IT Service Management Reference Architecture Series

IT Service Management

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1. Executive Overview

Information Technology Service Management (ITSM), is a set of well-defined Services focused on the management of IT infrastructure, components, business applications and associated processes. Multiple industry groups have well defined recommendations on the services, processes (and their relationship to each other), that can be used to solve a business need or requirement: Information Technology Information Library (ITIL), Control Objectives for Information and Related Technology (COBIT), the emerging IT4IT by the The Open Group, and others.

Along with the defined services, there is the additional concept of “maturity level”. These maturity levels assist corporations with determining whether these services must be core capabilities (e.g. well defined, automated, measured, etc.), or something that’s done ad-hoc as needed (for instance an inventory process between a small business with two (2) servers and a large multi-national corporation with hundreds of thousands of servers).

While some services can be completely stand-alone (for instance inventory), the greatest value of an ITSM is the ability to interconnect and deliver a solution that is greater than the sum of the parts. As an example, using the inventory capabilities to drive automated patching, license management, break fix actions, etc. Using automation to provision a server, deliver a patch, update an application as part of DevOps, all of these come about due to the integration and use of ITSM services in an Enterprise fashion.

The final piece to ITSM is that the tools/products/solutions used should support your processes, not necessarily force you to change what you have. However, in some cases, if this is your first entry in delivering an ITSM service, the solutions chosen should come with a set of well-defined best practices or patterns for success that give you a starting point versus you having to start from scratch.

When properly implemented, ITSM solutions help IT Operations teams to effectively manage increasingly complex, hybrid environments and accelerate Cloud services delivery. These solutions deliver advanced automation, performance management and orchestration capabilities. IBM has provided thought leadership to improve the 'state of the art' in IT Service Management for the past 30 years and continues to do so, whilst effectively delivering solutions and successfully managing client environments.
2. Introduction – IT Service Management

This whitepaper discusses some of the key features of IBM’s IT Service Management solutions and their use cases. It includes a partial discussion of key functional components, entry points and a basic implementation strategy to support your ITSM journey. As an introduction, let’s first define IT Service Management.

2.1 ITSM

IT Service Management refers to the sum of processes and practices required to manage and support Information Technology services. ITSM practices are meant to support, in a vendor independent way, the full spectrum of IT services from network to application to complete business services. Service Management process framework and standards such as ITIL, IT4IT, eTOM or COBIT have contributed to define standard operation procedures and supporting services within organizations while providing quality and efficiency gain for IT Operations teams.

In general, ITSM encompasses the following:

- Methods, tools and processes by which IT departments support and enable their ecosystem to deliver business services
- Framework by which effectiveness and value of IT services are measured
- Support for Agile and Waterfall DevOps integration
- Support both engineering and operations domains
- Ability to apply to both pre-production and production phases/environments

In today’s complex environments clients are challenged to deliver innovation and business value faster while optimizing operations. Operation teams need to support on-premise, off-premise Cloud and hybrid infrastructure services and integrate them with their current ITSM assets and deliver with speed and agility. Managing increased operational complexity, responding to continuous changes while providing operational feedbacks to the entire Operations team are the key challenges IT Service Management addresses.

IT Service Management domains and capabilities include, but are not limited to:

- Hosting a catalog of IT services, facilitating and coordinating the efficient request for and fulfillment of those services
- Managing Business Process Availability & Resiliency through the enabling technology
- IT Service Assurance – including Health/Performance of as well as Identification, Analysis and Resolution of issues associated with technology-enabled services
- Full life-cycle management of IT assets – be it hardware, software, application or virtual (e.g. cloud)

In addition to supporting cloud and hybrid infrastructure services, ITSM also plays a key role supporting Agile and DevOps practices and objectives such as:

- Configuration management to ensure consistent environments across development, test and production.
- Incident Management to enable timely corrective actions.
- Infrastructure and application performance management to provide the continuous monitoring required for sustained application quality.
- Business service management to provide business dashboards powered by analytics giving your stakeholders continuous business feedback allowing them to adjust their plans

Finally, IT Service Management practices and tools enable and ensure consistent and reliable operation to the corporation and provide feedback to all stakeholders. Without them, projects would be hard to steer in the
continuously evolving route traced by your business innovation needs. The following sections will present the IT Service Management business value, use case, architecture and deployment strategy to enable ITSM in your organization.

### 2.2 ITIL and ITSM

As mentioned, ITSM is the set of tools and process utilized to manage IT Services and support the delivery and management of business services. ITIL however, is a best practice framework of IT processes that support the implementation and delivery of ITSM. ITIL consists of a series of 5 core books that are focused on the areas of Service Strategy, Service Design, Service Transition, Service Operation and Continual Service Improvement.

ITIL Supports ITSM in the following ways:

**Service strategy**—is the planning stage in which you are striving for an effective means of delivering services. At this stage you look strategically at how you can leverage the capabilities of technology and business processes and provide guidance on how to effectively design and development of service management capabilities as a strategic asset.

**Service design**—Planning and building next-generation service architectures across on-premise, cloud and hybrid infrastructures. Here we need to design for scalable and cost effective services taking into account the infrastructure, applications and service management technologies which will be used to manage the services.

**Service transition**—At this stage we are looking at core IT Service Support Management (ITSSM) processes focusing on workflow and effective means of moving services into operations. Here we look at automating the configuration, change, and release flows too effectively deploy these services into production.

**Service operation**—At this point we are effectively managing the services on a day to day bases. We are assuring the availability and performance of business services and infrastructure. We employ monitoring and automation to improve the reliability of services and ensure we have sufficient capacity and resilience built in the services to maintain service operation.

**Service improvement**—Here, we provide continual improvement of services and solutions through greater visibility and integration of tools and processes. We gather metrics and measure KPI’s to understand the levels of service maturity and ensure we are providing our customers with expected quality service. We focus on the full service lifecycle and understand where we can provide improvement in the operation of services.
3. Considerations and Motivation (Business Value)

One of the key goals of ITSM is that it must support the organizations business objectives. One of the key messages from IT managers that we see today is that you need to do more with less. ITSM allows you to put in place the people process and technology to make this a reality.

As we implement ITSM the value can be realized in many different areas:

- **Drive efficiencies** in business processes and asset utilization - By combining an approach that addresses all aspects of people process and technology you are able to bring together the framework for enhancing the Service Management experience for development, operations, and end users. Implemented correctly, ITSM allows for greater visibility, control and automation of your environments. By gaining insights into your operations and better managing services, you can better utilize your resources and focus on business requirements.

- **Increase delivery velocity and quality** of new business services. Implementing ITSM follows a prescriptive proven methodology combined with solutions that help you automate key aspects of your environment. Once the solutions are in place and repeatable processes such as ITIL have been implemented, Service Management becomes a streamlined and repeatable solution. In addition, ITSM allows you to define and measure Key Performance Indicators (KPIs). By understanding and tracking these KPIs you can not only understand how well you are meeting your objectives but can also understand trending and take corrective action in to ensure there are no missed service level agreements (SLAs). Plans can be put in place to correct issues before they occur and ensure you are able to meet your business objectives.

- **Enhanced integration** - ITSM allows for integrated systems and sharing of information across solutions. It allows data to be integrated across all areas of on-premise, cloud and hybrid environments. Many organizations have gotten into the habit of implementing “best of breed” point solutions. While siloed tools may provide for deep dive into specific solutions, they can delay problem resolution and hamper the ability of IT to ensure that SLAs are met. ITSM pulls together information from disparate systems into a single view to provide for both efficient visualization and consolidation of events as to enable correlation of information.

- **Resolve problems faster** for increased quality of service and reduced costs. By automating key aspects of your Service Management environment you can quickly understand issues before they affect end users and provide resolution. In the event customers are affected; automation allows you to quickly take corrective action to minimize the effect of an outage. Automation spans across your on-premise, cloud and hybrid environments to provide efficiencies such as:
  - Automated detection of issues through instrumenting your applications for monitoring key components of your business applications
  - Event analysis and root cause analysis helps to quickly isolate issues and get them to the proper group for resolution
  - Runbook Automation which allows for repeatable procedures and provides operations with defined solutions to quickly resolve issues.
  - Workflow automation to streamline ITSM process such as Configuration, Asset, Change, Incident and Problem Management.

- **Predict & prevent issues** before they impact end users. IT Service Management solutions generate a significant amount of data. This ranges from logs to alerts, Service Desk artifacts, messages and metrics. IT Analytics in ITSM solutions allow you to consolidate analyze and correlate this data and utilize it to predict emerging trends and potential problem areas before they effect delivery of business services. When issues do occur, information is quickly analyzed to help discover underlying issues and allow you to quickly identify root cause and resolve the issue.
4. Use cases

The full breadth and depth of ITSM use cases is beyond the scope of this whitepaper. However, the following section describes common use cases seen within the majority of corporations and illustrates the need and value statements that ITSM can provide.

4.1 Enterprise Visibility, Control and Automation

In a heterogeneous environment of tools, infrastructure and organizations, there is no single point of visibility for operational information and automation that can cross these boundaries. This lack of visibility is driving inefficiencies and increasing the cost of delivering services. Lines of business, IT, production, and customer management teams, as well as the processes, tools, and information they depend on, must align around a common set of objectives to ensure that service quality is maintained, costs are controlled, and risks are effectively managed. This will require a more integrated service management approach—one that extends beyond IT and that can leverage and improve visibility, control, and automation across business and IT assets, people, and processes.

In order to accomplish this we need a solution set that can accomplish the following:

**Visibility:** Detailed domain specific dashboards need to be created for the various roles including subject matter experts and executives as to provide views into your environment while indicating status as well business metrics if so desired. In addition, there needs to be a way to create customizable dashboards tailored to specific views bringing in data from multiple sources. The views allow users to see the health and performance of services and as well as KPI’s to understand how well you are meeting business objectives against KPI’s.

**Control:** In today’s complex environments, it is essential that you can control governance, and compliance of applications, endpoints and assets. You must be able to provide protection of critical data and prevention of outages. Unmanaged change results in one of the biggest causes of issues and outages in services. You need a way to be able to effectively manage change in your environment. This includes a process of change control as well as automated methods to distribute software and maintain compliance. In addition it is critical to understand and manage the IT Assets as to understand and enforce license compliance and manage the assets throughout their life cycle.

**Automation:** To provide for effective Service Management you need to build agility into your operations. You need to be able to improve work-flow integration and automation across silos, tools, technologies, information and processes. In addition you need to reduce time to market as well as operational costs.

4.2 Detect to Correct

The IT landscape continues to become more complex as we move in to cloud based architectures and hybrid environments. As these environments continue to evolve the challenge of managing them becomes increasingly difficult. Being able to detect issues in the environment and understand the underlying root cause is a significant undertaking and requires cooperation from the many different domains across the IT landscape. Every aspect of the environment must be monitored as to understand how the business applications are constructed and how the different components that make up the applications are affected when a problem is encountered. This includes but is not limited to:

- Servers
- Processes
- Middleware (i.e. Databases, Web Servers etc.)
- Transactions
- Network components
All of these components are critical to the efficient operation of the business applications

In addition to understanding the different components of the underlying infrastructure of the applications, you must have the ability to sort through the events that come from the various components to understand the relationship to determine the root cause when an issue is encountered in the environment. Once the root cause is understood, the next step is to determine what to do to resolve the situation. This could be one of several steps. For example, some automation may be invoked to take corrective action.

On the other hand, if it is not readily apparent what is causing the issue then an incident may be automatically raised and the resolved through that route. In some instances corrective actions may be available via knowledge bases or existing run books. In other cases a configuration or code change may result. In that case the incident may initiate a change request that must be fulfilled and competed to resolve the issue. To allow for the change request, there must be a complete understanding of the configuration that makes up the application so that you are aware of how any change might affect the rest of the environment.

In other cases, a work around may be available but the underlying issue may require more extensive research which in turn may result in a problem record being raised and followed through.

In any of these cases, the important thing is to make sure that the solutions and their linkages are in place to route the issue to the appropriate process so that it can be worked to resolution.

4.3 Umbrella Management

The IT environment of a company spans many different IT domains, varying from applications running on mainframes, database appliances, private cloud systems, various storage environment, and network infrastructure. Each of these domains can have its own monitoring tool, making it difficult for IT Operations to effectively monitor and manage the entire business and take the necessary corrective action. An IT Operator’s primary job is to quickly triage outage situations and try to correct the problem.

When monitoring a heterogeneous environment with different systems, applications, infrastructure, and enterprise management systems, the business need arises for a consolidated event dashboard for IT Operators to view and take action on events from various sources. Without a consolidated event dashboard, IT Operators do not have a single view into the health of the business. IT Operators require the ability to take ownership of issues in the IT environment, and leverage automation tools to assist in tracking, delegating and troubleshooting issues until they are completely resolved. IT Operators must have a single pane with integrated event data and visibility into the entire organization to determine root cause and take action to rectify the problem.

In addition, there needs to be a means to automatically interrogate associated systems for additional information about issues in the environment and enrich the events so that Operations have the most up to date information about the state of the environment when an issue occurs. This information should be able to be correlated and automated root cause analysis should be performed. At this point, additional actions should be able to be enacted such as automatically opening an incident or kicking of some runbook or automation routine to correct the issue.

4.4 Request to Fulfill

Today’s businesses are focused on services and the delivery of those services to the consumer in the manner in which they require. IT Operations teams must deliver services to their “customers” (end users) in a consumable and well defined way. This requires Operations to understand not just their own offerings such as security providing firewall protection or the asset teams providing laptops or tablets, but how they can combine services into a consumable value focused offering for their customers.

It can be complex for Operations to bring together the IT components spread across disparate teams to deliver a service and a consumable experience for the user of a business service. In today’s environments,
organizations can provide multiple offering catalogs to try and address the needs of their users. The challenge we have is creating a single offering catalog that spans multiple organizations. How does IT Operations collaborate with the various organizations to offer a single catalog for the users to navigate and find what they require with a single request? This requires extensive collaboration and a strong understanding of the following:

- the specific needs of the user
- how to bring the various IT components together as a single solution or service
- the non-IT components to ensure they are in support of the services
- the value the service or solution has to the business and users
- cost and the need for chargeability or allocations
- where automation can provide extensive value and is a requirements versus manual delivery

It is no longer viable or efficient to maintain multiple service catalogs. Operations teams must be able to maintain a single catalog that accommodates the momentum of the changes and is able to adapt to the IT functions and services that users require to support the business services.

Request to fulfill requires the Operations to understand their capabilities and functions across the organization in order to ensure traceability of the service create services with value to the requester and ensure the service site can be found and navigate the user to the requested service. Most importantly, you must ensure the service can be delivered timely, within the expectations of the user and ensure it is supportable at a cost the business can afford.

In order to deliver the services in a timely and effective manner and to be able to effectively account for the cost of the service, the catalog must be able to integrate with automated delivery mechanisms and must have financial accountability.

4.5 IT Operations analytics and Dashboards

The ITSM solutions support a large variety of consumers, from the technical such as network operators and middleware subject matter experts to the business oriented such as Line of Business owners and also consumers that straddle both fields such as project and delivery managers.

Each of these serves and is served by the preceding use cases in different ways. The one common denominator is that in order to best achieve their goals the users require data that has been consolidated and prioritized and is presented in a way that enables rapid, and even preemptive, response.

The ever changing and expanding IT environments presents challenges which are insurmountable without the aid of machine optimization. By using techniques that include a combination of extracting the most pertinent information using Analytics and presenting it in the most efficient way using dashboarding technologies.

- The information displayed in the single pane by the management system needs to be optimized in such a way as to extract and display the pertinent information that is actionable and prioritized.
- When visualizing information, Analytics is used to match KPIs and service health in ways which users may not have expected and predict issues before they affect customers.
- Detection and display of root cause is done using Analytics in order to search for and find data and relationships between data that the user does not know exist.
- Analytics enables user to cross organizational boundaries in their understanding of the different events affecting the services which are under their responsibility, thus allowing them to respond in a more timely fashion.

All these capabilities allow the users to "shift-left" their actions and shorten the time that it takes them to respond to events and allow them to prevent events from affecting their customers.
5. ITSM Reference Architecture

In today's complex environments clients are challenged with the need to maximize existing on-premises assets while utilizing the Cloud for speed and innovation. With IBM IT Service Management clients can build, run, and manage applications, IT, and assets running either on-premises, in the cloud, or across both (hybrid). Collaboration is enabled across Development and Operations to automate business and IT processes, to achieve performance insights with analytics and to optimize inventory.

ITSM solutions help IT Operations teams to effectively manage increasingly complex, hybrid environments and accelerate Cloud services delivery. These solutions deliver advanced automation, performance management and orchestration capabilities. IBM has provided thought leadership to improve the 'state of the art' in IT Service Management for the past 30 years and continues to do so, whilst effectively delivering solutions and successfully managing client environments.

The diagram below depicts the multiple tiers and integration points within an ITSM solution. While these services can be implemented stand-alone, the true strength of any ITSM solution is in the integration and use of ITSM as an Enterprise-wide service.

5.1 The IBM ITSM Reference Architecture

As seen in the diagram above, key functionality and integration points have been identified in the numbers located within the drawing. These include:

1. **IT resources**

   Multi-vendor, heterogeneous networks, servers and applications are managed using a number of ITSM capabilities. These services are spread across on-premise, cloud and hybrid infrastructures and include distributed as well as mainframe resources.
2. **Performance Management**

With the disruptive, mobile, agile, high demand nature of technology in business today it is imperative to understand how your applications are meeting the needs of your customers. IBM Application Performance Management (APM) solutions provide the ability to manage the performance and availability of your applications and infrastructure. This solution can identify bottlenecks and quickly detect the root cause of application performance problems. The IBM solution provides the features to Control, Visualize and Automate the performance management environment. APM is customizable to fit the needs of the CIO, the line of business owner, operations and development.

The necessary capabilities for Performance Management are available:

- OS Monitoring
- Application Component Monitoring
- Deep Dive Diagnostic Data of Application Components
- Synthetic Transactions
- Transaction Tracking
- Best Practice out of the box monitors
- Reporting
- Hybrid Management for Cloud and on premise deployments

APM integrates with other solutions such as Incident Management, Automation, Predictive Analytics, Dashboarding and Cognos reporting.

With a broad depth of agents and the ability to create your own custom agents, the IBM APM solution is a valuable contributor to the Service Management Life cycle.

3. **IT Operations Management**

Netcool Operations Insight (NOI) combines the market leading capabilities of the IBM Event Management solution with the transformative capabilities of IT Operations Analytics all in a single solution.

NOI provides cross domain, correlation, enrichment and consolidation of millions of alerts/alarms and operational data into single Operational view as well effectively help identify the root cause of a problem. So it basically helps reduce the number of generated events into a much smaller subset of actionable problems.

NOI leverages Search and Event Analytics to provide operations with additional insight from both real-time and historical perspective that further help drive efficiencies for more agile and leaner operations.

The Analytic capabilities it provide helps reduce Operator loads by identifying difficult to find hot spots, visualize a client’s most frequent events or identify events that are related to the same problem or incident and automatically group them together. All for the purpose of helping operations become more efficient in accelerating the Operations Life Cycle, moving from detecting a problem to.

NOI is also tightly integrated with IT Operations Analytics portfolio that allows our clients to easily extend NOI with performance based analytics used to helping clients predict outages or providing early warnings of emerging problems so they can act to prevent service impacting issues faster.

4. **Service Desk**

IBM Control Desk (ICD) provides a single, unified platform to manage multiple service management, ITIL-based best-practice processes. These will help your organization go beyond traditional manual processes, adding automation, mobility, enhanced visibility and analytic insights to your service management. The services provided by the Service Desk are as follows:
• Service Request management through single web interface screen helps to ensure an efficient service desk and knowledge database for handling service requests and managing problems or incidents.
• Change, Configuration and Release management provides advanced impact analysis and automated change procedures to reduce risk and ensure integrity of services.
• IT asset lifecycle management facilitates full asset lifecycle management of IT hardware and software license compliance capabilities.
• A service catalog gives end users an interface for self-help to eliminate calls to service desk agents.
• Support for service providers supplying service support and service delivery capabilities for multiple customers in a single deployed instance providing hybrid cloud support.

5. **Workload Automation**

IBM Workload Automation helps you manage workloads efficiently in hybrid environments using a cloud-based solution. It automates the planning, processing and analysis of calendar- and event-based enterprise production workloads for efficient delivery of service level agreement business services. IBM Workload Automation helps you achieve economies of scale, improve IT operational efficiency and reduce manual labor by optimizing the throughput of work across the enterprise. In addition it enables you to automate, plan and control the processing of workloads. It includes and integrates workloads, tasks and processes for distributed environments and IBM System z environments – as well as enterprise applications. It functions as a virtual control point and allows you to intervene manually as required – giving you full control over service execution.

6. **Configuration Management System**

A Configuration Management System (CMS) is basically the set of tools and databases that contain the authoritative information about configurations in your environment. ITSM automatically provides vital information required to populate and maintain an accurate Configuration Management System and uses this information to proactively manage the environment. Scanners automatically discover configuration items and their dependencies and populate this information in your CMS.

7. **IT Operational Analytics and Dashboards**

Analytics solutions analyze terabytes of big data from your ITSM services and turn it into relevant information and insights that you can act on immediately. These analytics solutions use cognitive computing capabilities to learn your IT systems behavior over time and provide early warnings of abnormal behavior. Advanced text analytics are also used to extract insights from structured and unstructured data sources, such as service tickets.

IT operations analytics solutions help you:

• **Predict** problems before they impact service and cause costly outages.
• **Search** quickly across your operation data sources for faster problem resolution.
• **Optimize** your IT and application infrastructure to meet service levels efficiently.

Dashboards enable you to develop and deliver to your customers and operational teams’ visualization of critical information on the health, status and integration of multiple data sources. Detailed dashboards can be created for any role including subject matter experts and executives providing views into your environment while indicating status and as well business metrics if so desired.

8. **Integrations**

ITSM solutions can leverage information from and integrate with other IBM Middleware and adjacent software solutions to create holistic end to end solutions to manage your IT Services. There are many
existing 3rd party integrations available and also open interfaces to enable easy creation of additional solutions as needed. Examples of some popular integrations are as follows:

- **Performance Management/IT Operation integration** – allows situations from monitoring to send events to IT Operations Management which in turn analyzes the events and creates an incident if applicable.
- **Helpdesk / Lifecycle and Provisioning integration** – end users initiate IT operations such as deploying virtual machines, applying OS patches etc, through service catalogs on ICD self service center. ICD integrates with BigFix, IBM Cloud Orchestrator (ICO) and other IT operation products to facilitate deployments.
- **Configuration Management System and discovery tool integrations** – Accurate and timely CI and asset information is essential for ITSM. CI and asset information can be discovered by discovery tools and populated in Configuration Management System.

9. **ITIL**

As mentioned in the introduction, ITSM supports ITIL processes for Service Design, Service Transition and Service Operation, providing planning information for Service Strategy and enabling Continual Service Improvement.
6. ITSM Solutions

Following are the solutions to the Use cases that are documented in section 4.

6.1 Solution for Visibility Control and Automation

The IBM ITSM portfolio can integrate and deliver end-to-end visibility, control and automation across the full ITSM Services catalog. Using the IBM platform enables integration of heterogeneous tools, the consolidation and aggregation of data/information and automation via embedded functionality.

**Visibility:** IBM ITSM provides for domain specific operational dashboards. A comprehensive set of dashboards are provided out of the box from ITSM tools. If additional customized dashboards are necessary, DASH can be used to condense information from other dashboards or sources, e.g. Management dashboard for delivery pipeline status. Detailed dashboards can be created for any role including subject matter experts and executives providing views into your environment while indicating status and as well business metrics.

**Control:** IBM ITSM provides for a comprehensive IT Service Support Management (ITSSM) solution that allows for full lifecycle IT Asset Management and License compliance. ITSSM provides for a best practice based focal point for managing services, a “face” for IT to end users, and a hub for workflow and integration. The workflows around Change, Configuration and Asset Management enforce proper process flow by requiring appropriate approvals and escalations throughout the change and asset lifecycles. ITSSM can interrogate the configuration of a service and integrates with IBM and 3rd party deployment tools to automatically enact a change based impact to the service. The workflows ensure impact analysis is complete and automatically invokes the deployment tools to effectively distribute the change.

**Automation:** IBM ITSM allows you to build agility into your operations. You will improve work-flow integration and automation across silos, tools, technologies, information and processes, and reduce time to market as well as operational costs. There are numerous automation solutions provided by ITSM. Automated workflow in the ITSSM solution allows for structured and enforced process adherence in Configuration, Change, Incident, Problem, Release and Asset management. It also integrates with IBM and 3rd party solution to provide for automated collection of configuration and asset information and automated deployment.

In addition, monitoring allows for automated notification of situations and can raise events in a MoM. The MoM in turn correlates events to find root cause and can further take action such as opening incidents in a Service Desk or invoke additional automation to take corrective action.

ITSM also has automation solutions to provide for execution, operation and recovery of mission critical batch processes. It does error detection and recovery of services and provides automation for High Availability and Disaster Recovery.

6.2 Solution for Detect to Correct

As mentioned previously the process flow from Detect to Resolve runs a full lifecycle from monitoring, to event management, automation for recovery, incident management and also can involve change or problem management for final resolution of an IT issue. The IBM ITSM solution provides the complete integrated solution set to manage an issue from detect to resolution.

For example, ITSM has a full set of monitoring solutions that can be used to instrument the components that make up the business applications. It can monitor everything from systems, to networks and applications. The ITSM solution can also be combined and integrated with 3rd party monitoring solution to provide comprehensive coverage across the monitoring landscape.

To facilitate the ability to consolidate and analyze information across the various monitoring sources, ITSM provides for a Manager of Manager (MoM). The solution allows for information from the various sources to
be aggregated and correlated to provide for both a consolidated view across the environment and well as providing the ability to determine root cause.

Once root cause is determined ITSM provides for a Service Desk which provides for IT Service Support Management where an incident can either be generated automatically by the MoM or manually entered and be used to manage and track the issue to resolution. The Service Desk also provides support for Configuration, Change and Problem Management processes. Therefore if the issue requires additional processing, a change or problem request can be opened to follow the issue to resolution.

One of the most important aspects of Detect to Resolve is to identify and resolve issues before the users of a service are impacted. The benefit of the ITSM Reference Architecture is that all of the solution components are tightly integrated and data objects flow seamlessly from solution to solution ensuring that the required information is transferred to each system for interrogation. This helps to quickly identify and resolve many issues that you face in the growing cloud and hybrid environments.

### 6.3 Solution for Umbrella Management

IT Service Management provides a “Manager of Managers” (MoM) to collect, integrate, and correlate events across the entire set of complex networks and multi-vendor heterogeneous IT domains. ITSM provides an overall view into the health and performance of the entire business IT and network infrastructure. It provides real time fault monitoring and event analysis with consolidated event dashboards for a single pane view into the health of the IT environment.

In addition to consolidating information, ITSM’s MoM has the ability to gather additional information from external sources (i.e. databases) and enrich the events with the most up to date information. Then, based on a defined set of business rules, it can perform actions such as opening an incident in a Service Desk or invoking a runbook or other automation solution to resolve the issue.

### 6.4 Solution for Request to Fulfill

IBM’s IT Service Management solution provides the way for the business/IT teams to convey value by delivering a single consistent user interface which brings together services and catalog entries enabling the user to navigate to their desired service in an easy, intuitive and a way that can be reproduced quickly and repetitive manner. Additionally, the IBM solution allows for the service to be delivered through automation in order to have faster fulfillment, improved user experience and less dependence on human variables.

One of the most important functions of the service catalog is the presentation of a simplified user interface, even while working with complex services. The IBM service catalog and capabilities has the ability to bring together a streamlined user experience of multiple catalogs and services from multiple providers using the functions of the Service Catalog, Self-service and the service portal. The solution provides robust and complex processes for delivering services through the use of workflows, approvals, predefined parameters and questions, whilst providing the user with an efficient and welcoming experience of a simplified search, request and submit process.

Along with the easy user interface, IBM’s solution for request fulfillment enables the IT team to focus on the delivery of the service through automation for many of the services, which lessens the need for direct human fulfillment or approval. Establishing pre-defined workflows, escalations, service level agreements and even automation scripts the IBM solution will enable standards, governance and oversight to the process of fulfillment. This ultimately results in optimizing cost and resources, through simplifying user experience, providing automated services to reduce human intervention, and providing complete visibility of services.

As most services provided by the IT teams and infrastructure are a cost of doing business, it is often necessary to ensure the service is being used, providing value and the user, business and IT can see the use, understand the costs and establish a fair chargeback approach. The IBM solution enables the service to
represent the costs to the user, at the time of request and for approvals providing overall visibility to the business users and setting expectations.

The service management solution enables the IT team to ensure services are enabled as needed, retired when no longer in use and gain efficiencies of processes through oversight of the catalog and services that are provided to the business, allowing management and control of the services pipeline.

### 6.5 Solution for IT Operations analytics and Dashboards

IBM IT Operations integrates infrastructure and operations management into a single coherent structure across business services, business applications, middleware and custom applications which may be based on hybrid, cloud-based, on premise virtual and physical servers & devices.

The IT operations solution builds on the existing solutions (“Visibility, Control and Automation, Detect and Resolve, Request to Deploy and Umbrella Management) and extends them by leveraging Big Data (IT Operations Analytics) and visualization (Jazz for Service Management & DASH).

IT Operations Analytics (ITOA) leverages IT Big Data to predict, search, and optimize across your enterprise. By extending your IT Service Management solutions with analytics capabilities, you can improve overall efficiency with time and money savings.

ITOA is composed of three key offerings:

- **Predict**: predict problems before they become service impacting. By learning the standard behavior of the IT environment, the predictive offering creates a baseline for the behavior of the various components and their relationships. Since the offering covers the entire IT environment it can inform the user of abnormal behavior in one component which affects a business service well before the service itself begins to be affected by the troubled component. This enables quick resolution of issues without customers being affected.

- **Search**: Diagnose application & infrastructure issues using all your operational data. By collecting, aggregating and matching terabytes of data from multiple sources (logs, events, metrics, support documents and trouble tickets and more) the search offering helps identify, isolate and resolve problems that harm the business services.

- **Optimize**: Ensure your IT infrastructure is operating as efficiently as possible. By unifying and prioritizing the business affecting events the optimization offering enables enhanced agility and efficiency in dealing with IT issues.

Jazz for Service Management is a solution architecture which brings together the Open Services for Lifecycle Collaboration (OSLC) community's open specifications for linking data and other shared integration services, including administrative, dashboard, reporting, and security services.

Its central component is the **Dashboard Application Services Hub** which provides a visualization services for the entire ITSM suite. DASH brings together multiple separate, yet related, service management tasks into the same dashboard view. This view ties together data from IBM products as well as external sources and presents them in the correct operational context so that users can understand them and act based on the information presented.
7. Implementation Methodology

Implementing ITSM has logical starting points and dependencies (e.g. some services are dependent upon other services being up and in place). E.g. Self-Service software requires some method of license inventory, approvals and delivery.

However, as in any suite of services, the biggest drivers are the current pain points and gaps that exist. If you currently have no inventory solution and are unsure how many licenses you have deployed, need to perform chargeback, need to understand the current utilization of infrastructure to move to virtualization, all of these would drive the current focus and prioritization of the services to be delivered.

7.1 What or how should you start with ITSM?

As stated above, an ITSM solution can start at any discipline, but there are logical building blocks and dependencies that should be taken into account. In addition, not all of these building blocks are technology focused, they can also be service or process based. For that reason, the following order interleaves services/processes and technology based upon known success patterns.

However, there is no one-size-fits-all approach. Your specific needs and even the size of the environment are driving factors (e.g. a 50 server environment is significantly different than a 50K server environment).

**Developing a Service Catalog** enables you to define what you will deliver, what SLAs/SLOs/KPIs you will provide to your customers and how you will measure yourself. This can be one of the most important steps in any ITSM solution since it will drive not only your services, but also your ITSM infrastructure (e.g. you have to detect a fault within 10 minutes versus 5 minutes, you have to inventory 5K servers in a two hour maintenance window, versus a 48 hours maintenance window over the weekend, Etc.). Along with the infrastructure, it will also help you understand and properly staff your ITSM solution (e.g. your Service Catalog states you will deliver customer dashboards within 10 calendar days, this will require a team of X people to do dashboard development).

The final piece of the Service Catalog is, it defines the interactions and dependencies between related services and ensures that there is common agreement on operational and service interactions. Service dependencies must be clearly defined and understood to be successful.

**Monitoring** is one of the most common starting points since it solves a business need of understanding the health and status of the environment along with a rudimentary starting point for inventory. Note: Monitoring does not replace an inventory system, but it does allow you to at least know what components are currently being monitored. Once a true discovery and inventory system is in place, patterns for success recommend that you reconcile the two to ensure that what is deployed is being monitored.

Normal stair-step is to start with Hardware, OS, Software Components (e.g. processes, JVMs, Etc.), Hypervisors and Network monitoring as a starting point. This enables you to understand (at a high level), the health and status of the infrastructure along with the key relationships between items, even if done manually as a starting point (e.g. this network link feeds this building where this server resides).

In parallel to this resource-level monitoring, you would set up response time monitoring through synthetic transaction to understand the user-experience of the services offered.

**Event Management** should be in parallel, or the very next step, in any ITSM solution. Once you begin monitoring, event management will provide critical functionality such as correlation between events, suppression of cascade events (e.g. a router failure causing hundreds of server unreachable events), along with the ability to prioritize events on critical business services versus your internal commodity services such as file and print.
However, two of the biggest capabilities that come with event management include analytics to understand trends and areas of investment and also the ability to apply automation across the enterprise (where appropriate).

**Dashboards and Reports** enable you to develop and deliver to your customers and operational teams critical information on the health, status and integration of multiple data sources. From an operational perspective, being able to see at a glance root cause, trends, analytics displays, performance trends can reduce outages and improve Mean Time to Repair (MTTR). From your customer’s perspective, it enables them to see the information that’s most important to them such as current status, KPIs, performance and utilization information for the development teams and others. One final key point is, when done properly, it can reduce your operational since the dashboards and reports are automated and no longer manually created and provided.

**Incident Management Integration** provides for the bi-directional automation of incident tickets and information. Having your incident management team aware of issues (via monitoring -> event management -> incident management) can help reduce churn at the incident management system and ensure that automation can assist with problem resolution.

**Problem Management**, while not dependent on Incident Management, can be improved by integration with such a system to provide real world metrics and measurements to identify areas where investments should be made. These areas range from multiple or continuous failures, or business service impacting issues that need focused effort to reduce future outages.

**Inventory and Discovery** deployment enriches and enhances monitoring, event and incident management. Understanding what is deployed, their relationship to each other (e.g. consumer versus provider) and items such as rev or patch level can have a tremendous impact to the above. Is a machine not patched, are login failures related to an authentication server failure, is a utilization event from a network segment due to a failure in a peer link that now has all traffic routed over this one? In addition, using this information to enrich event/incident records can reduce MTTR in most cases.

**Change Control and Management** integration becomes an automated and mature service. Change control at this point within your environment can now start taking advantage of all the above features. Inventory and topology discovery helps determine the impact and who should be involved in the approvals and implementation process. Using automation to drive the actual change (along with recovery and back-out strategies), using the ITSM platform to as a whole to modify key metrics, thresholds, software and its configuration speeds deployment, recovery and assists with removing human error where appropriate.

**Move to Application Performance Management** as the next logical step. Beyond HW, OS and Network, the next level is the actual monitoring, at the internal, level of business critical applications. This enables you to understand (at the call stack level), the performance and events from applications that cannot be seen from an outside-in view (e.g. monitoring a process from the OS view). APM gives you the detailed information operations, application owners and development teams need to understand performance, issues and operational KPIs.

**Log and Predictive Analytics** are included by default in the majority of the IBM solutions for ITSM. However, at this point you should be well positioned to focus on Analytics as a core competency and Service to be delivered to your operational teams and customers. Using analytics allows you to understand trends, scrape log files for an additional level of monitoring and the ability to analyze the results, use predictive analytics to detect abnormal behavior for an application that points to an upcoming failure not captured by static thresholds.

Beyond the enhanced monitoring and movement from reactive to proactive posture, analytics allows you to pinpoint specific areas for investment that will provide the highest Return on Investment (ROI). Understanding that your file and print service (internal) is generating 100K events per month due to a missing patch, seeing that a network segment is the culprit in missing an SLA for a customer facing application, all of these are available with analytics.
Automation as a key service builds upon all of the above. Automation should be a part of every step described above and wherever possible. Automating repetitive tasks, removing the human error factor, implementing key services (e.g. core and log files always backed up for forensic work post failure, etc.), should be a core goal of any ITSM solution.

However, in this case, we’re talking about automation across key services. The ability to lay down an application, the ability to migrate a server, the ability to upgrade an entire environment to a new patch level, these are all key factors in providing automation.
8. Summary

ITSM is a core discipline within any corporation whether it be ad-hoc (the two server shop just performing patching and backups), to the major corporations where ITSM is a key business service including analytics, DevOps, hybrid on-premise and cloud infrastructure management.

However, what services are needed, their maturity level and level of integration are dependent (to a large extent), by the type of operations performed by the corporation (e.g. oil exploration versus retail) and the tradeoffs that are made between costs, available skills and what maturity level is deemed necessary.

IBM is uniquely positioned within the industry to enable, assist or partner with you on your ITSM needs or journey. IBM has solutions for every ITSM service domain along with a Services and Consulting organization that can work with you on planning, architecture, implementation or business process consulting to act as a change agent.

One of the greatest strengths of the IBM portfolio is our significant investment is analytics and the integration between the solutions. Over the last years, the massive growth in big-data use in ITSM has improved services and enabled customers to move from the reactive to the proactive model of management. While hard failures can never be predicted, the use of analytics allows for the normal operation of a critical business service to be determined and algorithms used to determine when it is deviating from those norms and for operations to react before it becomes service impacting.

Finally, the pure depth and breadth of the ITSM solutions IBM provides is a key success factor in allowing you to close or fill a gap within your portfolio whether it be homogenous or heterogeneous infrastructure, tooling or hybrid environments with both on-premise and cloud based services. From the lowest level of monitoring, to an incident management system that can provide automation and self-service capabilities, IBM products and our Services Organizations can help make you successful.
9. References

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This is one element in a series of reference architectures for IT Service Management. For other white papers in the IBM IT Service Management Reference Architecture Series please visit this link:

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