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SAP Standards Exception Handling and Business Process and Interface Monitoring

Whitepaper

Active Global Support
SAP AG

SAP® Standards Exception Handling and Business Process and Interface Monitoring



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1 Management Summary

Managing complexity, risk, costs as well as skills and resources is at the heart of implementing mission critical support for SAP-centric solutions. The complexity rises even further with the trend of outtasking and outsourcing of process components. To help customers manage their SAP-centric solutions, SAP provides a comprehensive set of standards for solution operations.

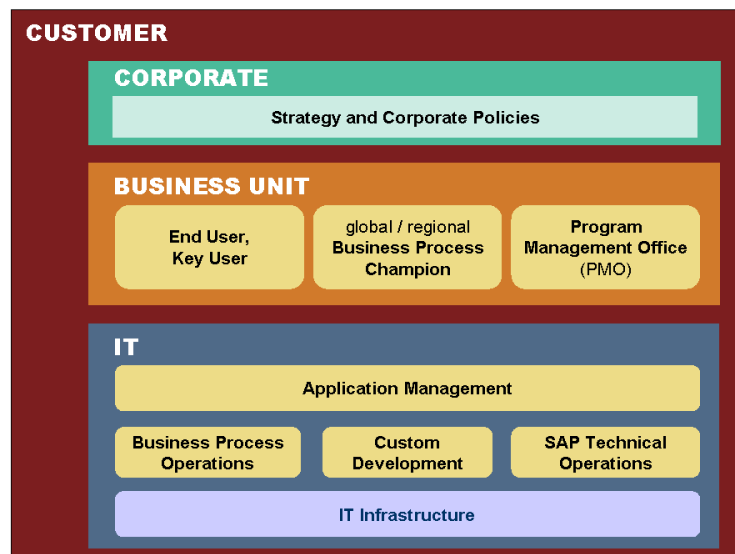
Out of this set of standards, the exception handling and business process and interface monitoring standards describe processes for the management of mission critical business processes. The exception handling standard explains how to define models and procedures to manage exceptions and error situations during daily business operations. The business process and interface monitoring standard describes best practices for monitoring and supervision of the mission critical business processes including critical interfaces.

This document provides details regarding the exception handling standard and the business process and interface monitoring standard. It explains the basic concept of the standards, describes the different steps within the process flows, and provides details on the implementation of the standards. This includes a description of the implementation methodology, information regarding the tools involved in the processes, and lists of training areas for the different roles involved. Finally, a list of key performance indicators helps customers to set up a reporting to measure the success of the implementation of the processes.

2 SAP Standards for E2E Solution Operations

Mission-critical operations is a challenge. While the flexibility of SAP-centric solutions rises, customers have to manage complexity, risks, costs, as well as skills and resources efficiently. Customers have to run and incrementally improve the IT solution to ensure stable operation of the solution landscape. This includes the management of availability, performance, process and data transparency, data consistency, IT process compliance, and other tasks.

Typically, multiple teams in the customer organization are involved in the fulfillment of these requirements. They belong to the key organizational areas Business Unit and IT. While the names of the organizations may differ from company to company, their function is roughly the same. They run their activities in accordance with the corporate strategy, corporate policies (for example, corporate governance, compliance and security), and the goals of their organizations.



The different teams specialize in the execution of certain tasks: On the business side, **end users** use the implemented functionality to run their daily business. **Key users** provide first-level support for their colleagues. **Business process champions** define how business processes are to be executed. A **program management office** communicates these requirements to the IT organization, decides on the financing of development and operations, and ensures that the requirements are implemented.

On the technical side, the **application management** team is in direct contact with the business units. It is responsible for implementing the business requirements and providing support for end users. **Business process operations** covers the monitoring and support of the business applications, their integration, and the automation of jobs. **Custom development** takes care of adjusting the solution to customer-specific requirements and developments.

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SAP technical operations is responsible for the general administration of systems and detailed system diagnostics. And the **IT infrastructure** organization provides the underlying IT infrastructure (network, databases, ...). Further specialization is possible within these organizations as well. For example, there may be individual experts for different applications within SAP technical operations.

Efficient collaboration between these teams is required to optimize the operation of SAP-centric solutions. This becomes even more important if customers engage service providers to execute some of the tasks or even complete processes. Customers have to closely integrate the providers of outtasking and outsourcing services into the operation of their solutions.

Key prerequisite for efficient collaboration of the involved groups is the clear definition of processes, responsibilities, service level agreements (SLAs), and key performance indicators (KPIs) to measure the fulfillment of the service levels. Based on the experiences gained by SAP Active Global Support while serving more than 36,000 customers, SAP has defined process standards and best practices, which help customers to set up and run End-to-End (E2E) Solution Operations for their SAP-centric solutions. This covers not only applications from SAP but also applications from ISVs, OEMs, and custom code applications integrated into the customer solution.

There are 16 standards for solution operations defined by SAP:

- **Incident Management** describes the process of incident resolution
- **Exception Handling** explains how to define a model and procedures to manage exceptions and error situations during daily business operations
- **Data Integrity** avoids data inconsistencies in end-to-end solution landscapes
- **Change Request Management** enables efficient and punctual implementation of changes with minimal risks
- **Upgrade** guides customers and technology partners through upgrade projects
- **eSOA Readiness** covers both technical and organizational readiness for enterprise service-oriented architectures (eSOA)
- **Root Cause Analysis** defines how to perform root cause analysis end-to-end across different support levels and different technologies
- **Change Control Management** covers the deployment and the analysis of changes
- **Minimum Documentation** defines the required documentation and reporting regarding the customer solution
- **Remote Supportability** contains five basic requirements that have to be met to optimize the supportability of customer solutions
- **Business Process and Interface Monitoring** describes the monitoring and supervision of the mission critical business processes
- **Data Volume Management** defines how to manage data growth



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- **Job Scheduling Management** explains how to manage the planning, scheduling, and monitoring of background jobs
- **Transactional Consistency** safeguards data synchronization across applications in distributed system landscapes
- **System Administration** describes how to administer SAP technology in order to run a customer solution efficiently
- **System Monitoring** covers monitoring and reporting of the technical status of IT solutions

Out of this list, this white paper describes the exception handling standard as well as the business process and interface monitoring standard.



3 Exception Handling Standard and Business Process and Interface Monitoring Standard at a Glance

During operations, exceptions may arise from within business applications. Effective and efficient handling of these exceptions is a crucial factor for both: an optimized total cost of operations and smooth business execution. The **exception handling standard** explains how to define a model and procedures to manage exceptions and error situations during daily business operations.

The advent of more complex and diverse business scenarios crossing application borders plus the immense volume of business transactions processed today require an exception handling that is scalable, open and central, and embedded into business operations and support processes. The business process champion and the responsible business process operations team have to define a model and procedures for handling exceptions and error situations during daily business operations. These procedures describe what proactive monitoring activities have to be executed to detect business-critical exception situations and what corrective actions are required in the given context. The procedures also describe who is responsible for certain activities in the business process operations team or the business unit. The execution of these procedures can be supported by monitoring and alerting tools within the business process and interface monitoring concept.

After the exception handling model has been defined, the **business process and interface monitoring standard** supports the monitoring of the mission critical business processes, enabling customers to identify problems long before typical IT alerts would be triggered.

Business process monitoring includes monitoring activities, alert and problem detection, notification of experts, error handling procedures, and well defined interface towards end-to-end root cause analysis (a separate standard).

Today's system landscapes are often decentralized and consist of various **interfaces** to different systems, legacy environments, where customers and vendors use different technologies. All those interfaces need to be monitored in terms of processing errors, backlog situations and performance.

IT operation has to ensure 100% data consistency. With an increased complexity of system landscapes, there is an increased risk of data inconsistencies. Specific data consistency reports have to be executed on a regular basis to ensure early detection of data inconsistencies. For disaster recovery purpose, detailed error handling and recovery procedures need to be defined.

The business process and interface monitoring standard enables customers to safeguard the smooth and reliable flow of the core business processes. As a result, this standard also ensures business continuity. In addition, establishing one central, proactive, and process-oriented strategy for business process monitoring reduces cost for solution operations by avoiding organizational redundancies.

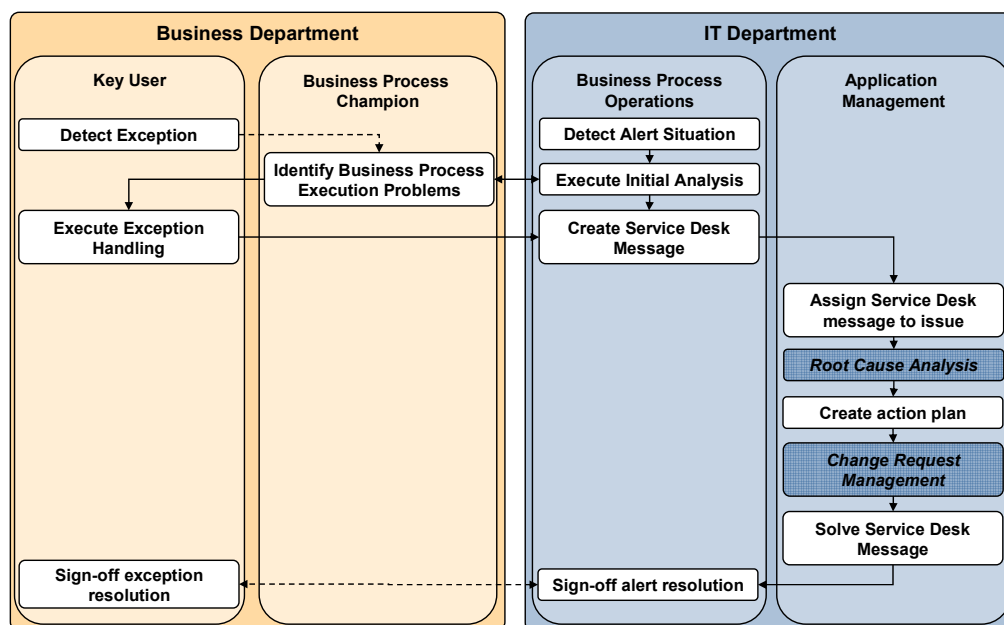
4 What are the Basic Concepts of the Exception Handling and the Business Process and Interface Monitoring Standard?

4.1 Architecture and Process Flow

The standards for exception handling and for business process and interface monitoring for a company's core business processes involve roles both from the business department and the IT department. Certain activities like the initial alerting and simple error handling procedures can be executed by the business process operations team within the IT organization, whilst the more detailed root cause analysis has to be carried out by the application management team.

The business department (both in the role of the key user or the business process champion) evaluates the business relevance of exceptions or alert situations and carries out business related error handling procedures.

Business process and interface monitoring should be executed using a central monitoring tool that provides access to all information relevant for executing the standard process. This includes information like the business process and interface documentation, error handling procedures, responsibilities etc. Since business process and interface monitoring can always result in the raising of incidents, the interface to the incident management processes should be well defined and supported by the monitoring tool. The interface to the change request management process should likewise be defined and supported by the monitoring tool.



4.2 Detect Alert Situation

The business process operations team executes the defined monitoring activity and within this activity detects the alert situation by comparing the observed situation to the defined thresholds or status values. An alert is raised if the observed value for the monitoring object is outside the limits defined by the thresholds or if the status of the monitoring object has reached a defined value. This way, it can be determined if a critical situation that requires further activities exists and exactly how critical this situation is, or if the business process is running successfully, meeting all business requirements.

If an automated monitoring tool is used, this alert detection happens automatically without user interaction. In case of an alert, members of the business process operations team should be notified via email or SMS. If no automated monitoring tool is used, the alert situation is detected manually as well.

Result of this step is a status rating for the monitoring object, detailing the status of the monitoring object at the time of the execution of the monitoring activity.

4.3 Execute Initial Analysis

The business process operations team carries out the initial analysis of the alert situation. This begins with the determination of the business relevance of the alert. It has to be identified which business processes, business process steps or interfaces are the source of the alert and which business processes, business process steps or interfaces are affected by it.

For each business critical alerts, the initial error handling procedures documented for the business process operations team are carried out within the initial analysis. These error handling procedures are stored in a central location and accessible to all involved parties. They include procedures like unlocking a user or restarting a job and do not require in-depth knowledge of the involved business processes.

4.4 Detect Exception

At the same time, it is possible that the key user or one of the end-users assigned to him identifies an exception during daily work, independently of the business process operations team. An situation is defined as an exception if the successful execution of the business process is hindered by the situation.

The key user uses the exception handling procedures available to him to determine the cause of the exception and to solve the exception situation. If these procedures do not succeed in solving the exception, the key user contacts the business process champion to verify if the exception was caused by insufficient execution of the business process.

4.5 Identify business process execution problem

Business process operations works in close collaboration with the business process champion to determine if problems within the execution of the business process execution have caused the alert situation or the exception.

4.6 Execute Exception Handling

The key user executes applicable error or exception handling procedures if these have been identified by the business process champion.

4.7 Create Service Desk Message

If the available error handling procedures are not sufficient to solve the alert situation, a service desk message is created by the business process operations team to forward the alert or exception to the application management team. This service desk message contains the description of the problem (expected behavior compared to observed behavior), steps that lead to the problem and error handling procedures that have already been applied.

4.8 Assign Service Desk Message to Issue

The application management team starts by identifying if the service desk message is related to any known issues. This might include general issues concerning the relevant business process, issues regarding support operations or issues regarding the technical infrastructure of the systems involved. Thereby it can be ensured that the root cause analysis is aligned to the overall root cause analysis strategy.

4.9 Root Cause Analysis

The root cause analysis is carried out according to the roadmaps and procedures defined in the standard for root cause analysis. The analysis is triggered by the application management team, but is not restricted to members of this team.

Further communication with the business department, both via the business process champion or the key user may be required to determine the root cause of the alert or exception and to evaluate the business significance of the problem. On the other hand, it might be necessary to have further communications with the business process operations team or with experts outside the customers own support organization to determine the root cause of the problem. This includes the final forwarding of the problem to SAP.



4.10 Create Action Plan

Once the root cause is found, countermeasures for solving the alert situation are determined and bundled within an action plan. The execution of the involved action items may result in changes to the solution or changes to the business process and interface monitoring concept and therefore has to be realized via the change request management standard.

4.11 Change Request Management

The execution of the change request management follows the process defined in the change request management standard. It is triggered by the application management team, but not restricted to this team. Business related action items may be executed by members of the business department, whilst technology related action items are executed by members of the IT department.

The final root cause and the successful error handling procedures are documented. Parts of the error handling procedures that can be executed by the business department directly or by the business process operations team are communicated to the respective team and included in the existing business process and interface monitoring concept.

4.12 Solve Service Desk Message

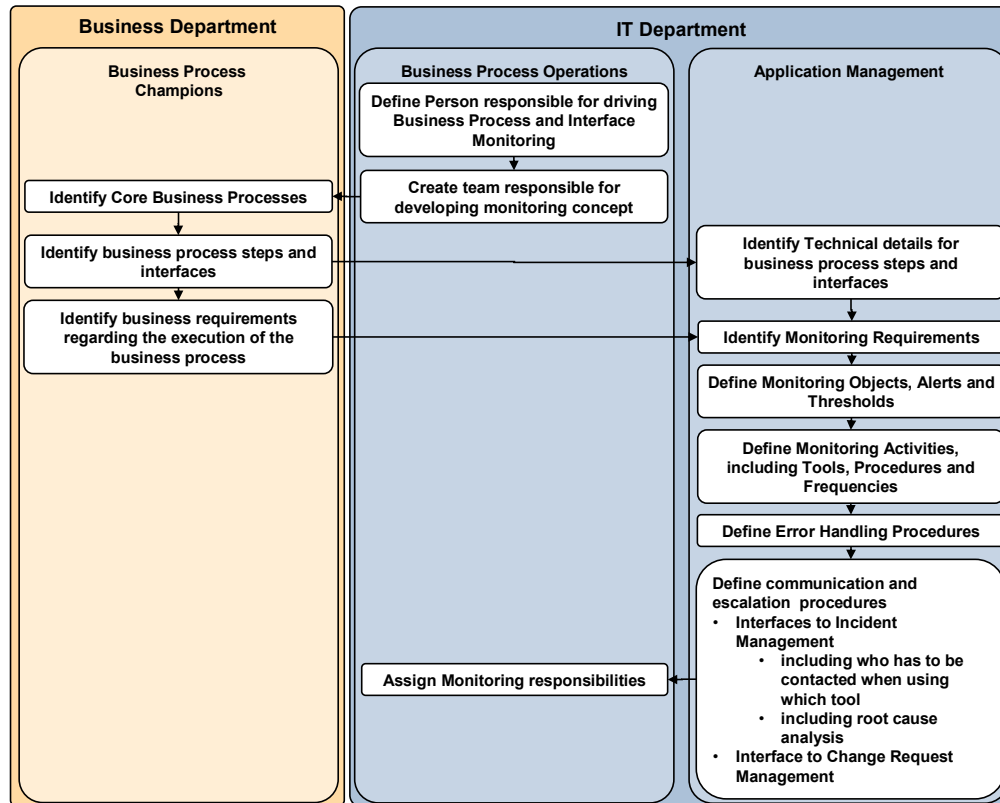
Once the measures for solving the alert situation have been successfully applied, the application management team communicates the problem resolution to the business process operations team and closes the service desk message, indicating that from application management side the problem has been solved. The final closing of the service desk message depends on the sign-off by the business process operations team or the business department.

4.13 Sign-off Alert Resolution

The business process operations team signs off the alert resolution, whilst the key user signs off the exception resolution. Until the sign-off, the problem resolution is not considered to be final.

5 How to Implement the Business Process and Interface Monitoring Standard?

5.1 Methodology



The setup of Business Process and Interface Monitoring starts with the definition of a member of the business process operations team responsible for developing and driving the Business Process and Interface Monitoring concept. This responsible person initiates a team responsible for the creation of the monitoring concept. This team contains designated members of business process operations and application management. During the creation of a business process and interface monitoring concept, detailed application knowledge is required that normally is not available within business process operations, thus application management has to provide a lot of the expertise during the creation of the monitoring concept.

The team contacts the business process champions to determine the core business processes. Within these processes, the business process steps and interfaces and business requirement regarding the execution of these business process steps and the processing of the interfaces are identified in closed collaboration between the business department and the application management team of the IT department.

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Based on the requirements, monitoring objects are defined. By regularly checking these monitoring objects later, on you can ensure that the business requirements are met. Monitoring objects can be of the following types:

- **Error Monitoring:** This includes the monitoring of all error situations documented within the system. Error situation can be identified by the occurrence of error messages or error statuses. Purpose of this monitoring is to recognize and resolve error situations within the solution.
- **Throughput Monitoring:** This includes the monitoring of processing volumes for business process steps and interfaces. Purpose of this monitoring is to recognize a business critical increase or decrease in the processed data volume.
- **Backlog Monitoring:** This includes the monitoring of backlogs within the solution. Purpose of this monitoring is to recognize growing backlogs which indicate that the business process is not functioning properly or that end users bypass the defined business process.
- **Performance Monitoring:** This includes the monitoring of processing times for transactions and reports within a solution. Purpose of this monitoring is to identify a business critical increase in processing times.

The definition of the monitoring object includes the technical specification of the involved reports, transactions, interface techniques etc. as well as the definition of alerts. The alerts are defined with comparative value against which the measured values will be compared and thus an alert status can be raised.

For each monitoring object, activities are defined which are supposed to be carried out as part of the monitoring. Within these activities, the monitoring tools, monitoring procedures and monitoring frequencies are defined. In addition, error handling procedures that can be carried out by business process operations or by the business departments are defined. This way, the load caused by application related problems on the application management team is reduced from the start. Procedures and responsibilities for keeping this documentation up to date are defined. This documentation does not have to be stored centrally, but has to be accessible centrally. Ideally, a central monitoring tool should be used for the business process and interface monitoring. The access to the monitoring relevant documentation should be integrated into this monitoring tool.

The communication and escalation procedures (who should be contacted and how) that should be used if the error handling procedures are not sufficient to solve the alert situation are defined. These paths and procedures have to be integrated into the incident/problem management process wherever this process is used. The interfaces to the incident/problem management process and the change management process are defined, so that incidents and requests for change are addressed and properly followed up. The incident management process and change management process are adjusted where needed so that they fit the business process and interface monitoring concept (e.g. via the creation of new incident areas etc.).

The monitoring responsibilities are assigned to persons within the business process operations team. It is ensured that these persons have access to all relevant documents.

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The interface between exception handling and business process and interface monitoring is defined.

In order to detect long-term trends within the business process execution, the monitoring objects relevant for long term reporting are identified. For each monitoring object it is determined whether the number of occurrences of alerts or the measured value is relevant for long term reporting. Reporting activities are defined, detailing the reporting period, reporting frequency, reporting content, reporting tool and reporting procedure.

The interface to the service level management process is defined. This includes the forwarding of service level agreement relevant reporting information to the business units. The execution of the reporting activity is assigned to a member of the business process operations team.

In general, the business process and interface monitoring concept should be part of a comprehensive solution monitoring concept, so that both the purely technical and the more application related aspects of the solution are monitored proactively.

Besides changes to the business process and interface monitoring process that are initiated from within the process, a regular review (yearly or biennial) of the business process and interface monitoring concept should take place in order to ensure that the concept is aligned to the current business processes and business requirements. This review is triggered by the member of business process operations responsible for driving the business process and interface monitoring concept.

SAP Solution Manager can be used as a central monitoring tool for business process and interface monitoring. It provides automated monitoring functionalities for various technical and application related areas. Furthermore, it provides central access to all monitoring relevant documentation and to SAP tools for error handling. The business process monitoring functionality within SAP Solution Manager is integrated into the service desk functionality within that tool.

SAP provides a best practice for business process management that details how to create and implement a business process and interface monitoring concept. SAP provides an onsite service "SAP Business Process Management" during which SAP consultants set up a business process and interface monitoring concept at a customer for one or two core business processes and provide knowledge transfer regarding the implementation methodology and the determination of suitable monitoring objects. The implementation of a business process and interface monitoring concept with SAP Solution Manager can be part of this service delivery.

5.2 Tools

To realize the different activities within a business process and interface monitoring concept, the following tools/functions are used:

- Monitoring tools (can be several, depending on monitoring objects) to gather information for the monitoring objects and evaluate the alert statuses

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- Tool for business process documentation to document the business process flow and the technical details behind the business process steps and interfaces
- Tool for documentation of monitoring activities, error handling procedures and communication and escalation paths and procedures
- Notification tools for communication of alerts to alert the first level application support or forward the alert to the second level application support
- Tools for root cause analysis (can be different tools, including SAP transactions) to determine the cause of the alert and solve the alert situation
- Tool for logging alert history and for logging alert confirmation and comments for alerts to provide a central documentation of the alerts that occurred and their processing/solving status
- Incident/problem management tool to forward alerts to the next support level or other team within the support organization. This tool should support the escalation procedures defined within the incident/problem management process.
- Reporting tool for identifying long term trends within the process execution and the alert occurrence.

Though the observation of the different monitoring objects requires different monitoring functionalities, these should be integrated in a central automated monitoring tool. This monitoring tool can then serve as a central entrance point for all monitoring activities. By using automated functionalities wherever possible, the manual effort for monitoring is greatly reduced.

Into this central monitoring tool, the documentation of the business processes should be integrated so that this information is accessible directly from the monitoring tool. The link between monitoring object and business process step / interface should be provided automatically within the monitoring tool, preferably by a graphical representation of the business process and the corresponding alerts.

Into this central monitoring tool, the documentation of responsibilities, monitoring activities and error handling procedures should be integrated as well, so that the person recognizing the alert has immediately access to all information relevant for solving the error situation.

5.3 People

The following roles are involved in the business process and interface monitoring standard:

- **Business process operations** – responsible for executing the monitoring activities, for determining the alert statuses, for applying the available error handling procedures and for forwarding the alert to application management if these procedures are not sufficient to solve the alert situation. The Business Operations Team is the owner of the alerts, meaning that they follow up on the resolution status of alerts forwarded to other support teams and escalate if the alert resolution is not provided within the agreed time spans. Business process operations is also responsible for the long term reporting and identification of business critical trends for the occurrence of alerts or trends within the business process flow.

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- **Application management** – first addressees for alerts that cannot be solved by business process operations. People within the application management team should have considerable application knowledge in order to perform root cause analysis for alerts.
- **Person responsible for business process and interface monitoring concept** – responsible for creating a business process and interface monitoring concept and for regular reviews of the monitoring concept. This person should be a member of the business process operations team who understands the purpose and methodology of creating a business process and interface monitoring concept. Application knowledge for the relevant business processes is of advantage, but not required. Wherever business knowledge or application knowledge is needed, this person gets in contact with members of the business units or the application management team to obtain the relevant information.

Everybody involved in the business process and interface monitoring concept has to be trained in the structure of the process for business process and interface monitoring. Each involved role has to be trained in the usage of the tools and procedures that are relevant for this role. In particular, this means the training for the following tools and procedures:

- **Business process operations team:**
 - Training in the structure and procedures of the business process and interface monitoring process
 - Training in the usage of the monitoring tools and the tools for root cause analysis
 - Training in the structure and content of the business process documentation and error handling documentation and training in accessing the documentation (where can I find the relevant information)
 - Training for the communication and escalation paths and procedures (how is the next support level contacted if the error handling procedures are not sufficient to solve the problem, what kind of information has to be provided to the next support level). This involves training regarding when and how the incident/problem management process is used.
 - Training in the handling of the alert history
 - Training in usage of the reporting tool and the identification of critical trends
- **Application management team:**
 - Training in the structure and procedures of the Business Process and Interface Monitoring process
 - Training in the usage of the monitoring tools and the tools for root cause analysis
 - Training in the structure and content of the business process documentation and advanced error handling documentation and training in accessing the documentation (where can I find the relevant information)
 - Training for the communication and escalation paths and procedures (how is the next support level contacted if the error handling procedures are not sufficient to solve the problem, what kind of information has to be provided to the next support level). This involves training regarding when and how the incident/problem management process is used.



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- Training for root cause analysis procedures for the involved business processes (expert application knowledge is required for this role)
- Responsible for business process and interface monitoring concept
 - Training in the functional scope of the monitoring tools
 - Training in the structure of the business process and error handling documentation
 - Training in the methodology and purpose of implementing a business process and interface monitoring concept

6 How to Measure the Success of the Implementation?

With an established business process and interface monitoring process the application related support aims toward proactive procedures. This means that instead of reacting to end user complaints (for instance in the form of incidents opened by end users) the support procedures tend towards avoiding these incidents to begin with. By identifying possibly business critical situations in the solution before they have a significant impact on the execution of the business processes, the application support has more time to react and solve the situation before a business process stand still has occurred. Thus, the benefits of the standard process for business process and interface monitoring are the following:

- Increased end user satisfaction in application support
 - By reacting to possibly critical situations before the end users work is impacted the end user has to open fewer tickets and gains a higher trust in the solution and the work of the Application Support
 - In order to measure this benefit, the number of tickets opened by the end users (either in total or in certain application areas) should be considered.
 - Measure the monthly number of tickets opened by end users in the relevant application areas. The monthly number of tickets opened before the implementation of a business process and interface monitoring concept should be compared to the monthly number of tickets opened after the implementation of the monitoring concept. Identify the percentage of tickets opened previously that would be avoided by implementing the monitoring concept. The target number of tickets should be the percentage that cannot be prevented by the monitoring concept.
- Decreased business process downtime
 - By reacting to possibly critical situations before they have become severe, the problem can be solved before the business process is brought to a standstill.
 - In order to measure this benefit, the total monthly business process downtime should be considered.
 - Measure the current monthly business process downtime. Identify which business process downtime could have been prevented by the monitoring concept. The target monthly business process downtime should be the time that could not have been prevented by the monitoring concept.
- Decreased bypassing of defined business processes by the end users
 - By monitoring backlogs within the systems it can be ascertained that the end users follow the defined business process procedures. Thus, the stable and reliable flow of the business processes can be ensured and process disruptions and even down times can be reduced.
 - In order to measure this benefit the size of the backlogs should be considered.

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- Measure the backlogs and the trends for the backlog size before the implementation of the monitoring concept. Based on this, determine with the business acceptable backlog sizes that serve as target KPIs.
- Improved performance, throughput & stability of business process
 - By monitoring the performance, throughout and stability of the business processes, by solving alert situations in the business process execution, by reporting over the number of alerts and trends for the business process flow, and by finding the root cause of critical trends and applying counter measures, the business process performance, throughput and stability improves and becomes stable at an improved level (considering that no changes to the solution have taken place)
 - In order to measure this benefit, the number of alerts that have occurred should be considered.
 - Measure the number of alerts that have occurred. After a defined “warm up” period, the number determines the number of alerts that can be handled by application support (both first and second level). The number of alerts should decline and stabilize at this level.
- Improved resolution time for error situations
 - By using a systematic approach to identify possible error situation and supplying error handling procedures, the resolution time for error situations is greatly reduced. Expert resources have to spend less time with error handling that can be handled by first level application support and thus have more time for solving advanced error situations. In addition, the problem resolution is not delayed by first level application support trying to solve problems that go beyond their expertise.
 - In order to measure this benefit, consider the resolution times for alerts originating from within the business process and interface monitoring and from application related incidents.
 - Measure the average monthly resolution time for application related incidents before the implementation of the monitoring concept. This number is the target for the alert resolution and application related incident resolution time. The average monthly resolution time for alerts and application related incidents should decrease from this level.

For the reporting purpose, data that was obtained during the long term reporting over the occurrence of alerts and trends within the business process flow can be used to measure the benefits of the business process and interface monitoring concept and thus can be made visible to the business units.



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