Who are the users of IT4IT applications?

IT4IT refers to all the necessary IT management capabilities needed to manage the entire lifecycle of all IT services. Therefore, all employees involved in managing IT are the primary users of IT4IT applications (or IT management tools). However, the business also uses IT4IT applications; for example, to request IT services from the catalog.

All IT workers such as the CIO, IT managers, enterprise architects, PMO office, project managers, demand managers, service managers, developers, testers, service desk agents, license managers, operations staff, and so on are users of IT4IT services. These employees use the IT management functionality implemented with IT management tools such as a Project Portfolio Management (PPM) system, a development or testing tool, the CMDB, or a service desk system.

In addition to IT employees, the business users also use IT4IT applications. Think about services such as browsing through a service catalog, requesting IT services (access to a business application, ordering a new laptop or additional software), or viewing IT costs. Some business users are also involved in requirements review and test management activities (such as User Acceptance Testing (UAT)) and use IT4IT functionality for these purposes.

2.2 IT Management Challenges

We are entering the digital era where the line between "business" and "IT" is blurring. Technology is increasingly integrated with business processes and directly affects the customer and business experience. IT no longer just supports the business; it is becoming an integral part of the business. In order to compete in the service economy, IT must change from a technology and project-centric orientation to a new service-centric ecosystem. It must be oriented around "systems of engagement" that are focused on connecting people in new ways and creating new experiences and innovation opportunities.

IT is a bureaucratic black-box

The business often perceives the IT function as a black box that they cannot control; it is seen as bureaucratic, lacking focus, overly complex, and considered very expensive and slow in responding to business needs. The IT function is not very transparent and its collaboration (and communication) with the business are very poor.

Both business and IT executives realize that there is a lot of "waste" and "slack" in the IT organization and that there is definitely room for significant improvements. However, they struggled to find the right model to redesign and transform their IT function.

The IT organization is under constant pressure to provide more cost transparency (and reduce costs), deliver solutions faster, respond to security risks, consolidate and rationalize (and standardize) the IT infrastructure, and much more. Corporate IT budgets are constrained while technology demand keeps increasing. Many organizations have already gone through many rounds of change programs, mergers, centralizations and consolidations, outsourcing (and insourcing), new IT strategies, or new management. The organization usually has been stretched beyond its limits.

Key expectations of the business posed to the IT organization are as follows:

- IT understanding the business processes and outcomes, and how IT impacts the business.

- Enable the business to become more innovative, improve customer experience, and support new business models (realizing the digital enterprise).

- Alignment of IT service delivery to business strategy and dynamic business demand, proactively suggesting innovations for the business.

- IT using business terms for benefits, costs, and risks, not "geek speak" about technology components and features.

- Continuously react to business change without being surprised that things change.

- Optimize the return on investment in IT.

- Replace "technical" SLAs by simple, honest, and meaningful reporting.

- Increase the transparency of IT to the business (manage IT from a business perspective).

- Reduce time-to-market to implement new requirements for new or modified services; or to fix problems/vulnerabilities.

- Improve the quality of IT services (to meet the expected service levels).

- Reduce the cost of ownership of IT services throughout the entire lifecycle (lower unit costs).

- Ensure continuous operations reducing business disruptions of failing IT.

- Create a more flexible consumption model for using IT services (instead of having a large amount of investment and fixed costs).

- Respond to new disruptive technologies such as mobility, cloud, big data, and Internet of Things (IoT).

- Control compliance and risks of the delivery of IT services to the business.

In summary, the IT organization needs to become faster, better, cheaper, and more controlled; or, in other words, credible, competitive, predictable, and affordable. In addition, the IT department is expected to be more responsive to innovation and embrace new IT technologies for business use such as mobility, cloud, big data, IoT, and Software-Defined anything (SDx). The following list summarizes a number of these new technology trends that the IT function needs to address:

- Cloud computing; e.g., IaaS, PaaS, and SaaS (and managing hybrid environments)

- Converged infrastructures

- Big data (for use in business intelligence)

- Mobility (e.g., mobile app store)

- IT consumerization

- Bring Your Own Device (BYOD)

- Internet of Things (embedded systems)

- Service-Oriented Architectures (SOA) and Microservices

- Containerization

- Software-Defined Networking (SDN), Software-Defined Data Center (or even more Software-Defined everything)

- Bimodal IT

- Infrastructure as code

- Design thinking

- API economy

- Robotic automation of business processes

- And all other disruptive technologies that are coming next …

However, most IT teams' skills lie in development and operations of legacy systems, leaving many unable to adapt to best serve a constantly changing business environment. This opens the door for the business to adopt shadow-IT, where complexity is mostly only increasing for the IT organization in the initial phases of this adoption. It can even result in complete outplacement of IT all together.

Today's IT organization faces a clear imperative:
- Manage IT as a business
- Enable the digital transformation of the business
- Provide full transparency on value, costs, and risks of IT services
- Provide more flexible consumption and usage models (more variable IT costs)
- Focus on delivery of end-to-end IT services through value streams (reducing bottlenecks and improving flows)
- Reduce IT costs (lower unit costs) while IT consumption will grow exponentially
- Create a culture of collaboration, innovation, and continuous improvement
- Deliver faster (and become more responsive to business needs)
- Enable new business and drive innovation (to become more competitive and agile)
- Better alignment of IT to achieve business objectives
- Buy before build; using standard market services (such as SaaS) by becoming a broker and integrator of IT services delivered by external vendors
- Build a flexible IT ecosystem brokering and orchestrating services from various external IT service providers
- Adopt a Lean and Agile approach focused on delivering value and high quality services

- Provide more flexibility to continually adapt to changing business environments (this includes elastic infrastructure platforms, flexible cost models, adjustable sourcing options, and so on)

- Enhance customer experience

- Improve security and risk control

- Bridge the skills gap (supply qualified IT professionals for modern IT skills)

- Create a climate of technology experimentation

- Establish new technology architectures that provide more flexibility and scalability

- Implement the right controls to ensure predictable outcomes

More often organizations realize that the current IT function is not very well organized and managed. The IT organization is regarded as bureaucratic with long lead times and many different inefficient controls. The management capabilities of the IT organization and its management tools are typically lagging behind. The timely adoption of new technologies introduces challenges because the required IT management capabilities are not developed. A recent example is the introduction of cloud technologies in many organizations. The use of cloud services is growing fast, but the capability to manage this new cloud environment properly is still immature. Figure 3 highlights this growing gap of new demand for IT *versus* the capability of the IT function to manage this new IT estate.
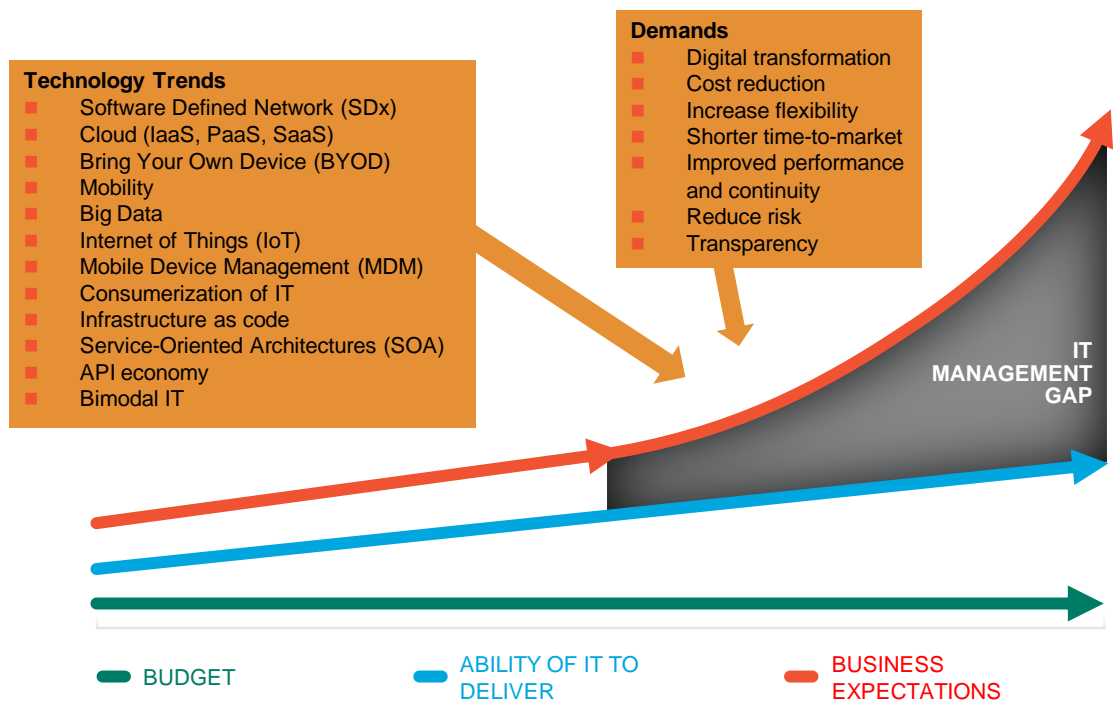

Figure 3: Growing Capability Gap within the IT Function

The IT organization will need to change its IT operating model in such a way that more and more (if not all) services need or can be consumed as market services from the cloud. An increasing number of organizations have defined cloud as the primary delivery method. This

again creates new challenges to the IT organization, specifically related to the orchestration and collaboration with an ever-growing number of external service providers to ensure end-to-end delivery to the business. This requires the IT organization to adopt an additional role, one of a service broker. This is illustrated in Figure 4.
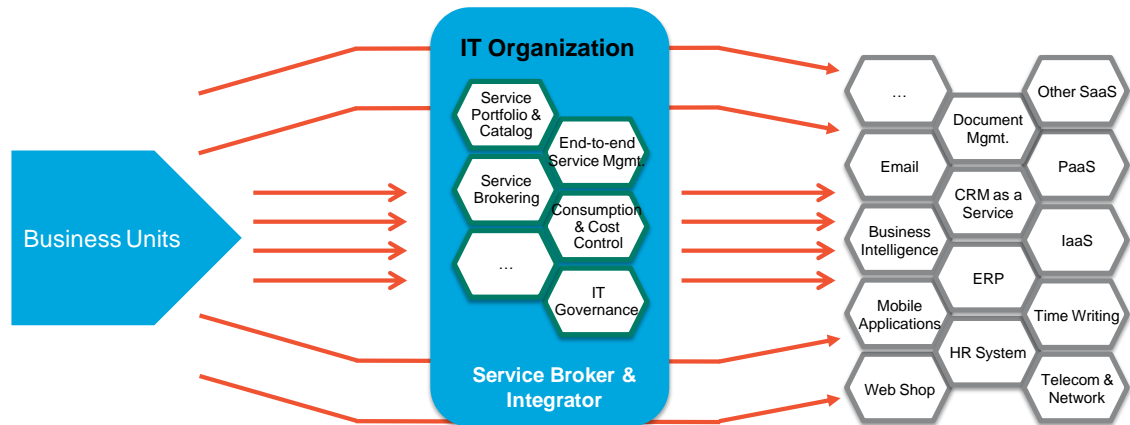

Figure 4: The IT Organization as a Service Broker and Integrator

IT organizations must reinvent themselves and transition into becoming Lean and Agile service providers. They have experimented with Continuous Delivery, DevOps, or any other practice that is promoted by the IT industry. However, what is typically forgotten or not well engineered is how this new IT organization will work across the silos, how it must be equipped with the right IT management tools, and how to make sure that the right information is available to support IT management activities. For example, questions that need to be answered are:

- How can we simplify and rationalize our IT service portfolio?

- How do we align the service portfolio with business strategy and plans? How can we adapt to continuous changing business demands?

- How can we contain IT costs while the consumption and usage of IT will grow significantly?

- How can we become a service broker and integrator, sourcing IT services from external service providers (consume standard market services)?

- How can we become more agile and deliver new functionality faster?

- How can we integrate with the increasing number of vendors (or service providers) such as IaaS, PaaS, and SaaS vendors?

- How can we balance the cost of keeping-the-lights-on *versus* change and innovation?

- How can we improve cost transparency (and reduce costs)?

- How should we deliver and manage new technologies to enable business innovation?

- How can IT enable digital leadership for the business?

- How can we reduce technology debt (legacy technologies, outdated and unsupported versions)?

- How do customers experience the delivery of IT services?

- How can we really harvest the benefits of cloud services?

- How do we manage cloud services (such as PaaS and SaaS)? What do we still need to perform ourselves? What new controls are needed?

- How can we provide self-service capabilities and support the end-to-end workflow from request to fulfillment?

- How can we automate end-to-end workflows/value streams (to reduce the number of manual activities)?

- How can we implement new paradigms such as DevOps and Continuous Delivery?

- How do we ensure all required information is available to support decision-making?

- How can we cope with the increasing risks such as security attacks and responding faster to security vulnerabilities?

- How can we ensure continuous operations for the business (that becomes more dependent upon IT)?

- How can we fill the IT skill (and competence) gap that has undermined our ability to innovate and improve the IT function?

This all comes down to a solid IT management system, bringing IT processes, tools, data, and people (and their skills, attitudes, mind sets) together in a standard IT operating model (using the IT4IT Reference Architecture as guidance).

Summarizing the above: it becomes clear that the IT organization is under enormous pressure to improve transparency, reduce cost, and provide more reliable services, while at the same time provide more innovation and enable new technologies to create new value for the business. IT must become an enabler to support the business in meeting the overall company goals.

The issue is that the current IT operating models are not suitable for the new role that the IT function needs to play. There is an enormous gap that needs to be bridged. To understand this gap in more detail it is important to understand how the IT function is currently managed. One of the core problems is that IT is not managed from an end-to-end perspective – but rather along silos, different technologies, teams, tools, and processes. Business customers are often brought into the process at different points, resulting in miss-set expectations and priorities. This results in a suboptimal management model, as illustrated in Figure 5.
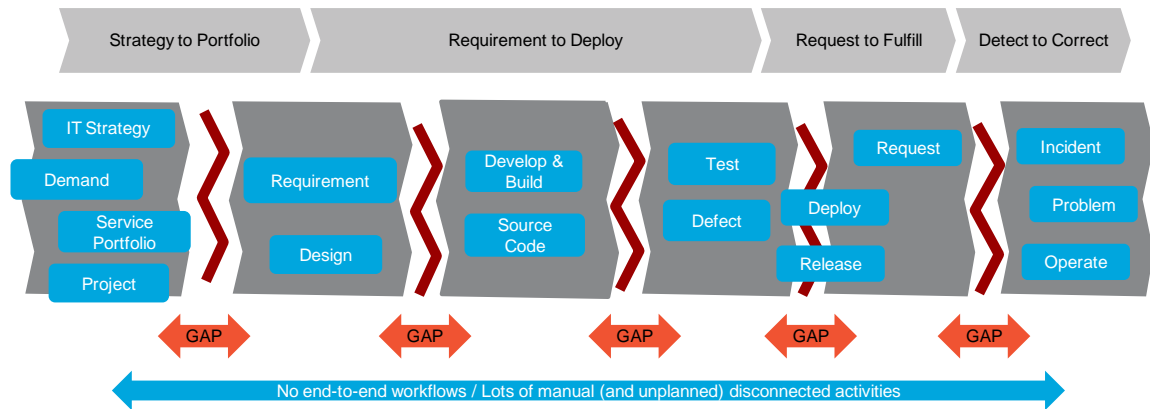
Figure 5: Lacking End-to-End Workflows in the IT Organization (Broken Hand-offs in IT)

IT service delivery suffers from disorganized handovers from business to the IT function and from development to operations. The IT Value Chain is managed through fragmented teams, processes, and tools. An end-to-end IT service view is missing which results in poor transparency and traceability, and that causes higher costs, higher risks, and lower quality. This way of working is blocking the IT organization from making a step change. Typically, different teams or process owners select and implement their own tools; optimizing their own processes without any understanding of the impact on the entire value stream.

Fragmented IT management data repositories/Lacking a common IT information model

The IT organization typically lacks a single system of record to find all relevant IT information. Today many different fragmented repositories exist in which IT data is maintained. A common data model for IT has been lacking for many years. Some examples of IT data relevant for the IT function are shown in the table below.

Example of Data Managed in the IT Function			
Business process (and business services)	Business capabilities	IT service (or application) or products	Roadmap
Demand (or idea)	Investment	Business goals and drivers	Project (and related benefits and business case)
Incident	Problem	Change	Configuration item
License	Contract	Time sheet	Project document
User manuals	IT operating procedures	Knowledge items	Service request
Service catalog items	Requirements (themes, epics, user stories)	Sprint and release plans	Project plan
Project risks	Project issues	Audit findings	Security incidents
IT risks	Policies	IT standards	End-of-life or end-of-support data
Event	Availability data	Capacity and performance data	Application logs
IT skills and competences	IT training plans	IT organization structure	IT roles and responsibilities
Service reports	Customer surveys	Design specifications	Invoices (from IT
Business Impact Assessments (BIA)	Known errors		
	Deployment or release packages		

Builds	Defects	Improvement opportunities	suppliers)
Test cases	Locations	Run books	Source codes
Suppliers (or vendor data)	Installed software	Capacity plan	Test plan
Access rights	Vendor information	Identities (or users)	SLA (and other contracts)
IT budget		Hardware assets	Subscriptions of users to IT services
		IT costs	IT cost centers (and WBSE)
			Service KPIs, metrics, and service reports

The IT administration of the average IT organization has a large number of gaps, considering:

- There is no single repository containing all IT services and applications (and its related technologies).
- There is no insight into which projects are planned (or in-flight) for the IT services and applications in the portfolio.
- The total cost of ownership of IT services is not transparent (for example, infrastructure costs, contract and license costs, support FTE).
- Requirements are not correctly captured and managed (not traceable).
- The CMDB is not up-to-date and a lot of configuration data is missing (for example, what applications are using what IT resources).
- There is no repository to manage all subscriptions of users to IT services, applications, and IT resources (identity and access administration).
- There is a lack of data related to usage, performance, and availability of IT services from a business perspective.
- Documents cannot be easily found (for example, latest design documents, user guides, and so on).
- A large amount of changes and incidents are not formally registered in the IT Service Management (ITSM) system.
- Licenses purchased, actual software usage, and compliance are unknown (no solid SAM administration).
- Contracts are managed by using spreadsheets. Contracts with vendors are not related to the services and assets provided by these vendors.

As a result, an IT organization typically doesn't know what applications are running on which servers, who is using them, what it cost, what licenses have been purchased, how the application is performing, what capacity or IT resources are needed to run the application, who owns the application, which suppliers support them, when the contract ends or needs to be renewed.

A lot of productivity is lost by having IT employees spending time searching for information, updating the wrong version of a document, disturbing other colleagues, waiting for the data, and creating their own reports (or version of the truth), or due to the frustration of not having

> access to accurate and complete data. In other cases, there is just too much information that is not relevant any more or even incorrect (as it cannot be maintained).

IT data is spread across many different systems and repositories each having its own data model. As a result, information is not easily available to support decision-making. It is very difficult to find the relevant information. In addition, the ownership of data is unclear and data quality is questionable.
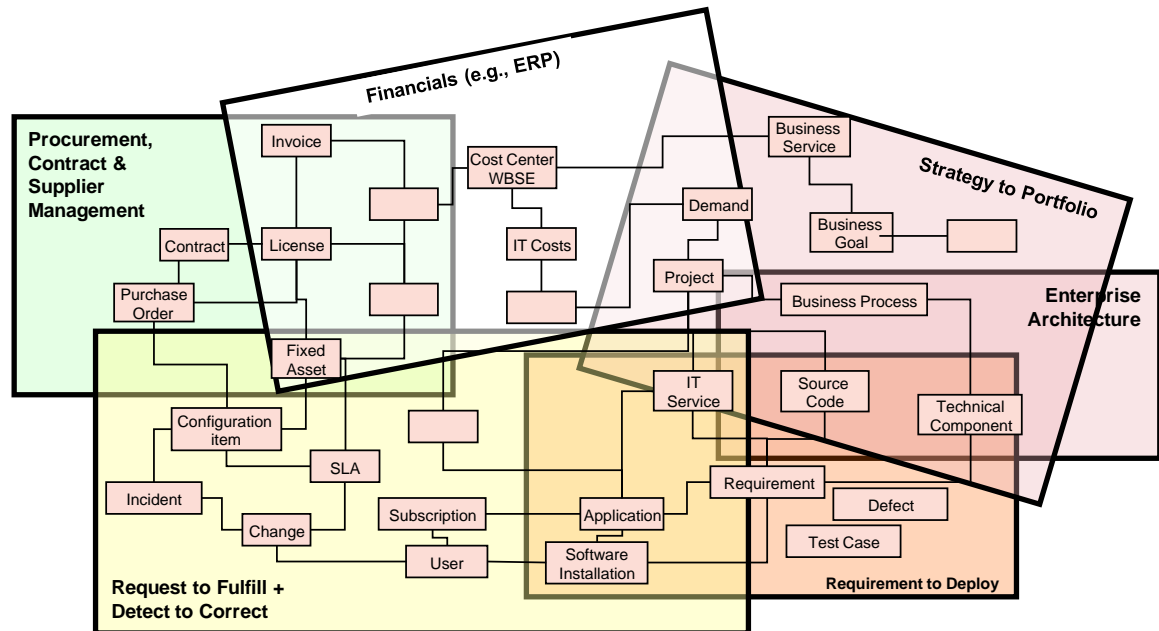

Figure 6: Building a Common Information Model for the IT Function

It should not be a surprise, looking at how IT is organized today, that the business raises concerns such as: "Why does it cost so much?", "Why does it take so long?", or even "Why is it so hard to work with IT and why can't we get what we want?".

The following list provides examples of key symptoms indicating gaps and issues with the current IT management environment:

- The presence of a complex IT management tooling landscape with many different management tools, data repositories, and interfaces (or, conversely, a near-total lack of IT management tools)

- Lacking cost transparency of IT service delivery (and the IT resources consumed when delivering a service)

- Different support teams having their own tools (they select and implement their own)

- The existence of many customizations and homegrown tools (for example, a proprietary web shop for ordering IT services)

- High workload and stress for IT specialists (with business complaints that their priority items are not addressed on time)

- The lack of an integrated IT service catalog

- Large amount of unplanned (or *ad hoc* or emergency) activities

- No single repository with the entire service/application portfolio (defining the IT portfolio)

- Lack of standard integrations with different external service providers

- No adequate information available to support the decision-making process (or a lot of effort to find relevant information)

- IT administrations are not up-to-date (for example, the CMDB, license, and contract management)

- Most IT activities are still performed through manual procedures (limited use of automation)

- No agreed unified IT management architecture

- No formal ownership in the IT organization for the IT tools and its IT data; ownership is fragmented around different departments and teams, each developing their own processes, practices, and tools

- A huge amount of waste; for example, due to rework and over-capacity (or underutilized IT resources and licenses)

- High costs to maintain and implement IT management tools

- There are many administration gaps in IT (for example, what licenses have been bought, what applications are deployed, who is using them, and so on)

- Difficult to find information and data to support decision-making

- Cumbersome integration with external suppliers and between tools; complex interfaces between IT management tools

- No consolidated self-service portal to interact with the IT organization (instead there many different unclear channels to order, report incidents, ask for help, etc.)

- No clear communication with the business in case of outages or planned new releases

- No plug-and-play of IT tools from different vendors

- A lot of data and (manually created) reports but not much insight

- Heavy dependency upon email and spreadsheets to manage IT activities and performance as well as the trusted data source – it seems like the IT is managed using spreadsheets

To make things even worse, there are a number of other trends that make the IT management capabilities even more important, such as:

- Increasing number of IT services or applications (such as micro-services, mobile applications)

- Increase in consumption of IT resources (such as storage, number of transactions)

- More changes and releases (due to incremental and continuous delivery)

- Increasing volume of events and machine data

- Increasing number of security risks, cyber attacks, and vulnerabilities that need to be mitigated

- More devices connected to the network (such as IoT, BYOD)

- More service requests to continuously act upon changing workload and consumption volumes

- More and more frequent changes in the business (such as mergers, acquisitions, disinvestments, reorganizations, etc.)

Characteristics of a new IT operating model:

- Implement end-to-end value streams to focus on delivering value to the business; and apply Lean and Agile practices focused on business outcomes

- Provide standard IT management capabilities consisting of integrated processes, tools, and data

- Automate IT management activities as much as possible to eliminate manual activities, reduce errors, deliver faster, reduce waste, more predictable, etc.

- Implement the service broker and integrator role of sourcing, orchestrating, and integrating standard market services

- Provide self-service capabilities (business-led IT) to the business and IT

- Ensure IT specialists have all information and data available to support their work and make the right decisions

- Support new organizational structures that empower IT specialists and create a less bureaucratic environment

- Adopt new management paradigms such as Agile, Bimodal IT, DevOps, Lean IT, and Continuous Delivery

- Provide transparency and insight to support the continuous improvement of the IT function

- Support new collaboration technologies to optimize communication between all stakeholders involved in the IT Value Chain

- Business-oriented service management delivering IT as a service

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As a result, the IT organization needs to do more – and coordinate more than ever before. This in turn means there is a need to automate IT processes. Thought leaders realize that a fundamentally different approach is needed to create, organize, and manage the new IT paradigm. This new approach should be based upon end-to-end value streams, which are in contrast to the currently used, often-fragmented process and tool approach. The new approach is characterized by:

- An end-to-end IT Value Chain – The important theme of the IT4IT approach is that the entire plan-to-operations lifecycle must be viewed as one end-to-end value chain composed of individual value streams. Individual methodologies can be followed for individual segments (value streams) or that processes (such as SCRUM on one end and ITIL on the other, so long as those processes can be plugged together) form a unified process which, in turn, can be managed from a unified point-of-view.

- Integrated and rationalized tooling landscape – The IT4IT standard defines a structured approach for collaboration and automation. Support themes such as "infrastructure as code", "model or topology-driven automation", and "continuous deployment" are all concepts that would fall under the IT4IT approach.

- Common information model – The IT4IT standard defines a common information model for the data and metrics needed to manage IT.

- Supplier integration – Ability to orchestrate and coordinate IT service delivery amongst the many service providers.

The next section provides a more detailed introduction of the IT4IT value streams and the IT4IT Reference Architecture.

2.3 An Introduction to The Open Group IT4IT Reference Architecture Standard

The IT4IT Reference Architecture standard comprises an architecture and value chain-based operating model for managing the business of IT. The operating model defined by the standard serves the digital enterprise with support for real-world use-cases (e.g., cloud-sourcing, software-defined datacenter, Agile, DevOps, and service brokering) as well as embracing and complementing existing process frameworks and methodologies (e.g., ITIL, COBIT, SAFe, and the TOGAF standard).

The IT4IT Reference Architecture provides a prescriptive framework to support the value chain-based IT operating model and service-centric management ecosystem. Think of it as describing all information you need to run and optimize IT, defining the automation you need to support end-to-end value streams, and the standard and open integrations with the external service providers. The IT4IT Reference Architecture also provides a standard blueprint of all IT solutions needed for managing a modern IT organization.

It offers great value to any company that takes managing the business of IT seriously, and especially those with an interest in business and IT transitions. It allows the IT function within an organization to achieve the same level of business discipline, predictability, and efficiency as other functions in the business.

The standard is focused on defining, sourcing, consuming, and managing IT services by looking holistically at the entire IT Value Chain. While existing frameworks and standards have placed their main emphasis on process, this standard is process-agnostic, focused instead on the information (or information systems) and automation to manage a service through its lifecycle. It describes the functional components (IT management software) that are required to produce and