



Subject : Definitions and and terms used in Tofs and OpenSpecs

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Terms	Definition
System	<p>A composition of communicating objects, cooperating towards completion of a mission. A system can be composed of several sub-systems. Each system and sub-system is also an object.</p> <p>Definition in 15288 a combination of interacting elements organized to achieve one or more stated purposes</p> <p>NOTE 1 A system may be considered as a product and/or as the services it provides.</p> <p>NOTE 2 In practice, the interpretation of its meaning is frequently clarified by the use of an associative noun, e.g. aircraft system, product system. Alternatively the word system may be substituted simply by a context dependent synonym, e.g. aircraft, product, though this may then obscure a system principles perspective.</p>
Examples.	An Anti Blocking Braking System (ABS) system, a Personal Digital Assistant (PDA), the postal system, ...
Mission	<p>Overall purpose of the system is to complete one or more missions.</p> <p>It is an attribute of the system and when achieved, the mission can be seen as 'an emerging property' of the system</p>
Ex.	<p>The ABS system shall allow a car to stop in the shortest way.</p> <p>Note 1. This should not yet say anything about how this is achieved.</p> <p>Note 2. Safety could be the overall 'mission' achieved as side-effect of the originally stated mission.</p> <p>The postal system shall receive letters and deliver them to the addressees.</p>



Enabling system	A system that complements the system-of-interest during its life cycle stages but does not necessarily contribute directly to its function during operation (15288).
Ex.	Roads are needed for the postal system to operate. The ABS production system.
Object	A well defined and identifiable part of a system.
Ex.	The postal office building The hydraulic brake actuator (ABS)
Project	All activities related to the development or redevelopment of a system, bounded by specified resources and requirements (A Project, may contain multiple CIs)
Ex.	The project to decrease the operating cost of the postal system The project to develop a less noisy ABS
Work Package	A specific set of tasks to be executed as part of a project
Ex.	To simulate the new postal organisation To develop a new ABS control algorithm
Task	A well defined, specific activity in a work package
Ex.	To define simpler postal tariffs To manufacture the ABS electronic print
Message	Any interaction between objects Note : a method invocation (with arguments) can be seen as a message
Ex.	To request a set of stamps The pressure from the brake pedal to the ABS controller
Protocol	The message's content and its sequence in relation to other messages
Ex.	Weight-Size-Priority (related to postal mail) Message Sequence Chart between controller and brake pedal
Action	Defined behavior within an object



Ex.	When priority is high, put envelope in right bin When wheel blocks, release pressure (to complete its prupose)
Dependency area	Part of system(s) on which an object depends
Ex.	Delivery of mail requires postal workers ABS operation depends on presence of electric power
Responsibility area	Part(s) of a system for which a developer is responsible
Ex.	The Human Resources manager shall recruit the postmen The software group shall implement the new algorithm
Stakeholder	Any person or organisation who can be affected by the system (or has a vested interest in the system's project)
Ex-	Enterprise customers, postmen, Driver, car manufacturer, other drivers, insurance companies
Operator	Human part of a system
Ex.	The postal sorting machine operator The driver of the car
User	A person or organization benefiting from the system without necessarily operating it.
Ex.	The addressee of a journal subscription ABS : the driver is the user
Developer	A person participating in a project and actually participating in implementing from design specification to validation testing
Ex-	The person implementing the LAN in the post office The embedded software engineer implementing the controller software
Requirement	A text, more or less formal that defines qualities that a system shall or should have. Note: Requirements should avoid implicit design decisions.
Ex.	The Postal Service shall deliver 90 % of the letters in 2 days



	The ABS system shall have a MTBF of 5 years
Specification	Are the translations of the requirements in measurable attributes of the system. A specification is a document (on paper or in a computer), which defines (specifies) a system. It can contain: <ul style="list-style-type: none"> - requirements on the system - test cases to match the requirements - manuals (specifies operator roles) - definition of environment (enabling systems) - etc.
Ex	Resulting specification document agreed upon between the Postal administrator and the successful bidder Final delivery specification agreed upon by the car manufacturer and the supplier of the ABS system
Feature	Some ability of a system, which contributes to completion of the system's mission(s)
Ex.	Letters are always delivered in 3 days (required was 2 days) Braking distance decreased with 30 %
Configuration Item (CI)	Tofs equivalent to a Work Package. Items in a CI can be put under Configuration Control.
Ex.	See Work Package
Attribute	Something that belongs to something else. For example, after you have allocated some requirements to an object for fulfillment, this object has a list of fulfillment requirements as an attribute. The object will also have list of test cases as an attribute to make the requirements meaningful.
Ex.	Number of post packages processed in a day by one person Mean Time Between Failure for the ABS system
Attributes to a CI	Mission (for the system object) Requirement CI document AND Object-specific attributes: <i>Status: can_be</i> <ul style="list-style-type: none"> - <i>objects identified</i> - <i>support objects identified</i>



	<ul style="list-style-type: none"> - <i>ready for implementation</i> - <i>approved object level, meaning that the object is approved, but not necessarily the complete system</i> - <i>approved CI-level, meaning that the CI (system/system part) is approved, including its contained objects.</i> <p>Mode: <i>can_be</i></p> <ul style="list-style-type: none"> - <i>working</i> - <i>frozen for review</i> - <i>frozen and approved.</i> <p><i>The difference between Status and Mode depends on the need to have a more formal status for project management and a more informal Mode for developers to use.</i></p>
Test Case	Procedure with a measurable output to verify one, or more or part of a requirement.
Category for objects	<p><i>can_be:</i></p> <ul style="list-style-type: none"> - CI (System) - Operator (often human) - Software - Hardware - Other <p>(this classification can be domain specific)</p>
Object qualifiers	<ul style="list-style-type: none"> - Decision maker - Sensor - Controller - ...
Work area	<p><i>can_be</i></p> <ul style="list-style-type: none"> - Local, what a single developer works with at one time, normally an object - Group, what a small group of developers is responsible for, normally a CI (System)
Attributes to an Object	<p><i>can_be:</i></p> <ul style="list-style-type: none"> - Supporting Object (relative to any object) - Contained Object (relative to a CI or system) - Attached Object (relative to a CI or system) <p>Status: <i>can_be</i></p> <ul style="list-style-type: none"> - candidate object - object identified - support objects identified - ready for implementation



	<ul style="list-style-type: none"> - approved object level, meaning that the object is approved, but not necessarily the complete system <p>Mode: can_be</p> <ul style="list-style-type: none"> - working - frozen for review - frozen and approved.
Qualifier	Information, attached to a requirement to define its scope
Types of Requirement qualifiers	<ul style="list-style-type: none"> - General : applies to the whole system - Normal, applies to part of a system <ul style="list-style-type: none"> o Responsibility, to be fulfilled by the current object or by one of its support objects o Fulfillment to be tested with the current object
Action Types	<ul style="list-style-type: none"> - Message exchange (send-receive) - Invocation of another action <p>Note : messages act like synchronization points</p>
Concurrency	An activity can execute (or continue to execute) whenever it has received the necessary input messages
Objects Types	See Object categories
System Analysis	The process of investigating a system's requirements and interactions with its environment.
Architectural design	Part of the design work that defines what are the objects and their types and how they are related to each other through messages and dependency relationships. Note: dependencies can be indirect.
Change proposal	Proposal for requirements, that initiates corrective action, during system development. Handled as problem in O4S™ .
Problem	Any issue that comes up during the system development process and needs further work to remove or settle the issue
Validation	The process to certify that a completed system satisfies the agreed upon specifications and meets the systems requirements (by that time the original specification will often be updated)



Grammar and semantics

system CONSISTS_OF

object (1-N) AND
message (1-N)

// N = 1 : means a system is an object (the object is the
// system), everything else are composing objects and
// subsystems
// Minimum system has one object and one message
(e.g. door opener)

object CONSISTS_OF

object (1-N) AND
messages (1-N) AND
action (1-N)

object HAS_ATTRIBUTES

requirement (1-N) AND
// test_case AND -> requirement
status (1) AND
mode (1) AND
category (1) AND
related_test_case (1-N)
specification (1)
document (1)

object HAS_TYPE

system OR
operator OR
software OR
hardware OR
other

requirement CONSISTS_OF

requirement_description (1) AND
supporting_document (0-N) AND
attributes

requirement HAS_TYPE

general XOR
normal // normal HAS_TYPE ??

specification CONSISTS_OF

sub_specifications



protocol CONSISTS_OF
 message (1-N) AND
 message_sequence (1)

action CONSISTS_OF
 action_description (1) AND // in ODEL
 segments (1-N) AND // atomic action
 synchronisation_point (0-N)

configuration_item CONSISTS_OF
 object (1-N) AND // defines a work_area

workpackage CONSISTS_OF
 object (1-N) // same as CI

workpackage HAS_LINKS WITH // modeled as messages
 workpackage (0-N)

system_development HAS_VIEWS
 requirements-view (1) AND
 project-view (1) AND // includes planning
 architectural_view (1)

project CONSISTS_OF
 object (1-N) AND
 milestone (1-N) AND
 deliverables (1-N) AND
 resources (1-N) AND
 work_package (1-N)

work_package CONSISTS_OF
 task (1-N)

architecture CONSISTS_OF
 specified_objects (1-N) AND
 specified_messages (1-N)

According to Britannica dictionary :

	<p><u>Main Entry: spec·i·fi·ca·tion</u> Pronunciation: "spe-s&f&-'kA-sh&n, "spes-f&- Function: <i>noun</i> Date: 1633 1 : the act or process of specifying 2 a : <i>a detailed precise presentation of something or of a plan or proposal for something -- usually used in plural</i> b : a statement of legal particulars (as of charges or of contract terms); <i>also</i> : a single item of such statement c : a written description of an invention for which a patent is sought</p>
	<p><u>Main Entry: re·quire·ment</u> Pronunciation: -'kwlr-m&nt Function: <i>noun</i> Date: 1662 : something required: a : something wanted or needed : NECESSITY <production was not sufficient to satisfy military <i>requirements</i>> b : <i>something essential to the existence or occurrence of something else</i> : CONDITION <failed to meet the school's <i>requirements</i> for graduation></p>
	<p><u>Main Entry: 'at·tri·bute</u> Pronunciation: 'a-tr&-"byüt Function: <i>noun</i> Etymology: Middle English, from Latin <i>attributus</i>, past participle of <i>attribuere</i> to attribute, from <i>ad-</i> + <i>tribuere</i> to bestow -- more at TRIBUTE Date: 14th century 1 : an inherent characteristic; <i>also</i> : an accidental quality 2 : <i>an object closely associated with or belonging to a specific person, thing, or office <a scepter is the attribute of power>; especially : such an object used for identification in painting or sculpture</i> 3 : a word ascribing a quality; <i>especially</i> : ADJECTIVE synonym see QUALITY</p>
	<p><u>Main Entry: sys·tem</u> Pronunciation: 'sis-t&m Function: <i>noun</i> Etymology: Late Latin <i>systemat-</i>, <i>systema</i>, from Greek <i>systema-</i>, <i>systema</i>, from <i>synistanai</i> to combine, from <i>syn-</i> + <i>histanai</i> to cause to stand -- more at STAND Date: 1603 1 : <i>a regularly interacting or interdependent group of items forming a unified whole <a number system>; as a (1) : a group of interacting bodies under the influence of related forces <a gravitational system> (2) : an assemblage of substances that is in or tends to equilibrium <a thermodynamic system></i> b (1) : <i>a group of body organs that together perform one or more vital functions <the digestive system></i> (2) : <i>the body considered as a functional unit</i> c : <i>a group of related natural objects or forces <a river system></i> d : <i>a group of devices or artificial</i></p>

	<p><u>objects or an organization forming a network especially for distributing something or serving a common purpose <a telephone system> <a heating system> <a highway system> <a data processing system> e : a major division of rocks usually larger than a series and including all formed during a period or era f : a form of social, economic, or political organization or practice <the capitalist system> 2 : an organized set of doctrines, ideas, or principles usually intended to explain the arrangement or working of a systematic whole <the Newtonian system of mechanics> 3 a : an organized or established procedure <the touch system of typing> b : a manner of classifying, symbolizing, or schematizing <a taxonomic system> <the decimal system> 4 : harmonious arrangement or pattern : ORDER <bring system out of confusion -- Ellen Glasgow> 5 : an organized society or social situation regarded as stultifying : ESTABLISHMENT 2 -- usually used with <i>the</i> synonym see METHOD - sys·tem·less /-l&s/ adjective</u></p>
	<p><u>Main Entry: ¹ob·ject</u> Pronunciation: 'äb-jikt, -(")jekt Function: <i>noun</i> Etymology: Middle English, from Medieval Latin <i>objectum</i>, from Latin, neuter of <i>objectus</i>, past participle of <i>obicere</i> to throw in the way, present, hinder, from <i>ob-</i> in the way + <i>jacere</i> to throw -- more at OB-, JET Date: 14th century 1 a : something material that may be perceived by the senses <I see an <i>object</i> in the distance> b : something that when viewed stirs a particular emotion (as pity) <look to the tragic loading of this bed... the <i>object</i> poisons sight; let it be hid -- Shakespeare> 2 : something mental or physical toward which thought, feeling, or action is directed <an <i>object</i> for study> <the <i>object</i> of my affection> <delicately carved art <i>objects</i>> 3 a : the goal or end of an effort or activity : PURPOSE, OBJECTIVE <their <i>object</i> is to investigate the matter thoroughly> b : a cause for attention or concern <money is no <i>object</i>> 4 : a thing that forms an element of or constitutes the subject matter of an investigation or science 5 a : a noun or noun equivalent (as a pronoun, gerund, or clause) denoting the goal or result of the action of a verb b : a noun or noun equivalent in a prepositional phrase synonym see INTENTION - ob·ject·less /-l&s/ adjective - ob·ject·less·ness noun</p>
	<p><u>Main Entry: ¹mis·sion</u> Pronunciation: 'mi-sh&n Function: <i>noun</i> Etymology: New Latin, Medieval Latin, & Latin; New Latin <i>mission-</i>, <i>missio</i> religious mission, from Medieval Latin, task assigned, from Latin, act of sending, from <i>mittere</i> to send Date: 1606 1 obsolete : the act or an instance of sending 2 a : a ministry commissioned by a religious organization to propagate its</p>



	<p><u>faith or carry on humanitarian work</u> b : assignment to or work in a field of <u>missionary enterprise</u> c (1) : a mission establishment (2) : a local church or <u>parish dependent on a larger religious organization for direction or financial support</u> d plural : <u>organized missionary work</u> e : a course of sermons and services given to convert the unchurched or quicken Christian faith</p> <p>3 : a body of persons sent to perform a service or carry on an activity: as a : <u>a group sent to a foreign country to conduct diplomatic or political negotiations</u> b : a permanent embassy or legation c : a team of specialists or cultural leaders sent to a foreign country</p> <p>4 a : a specific task with which a person or a group is charged b (1) : a definite military, naval, or aerospace task <a bombing <i>mission</i>> <a space <i>mission</i>> (2) : a flight operation of an aircraft or spacecraft in the performance of a mission <a <i>mission</i> to Mars></p> <p>5 : CALLING, VOCATION</p>
	<p>Main Entry: <u>mes·sage</u> Pronunciation: 'me-sij Function: <i>noun</i> Etymology: Middle English, from Old French, from Medieval Latin <i>missaticum</i>, from Latin <i>missus</i>, past participle of <i>mittere</i> Date: 14th century</p> <p>1 : a communication in writing, in speech, or by signals 2 : a messenger's errand or function 3 : an underlying theme or idea</p>
	<p>Main Entry: <u>pro·to·col</u> Pronunciation: 'prO-t&-"kol, -"kOI, -"käl, -k&l Function: <i>noun</i> Etymology: Middle French <i>prothocole</i>, from Medieval Latin <i>protocollum</i>, from Late Greek <i>prOtokollon</i> first sheet of a papyrus roll bearing data of manufacture, from Greek <i>prOt-</i> prot- + <i>kollan to glue together</i>, from <i>kolla</i> glue: perhaps akin to Middle Dutch <i>helen</i> to glue Date: 1541</p> <p>1 : an original draft, minute, or record of a document or transaction 2 a : a preliminary memorandum often formulated and signed by diplomatic negotiators as a basis for a final convention or treaty b : the records or minutes of a diplomatic conference or congress that show officially the agreements arrived at by the negotiators 3 a : a code prescribing strict adherence to correct etiquette and precedence (as in diplomatic exchange and in the military services) b : a set of conventions governing the treatment and especially the formatting of data in an electronic communications system 4 : a detailed plan of a scientific or medical experiment, treatment, or procedure</p>