Glossary

Keywords	Definition or Descriptions
4I (Interface, Intelligence, Integration and Infrastructure)	4I is a service technology framework proposed by Institute for Information Industry (III) in Taiwan which includes interface technology, intelligence technology, integration technology and infrastructure technology. The 4I framework provides a reference to locate technology resources in a service design. From the front-end device machine, middle content analysis, back-end service to virtual service center, these four innovative system total solutions solve the technical problems in different layers.
6LoWPAN (IPv6 over Low power Wireless Personal Area Networks)	The 6LoWPAN working group of IETF (The Internet Engineering Task Force) has defined encapsulation and compression mechanisms to send and receive IPv6 packets over wireless networks with strong constraints on power consumption.
AOP (Aspect-Oriented Programming)	Aspect-Oriented Programming is a programming paradigm that emphasizes the idea of 'cross-cutting' to provide a way for managing separate parts of code which may belong to the same 'aspect'.
Apache Felix	Felix is a project of the Apache software foundation that provides an implementation of the OSGi service platform specification.
B2B (Business-to-business)	B2B describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer. B2B is also used in the context of communication and collaboration. Many businesses are now using social media to connect with their consumers (B2C).
BIMM (Business-IT-Mapping Model)	The Business-IT-Mapping Model defines a connection between a business process model and a service composition specification. Currently, this link is neither supported by business process modeling nor by CASE tools. In particular, BIMM allows storing and maintaining the complex dependencies between business process models and service composition specifications in a traceable way.
Bluetooth	Under the IEEE Std 802.15.1, Bluetooth, a Wireless Personal Area Network (PAN), is a wireless protocol for exchanging data over short distances via radio waves. It has been designed in order to replace data cables between fixed and mobile devices.
BPEL (Business Process Execution Language)	It is short for Web Services Business Process Execution Language (see BPEL4WS).
BPEL4People	BPEL4People is a BPEL extension for People. It extends BPEL in order to support the orchestration of role-based human activities.
BPEL4WS or WS-BPEL (Web Services Business Process Execution Language)	It is an OASIS standard executable language for specifying actions within business processes with web services. It extends the web services interaction model and enables it to support business transactions. WS-BPEL defines an interoperable integration model that should facilitate the expansion of automated process integration both within and between businesses. In BPEL, web service interactions can be described in two ways: executable business processes and abstract business processes. Executable business processes model the actual behavior of a participant in a business interaction; whereas abstract business processes are partially specified processes that are not intended to be executed.
Business Process	A business process serves a particular business goal (e.g., to handle customer orders, to deliver goods or to manage product changes) and it constitutes a recurring sequence of business functions whose execution has to meet certain rules. Furthermore, a business process model documents business requirements in respect to the process- and service-oriented information system to be designed. These business requirements are often elicited by interviewing end users as well as process owners. The graphical representation and documentation of business processes is usually supported by respective business process modeling (BPM) tools.

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Business-IT Alignment	Business-IT alignment targets at closing the gap between business processes and their IT implementations (e.g., service composition specifications). This goal can be achieved, for example, by improving the interactions between business and IT departments during the service development process as well as during service maintenance. Amongst others, this mapping model explicitly maintains the relationships between business process models and their implementation in a process- and service-oriented information system.
Case Base	It is a repository for storing cases, in which a case is a record that records a problem description and its solution learned from previous experience. It is used in a case-based reasoning approach. (see CBR)
CBR (Case-Based Reasoning)	CBR is a process of solving new problems based on the solutions of similar past problems. Case-based reasoning uses a four-step cycle, retrieve, reuse, revise, and retain, for providing solutions and learning process.
CBSE (Component-Based Software Engineering)	CBSE is a sub-discipline of software engineering based on the concept of separation of concerns where software systems are built as a composition of reusable components.
Cloud Computing	Cloud computing refers to anything that involves delivering services over the Internet. Such services can be divided in three categories: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). A Cloud service is available on demand and fully managed by the provider.
Component	A component is a central concept in CBSE. A software component can be defined as a unit of composition. A component is designed as a black box, i.e. its internal structure is not available to the public. Such design allows components to be easily substituted in a software system. (see CBSE)
Device	A device is an electronic entity which disposes of communication capabilities such as a computer, printer, router, mobile phone, PDA, etc.
DPWS (Devices Profile for Web Services)	DPWS is a specification fully aligned with Web Services technology which enables discovery and description of devices, as well as transmission of messages and events. Its objectives are similar to those of Universal Plug and Play (UPnP) but, in addition, DPWS is fully aligned with Web Services technology and includes numerous extension points allowing for seamless integration of device-provided services in enterprise-wide application scenarios.
Dynamic Testing Techniques	Dynamic testing techniques try to find bugs in a program (or part of it) by executing it. Typical techniques are test case generation, regression testing or stress testing. The advantages of such techniques are able to provide real-world results, easier to conduct testing, and simpler to automate the testing process. On the negative side, they may miss certain information that static testing techniques provide, so both are usually considered complementary.
EAI (Enterprise Application Integration)	EAI is an integration framework composed of a collection of technologies and services which form a middleware to enable integration of systems and applications across the enterprise. Typically, an enterprise has existing legacy applications and databases and wants to continue to use them while adding or migrating to a new set of applications that exploit the Internet, e-commerce, extranet, and other new technologies. EAI may involve developing a new total view of an enterprise's business and its applications, seeing how existing applications fit into the new view, and then devising ways to efficiently reuse what already exists while adding new applications and data.
EJB (Enterprise JavaBeans)	EJB is a component architecture written in the Java programming language for modular construction of enterprise applications.
Equilibrium	An equilibrium in an eco-system is a "steady state", where the competing forces balance each other out. Changes to an eco-system perturb these equilibria, but the system eventually settles into a new equilibrium that accommodates these changes. A service eco-system is in an equilibrium if all inter-service realization and consistency links are satisfied, and there is no alternative equilibrium that further minimizes change to the prior state of the service eco-system. Several key tasks in services engineering, including the implementation, deployment and life-cycle management of services require the computation of service eco-system equilibria.

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Equinox	Equinox is a project of the Eclipse consortium that provides an implementation of the OSGi service platform specification.
ESB (Enterprise Service Bus)	ESB is an architectural pattern to integrate and manage services. An ESB generally provides an abstraction layer on top of an implementation of an enterprise messaging system, which allows integration architects to exploit the value of messaging without writing code. Unlike the more classical enterprise application integration (EAI) approach of a monolithic stack in a hub and spoke architecture, an enterprise service bus builds on base functions broken up into their constituent parts, with distributed deployment where needed, working in harmony as necessary.
Extra-Functional Properties	Extra-functional properties are pieces of code which provide additional functionality to the system, where this functionality is not part of the main one or of the main concern approached by the system.
Fractal	Fractal, a project of the OW2 consortium, is a modular and extensible component model. Fractal aims to reduce the development, deployment and maintenance costs of software systems.
GENA (General Event Notification Architecture)	The GENA is a protocol that defines an HTTP notification architecture for the sending of notifications between resources.
Glassfish	Glassfish is an open-source implementation of the Java EE application server specification. Glassfish is a project of SUN Microsystems.
Goal Model	A goal model is a definition of user or system requirements in terms of the goal that the user wants the system to achieve. I is built hierarchically starting with the ultimate goal which is then supported by subgoals which must be achieved in order to satisfy the ultimate goal.
Goal-Driven Approach	A goal-driven approach uses goals in software analysis and design to represent user and system requirements
GSM (Global System for Mobile Communications)	GSM is a standard for mobile telephony systems. GSM is used by over 1.5 billion people (2010).
IDE (Integrated Development Environment)	An IDE is a system development environment providing tools for writing application logic and designing application user interfaces such as Eclipse, DevC++, Emacs, or Visual Studio, etc.
Intention	The target that a human user wants a software system to achieve. It is also the reason why the user issues a request to the system. (see Intention-aware system)
Intention-Aware System	A software system that can map service requests from users to a computer interpretable data structure and provide related actions to satisfy these requests based on user background.
Internet	Internet is the largest global network of interconnected computer networks that use the TCP/IP network protocols in order to transmit and exchange data between billions of user worldwide.
Intranet	A private computer network created using Internet protocols.
iPOJO	iPOJO is a service component model and runtime that specifically supports dynamically adaptable applications. iPOJO is part of the Apache Felix project.
Java EE (Java Enterprise Edition)	Java EE is a platform for server development in the Java programming language. It is broadly based on modular components such as EJB running on an application server. Those components provide functionalities to deploy fault-tolerant, distributed, multi-tier Java software. (see EJB)
JOnAS	JOnAS is an open-source implementation of the Java EE application server specification. JOnAS is a project of the OW2 consortium. (see OW2)
JSON (JavaScript Object Notation)	JSON is a text-based human-readable computer data interchange format. It allows for the representation of simple data structures and associative arrays, called objects.
JSON-RPC	JSON-RPC is a remote procedure call protocol encoded in JSON.
Knopflerfish	The Knopflerfish is a project that provides an implementation of the OSGi service platform specification.

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Loose Coupling	Loose coupling is a design goal to make the related modules having the minimum dependence. Loosely coupled systems provide many advantages including support for late or dynamically binding to other components while running and can mediate the difference in the component's structure, security model, protocols, and semantics, thus abstracting volatility. This is in contrast to compile-time or runtime binding, which requires binding the components at compile time or runtime (synchronous calls), respectively, and also requires that changes be designed into all components at the same time due to the dependencies.
MDA (Model-Driven Architecture)	MDA is a software design approach, which provides a set of guidelines for the development of software systems expressed as models. In this regard, model-driven development is a software development methodology which focuses on creating models of the systems, leaving implementation technologies for a later stage.
MEP (Message Exchange Pattern)	In software architecture, a messaging pattern is a network-oriented architectural pattern which describes how two different parts of a message passing system connect and communicate with each other. In telecommunications, a message exchange pattern (MEP) describes the pattern of messages required by a communications protocol to establish or use a communication channel. There are two major message exchange patterns: a request-response pattern, and a one-way pattern.
OSGi	OSGi is both a component-based platform and a service platform for the Java programming language. OSGi aims to facilitate the modularization of Java applications as well as the interoperability of such applications and services over various devices.
OW2	The OW2 consortium is a not-for-profit international consortium devoted to producing open-source middleware.
Paradigm Shift	Paradigm shift is the term used by Thomas Kuhn in his influential book "The Structure of Scientific Revolutions (1962)" to describe a change in basic assumptions within the ruling theory of science. It is in contrast to his idea of normal science. The term paradigm shift, as a change in a fundamental model of events, has since become widely applied to many other realms of human experience as well, even though Kuhn himself restricted the use of the term to the hard sciences.
Pervasive Computing	Pervasive or ubiquitous computing corresponds to an information processing model where the user interacts naturally with their environment. The model proposed by pervasive computing consists of using the objects in the environment as a means of interaction between users and computer systems.
PHR (Electronic personal Health Record)	PHR refers to electronically storing personal health related medical information records that generally provide purposes similar to Electronic Medical Record (EMR). It is typically a health record which is initiated and maintained by individual. A PHR provides health information for online accessing to one who has the rights to view the information.
Protocol	A set of formal rules describing how to transmit data, especially across a network. Low level protocols define the electrical and physical standards to be observed, bit- and byte-ordering and the transmission and error detection and correction of the bit stream. High level protocols deal with the data formatting, including the syntax of messages, the terminal to computer dialogue, character sets, sequencing of messages etc.
Publish/Scribe Messaging	In a publish-subscribe system, senders label each message with the name of a topic ("publish"), rather than addressing it to specific recipients. The messaging system then sends the message to all eligible systems that have asked to receive messages on that topic ("subscribe"). This form of asynchronous messaging is a far more scalable architecture than point-to-point alternatives such as message queuing, since message senders need only concern themselves with creating the original message, and can leave the task of servicing recipients to the messaging infrastructure. It is a very loosely coupled architecture, in which senders often do not even know who their subscribers are.
OASIS	OASIS is the abbreviation of "Organization for the Advancement of Structured Information Standards".
Quality Attributes	Quality attributes, such as response time, accuracy, security, reliability, are properties that affect the system as a whole. Most approaches deal with quality attributes separately from the functional requirements of a system.

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QoS (Quality of Services)	Quality of Service (QoS) is a set of technologies for managing network traffic in a cost effective manner to enhance user experiences for home and enterprise environments. QoS technologies concern with tasks to measure bandwidth, detect changing network conditions (such as congestion or availability of bandwidth), and prioritize or throttle traffic.
Replication	Replication refers to the use of redundant resources (also called "replica" or "failover" components), including software or hardware components, to improve availability, reliability, fault-tolerance, and performance.
REST (Representational State Transfer)	REST-style architectures consist of clients and servers. Clients initiate requests to servers, while servers process requests and return appropriate responses. Requests and responses are built around the transfer of representations of resources. A resource can be essentially any coherent and meaningful concept that may be addressed. A representation of a resource is typically a document that captures the current or intended state of a resource.
RFID (Radio Frequency Identification)	RFID is a wireless technology that allows for non contact reading. RFID is often used as an alternative to bar coding.
SaaS (Software as a Service)	SaaS is a delivery model for software whereby the vendor provides an application to customers for use as a service on demand. Customers pay for using the software rather than owning it. The software is hosted and maintained by the vendor. SaaS is an important feature of cloud computing.
Security Service	Security service is a processing or communication service that is provided by a system to give a specific kind of protection to resources, where said resources may reside with said system or reside with other systems, for example, an authentication service or a PKI-based document attribution and authentication service. Security services typically implement portions of security policies and are implemented via security mechanisms.
Semantic Web Services	The semantic web services, like conventional web services except for stressing the needs of meaning in the service description, are the server end of a client–server system for machine-to-machine interaction via the World Wide Web. Semantic services are a component of the semantic web because they use markup which makes data machine-readable in a detailed and sophisticated way (as compared with human-readable HTML which is usually not easily "understood" by computer programs).
Server Load Balancing	In order to achieve web server scalability, more servers need to be added to distribute the load among the group of servers, which is also known as a server cluster. The load distribution among these servers is known as load balancing. Load balancing applies to all types of servers (application server, database server), however, we will be devoting this section for load balancing of web servers (HTTP server) only. When multiple web servers are present in a server group, the HTTP traffic needs to be evenly distributed among the servers. In the process, these servers must appear as one web server to the web client, for example an internet browser. The load balancing mechanism used for spreading HTTP requests is known as IP Spraying.
Service	A service is an abstract resource that represents a capability of performing tasks that form a coherent functionality from the point of view of service providers and service requestors.
Service Availability	There are two interpretations for service availability: (1) service availability as the percentage that a Web service is available and functioning within its operational requirements; (2) service availability as the percentage of successful service invocations in all service invocations.
Service Broker	A software entity that collects a list of Web services advertisements from the service provider, accepts the service request from the requester, and helps to construct connections between them.
Service Composition	It is a way of creating a new service by combining existing services. Building enterprise solution typically requires combining multiple existing enterprise services. These composite services can be in turn recursively integrated with other services into higher level solutions. Such recursive service composition is one of the most important features of SOA, allowing to rapidly build new solutions based on the existing business services.

Keywords	Definition or Descriptions
Service Composition Schema	A service composition schema represents the technical and platform-specific specification of a business process. For the implementation of process- and service-oriented information systems, additional information which goes beyond the one from the respective business process model are required; e.g., technical specifications of data objects and data types, implemented services, user interfaces, business rules, and access control policies. The service composition schema has to meet a number of constraints in order to be executable by a service orchestration engine; e.g., specification of transition conditions, assurance of soundness or completeness of the specified data.
Service Provider	A software entity that is capable of and empowered to perform the actions associated with a service on behalf of its owner.
Service Requestor	A software entity that wishes to interact with a service provider in order to request that a task be performed on behalf of its owner.
Service-Oriented System	It is a software system that its implementation relies on a mesh of software services which comprise unassociated, loosely coupled units of functionality.
Smart Store	Smart Store integrates the information and communication technologies (ICT) and innovation of related services. It is based on a technological platform that offers the support for some attractive and efficient services for customers and administrative staff. Customers can obtain a new brand in a new experimental shopping environment from Smart Store.
SMS (Short Message Service)	SMS is a text communication service that allows the exchange of short text messages between mobile phones or land phones.
SMTP (Simple Mail Transfer Protocol)	SMTP is a text-based protocol for e-mail transmissions across the Internet.
Service Eco-System (or Service Ecosystem)	A Web service ecosystem is a logical collection of Web services whose exposure and access are subject to constraints characteristic of business service delivery. In these ecosystems, service consumers procure services through different distribution and delivery channels, outsourcing service delivery functions such as payment, authentication, and mediation to specialist intermediaries. Web service ecosystems make explicit the notion of service procurement, separating it from that of conventional service supply. (from A. P. Barros and M. Dumas “The rise of web service ecosystems”, IT Professional, vol. 8, no. 5, 2006)
Servitization	Servitization is the process to partition software functionalities within an organizational context into a set of services. Servitization will consider multiple dimensions of viewpoints, such as manageability and utility, to package a combination of appropriate functionalities as a service.
SOA (Service-Oriented Architecture)	SOA is a flexible set of design principles used during the phases of systems development and integration in computing. A system based on SOA architecture will provide a loosely-coupled suite of services that can be used within multiple separated systems from several business domains. SOA defines how to integrate widely disparate applications for a Web-based environment and uses multiple implementation platforms. A specific implementation of SOA is the one based on Web services: modular applications, which are auto-descriptive (WSDL), that can be invoked through the Internet following some established standards (typically SOAP over HTTP).
SOAP (Simple Object Access Protocol)	SOAP is a protocol specification for exchanging structured information in the implementation of Web Services in computer networks. It relies on eXtensible Markup Language (XML) for its message format, and usually relies on other application layer protocols, most notably Remote Procedure Call (RPC) and Hypertext Transfer Protocol (HTTP), for message negotiation and transmission. SOAP can form the foundation layer of a web services protocol stack, providing a basic messaging framework upon which web services can be built.
SOC (Service-Oriented Computing)	SOC promotes the use of well-defined composition units – services – to support the rapid development of applications. The central objective of this approach is to reduce dependencies among composition units, where a unit is typically some remotely accessed by clients.

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Software Testing	Software testing comprises different techniques that aim to find bugs in a program or system. Depending on the kind of bugs, it can be functional testing (i.e., functional operation) or non-functional testing (e.g., usability, performance, etc.). If the tester is allowed to look into to the source code of the program it is a white-box testing approach;, otherwise it is black-box testing.
Software Verification and Validation (V&V)	Software verification and validation concerns with software quality in terms of correctness of code and user acceptance of a system. In particular, the software verification process verifies whether the resulting product meets requirement specifications, and the software validation one checks if resulting product satisfies the user's demands.
SSDP (Simple Service Discovery Protocol)	SSDP is a network communication protocol. It enables the discovery of available service on a network. SSDP uses UDP multicast or unicast in order to discover the services.
Static Testing Techniques	Static testing techniques try to find bugs in a program without executing it. This can be done by checking its development process (using code reviews, inspections, walkthroughs, etc.) or analyzing its source code (by means of model checking, Petri nets, pi-calculus, etc.). These techniques usually provide the most reliable results, but they are limited because of their complexity when compared to those of dynamic testing techniques, being complementary.
Test Case	A test case is a set of input values and expected results for an execution of a piece of software. A set of test cases is called a test suite. Test suites are usually produced to meet a certain adequacy criteria (e.g., executing all the instructions in the program at least once). When the expected results are missing, the test suite reduces to test data.
Ubiquitous Computing	See Pervasive Computing
UDDI (Universal Description Discovery and Integration)	UDDI is a platform-independent, Extensible Markup Language (XML)-based registry for businesses worldwide to list themselves on the Internet and a mechanism to register and locate web service applications. UDDI is an open industry initiative, sponsored by the OASIS enabling businesses to publish service listings and discover each other and define how the services or software applications interact over the Internet.
UPnP (Universal Plug And Play)	UPnP is a specification defined from an industrial initiative and is currently run by the UPnP Forum. The goal of this specification is to simplify connections between heterogeneous communicating devices and the construction of home networks.
Web Service	A web service is typically an application programming interface (API) or Web API that is accessed via Hypertext Transfer Protocol (HTTP) and executed on a remote system, hosting the requested service. The W3C defines a "web service" as a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.
Wi-Fi	Wi-Fi refers to a trademark that is commonly used to describe a set of standards enabling devices to be connected to the Internet through a wireless network.
WiMAX (Worldwide Interoperability for Microwave Access)	WiMAX (IEEE 802.16m) is a telecommunications protocol that provides fixed and mobile Internet access. WiMAX forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL"
WSDL (Web Services Description Language)	The Web Services Description Language (WSDL) is an XML language for describing Web services as a set of network endpoints that can operate messages. It allows service descriptions in a standard format.
WS-HumanTask (Web Services Human Task)	WS-HumanTask is a BPEL extension which introduces the definition of human tasks and notifications. It is related to BPEL4People.
WS-I (Web Services Interoperability)	WS-I is an industry consortium chartered to promote interoperability amongst the stack of web services specifications.

Keywords	Definition or Descriptions
WS-Policy (Web Services Policy Framework)	WS-Policy defines a general-purpose XML-based model and syntax that may be used to describe and communicate the policies that inhere to any Web-based service. In other words, WS-Policy assertions express the capabilities and constraints that apply to some particular Web service to which they pertain.
WS-Security (Web Services Security)	WS-Security is a proposed IT industry standard that addresses security when data is exchanged as part of a web service. It is a member of the WS-* family of web service specifications and was published by OASIS. WS-Security specifies how integrity and confidentiality can be enforced on messages and allows the communication of various security token formats.
WSSG (Web Service Security Gateway)	WSSG is a high-performance software solution for Web Services Security Control & Management, powered by XML processing technology and built from the ground up with security in mind to be a security-enforcement point for XML and Web services transactions. It also helps provide comprehensive XML security and the high-speed performance needed for real-world applications.
WS-Transaction (Web Services Transaction)	The WS-Transaction defines what constitutes a transaction and what will determine when it has completed successfully. Each transaction is part of an overall set of activities that constitute a business process that is performed by cooperating Web services. WS-Transaction declares two coordination types: Atomic Transaction for individual operations and Business Activity for long running transactions. Developers can use either or both of these coordination types when building applications that require consistent agreement on the outcome of distributed activities.