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## Design of a Methodology to Support Software Release Decisions

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## GLOSSARY

The definitions listed below are either defined by the researcher or derived from multiple sources and adjusted in such a way that they match the definitions or interpretations used in this thesis. Where appropriate, a reference is made to the original source.

- act of choice** - the actual choice between different **alternatives** or **courses of action** taken by the appropriate **authority** in an **organization**
- alpha test** - an in-house test of a pre-production **software product** to find and eliminate the most obvious **defects**, either conducted in a laboratory setting or in some part of the **software manufacturer's** regular operations
- alternative** - a possibility one can choose from; alternatives can be identified (that is, searched for and located) or even developed (created where they did not previously exist)
- application software** - a program or group of programs designed for **customers** or **end-users**; figuratively speaking, applications software sits on top of **system software** because it is unable to run without the operating system and system utilities
- artefact** - a person-made object taken as a whole (in this study: the associated documentation and data belonging to a **software product**)
- aspiration level** - a set of attributes that describes minimally satisfactory (desirable, acceptable) **alternatives** or the smallest outcome that would be deemed satisfactory by the decision-maker
- authority** - the agency or program with the **power** or right to give orders or make **decisions** (in this study the following authorities are distinguished: **Senior Management, Marketing, Development, Maintenance & Exploitation**)
- benefit** - the economic value of a scheme, usually measured in terms of the cost of damages avoided by the scheme, or the valuation of perceived amenity or environmental improvements (not necessarily expressed in a monetary value)
- beta test** - an external test of a pre-production **software product** at a limited number of **end-user** sites with the purpose to test the product for all functions in a breadth of field situations to find those **failures** that are more likely to show in actual use than in the **software manufacturer's** more controlled in-house **alpha test** before release to the **end-user(s)**
- bounded rationality** - limitations on decision-making caused by costs, human abilities, time, technology, and availability of information
- burden** - the opposite of **benefit**
- business case** - a justification of why a **project** is required for an **organization** and what the product is going to be; it should include the expected **benefits**, the project's product and performance characteristics, major project **uncertainties**, and the upside opportunities (in this study: **software product**)<sup>96</sup>
- business strategy** - a description of the manner in which an **organization** intends to gain a **competitive advantage**
- capability** (in decision-making) - the potential of a **stakeholder** to co-determine the **decision** outcome
- case study** - an empirical enquiry that investigates a contemporary phenomenon within its real life context, when the boundaries between phenomenon and context are not clearly evident
- certainty** - different **alternatives** can be evaluated without consideration of any scenarios

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<sup>96</sup> A well-written project objective should comprise at least the following: identification of a parameter to be modified, current value of the performance parameter to be changed, date of measurement of the current value, expected target value of the performance parameter, and the expected date of achieving the target value of the performance parameter.

- competitive advantage** - an advantage an **organization** has over its **competitors** because of the quality or superiority of products or services which will persuade **customers** to buy from them rather than from **competitors** (in this study the product or service is a **software product**)
- competitor** - an **organization** that is engaged in selling and buying products or services in the same market as another **organization** (in this study, the organization is a **software manufacturer** and the product or service is a **software product**)
- complete uncertainty** - different **alternatives** can be evaluated with considerations of some scenarios but the chance of occurrence of each scenario cannot be quantified
- constituency** - a representation of an organizational **authority**
- cost** - the economic value of the amount of resources applied to a cost object (not necessarily expressed in a monetary value)
- cost/benefit analysis** - a method of appraisal that assesses different **alternatives** through a comparison between their **costs** and **benefits**
- customer** - someone who pays for products or services (in this study the product or service is a **software product**)
- course of action** - a sequence of activities that an individual or unit may follow (in this study the individual or unit is a **stakeholder**)
- decision** - a moment in an ongoing **process** of evaluating **alternatives** for meeting an objective, at which expectations about a particular course of action impel the decision-maker(s) to select that course of action most likely to result in attaining the objective
- decision rule** - a statement that tells a group of decision-makers how to choose among different **alternatives** based on the characteristics of the decision situation
- decision-making process** - the choice **process**, in which one among several **alternatives** or **courses of action** is selected
- decision success** - the outcome of a **decision** that results in the attainment of the objective that gave rise to the **decision** within the constraints that had to be observed to bring out such attainment
- defect** - the result of making an error; one error can lead to multiple defects
- defect density** - the number of residual **defects** per size attribute
- defect potential** - the number of injected defects per size attribute
- defect removal efficiency** - the number or percentage of injected **defects** removed
- Development** - the organizational **authority** responsible for **(software) development**
- (software) development** - a set of activities that results in the first version of a **(software) product** or a major revision of an existing **(software) product**; software development may include new development, modification, reuse, re-engineering, maintenance, or any other activities that result in a **(software) product**; minor revisions of an existing **(software) product** are accomplished through **(software) maintenance**
- deutero-learning** - the **process** of learning how to carry out **single-loop learning** and **double-loop learning**
- development costs** - the cash outflows of a (software) product before its (software) release
- diffusion** - a particular type of communication in which the message content that is exchanged is concerned with a new idea
- double-loop learning** - a **process** in which **organizations** examine and correct problems even though correction requires challenge to underlying policies and objectives
- duopoly** - market structure in which two manufacturers of a product or service compete with each other
- effectiveness** - a measure of the extent to which a project attains its project objectives
- end-user** - the individual who uses the **(software) product** after it has been developed, produced and released
- entrant** - an **organization** that enters competition in an established market
- equilibrium** - the amount of output supplied equals the amount demanded: the market has neither a tendency to rise nor fall
- espoused theory** - the reasons given when explicitly asked to explain one's behaviour (opposed to **theory-in-use**)

- failure** - non-adherence to one or more stated **functional requirements** and/or **non-functional requirements** observed by a **customer** or **end-user** of a **software product**, that may indicate the presence of one or more **faults**
- fault** - **defect** observed by someone
- fixed cost** - cost that does not vary with output (opposed to **variable cost**)
- functional requirement** - a requirement that specifies a function that a system or system component must be able to perform (in this study, the system considered is the **software product**)
- game theory** - the study of decision problems in competitive situations, being the procedure for analysing and deriving rules for making **decisions** when two or more people or **organizations** are competing for some objective
- guideline** - a recommended practice that provides guidance to appropriate behaviour
- heuristics** - simplified rules used for processing **information** on a rule of thumb, trial and error basis
- incumbent** - an **organization** that has been providing products or services in a market for some time
- influence** - any actions or examples of behaviour that cause a change in attitude or behaviour of another individual or group
- information** - data that has been interpreted, translated, or transformed to reveal the underlying meaning
- information perfection** - extent to which **information** is reliable and complete
- informed uncertainty** - different **alternatives** can be evaluated with considerations of some scenarios, whereby the chance of occurrence of each scenario can be quantified with probability or possibility values
- innovation** - an idea, practice, or object that is perceived as new by an individual or other unit of adoption
- instruction** - a description how something is to be done
- intuition** - a mental process that is subconsciously informed by emotional impulses
- irreversibility** - property of an event which makes reverting back to the state before the occurrence of the event impossible
- issue** - a major controversial point for collective decision-making
- maintainability** - the probability that, for a given condition of use, a maintenance activity can be carried out within a stated time interval and using stated procedures and resources (in this study: **software product**)<sup>97</sup>
- (software) maintenance** - a set of activities that results in a newer version of an existing **(software) product** and the exploitation of that **(software) product** after its release; major revisions of an existing **(software) product** are accomplished through **(software) development**
- Maintenance & Exploitation** - the organizational **authority** responsible for **(software) maintenance**
- (software) manufacturer** - the organization engaged in the original development, production and release of a (software) product to one or more **customers** or **end-users**
- marginal cost** - change in total cost following a one-unit change in output
- marginal value** - change in total value following a one-unit change in output
- Marketing** - the organizational **authority** responsible for the process of planning and executing the conception, pricing, promotion, and distribution of **software products** that will satisfy the objectives of **customers** and/or **end-users**
- maximizing behaviour** - concept assuming that an economic person (in this study: **stakeholder**) can calculate those alternative **courses of action** that will permit the attainment of the highest possible point on the scale of personal preferences
- method** - a way of doing something, especially a systematic, prescribed way

<sup>97</sup> In (IEEE 1990) distinction is made between the ease with which a product or component can be modified to correct **failures** (corrective maintenance), improve performance, or other attributes (perfective maintenance), or adapt to a changed environment (adaptive maintenance).

- methodology** - a coherent set of **methods**, **instructions**, **techniques**, **guidelines**, or **practices**, that prescribe how somebody who is willing to follow them should continue, and under what circumstances
- model of choice** - a calculation method for weighting aspects of **alternatives** (examples for this study: project alternatives, design alternatives, release alternatives)
- monopoly** - market structure in which there is only one manufacturer of a product or service
- network effects** - arise when a good is more valuable to a user when more users adopt the same good or compatible ones
- non-functional requirement** - a product property that puts one or more constraints upon one or more **functional requirements** (examples in this study: **reliability** and **maintainability**); non-functional requirements include the compliance to relevant standards
- operational costs** - the cash outflows of a (**software**) **product** after its (**software**) **release**
- opportunity costs** - the value of something given up to pursue something else
- optimizing behaviour** - concept assuming that an economic person (in this study: **stakeholder**) can calculate those alternative **courses of action** that will permit the attainment of the highest possible point on the scale of personal **preferences** (see also **maximizing behaviour**), taking into account that **information** has a price in time and money
- option** - the choice to take a specific action in the future (examples in this study: time-to-build and growth options); the action considered in finance are the purchase (call option) or sale (put option) of an asset
- organization** - a social entity that is goal-directed and is a deliberately structured activity system with an identifiable boundary
- organizational learning** - an area of knowledge within organizational theory that studies models and theories about the way an **organization** learns and adapts
- point of optimality** - value of **information perfection** where the marginal value equals the marginal cost
- position** (in decision-making) - the **preference** of a **stakeholder** regarding the **decision** outcome
- power** - the ability to exert **influence**
- practice** - a customary way of operation or behaviour
- predictability** - the ability to produce the same value within given accuracy bounds when successive readings of a specific quantity are measured (examples in this study: schedule, budget, requirements)
- preference** - a predisposition in favour of something
- process** - a set of instructions that defines a path to accomplish a predetermined objective
- process area** - a cluster of related **practices** that, when performed collectively, achieve a set of goals considered important for establishing **process capability** in that area
- process capability** - a point on an arbitrary scale that presents the increasing capability of the performed process (in this study an ordinal scale is taken: Low - Medium - High)
- product development strategy** - the product-market strategy whereby an **organization** creates new offerings for existing markets innovation, product augmentation, or product line extensions
- Product Development Team** - the team at operational level that is responsible for implementing defined **project objectives** of one **project**
- profit** - the excess of **revenues** over **development costs** and **operational costs** in a given period of time
- program** - a coherent set of one or more **projects** to be carried out to attain long-term organizational goals, defined in the **business strategy**
- project** - an intervention that consists of a set of planned, interrelated activities designed to achieve defined **project objectives** within a given budget and a specified period of time
- project objective** - a **benefit** that an **organization** expects to achieve as a result of injecting project product(s) into itself or its environment
- Project Steering Committee** - the team at tactical level that is responsible for meeting defined **project objectives**; a team will normally be composed of different **constituencies**

- real option** - an investment **decision** that is characterized by **uncertainty**, the provision of future managerial discretion to exercise at the appropriate time, and **irreversibility**
- (software) release** - the act of formally transferring a **(software) product** to its intended **customers** or **end-users** and to the organizational **authority** responsible for post-release activities like **software maintenance**
- (software) release criteria** - the particular criteria that are taken into account to make the **decision** whether or not to choose for a **(software) release**
- reliability** - the probability that a product will operate without **failure** under given conditions for a given time interval (in this study: **software product**)
- revenues** - the cash inflows from a (software) product after its **(software) release**
- risk** - the quantifiable likelihood of loss or less-than-expected returns
- salience** - the degree to which a **stakeholder** is interested in an **issue**
- satisficing behaviour** - concept assuming that an economic person (in this study: **stakeholder**) can not calculate those alternative **courses of action** that will permit the attainment of the highest possible point on the scale of personal preferences (see also **maximizing behaviour**) as internal and external constraints limit the global rationality and consequently the behaviour and processes of choice; as a result the course of action is chosen that most satisfies a aspiration level
- Senior Management** - the organizational **authority** at the level of (strategic) executive management above one or more **Project Steering Committees**, which has approval authority to **project objectives**
- single-loop learning** - a **process** in which **organizations** are able to correct matters in order to achieve stated objectives
- social system** - a set of interrelated units that are engaged in joint problem-solving to accomplish a common (set of) goal(s)
- software (product)** - the complete set, or any of the individual items of the set, of computer programs, procedures, and associated documentation and data designated for delivery to a **customer** or **end-user** (IEEE 1990) (in this study: **application software**); a software product can be either a standalone software application or software embedded in a system
- software release decision** - a moment in an ongoing **process** of evaluating release **alternatives** for meeting defined **project objectives**
- stakeholder** - a person or **constituency** whose interests are at stake; being involved in a **decision** is not a prerequisite to be a stakeholder
- strategic** - of great importance to an **organization** (for instance a **program, project** or **decision**)
- sunk cost - fixed cost** that are non-recoverable
- system software** - low-level programs that interact with the computer at a very basic level; this includes operating systems, compilers, and utilities for managing computer resources (see also **application software**)
- technique** - a well-defined procedure used to accomplish a specific activity or task
- theory-in-use** - the often unconscious theories which guides one's actual behaviour (opposed to **espoused theory**)
- theory of the firm** - basic model of business assuming that an **organization** has profit maximization as its primary goal
- time value of money** - concept that acknowledges that money changes value over a period of time: that a sum of money today is worth more than the same sum of money at a future date, because of the fact that the money received now can be invested to earn interest
- trade-off** - an exchange of one thing in return for another, especially relinquishment of one **benefit** for another regarded as more desirable
- uncertainty** - immeasurable **risk**
- validation** - confirmation by examination and provisions of objective evidence that the particular requirements for a specific intended use are fulfilled (IEEE 1990)
- variable cost** - cost that fluctuate with output (opposed to **fixed cost**)

**verification** - confirmation by examination and provisions of objective evidence that specified requirements have been fulfilled (IEEE 1990)

**zone of cost effectiveness** - bandwidth of **information perfection** where the difference between the absolute **marginal value** and absolute **marginal cost** is below a certain threshold