Defining "IT Service" for the IT4IT™ Reference Architecture

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Boundaryless Information Flow

Boundaryless Information Flow™ achieved through global interoperability in a secure, reliable, and timely manner

Executive Summary

This document is an IT4IT™ White Paper, designed to complement the IT4IT Reference Architecture, Version 2.0 by providing explorative information about aspects of the reference architecture. In this paper we explore the definition of IT service that is used across the IT4IT Reference Architecture (RA) body of work.

The proposed definition is grounded in industry and service science research and is intended to function as a foundation construct for the RA and for IT organizations looking to capitalize on the new style of IT powering the digital business era. The RA provides a prescriptive framework for a value chain-based IT operating model and the service management ecosystem that enables it. While traditional methods of creating "reference architectures" for IT start with process, capabilities, or technology implementations, the RA uses the concept of IT service as its core design principle. Placing the concept of service at the core of the RA requires a clear definition of the term:

"An IT service is a performance or an act that applies computing and information management competencies or resources for the benefit of another party. Every IT service has three aspects: the service interaction, the service offer, and the service system."

The White Paper goes on to describe and define these three aspects.

Introduction

This White Paper proposes the definition of "IT service" that is used across the IT4IT™ Reference Architecture (RA) body of work.

The proposed definition is grounded in industry and service science research and is intended to function as a foundation construct for the RA and for IT organizations looking to capitalize on the new style of IT powering the digital business era. The RA provides a prescriptive framework for a value chain-based IT operating model and the service management ecosystem that enables it. While traditional methods of creating "reference architectures" for IT start with process, capabilities, or technology implementations, the RA uses the concept of service as its core design principle. Placing the concept of IT service at the core of the RA requires a clear definition the term.

There are many published works from across academia, service science, and industry consortia that explore the topic of service and the associated economic and marketing theories in general terms.[12] The research depicts two primary views of service. One view describes service as an intangible good/resource or as something that enhances a product; for example, auto insurance or a product warranty. This view drives organizations to concentrate on optimizing the supply chain processes and cost-effectiveness of the provider but limits the ability to directly correlate service with specific outcomes or value. Here, value determination is left in the hands of the consumer.

The other view of service places its primary emphasis on outcomes that consumers desire; for example, a haircut or auto repair. Here, service is described as an act performed on behalf of a consumer that results in a desired outcome – value is derived through the co-creative partnership between provider and consumer. It also presents the notion of an integrated set of resources used by the provider (a service system) that facilitates the act; thereby providing end-to-end visibility and direct correlation between service and value. This White Paper leverages the research and applies it specifically to the IT domain. It is written for IT professionals and is designed as a bridge between the theory and the real world to arrive at a clear, actionable definition.

The balance of this paper focuses on providing three key takeaways:

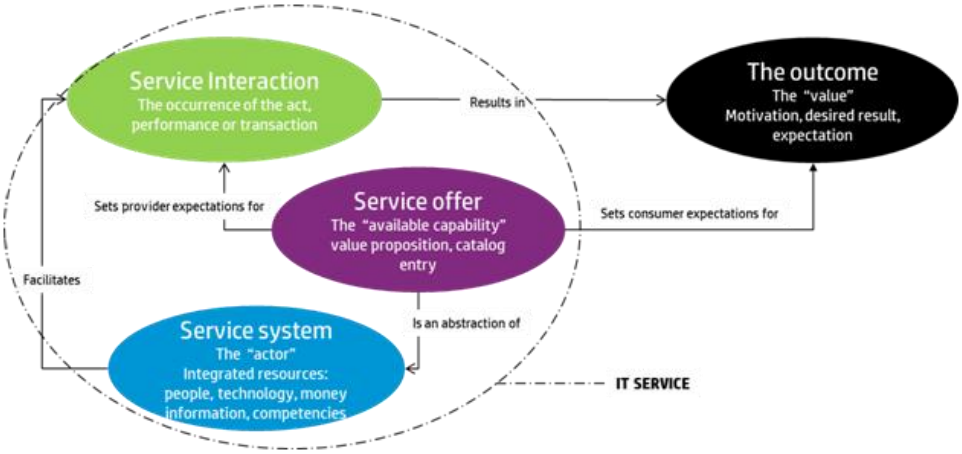
- The definition of IT service and its characteristics
- The rationale behind the new definition and its implications to the IT function
- Comparisons between IT service and other similar concepts that often generate confusion and ambiguity (specifically applications and business services)

[1] J. Spohrer: The Well Read Service Scientist, Service Science 2013; available from: http://service-science.info/archives/2708.

[2] S.L. Vargo, F.W. Morgan: Services in Society and Academic Thought: An Historical Analysis, Journal of Macromarketing, 2005, 25(1): pp42-53.

IT Service Defined

An *IT service* is a performance or an act that applies computing and information management competencies or resources for the benefit of another party. Every IT service has three aspects: the service interaction, the service offer, and the service system.



An *IT service interaction* is an occurrence of the performance or acts where the computing and information competencies are applied. The concept of "service" as an "act" is based on principles published by experts in services science research.[3][4]

The service interaction is ephemeral, even transactional – it is that "moment of truth" when a performance occurs and value is created. Each interaction occurs at a specific time/place and can be measured using industry standard KPIs (for example, quality, performance, cost, value). To help with modeling and portfolio management, interactions can be grouped into three primary provider/consumer relationship patterns:

- Human-to-Human – where the dominant provider and consumer are humans. Examples include service interactions that provide consulting or support outcomes.
- Machine-to-Machine – where the dominant provider and consumer are both technology (machines). Examples include web services, micro services, and APIs.
- Human-to-Machine – where the dominant consumer is a human and the provider is technology (machine). This is the most common form of interaction that IT facilitates. Service interactions in this category are oriented around technology-enabled services that consumers engage with. Examples include:
    - Look up my bank account balance and determine if I can afford to eat out tonight

[3] J. Spohrer et al: The Service System is the Basic Abstraction of Service Science, in 41st Hawaii International Conference on System Sciences, 2008.
[4] S.L. Vargo, R.F. Lusch: Evolving to a New Dominant Logic for Marketing, Journal of Marketing, 2004, 68 (January 2004): pp1-17.

- Collaborate with teammates who office in locations around the world to create an architecture diagram
- Ensure that the data on my personal computer is backed up before I leave for vacation
- Check my email from my iPhone

Many usages of the term "IT service" imply that it is the entity that is consumed and, in those circumstances, the term "service offer" should be substituted for "service".

An *IT service offer* is a consumable form of an available capability that advertises the ability to produce or experience an outcome. It is marketed by a provider to potential consumers, defined by a contract, and (most importantly) presented in consumer-oriented terms.

Example IT service offers include:

- Online banking service
- Virtual meeting service
- PC backup service
- Mobile mail and messaging service

Fundamentally, the offer sets the consumer expectations for the service. It is the customer-facing, consumable representation of a capability or functionality. It also sets the provider expectations for what is to be provided to consumers. It is an abstraction of the integrated set of resources required to actuate the service for the consumer. It represents a contract that can be implemented or facilitated in various ways by underpinning IT service systems.

An *IT service system* is an integrated set of resources and perhaps other supporting capabilities, functioning as a single entity and considered from the provider side, upon which IT service offerings are based and service interactions are facilitated.

Examples:

- The online banking system, which may be a complex integration of web and mobile-facing functionality, including technical, process, and human components, interacting in turn with core banking systems servicing many other channels
- Virtual meeting, which includes Microsoft Lync, Webex, and other applications, and related technical, human, and information dependencies
- PC backup, which includes a PC backup application and related dependencies (technical resources and other service systems)
- Mobile mail and messaging, which includes mobile mail apps, security apps, and other related dependencies

The traditional approaches to creating IT systems focus primarily on technology resource integration. The IT service system focuses on the integrated set of resources from across multiple resource domains including human, financial, information, and technology. Modeling and managing in this manner ensures that the

appropriate people with skills/competencies, funding, information, technology components, as well as other service systems remain attached to the IT service throughout its lifecycle.

A note on terminology: Most IT organizations utilize an approach where services take the form of intangible goods/resources. This practice is deeply rooted in the IT industry and it will be difficult even for professionals who agree with the concepts above to use them consistently in all cases.

Even within the IT4IT content, the term "IT service" may be shorthand for any of the three (the interaction, the offers, or the system/service system). This will not be easily changed in the industry, but the alternative is to continue having confusing and unproductive interactions on this topic.

Rationale for this Approach

For over two centuries, economists, academics, and practitioners from multiple disciplines have debated the definition of the service concept and some still contend that no single definition can be uniformly applied across various business and/or government domains.[5] Lack of a common definition has created the opportunity for many different interpretations and applications of the term. This is especially true in IT where the definition of service has been controversial since the earliest versions of ITIL and explorations of IT service management. As a result, the term IT service has become increasingly overloaded and inconsistently applied, generating confusion within the IT functions, across the business areas they support, and with IT vendors. Our objective with this definition is to help provide consistency and unification to organizations struggling with the confusion generated by the variety of interpretations of the term.

For the majority of the 20th century, the global economy revolved around product/goods manufacturing. Services were closely associated with or derived from goods and the same principles and methods used to create and manage products were applied to services. This "goods-dominant" approach to service places its primary emphasis on product/goods as the deliverable that customers value. This means that service is often described as *a type of intangible good or an add-on that enhances the value of a product*. Most IT organizations utilize the goods-dominant approach as the design principle for their service taxonomy and describe services using technology/product terms. For example, some organizations provide a "virtual server service". This service provides an intangible form of a compute resource that includes an enhancement (virtualization) meant to increase its "value". Other organizations might provide "ERP as a service" which is a complex system (resource) provided through an intangible license agreement. In each case, the emphasis is on providing a resource to consumers, who in turn will utilize it to produce some form of value on their own. An IT service taxonomy based on this design principle becomes problematic for the following reasons:

- The technology portfolio becomes confused with the service portfolio. Investment discussions degenerate into "what version are we on and when do we upgrade?" rather than "what is the driving business need?".
- Service creation and management becomes "supply-side" focused. This means the provider-side concerns are the primary emphasis of the organization and optimizing the delivery processes, with specific focus on cost-effectiveness, is the key financial motivation. Value determination is left in the hands of the consumer/user.
- No standard service taxonomy can be utilized consistently across the organization. Everyone gets to decide what a service is and everyone is "right". As a result, most services are either technology resources, complex IT systems, or "service systems" offered to consumers as services. For example, many current IT services carry the label of "X-as-a-service", where X is a technology resource. This type of approach builds complexity into service modeling and management.
- IT service catalogs based on this approach often expose the technology resources and/or capabilities along

[5] J. Gadrey: The Characterization of Goods and Services: An Alternative Approach, Review of Income and Wealth, 2000, 46(3): pp369-387 (see discussion in Conclusion).

with the complex fulfillment processes to the consumer.

- There is a significant focus on "requirements" and the notion that once requirements gathering is "complete", a technical "solution" (labeled as a service) can be constructed. Detailed specifications and requirements are certainly appropriate in goods manufacturing, where engineers must carefully specify things like tensile strength, duty cycles, and viscosity requirements as part of the product creation process. However, when translated to IT, the concept establishes a psychological barrier between the business consumer and the IT supplier. Rather than understanding the business opportunity or desired outcome in its own terms, the IT function often puts the burden on the business to do the all-important translation from value proposition to product specification. The requirements for the IT products are then packaged into projects – large, tightly governed "batches" of IT work, notorious for their latency and failure at scale.
- Business innovation is too often restricted by the pace of the IT project lifecycle. For many large enterprises, this could mean that upwards of 80% of business demand is satisfied through a project lifecycle while 20% flows through some sort of service request or self-sourcing experience. Project lifecycles are inherently long-running transactions that can take months to deliver the pre-specified result. Today, businesses are no longer willing to accept this level of performance and as a result IT organizations are looking to methods such as agile, DevOps, and lean IT to improve the efficiency and effectiveness of their project-driven deliverables.

The goods-dominant design principle evolved from the manufacturing-oriented economy of the 20th century where the emphasis was on using IT as a tool/resource for streamlining business processes. However, modern service research is aligning around a new definition of the term, one where *outcomes* rather than *goods* are the primary emphasis. This "service-dominant" approach defines service as *an act performed for the benefit of another*. Here, the service act involves at least two parties, one applying competence (a provider) and another experiencing an outcome (a consumer). Goods (as a form of resource) are still important in this approach, but are positioned as resources used in the delivery of service.

Consider a "haircut service" where a barber (or hairstylist) applies competence to perform an act that the consumer would otherwise have to perform for themselves. Goods/resources like scissors and combs aid in the performance of the act. Here, the emphasis is on the outcome (a quality haircut) and not products. Likewise, in the world of IT the "email service" enables communication outcomes between multiple parties. Resources like Microsoft Exchange, Outlook, and Active Directory are integrated together along with the appropriate HR to provide ongoing support. Funding (financial resource) must also be integrated into the service model to ensure that quality levels of communication outcomes can be achieved on an ongoing basis. The primary focus for both provider and consumer is on the outcome (communication between parties) and not the products.

When described as a performance or an act, every service will have three key aspects: an *interaction* where a performance of the service occurs, an *offer* that describes available capabilities from the provider in value proposition terms (outcome-oriented), and a *service system* which is the integrated set of resources needed to facilitate the interaction/outcome. As a rule of thumb, if what is being described does not have these three aspects, then it is likely to be a service designed using the goods-dominant design principle.

Goods-dominant service design is oriented from the "resource-out". Consider the "virtual server service". The purpose of such a service is generally to provision resources in a more timely manner and to maximize the value of the resource (server). This helps the provider to optimize its supply chain but the consumer

doesn't necessarily value a virtual server more than another form of compute unless there is a difference in price or quality of the service. In general, with this type of approach, there is no financial traceability beyond the cost of the resources on the provider side and no traceable connection between the service and the outcome produced by the consumer.

- Service-dominant design works from the "outcome-in". Consider LinkedIn, YouTube, and Google search. Each of these services provides an outcome of some value to subscribers/consumers. They are performance-based services, providing content, collaboration, and/or information interactions. The service system (resources) is 99.9% abstracted from the consumer – the device, a web browser, and software used in conjunction with service delivery are the only exposed resources. The model for such a service would contain a description of the interactions, the offers, and the integrated set of resources from across domains (service system) needed to facilitate the interactions/outcomes. Because of this there is full financial traceability between cost and value.

- The shift from goods-dominant to service-dominant design will take time and might not make sense for some services. Therefore, IT organizations will likely continue to utilize both design principles in service design and management. Factors like industry segment and company culture will contribute to the transition approach used by different organizations. Regardless of the approach used, here are five core principles/practices that will contribute to a successful transition:

- The *service-dominant* approach is "demand and supply-focused", placing equal emphasis on consumption and delivery. This means that the engagement model between IT and the business must embrace the notion of self-service consumption as its primary means of supplying services. This forces a shift from IT being a sole-source provider of consulting and technology to a broker of services – connecting consumers with desired performances/acts that result in outcomes. Supply-side optimization remains important, but projects that control service creation and delivery take on new forms. For example, service creation may be a procurement and integration exercise rather than a long-running development/engineering project.

- IT service "demand" should be expressed more in terms of outcomes and less in terms of projects and IT bills of material. The *service portfolio* is the key control used to connect IT services with value creation. The project portfolio remains important for managing R&D and maintenance activities but is not the master control for maintaining business alignment.

- Service offers should be marketed to consumers using an intuitive shopping experience and *service catalog*. The service catalog in this approach abstracts away detailed technical resource choices and complex fulfillment processes from the consumer.

- The *service model* should be the central structure that is managed to ensure the services are capable of delivering the desired outcome at the service levels advertised in the offer. While the project lifecycle remains an important structure for managing engineering work, the *service lifecycle* becomes the predominant governance structure for the organization.

- Business innovation pace becomes consumer-driven. Using a service-dominant approach, a company that satisfies 80% of innovation-demand through a self-service IT engagement experience while 20% is realized through project-driven deliverables, could have a material impact on business innovation and change velocity. Complete inversion of the metric may seem idealistic, but without adopting service-dominant design principles, moving the needle will be very difficult.

Goods-dominant service design results in disconnects between business and IT by placing primary emphasis on technology as the solution to business problems. Service-dominant design emphasizes the co-creative partnership between business and IT and inherently places more control of innovation velocity and change into the hands of consumers (see Table 1 for more comparisons). Service-dominant is the design principle behind many of the Internet-based services today and our definition leverages and applies it to enterprise IT; enabling organizations to introduce a step-change in their ability to contribute to business value across the enterprise.

The concepts introduced here are similar to those expressed by other bodies of work such as ITIL, The Open Group SOA Reference Architecture, and the TOGAF® standard. However, current frameworks remain open to widely different interpretations at the implementation level. The primary difference with this work is that we believe the separation of concerns between the act (interaction), capability (offers), and actors (service systems) will help practitioners in adopting a service taxonomy that enables them to model and manage services consistently and efficiently. It also helps keep them equally focused on both consumer and provider concerns to ensure that the costs incurred by the provider can be correlated with value being created through consumption.

A note on reality: IT is in the process of a long-term transition from goods-dominant to service-dominant design. For the foreseeable future, IT organizations will be forced to deal with both approaches, making the transition difficult and uneven. Over the long term, organizations that can shift the balance of their service portfolio from goods-dominant to service-dominant design have greater potential for facilitating the next generation of business breakthroughs. The RA provides a prescriptive framework that ensures services can be managed effectively across their lifecycles and functions as a unifying construct to help organizations on their journey to the new style of IT.

Table 1: Comparison of the Two "Service" Design Principles

	Goods-Dominant	**Service-Dominant**
Purpose of Economic Exchange	Resources	Outcomes
View of Service	Intangible good or product that adds to or enhances the value of material/tangible goods.	Applied knowledge, competencies, and skills performed by one party for the benefit of another.
Value Generation	Value determination is controlled by the consumer.	Value can be co-created through a collaboration between provider and customer/consumer.
Role of Provider	Produce and distribute resources.	Produce outcomes.
Role of Goods/Resources	Get embedded with utility/value during manufacturing.	Vehicle for service provision or aid the experience.
Business Model Perspective	Supply chain/build or engineer to order.	Value network/configure to order/self-configure.

[Source: Adapted from Vargo, Maglio, and Akaka (2008, p. 148).]

Appendix A: Resource-Centric and Outcome-Centric Service

To aid in the transition from goods-dominant to service-dominant design, the RA depicts two forms of IT service: *resource-centric* and *outcome-centric*.

Resource-centric services are consumed (rented) and used like "tools" by the consumer to produce their own outcome. Here, the offer and service system are controlled/managed by the provider and the act is performed by the consumer to achieve the desired outcome. The provider may not always know how the service will ultimately be used and in fact a single service may be used to produce multiple types of outcomes.

A car rental agency provides a resource-centric service. Here the consumer rents a resource (vehicle) and utilizes it (the act) to produce their own outcome; transporting themselves from the airport to a client meeting. The same service might be used by a consumer to produce other outcomes such as pizza delivery. The provider offers resources through an as-a-service interface but does not directly control the outcome. The provider does control the lifecycle of the resources that comprise the service system and the offers presented to consumers.

Resource-centric services are the most common form of services provided by IT organizations today. Consider these examples:

- Infrastructure as a Service (IaaS): The consumer rents compute and storage resources from the provider to perform acts that can range from application development to production execution of application, database, or other workloads. The provider offers technology resources through an as-a-service interface and does not control the type of workloads and/or acts that are performed with the service. In this context, Amazon EC2 is a resource-centric service.
- Software as a Service (SaaS): The consumer rents software (or an application) to perform acts that fall within the boundary conditions of the offer. The provider controls the basic functionality of the software and the consumer uses it as a tool to produce the outcome they desire. In this context, Microsoft Office 365 is a resource-centric service.

The primary IT management emphasis for resource-centric services is on ensuring the availability and performance of assets and the technology lifecycle associated with the service system components. Resource-centric services are used to bring greater efficiency to the consumer and the dominant financial metric used to measure them is cost.

Outcome-centric services are those provided by IT that facilitate outcomes on behalf of the consumer. Here the co-creative partnership between the provider and consumer results in a desired outcome. The provider performs an act on behalf of the consumer and the consumer experiences the desired outcome.

A hair stylist provides an outcome-centric service (haircut). Here the consumer enlists the provider to perform the act of cutting hair. There is a co-creative partnership in that the consumer provides the hair and the provider utilizes an integrated set of resources from across resource domains to facilitate the desired outcome.

In the digital business era, where lines between what is IT and what is business are blurred, outcome-centric services will become more pervasive.

However, IT already provides outcome-centric services. Consider these examples:

- Monitoring service: The consumer experiences monitoring of an application. The provider utilizes an integrated set of technology and human resources to produce the desired outcome on behalf of the consumer. The co-creative act consists of a consumer providing an application system and the provider facilitating the valued outcome.
- Inventory control service: The consumer experiences inventory control for finished goods and/or goods in transit. The co-creative act between a supply chain analyst and the IT system is effective inventory control. Here IT is directly involved in facilitating value creation. The service system is comprised of an integrated set of resources from across technology, human, physical (trucking), and resource-centric service domains.

The primary IT management emphasis for outcome-centric services is on ensuring the production of outcomes. Outcome-centric services are used to bring greater effectiveness to the consumer and the dominant financial metric used to measure them is value (or value creation).

Both resource-centric and outcome-centric services play a vital role in the digital business era. However, as more resource-centric services reach "commodity" status, organizations are more likely to source them from third parties. That's not to say that internally owned technology resources and/or resource-centric services will go away completely; instead it is meant to describe a trend of rebalancing company owned *versus* externally sourced services. This trend will require a shift for IT from service provider to service broker.

Appendix B: IT Service Performance/Interaction Patterns

IT service interactions can be categorized by the different provider and consumer interaction patterns. Grouping them in this manner helps to:

- Streamline service portfolio management
- Standardize the artifacts required in the various service systems which is key for service model and lifecycle management
- Optimize the tool chain required for service creation, consumption, and support in each category

This categorization is not critical to the definition construct; instead it is intended to be a tool to help optimize service modeling and management.

Human-to-Human (H2H)

- Services where the dominant consumer and provider entities are both humans. Technical resources may contribute to these service interactions, but this is not the dominant entity on the provider or consumer side.
- Examples of IT service offers in this category: consulting, IT help-desk, break/fix repair, IT project management.

Human-to-Machine (H2M)

- Services where the dominant consumer entity is a human and the dominant provider entity is technology-based. Most of the IT services in this category are readily consumable offers exposed through value propositions to various economic buyers. In addition, the consumption and fulfillment experiences associated with these services can be largely automated (self-service/self-sourcing).
- Examples of IT service offers in this category: PC lifecycle, managed mobility, email, salesforce enablement services.

Machine-to-Machine (M2M)

- Services where the provider and consumer entities are both technology-based. The provider exposes software-based services to software-based consumers and both the provider and consumer experiences are automated.
- Examples of IT services in this category: web services, other SOA-based services, API interfaces, micro-services, other Machine-to-Machine exchanges that emerge from the Internet of Things disruption.

Defining "IT Service" for the IT4IT™ Reference Architecture

In his writings, Steven Alter outlines a service interaction continuum of enterprise-to-enterprise, enterprise-to-individual, individual-to-individual, enterprise [society]-to-individual, machine-to-human, and machine-to-machine services (similar to that outlined above).[6] We've used this as the basis for our categorization of IT service interactions. As service-dominant IT design advances in the industry, revisiting this categorization might make sense.

[6] S. Alter: Viewing Services as Service Systems: Base Premises of an Operational Model for Service Innovation, Engineering, and Management, 2013, pp5-6.

Appendix C: IT Service Offer Categories

IT service offers represent an advertised capability for a provider to produce an outcome. Offers are expressed as value propositions and represent a consumable entity. They set the expectations for the consumer with regards to outcomes that can be expected from the service interaction. The goal of service offer design is to abstract away confusing technology choices and complex fulfillment processes that are associated with the service system. Categorizing offers helps in governing the service portfolio and service catalog to ensure offers are consistently packaged for consumption, delivery, and ongoing lifecycle management. It also helps to ensure appropriate resource allocation in service system design and development. Below is a sample service offer categorization that we believe captures the bulk of the IT services for most large organizations:

- **Professional Services**: This category of offers focuses on outcomes that are consultative in nature where, through human interactions, an outcome can be achieved. Examples might include business analysis and Enterprise Architecture.
- **Support Services**: This category provides repair and restoration -related outcomes for line of business and IT employees. Examples might include device repair, security operations, and IT monitoring/management.
- **IT Infrastructure Services**: This category of offers focuses on outcomes that satisfy the needs of other IT practitioners (creating or managing services) and the business community as part of a business service system. Examples might include computing, storage, mobile connectivity, developer workbench, and personal storage.
- **Application Services**: This category of offers focuses on outcomes that are most often related to business services. This classification represents services where application software is the dominant entity of the service system. Examples include CRM, employee expense management, supply chain planning, and sales force enablement. Complex IT systems that have been branded as "services" could be placed into this category. As an offer, the service should be represented more generically: "HR support services" rather than emphasizing the technology resources such as "PeopleSoft" or "Workday".
- **Information Services**: This often overlooked category of offers provides outcomes that facilitate the production, consumption, and/or exchange of information or content. Examples might include newsfeeds, electronic data interchange, content distribution networks, and video/audio content sharing (e.g., Flickr, Vimeo, YouTube, etc.).
- **Productivity or Workplace Services**: This category of offers focuses on outcomes that aid in employee productivity. Examples of offers in this category might include collaboration, email, PC lifecycle, printing, and managed mobility services.
- **Machine-to-Machine Services**: This category of offers focuses on outcomes for developers and engineers in the service creation process. They are predominantly software-based but not considered applications. Examples of offers in this category include web services and APIs. Due to the nature of these offers, consumption might be handled differently than the other categories.

This categorization is intended to be a starting point and not an exhaustive list. As service-dominant thinking permeates organizations in more real ways this list may be revisited and/or modified. Other bodies of work

like the TOGAF standard and ITIL provide IT service categorization and we have leveraged those here. We believe the above classification facilitates a consumption-driven style of IT.

Appendix D: IT Service Systems

The service system construct can be applied to both business and IT services. A system is generically defined as a configuration of resources, in which the properties and behavior of the configuration are greater than the properties and behaviors of the individual resources. Therefore, a service system is a system capable of improving the state of a consumer or another system through sharing or applying its resources.

These abstract principles are at the core of our definition of an IT service system. An IT service system is the integrated set of resources and techniques that facilitate the service act/interaction. It is the representation of "how" service outcomes are achieved. An IT service system can be a component of one or more IT services or business service systems or can exist to run the business of the IT function.[7] The resources that contribute to the formation of the IT service system come from multiple domains including:

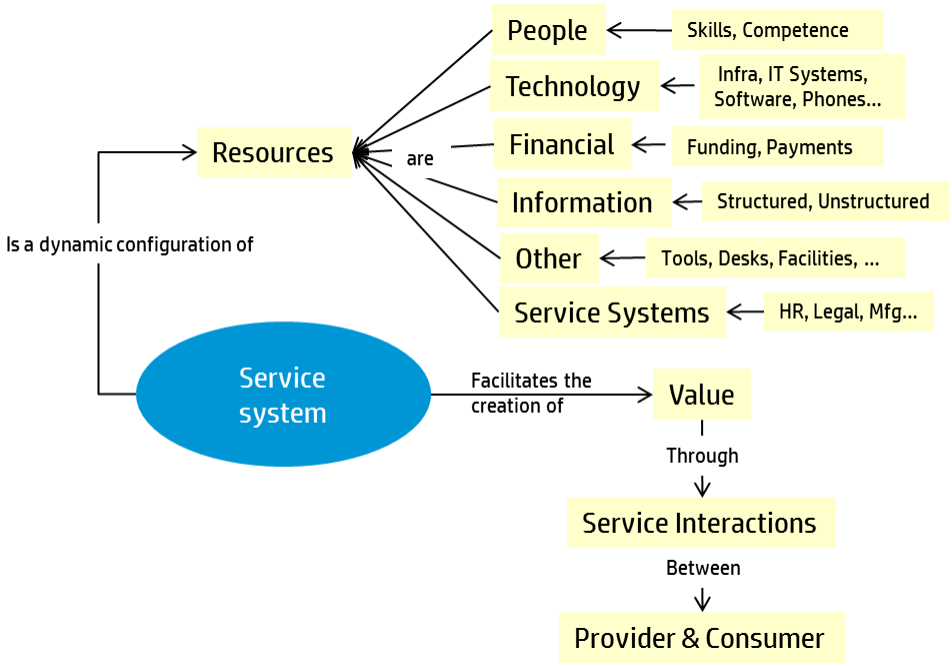
- **Technology Resources**: Resources from compute, storage, network connectivity, application software, middleware, IT management domains – provided individually or collectively as an integrated unit – can be part of an IT service system. These are often viewed as "the" IT service system. However, technology resources alone do not represent a complete IT service system.
- **Information Resources**: Structured and unstructured data, represented by individual records or collections of records, unstructured content like video, audio, or text are all resources can be part of an IT service system.
- **Human Resources**: Skilled labor with competence in computing and information management as well as resources with expertise and competencies in finance, legal, and administrative functions contribute to the IT service system.
- **Other Resources**: Funding for creating and managing services; facilities like data centers and support call centers which house the HR associated with the help-desk; policy and strategy are all examples of "other" resources in an IT service system.

Traditional, complex IT applications and/or systems can be viewed as an IT service system. For example, an ERP implementation may be seen as a service system that produces manufacturing outcomes in the business. It is comprised of technology resources from across computing, networking, storage, DBMS, software, and other IT domains. The service system also includes information, financial, and human support resources. This IT service system can be a component of a business service system; the supply chain service system (see Appendix F: Business Service *versus* IT Service for more details).

IT service systems vary in size and complexity. A laptop with all of its installed application software can be considered a small service system. An email service system which is comprised of a wide variety of resources from across multiple domains would be a larger, more complex service system.

[7] An example might be IT services that facilitate software development to create new services or applications.

Defining "IT Service" for the IT4IT™ Reference Architecture



The IT service system concept can be used as a foundation for Enterprise Architecture and service modeling. Traditional service modeling practices concentrate on aligning technology resources with business processes at an implementation level. The service model is often disconnected from the Enterprise Architecture deliverables and, as a result, what was requested by the business may not match what was ultimately delivered by IT. The service system concept provides a mechanism to connect Enterprise Architecture, Service Management, and Portfolio Management to provide holistic control over the service model which drives better investment decisions and improved alignment between the business and IT. The RA provides a good foundation for the service model construct associated with service systems.

Appendix E: Application *versus* Service

"Application" is another term that has become increasingly overloaded and inconsistently applied across the IT landscape. Definitions have been published from a wide variety of sources over a long period of time and, as a result, the term carries multiple, often ambiguous meanings. Here are three examples of generally accepted definitions of the term:

- A deployed and operational IT system that supports business functions and services; for example, a payroll application. Applications use data and are supported by multiple technologies but are distinct from the technology components that support the application components.[8]
- Software that provides functions that are required by an IT service. Each application may be part of more than one IT service. An application runs on one or more servers or clients.[9]
- An executable software component or tightly coupled set of executable software components (one or more) that deliver some or all of a series of steps needed to create, update, manage, calculate, or display information for a specific business purpose. In order to be counted (as an application), each component must not be a member of another application.[10]

The RA uses industry definitions like those above for context. However, the new style of IT is driving a shift from monolithic, systems of records that focus on controlling the core data of a company to systems of engagement that focus on connecting people with each other, producing new forms of information and experiences.[11] This shift brings with it new techniques for creating and managing the IT ecosystem. The RA also draws upon Steven Alter's efforts in defining work systems, which are a more general category including but not limited to service systems.[12] As a result, the RA recognizes that the term "application" is ambiguous and therefore delineates between application software and application service which results in the following description of the term:

- Application software is functionality implemented in binary code that is used to automate a process, function, or task or to connect people with each other or with information. It can be part of a complex IT system or consumed as an independent resource and used to connect the user with a variety of service systems. We refer to application software implemented in this manner as an "application".
- Application software can also be the primary component of an IT service system to the point that it becomes the identity of the IT service. We refer to these as "application services". Opinions may differ as to whether this is good practice, but the reality is that many IT practitioners utilize this terminology and

[8] Everware-CDBI, Service Architecture and Engineering Framework (SAE); refer to: everware-cbdi.com.

[9] The Stationery Office: Information Technology Infrastructure Library (ITIL): Continual Service Improvement, Service Design, Service Operation, Service Strategy, Service Transition, 2011.

[10] N. Malik: Inside Architecture Blog, August 2006.

[11] G. Moore: Systems of Engagement and the Future of Enterprise IT: A Sea Change in Enterprise IT, AiiM White Paper, 2011, pp1-4.

[12] S. Alter: Service System Fundamentals: Work System, Value Chain, and Life Cycle, IBM Systems Journal, 2008, pp71-85.

do not embrace a model that attempts to rigorously subordinate "applications" to "services" in all cases.[13]

- An application service *must* have a service system that contains the resources and capabilities like run-time infrastructure, on-call support, and so on. A simple rule of thumb to use is that if no one on the provider side is on-call to support it, then it is probably *not* a service.
- Application software can be a functional component of one or more IT service systems or business service systems. However, service systems do not always have application software components.

Consider the following examples:

- The Oracle HR application is a large, capital-intensive investment with extensive technical infrastructure, on-call support teams, training, and so on. It is known from the CEO on down as "Oracle HR". Attempts to characterize it as an abstract "HR IT service" are perceived as ethereal and non-value-add. In this case, "Oracle HR" is a service system.
- The email application on a mobile phone can connect to multiple email service systems (Microsoft, Google, Yahoo!, etc.). In this case, the application software is an application (resource) that enables the user to connect with a variety of service systems and the service system does not necessarily dictate application functionality.

Carlson-Wagonlit Travel (CWT)[14] provides travel services on behalf of companies. These services are offered to employees and are comprised of service systems that include technology resources as well as travel specialists (humans) that provide support and assistance. Travel booking is accomplished through an application service from Concur Technologies. TripIt is a supplementary travel service system, providing value-add travel assistance services that manage itineraries. There is an application (e.g., mobile app) that runs on various client devices used to connect with the online service system.

[13] 48% of 150 qualified IT professional respondents agreed with the statement: "*An "Application" or "Application Service" is a kind of production IT service and one way that IT provides business value*" as opposed to 45% who disagreed. (C.T. Betz: Unified IT Demand Management, 2012, Enterprise Management Associates, p13.)

[14] Refer to: www.carlsonwagonlit.co.uk.

Appendix F: Business Service *versus* IT Service

"Business service" is an IT term that can be interpreted in a variety of ways. Some IT practitioners use the term to describe processes or activities driven by the lines of business or functions that are used by end-customers of a company or its employees. Others use the term as a means of creating a distinction between applications and technology infrastructure; the former being considered a business service and the latter an IT service. We believe that these terms should be eliminated from the IT vocabulary. However, this is not realistic in the near term, so clarity is needed in order to help reduce confusion in service design and management that exists in many IT organizations.

Applying the service-dominant principles used to define IT services, a business service can be defined as a performance of an act provided by the lines of business/functions of a company that result in outcomes for end-customers or for employees. Clearly, IT is a business function within a company and thus has its own business services; however, for the sake of simplicity in this paper we are suggesting that any service that is not an IT service is a business service.

A key criterion in distinguishing between the two is whether the service system is primarily defined by its dependence on computing and information management resources.[15]

- **Example**: The ability for an individual to look up his/her bank account balance via the Internet is a service offered to customers by a bank. The ability for an employee to see his/her online health benefits statement for the current quarter is a business service offered to employees by the HR department. These services depend on IT service systems, but on a day-to-day basis are defined as much or more by their dependence on finance and accounting process, policies and people, or HR professionals with healthcare benefits management experience.

Sometimes a business service and an IT service can have the same name. When this occurs the IT service should be viewed as part of the business service system.

- **Example**: The hiring and on-boarding of new employees is the responsibility of the HR function. In many companies the business service and the IT service that oversee new employee on-boarding share the same name. While new employees will need subscriptions to certain IT services and to obtain goods like laptops from the IT organization as part of the on-boarding process, the HR business service is the central control point for the employee new hire process. Therefore, there may be an IT service offer named "new employee on-boarding" that delivers the IT capabilities new employees require, but it should be viewed and ultimately managed as part of the larger HR service system.

Business services often rely on resources and/or service systems from multiple domains (including IT).

- **Example**: The ability for customers of a bank to check their account balances is a business service that relies on a wide range of integrated resources. A mobile banking application is one such resource (from IT) that connects customers to the business service system that facilitates this outcome. The ability for

[15] For example, those principles and practices based on the theories of Alonzo Church, Alan Turing, Claude Shannon, et al.

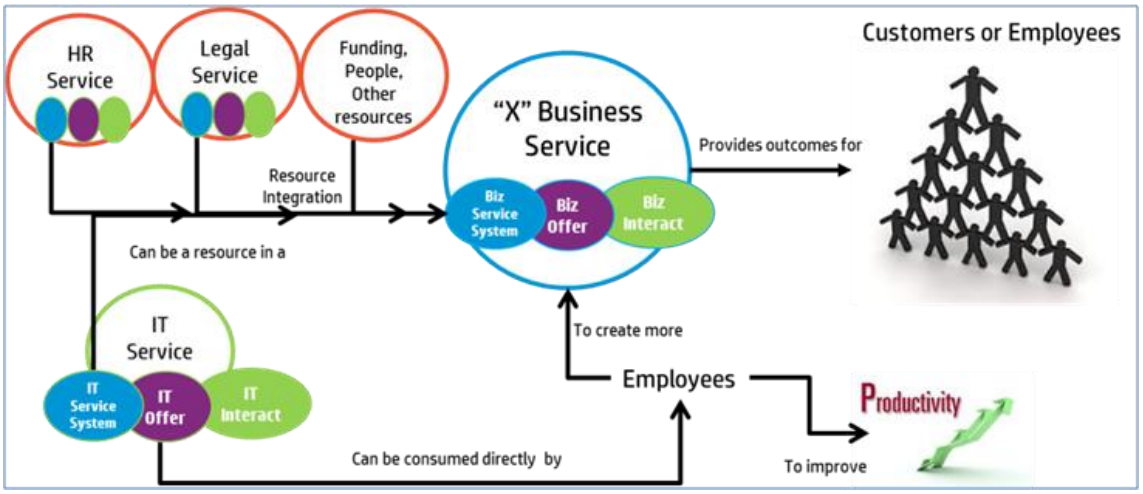
employees to see their benefits statement online (outcome) is facilitated by an IT service system that is part of the larger pool of resources that comprise the HR service system that manages employee benefits.

As defined in this White Paper, IT services are performances that are rooted in computing and information management competencies that produce outcomes for employees of the business. They may be used to create other business services or to facilitate outcomes for company employees.

IT resources like complex systems, devices, and applications can be used as part of other service systems or as a means of obtaining a service outcome.

Sometimes end-customers of a company can interact with an IT service system. When this occurs it's important to remember that the IT service system is a resource that is part of the business service system.

This approach to defining service (business and IT) enables organizations to improve their ability to design and manage services and resources. Doing so helps improve the ability of the organization to manage its financial performance; driving clarity into where and why IT investments are being made and how they are being utilized to drive value creation and/or optimize costs. This approach also helps improve organizational effectiveness; bringing greater clarity to roles and responsibilities of personnel, and more accurately positioning new methods and processes.



Glossary

Application Service/Service System: A service portfolio entry notable for its heavy dependence on application software.

Application Software: Business-facing functionality implemented in binary code for deployment on computing machines.

Boundaries/Boundary Conditions: The range of functionality, configurability, and usability of the service that is enforced by the provider. Boundary conditions might include the number of simultaneous users or ranges of configurable parameters.

Capability: A function or activity that can produce an outcome of value through the utilization of people, process, methods, technology resources, tools, and functional components.

Consumer: Someone who buys goods or services. The consumer of a service is the person or group who configures and agrees to the service terms and conditions and/or the SLA targets. The term is also sometimes used informally to mean user or customer of IT.

Contract: A binding agreement between a service provider and consumer. Contracts can be explicit; embodied in a formal terms and conditions agreement or an SLA. They can also be implicit or informal; captured in service specifications, usage agreements for freeware/shareware, and purchase agreements that accompany a credit card transaction where explicit contracts might not be used.

IT4IT Reference Architecture: A body of work that describes the operating model and management ecosystem required to run a service-dominant IT organization. The work is being developed by the IT4IT Forum, a forum of The Open Group, which consists of IT industry suppliers and customers.

New Style of IT: Manner of describing the next generation of techniques, methods, and technology architectures that bridge consumer and enterprise computing experiences driven by cloud computing, mobility, security, and big data.

Provider: An organization supplying services to one or more internal or external customers (consumers). Service provider is often used as an abbreviation for IT service provider.[16]

Service-Level Agreement (SLA): An agreement between a service provider and a consumer. The SLA describes the service and specifies the responsibilities of the provider and the consumer. A single SLA may cover multiple services or multiple consumers. Can be the contract that a service provider and a consumer agree to, which defines the provider's and the consumer's obligations with respect to one or more services.[17]

Service-Level Objective (SLO): The measurable obligations/targets that the provider agrees to deliver to the consumer, such as: the percentage of the time services will be available; the number of users that can be

[16] The Stationery Office: Information Technology Infrastructure Library (ITIL) Service Strategy, 2011 Edition, Norwich, UK.

[17] Adapted from the TOGAF® 9.1 Standard, a standard of The Open Group.

served simultaneously; specific performance benchmarks to which actual performance will be periodically compared; the schedule for notification in advance of changes that may affect users; help desk response time for various classes of problems; the usage statistics that will be provided; penalties for non-conformance.[18]

Service Specifications: The description of functionality and configurable options of a service as defined by the provider.

[18] Adapted from the TOGAF® 9.1 Standard, a standard of The Open Group.

Acronyms and Abbreviations

API	Application Program Interface
CRM	Customer Relationship Management
DBMS	Database Management System
DevOps	Development and Operations
ERP	Enterprise Resource Planning
HR	Human Resources
IaaS	Infrastructure as a Service
IT	Information Technology
ITIL	Information Technology Infrastructure Library
KPI	Key Performance Indicator
SaaS	Software as a Service
SAE	Service Architecture and Engineering Framework
SLA	Service-Level Agreement
SLO	Service-Level Objective

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The following documents are referenced in this White Paper. (Please note that the links below are good at the time of writing but cannot be guaranteed for the future.)

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About The Open Group IT4IT™ Forum

The IT4IT Reference Architecture refers to the capability or capabilities required to manage the business of IT, covering IT end-to-end from plan, through build and operate. It assumes the principle that the business of running IT is industry-agnostic and that IT leaders share the same problems and opportunities in managing the service lifecycle effectively. At the core, these problems are rooted in IT structure, competencies, and capabilities and the missing link has been the lack of an IT operating model. The IT4IT Reference Architecture proposes that it is possible to establish an IT operating model standard mapped to the existing IT landscape yet flexible enough to support the volatility inherent in the IT industry and accommodate changing IT paradigms (composite apps, agile development, mobile technology, multi-sourcing, etc.).

The Open Group IT4IT Forum was created when its predecessor, the IT4IT Consortium, transferred its activities to The Open Group. The IT4IT Consortium came into being in 2011 as a practitioner-driven initiative. The Consortium was comprised of IT professionals from multiple industry segments and several IT vendors who agreed to share their experiences for the purpose of developing and publishing future-safe prescriptive guidance for implementing end-to-end an IT4IT architecture with full insight. Past and present members include Enterprise Architects and IT department leaders or industry consultants from: Accenture, Achmea, AT&T, HP IT, ING Bank, Munich RE, PwC, Royal Dutch Shell, and University of South Florida.

For more information on the IT4IT Forum, please visit www.opengroup.org/it4it.

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- Offer a comprehensive set of services to enhance the operational efficiency of consortia
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