each step in the project. If you use ITSM in SAP Solution Manager you can directly create service requests. Typical transactions to be executed are available for each step as well.

3.1.1.2 Setup Productive Governance

In case that the SAP Solution Manager is used for critical IT processes in operations like monitoring & alerting of the whole IT landscape, it is also important to consider high governance standards including high availability for the SAP Solution Manager itself. During the plan phase, it is important considering the self-monitoring of the monitoring tool itself. The Monitoring and Alerting Infrastructure is only able to generate alerts when information passed the event calculation engine. Whenever information is not collected correctly or the calculation is corrupted, the effect and result will be complete different ones. Therefore, it is important to plan monitoring also for all infrastructure components and the collection framework.
3.1.1.3 Define Focus
During this phase, you need to plan the amount and the level of information of system monitoring and alerting, and integration or setup of IT processes using the system monitoring. All systems and technical components of the system landscape you want to monitor need to fulfill the prerequisites, namely they need to be connected to the SAP Solution Manager. It is important to check if SAP already provides templates for all those systems and components you plan to monitor or if you need to create your own ones.

The SAP Solution Manager provides a variety of tools to monitor also the application layer and complex scenarios. The System Monitoring tool provides its information to constitutive tools like Process Integration Monitoring, Business Intelligence Monitoring, Interface Monitoring and will be extended not only to SAP solutions. It supports as well more and more non-SAP solutions. Important in this first phase, the planning phase, it is important to decide which parts of the monitoring should be involved and needs to be considered for the implementation phase. Which components need to be monitored on which level of aggregation and information detail?

Together with all involved parties, you need to discuss useful thresholds and possible follow up activities. Your business will deliver business related Key Performance Indicators (KPI) like availability or necessary response times. As an entry point for those KPIs, you can also use the thresholds provided by the SAP standard templates. However, you need to be aware that it is very likely that you need to optimize the initial setup of metrics and thresholds later. The level of information in monitoring means that you need to plan if and what automatic information level should be in place.

- Default Level: You can scan regularly the Alert Inbox. Alert Inbox allows the processing of the alerts and confirming them after the root cause of the incidents has been resolved.
- Enhanced notification level: You can define a notification method. In case of an alert, you can use e.g. email or SMS for informing responsible persons/teams automatically to follow up on it.
- Enhanced incident management level: You can setup a full integration into incident and problem management by automated creation of an incident messages in your ticket system. Most comfortable and fully supported is the integration with ITSM in SAP Solution Manager. However, it is also possible to setup and develop the integration with other third party ITSM.

Of course, you can mix up the different levels for different KPI and systems. This depends on your needs. The most reliable option of information would be to integrate alerting into the incident management process and in case of critical situation combine with the notification level to ensure the awareness of the incident beside the incident management. With the incident management, it is ensured that every occurrence and error will be tracked and documented in one central system. Beyond the notification of the IT staff, it is also possible executing any ABAP program as an auto-reaction method automatically. Beside the reactive usage of monitoring and alerting you can also benefit in the optimization of your IT and business processes. A suitable monitoring on historical and prognosis data of KPIs is essential for your IT optimization process. Therefore, you should plan also the reporting on the collected data. As stated all measured monitoring data will be stored in the BI of SAP Solution Manager. To take advantage of the reporting you need to identify useful KPIs, and define how and how often they should be reported. Reporting is only useful if you have established a follow up process for improvement. Therefore, you need to plan who will use the reporting and what should happen if there are critical values or a critical prognosis is given.

3.1.1.4 Plan Authorization Concept
An authorization concept should be part of your monitoring blueprint as well. You need a clear definition who has access to which parts of the monitoring and reporting. There should be only a limited group of named users that have full access to all monitoring objects and the customizing of the monitoring. The Service Desk should have read only access to read the alert inbox and to be able to use the root cause analysis tools. The SAP Solution Manager delivers predefined roles and authorizations you can use.
3.1.1.5  **Plan Work Modes**

There are different usage and operation profiles for the solutions. Remember regular system maintenance windows or maybe year-end closing period. For such events, it might be useful to define other monitoring profiles than the common ones. During restricted operations due e.g. shut down for maintenance it might be useful to switch off the common monitoring. For such purposes, you can use so-called work modes. The work modes administration is part of the System Administration standard and can be found in the area of Technical Administration. After finalizing the scenario description including the integration with the IT processes, you can hand over the project information and the monitoring concept to the implementation phase.

3.1.2  **Build phase**

The configuration of system monitoring is executed in the step technical monitoring in the Work Center Solution Manager Configuration. During the setup the landscape preparation will be checked automatically. Another important step during configuration is the maintenance of the default entries for the notification. You need to adapt the pre-configuration to your needs. You can maintain the retention period of the collected monitoring data as well as possible compression degree for later reporting on the data. Beside the existing preconfigured reports, you can define any reporting you might need by using the powerful BI tools.

For different operations situations, you can activate different monitoring templates. For doing so you create suitable work modes for the different approaches for e.g. high-workload periods or planned maintenance periods. You can execute the configuration process multiple and adapt and extent continuously. If you need to extent to a new system or change the templates, you have to run the configuration again. After finalization of the configuration, you can run the monitoring.

3.1.3  **Run phase**

After transferring the monitoring into production SAP Solution Manager, it becomes key in your IT Operations and has to be handled and maintained like this. If you run a monitoring configuration the first time, it is recommended to check if the designed monitoring covers most of the expected critical situations. If you substitute an already existing monitoring, it might be useful to run both monitoring scenarios in parallel for a certain time.

If there is an alert raised, you will find it in the so-called Alert Inbox in the Work Center for Technical Monitoring. All raised alerts are assigned to categories as database, host specific or system specific. On the first level, the entry level, you will get an alert list sorted by type. To avoid alert flooding you can access then different alert groups related to one monitoring object. By double-clicking on the alert groups, you can drill down to the third level, the detailed list for alerts. The metric viewer will show the historical development of the measured values. You can switch directly to the analysis tools, which were assigned during the configuration phase of monitoring.

After finishing the first release of your monitoring configuration, you can run the monitoring. Ideally, an alert is raised only if there is a critical situation or you need to take an action to avoid such a situation. In most cases, this requires a continuous improvement to tune the configured threshold values to adapt the templates by deleting and adding different KPIs.
3.1.4 **Optimize phase**

The monitoring information of your system landscape can be displayed in the System Monitoring work center of the SAP Solution Manager. Alternatively, monitoring information can also be displayed in third-party system management tools. Monitoring & Alerting as well as reaction methods are integrated in processes and are themselves processes. Those processes need to be optimized. This leads to the question what are quality criteria for the monitoring and how can the KPIs be measured. In the ideal world, the monitoring will detect fast enough upcoming events or potential incidents so that you can react and avoid real incidents. KPIs which help to measure the distance to this ideal world are:

- Level of integration into Incident, Problem, Change Management etcetera
- Level of covered solutions
- Number of incidents which are not detected by monitoring
- Ratio of manual, reactive work to proactive work
- Number of unreasonable events

Due to the evolution of business processes, you need a continuous optimization of your Monitoring & Alerting as well. Monitoring with SAP Solution Manager provides in parallel important information and is basis for the solution optimization process. For that, SAP Solution Manager offers huge opportunities on reporting.
3.2 Implementing the System Administration Process

3.2.1 Plan phase

To implement System Administration, knowledge regarding the business requirements for performance and throughput of the systems and technologies is required as well as technical details for the systems and interfaces involved. The affected business units should be identified. Critical situations (and escalation situation) should be defined by the business. A detailed list of all regular tasks should be documented and available in the central admin tool SAP Solution Manager. Regular tasks should be reviewed on their possibility to replace activities and tasks by automated monitoring activities or reporting functionalities.

Furthermore, possible dependencies must be known and a holistic System Administration concept should exist. This concept should be aligned with the Solution Monitoring Concept. Considering the inherent supervising function from a technical perspective, there are dependencies on all other topics, especially the following:

- Incident Management:
  In case of incidents, relevant information is provided by System Administration tools. Change Management:
  Change requests and deployments have direct impact on System Administration tools.

- Root Cause Analysis:
  Description of strategy and usage of tools to locate and solve the root cause of an incident.

- System Monitoring:
  Architecture, strategy and method to setup and operate a proactive monitoring of a solution landscape.
  Business processing strongly depends on System Administration tools, especially in error cases. This requires a complete support process covering all business requirements on the system requirements. Beside the definition of support and escalation processes the communication and information share point needs to be defined and rolled out at the beginning to ensure all business and third parties involved are collaborating on one source of information.

For a detailed operations concept it will be important to make decisions also about the planned work modes of separate components of the entire IT Landscape as well it is important to know already regular planned downtimes and defined peak business hours.

3.2.2 Build phase

During the build phase documenting all procedures and building up transparency across all System Administration processes is key for a high quality of the operations. To keep all this information it is useful to establish a central document share, which is the foundation for training of the staff. As the System Administration concept is closely related to the Monitoring concept, the documentation of the System Administration procedures can also be accessed from the different alerts from the monitoring.

Furthermore, it is important to have an incident management process in place and to have escalation paths in place. The setup of a central administration is divided into an initial setup and a continuous improvement of these initial settings. In addition, the activities can be divided into the central part of the infrastructure and in the decentral components that have to be maintained.

Requirements for a successful setup are:
• The availability of a dedicated system for central administration. This can be SAP Solution Manager 7.1 SR1 providing the Technical Administration work center.

• The system landscape information is available in landscape management database (LMDB) of SAP Solution Manager.

3.2.2.1 Process Implementation Steps

In the initial setup phase, the following activities must be addressed:

• Configuration of central system monitoring. With the monitoring and alerting infrastructure within SAP Solution Manager there is the capability to roll out monitoring setup within three 'clicks'.

• Configuration of the DBACOCKPIT in SAP Solution Manager.

• Configuration of periodical admin tasks in the Task Manager of SAP Solution Manager.

• Configuration of SAP Print Assistant for Landscape in SAP Solution Manager.

• Define guided procedures for already known solutions and trouble shoot activities in the SAP Solution Manager.

• Schedule and define the operational modes of systems and technical components in the workmode management of SAP Solution Manager.

As part of the continuous optimization process, the following questions must be answered:

• Are any additional administrative tasks to be considered for secure system operation? Do basic errors occur even though all planned activities have been carefully carried out?

• Have recurrence frequencies set appropriately?

• Are the administration activities documented sufficiently?

• Are technical components exchanged or are basic changes such as upgrades planned that will also require the administration tool environment to be modified?

• As part of this process, the affected settings must be adapted continuously.

3.2.2.2 Output and Result

The result of the setup is the final operations handbook where the following information is included:

• Definition and usage of the tools & procedures

• Organization of operations processes in the company including responsibilities, roles and activities

3.2.3 Run phase

The following section gives an overview of typical tasks in system administration. It is not described what has to be done in detail. The approach is to raise the awareness of the tasks and the necessity to be prepared for such tasks.

3.2.3.1 Configuration tasks

As an outcome of monitoring and incidents, it can be necessary to adapt configuration of technical components, systems, operating systems and much more. Depending on the technology, there are different configuration tasks. Administrative tasks are release and usage-type specific. A good overview of all standard administration tasks to be processed is available in the Technical Operations Manual for SAP NetWeaver, which describes SAP NetWeaver 7.0 (2004s). SAPs Online Help page http://help.sap.com offers such a manual for SAP NetWeaver 04 as well. The typical administrative scope
includes tasks such as starting and stopping systems and components, user administration, optimizing load distribution and process automation (job scheduling).

3.2.3.2 Configuring SAP NetWeaver

The ABAP and the Java stack each require a set of configuration steps. Some cross-NetWeaver configuration is also required.

Configuring SAP NetWeaver ABAP

Most configuration steps for the various components of SAP NetWeaver ABAP are contained in the SAP Customizing Implementation Guide (IMG). To call the IMG, choose Tools → Customizing → IMG → Execute Project from the SAP menu to display the SAP Reference IMG. In the SAP Reference IMG, choose the relevant section under SAP NetWeaver. Apart from the NetWeaver section, there are sections on cross-application components and the integration of other SAP components in the top IMG structure. You can create and delete group entries, remove instances from groups, and delete entire logon groups. For details, see the section Configuring Logon Groups in the Technical Operations Manual. For other configuration task on ABAP Systems, such as configuring instances, instance profiles and operation modes, see the Configuration documentation in the SAP Help Portal.

Configuring SAP NetWeaver Java

The J2EE Engine installation procedure provides a system that is ready to be run and used. However, you may need to configure the J2EE Engine additionally to adapt the system to the needs and requirements of a particular business scenario. For configuration details, see the documentation on the J2EE Engine Configuration in the SAP Help Portal.

Cross-NetWeaver Configurations

Additional configuration options may be relevant to your NetWeaver implementation although they do not apply to a specific IT scenario.

Adobe Document Services – Configuration

Adobe document services allow SAP applications (either Java or ABAP) to take advantage of the full range of capabilities in Adobe Acrobat® Professional, Adobe Acrobat Standard, and Adobe Reader®.

SAP Enterprise Search

The enterprise search allows to index documents in your systems. You have to create the indexes for the different search options.

SAP License Key

After you have installed the components, the system is equipped with a temporary license, which is valid for four weeks. During this time, you have to apply for a permanent license from SAP and install it.

Starting and Stopping technical components and systems

In most cases, SAP Systems and Instances are operated in a high availability environment. Nevertheless you need to stop and start every now and then e.g. for maintenance issues related to software and hardware. Very often, the systems and instances are not any longer independent on other systems and
components. There are technical as well business dependencies across the landscape. Due to that, you need to prepare suitable stopping and starting procedures including monitoring procedures etcetera.

When you start the SAP System, you simultaneously start the system database, the application server and the respective processes of which the system consists. In the simplest case, an SAP System consists of only a database and a single application server.

There are different processes, depending on the type of SAP system and operating system platform. Note that you can start and stop systems and instances centrally using the SAP Management Console for all, the System Administration work center in SAP Solution Manager, or using the Microsoft Management Console under Windows.

User Administration

With the user administration, you create the prerequisites for your employees being able to work in the SAP system. Create a user master record for every employee. The record contains all the information about this user (both technical administration data and authorizations included in roles and profiles that allow the user to execute an action in the SAP system). Note that you can administer users centrally. For details regarding user administration on the ABAP and Java stacks, see the section User Administration and Identity Management in the Technical Operations Manual for SAP NetWeaver.

Database Administration

The key administrative database task is to perform a database backup on a daily basis. SAP recommends to store multiple database backups. This ‘backup cycle’ is described in detail in the links mentioned above, together with the database specific administration tools.

Data Archiving

SAP Data Archiving allows you to remove business data, according to business rules and legal compliance, from the database and store it in a consistent and secure manner. The archived data is stored in a file system and can be moved from there to other, more cost efficient storage media. This reduces the size of your database, the database backup size and time, and leads to an overall database performance increase.

If there is need for accessing the archived data, SAP offers an infrastructure for read access. The data archiving technology, which comes with SAP NetWeaver, provides the technical basis for every data archiving solution that SAP delivers. For more information about archiving in an SAP environment, see the section Data Archiving in the Technical Operations Manual.

Further information regarding data archiving is available in the solution operations standard Data Volume Management.

Process Scheduling

SAP NetWeaver's background processing is used for running large and periodical business processes asynchronously without user interface at best performance. SAP NetWeaver offers a wide variety of scheduling options, including time-based, event-based, and calendar-based scheduling.

In addition to the local job scheduling functionality (Transactions SM36/SM37), Central Process Scheduling (CPS) offers a new solution for the SAP NetWeaver platform to help companies manage, monitor, and execute business-critical processes from a central location.

For more information about process scheduling in an SAP environment, see the respective solution operations standard Job Management.
Adaptive Computing

Adaptive computing is a new approach to designing hardware, software, and system services in ways that reflect the business driven reality of continuous change, and the need for constant adaptability. Adaptive computing empowers the user to be able to run any application service, anytime, on any server. (In this context the term “application service” is used to describe any kind of IT scenario, solution, or application component.) Adaptive computing works by flexibly assigning hardware resources to support specific application services, using standardized building blocks for the computing, network, storage, and control elements of the data center. By supporting adaptive computing, SAP NetWeaver provides a way to virtualize application services, and provides a single, central point of control for assigning computing resources. For more information, see Adaptive Computing.

Security and Authorization

For security-relevant information, such as roles and authorizations, see the SAP NetWeaver Security Guide. It contains an overall overview of security with SAP NetWeaver as well as links to the individual guides for each of the usage types, standalone engines, connectivity and interoperability technologies, database and operating system platforms, and the various scenarios.

Important Central Administration Tools

CUA

Using Central User Administration, you can maintain user master records centrally in one system. Changes to the information are then automatically distributed to the child systems. This means that you have an overview in the central system of all user data in the entire system landscape. Distribution of the data is based on a functioning Application Link Enabling landscape (ALE Landscape). In this way, data can be exchanged in a controlled manner and is kept consistent. An ALE System Group is used by the Central User Administration to distribute user data between a central system and child systems linked by ALE. You should therefore familiarize yourself with basic information about the ALE Integration Technology. Central User Administration data is distributed asynchronously between the application systems in an ALE environment. This ensures that it still reaches the target system even if it was unreachable when the data was sent. One system in the Central User Administration ALE environment is defined as the central system. The central system is linked with every child system in both directions. The child systems are not linked to each other, except for the central system, which is itself a child system, from the point of view of Central User Administration.

JM

The Job Management component enables you to do the following:
Overview and control all jobs of your system environment that are running in the background:
Central and complete job documentation
Management of jobs using, for example, the following standardized workflow:

Schedule Jobs
Possibility to import jobs from systems connected using SAP Solution Manager into job documentation.
Possibility to import jobs from job documentation into systems connected using SAP Solution Manager.
Automatic job monitoring in the business process context:
Possibility to monitor jobs and see in the analyses to which business processes and business process steps the job belongs.
**LMDB**

The core task of the LMDB is to provide information about the entire system landscape at a central location. The Solution Manager System Landscape (SMSY) and the System Landscape Directory (SLD) already provide this function with different technologies for different applications. The aim of the LMDB is to unify the SLD and SMSY in SAP Solution Manager. The LMDB is supplied with data automatically; in as far as this is possible.

**Integration Possibilities**

Integration with the System Landscape Directory: Data suppliers exist for most technical systems and automatically register these systems in the System Landscape Directory (SLD). The SLD, therefore, is the central data source for the LMDB. Changes to technical systems should be carried out in the SLD where possible.

Integration with the Solution Manager System Landscape: As of SAP Solution Manager Release 7.1, changes to technical systems can only be made in the Technical System Editor of the LMDB. You still manage your product systems in the Solution Manager System Landscape (transaction SMSY). Some applications of SAP Solution Manager still retrieve their landscape information from transaction SMSY.

Integration with the Landscape Verification Tool: You can use the Landscape Verification Tool to analyze whether your system landscape has been maintained correctly in the Solution Manager system landscape (transaction SMSY). We recommend that you perform this analysis before migrating data from transaction SMSY to the LMDB to ensure that all the required information is available in transaction SMSY.

To describe the landscape elements, the LMDB, like the SLD, uses the SAP extension of the Common Information Model (CIM) of the Distributed Management Task Force (see also www.dmtf.org). Typical elements in this model are “computers”, “systems”, “products”, and “software components”.

In the technical view, the LMDB displays the mapping of the Java SLD implemented in ABAP. The cooperation of the SLD and the LMDB takes place using a connection to synchronize the contents, which works on the same principle as the synchronization between two SLD systems. It is therefore possible to read all data from the LMDB that already exists in the SLD. The cooperation between the SMSY and the LMDB takes place on the one hand with the possibility to migrate data from SMSY to LMDB and on the other hand with the automatic synchronization from LMDB to SMSY.

**SAP Print Assistant for Landscape (PAL)**

PAL is an ABAP WebDynpro based tool, which is used for central printer configuration. The administrator can use PAL to:

- Configure printers centrally
- Distribute printer definitions to other systems
- Bundle printers and systems into groups and assign them to each other. This allows large printers in system landscapes to be maintained efficiently.
- PAL is especially suited for front-end printing and printing using a print server. In the future, you will also be able to request the printer status centrally.

**SAP NetWeaver Administrator (NWA)**

NWA is used for administration of managed systems and can be centrally started from the work center System Administration. SAP NetWeaver Administrator (NWA) focuses on system administration for Java based systems. It can be accessed from within the SAP Solution Manager work center “System Administration” and “System Monitoring”.

NWA is part of the AS Java component and does not need to be installed separately. It delivers functionality to administer an SAP NetWeaver Application Server Java and can contain usage type specific enhancements. For SAP NetWeaver Composition Environment (SAP NetWeaver CE) it contains important functionality to administer service oriented applications as well as the management of service-
oriented architectures within SAP NetWeaver Process Integration 7.10. NWA will be continuously enhanced and replaces the SAP Visual Administrator completely.

Note

Functions of the system-wide SAP NetWeaver Administrator are being integrated into SAP Solution Manager as the central platform to administer system landscapes and can be accessed from the respective work centers.

SAP Management Console (SAP MC)

In a “worst case” scenario, and especially if it is not possible to log onto an SAP instance, administrators require a tool that allows them to execute basic tasks such as starting and stopping instances or analyzing log files, without having to log onto the system. This is known as "bootstrap management". Whereas administrators of SAP landscapes in Windows environments have been using a convenient tool for starting, stopping, and analyzing SAP systems for a long time (the SAP snap-in for Microsoft Management Console, or SAP MMC), administrators in Unix environments had to master a range of tools and scripts, such as startsap script, stopsap script, or dpmon.

Even though the Unix tools were simple to use and functioned stably, they still had some disadvantages such as:

- No clear indication of the current system status
- No option to work remotely, for example, starting a remote system
- No central point of access for administration of multiple systems
- Different concepts for Unix and Windows environments

The SAP Management Console now provides the administrator with one, platform-independent tool that can be used to complete nearly all the basic administration tasks such as starting or stopping the system or analyzing log files, without having to log onto an SAP instance.

The SAP MC interface is based on the interface of the SAP MMC. Both tools exist in parallel and will be supported by SAP in the future.

SAP Management Console

To implement SAP MC on Unix-based systems, a new SAP startup framework has been developed, which comprises the SAPStartSRV and SAPHostControl services. SAPStartSRV, which is implemented on Unix platforms as a daemon, starts for each SAP instance when the system is started and provides instance-specific information. SAPHostControl, which is also implemented as a daemon, provides host-specific information and is started once for each host.

SAP MC itself does not have to be installed, but connects to the corresponding services via a Web interface. It is implemented as a Java applet and can be called in a browser with the following URLs:

http://<host>:5<instance number>13
https://<host>:5<instance number>14

A Java runtime environment (JRE) with a minimum release level of 1.4.2 is required for this. The SAPStartSRV and SAPHostControl services are both implemented when a current SAP NetWeaver system is installed. However, it is also possible to use this technology on earlier SAP NetWeaver platforms if certain technical framework conditions are met. For more information, see SAP Note 1014480.
This sub-chapter describes what can be done after a successful implementation in the “Run”-phase in order to fine-tune the administrative tasks. The “Optimize”-phase is an ongoing process, which requires on one hand the identification of tasks for potential improvement and on other hand adjustment of discovered areas without destroying already existing configuration. SAP Solution Manager 7.1 offers various tools to achieve this approach.

A review of implemented tasks can be a starting point in the optimization process. Depending on the implemented scenarios and results of the performed review, following tools can be used:

**Guided Procedure Management**

Within help of this tool an administrator can document daily administrative tasks as guided procedures and automate certain activities. This scenario can be used to reduce manual tasks and at the same time to provide an overview of the performed activities.

**Reporting capabilities**

SAP Solution Manager 7.1 provides different reporting opportunities which can support administrators during an optimize phase by delivering meaningful key performance indicators for the day-to-day technical operations. They can help to find some gaps and potential improvement in the system configuration (e.g. parameter proposal or security notes) delivered on a weekly basis in form of document based reporting – called EarlyWatch Alert. Another kind of reporting – Interactive Reporting can be set up on top of Technical Monitoring and called at any time to analyze historical data and thus discover some negative trends.

**Work Mode Management**

Work Mode Management can be used either as a stand-alone application or easily integrated with the tools from Technical Monitoring area. The main purpose of this tool is planning, managing and recording different system work conditions by scheduling specific work mode, e.g. planned downtime or peak business hours centrally for a relevant managed object. On top of this, an administrator can centrally notify end-users about upcoming events or even execute system downtimes. Additionally, the maintained work modes can be re-used in a configured technical monitoring scenario. This integration can contribute to optimization of monitoring concept by reducing a total number of occurring alerts. To achieve this, a defined special work mode will have an impact on a monitoring behavior, like switching off alerting during DB Backup run.

**Alert Management/Top Issues**

Another possible zone for the optimization is the analysis of top issues from the monitoring area. A continuous investigation of top N° issues (e.g. top ten), on a weekly or monthly basis can be done with a help of alert related tools like alert inbox and alert management reporting.
4 TRAINING

The following basic training courses are available for system administration:

ADM100 – SAP Web AS Administration I
Implementation of basic administrative tasks in a production environment

Course Content
Starting and stopping an SAP system
System configuration options
Configuration of online documentation
Configuration of periodic, automated work with a database, e.g. scheduling backups
Transport functions in SAP systems
Importing support packages and add-ons
Scheduling background jobs
Definition and integration of printers
Fundamentals of user administration
Setting up remote connections
Using system monitors
Fundamentals of SAP document archiving
Structured error searches
Fundamentals of system security

ADM102 – SAP Web AS Administration II
Performing additional administrative tasks that are not dealt with in the course ADM100

Course Content
Internet-based technology components:
- SAP Internet Transaction Server (SAP ITS)
- Internet Communication Manager (ICM)
- SAP Web Dispatcher
Globalization
- Several languages in one SAP system
- Several code pages in one SAP system and Unicode
Technical aspects of external communication:
- External mail server links using SAPconnect and SMTP
Extended Computer Aided Test Tool (eCATT)
Central user administration (CUA)
Directory services links using LDAP

ADM 200 – SAP Web AS Java Administration
Carrying out fundamental administration tasks during SAP Web AS Java operation

Course Content
Fundamentals of SAP Web AS Java
Installation of an additional Java instance for an existing SAP system
Starting and stopping
Basic configuration of SAP Web AS Java
User management
Monitoring
Patching for SAP Web AS Java
Change management for SAP Web AS Java
SAP transport management for Java
Other topics related to system administration

SM100 – SAP Solution Manager for Operations of SAP Solutions
Introduce the Operations and Support Tools of SAP Solution Manager.

Course Content
SAP Solution Manager Overview
Installation Overview
Customizing SAP Solution Manager
- IMG structure (Basic and Optional Settings)
Solution Monitoring
- System Monitoring
- Business Process Monitoring
Service Desk
- Service Desk Reporting
- Message Processing
Service Delivery
- Service Plan
- Issue tracking
- Maintenance Optimization
EarlyWatch Alert Reporting
Service Level Reporting
Solution Reporting
- Service Reporting
- Availability Reporting
- System Administration Reporting
Solution Manager Diagnostics
Change Request Management