What is a requirement and what is requirement engineering?

In the context of a **project**, **requirements** set up a "**contract**" between those who express the **needs** and those who are in charge of realizing the project. Requirements help to delineate the **scope** of the project, to elaborate **acceptance tests**; they contribute to a clear definition of the **project costs** and a clear definition of **achievement criteria** for the project.

Mastering **requirements** is therefore crucial for any project to be successful and to reduce **risks** of failure. Projects will indeed pay cash mistakes made during the requirements engineering phase in terms of stakeholder **dissatisfaction**, **delivery terms**, and project **profitability**.

Companies and organizations must therefore be acquainted with the **methods**, **techniques** and **tools**, on the one hand, for identifying and formulating requirements and, on the other hand, for coping with requirements evolution. That's exactly the goal of **requirements engineering** (**RE**)!

Methodological approaches in RE

Formulating requirements rely always at least on "**natural language**": the requirements must indeed be communicated, validated, have a contractual scope and be used as evidence.

Good practices exist to help analysts write requirements: requirements document **templates**, **stylistic rules**, requirement type **taxonomies**, **standard clauses**, etc. Although they contribute to a better quality in the requirements formulation, those techniques do not solve any of the intrinsic problems related to the natural language: how to guarantee **consistency** between what has been written at page 10 of the requirements document and what has been formulated at page 150? How to avoid **ambiguities** and **inaccuracies**?

To avoid those problems, techniques for writing textural requirements are worth being completed with **modeling** techniques which are more precise and more concise.

The most used modeling techniques allow one to describe the following:

- **behaviors**, the dynamics of existing or future systems
- the convoyed **data** and how it is structured

Most modeling techniques have been developed for the design phase, that is, for those who provide a solution to the problem issued by the **contracting authority**. Some of those modeling techniques are not understandable by the contracting authority: try for instance to validate a UML class diagram or an entity/relationship schema with the contracting authority…: it's far from being evident and natural!

Goal orientation in RE

A good requirements document is beforehand the **statement of a problem** to solve and the **statement of minimal constraints** to be fulfilled by any solution.

Clearly, something is missing upfront in classical modeling approaches: an approach that allows one to model the **problem**. An approach oriented to - and understandable by the **contracting authority** (the customer, the business owner and team, users, the management…).

Goal oriented requirements engineering (GORE) addresses this issue by focusing on **goals**. Each goal describes some chunk of the **problem** to be solved.

Each goal is systematically challenged with two essential questions: **why** this goal? **How** to reach the goal? The answer to those two questions provides new goals which are analyzed in the same way.

The elicitation of **strategic goals** stops the quest for the why questions. The elicitation of concrete **requirements** on the system, of **hypotheses** and of **expectations** made on the system **context** stops the quest for the how questions.

The system **context** is the part of the system environment which must interact with it to achieve goals (the users, other systems with which the system must cooperate to reach the higher level goals).

This approach leads to a clear, structural and motivated **requirements** statements and a clear statement of the **responsibilities** for all stakeholders: who is responsible for what in the system and in its context.

The approach complements the classical modeling techniques and does not aim to replace them. It can be used instead as a frame for them. The goal and requirement analysis allows also one to identify the convoyed **domain concepts** (to setup at least a **glossary** and possibly a **business conceptual model**); the translation of requirements and expectations in terms of **operations** undertaken by the responsible agents allows one to model the new or modified **processes**, the execution of which will satisfy to the requirements (dataflow or activity diagrams). Conversely, the analysis of existing processes allows one to identify the business goals to keep and to be revisited as well.

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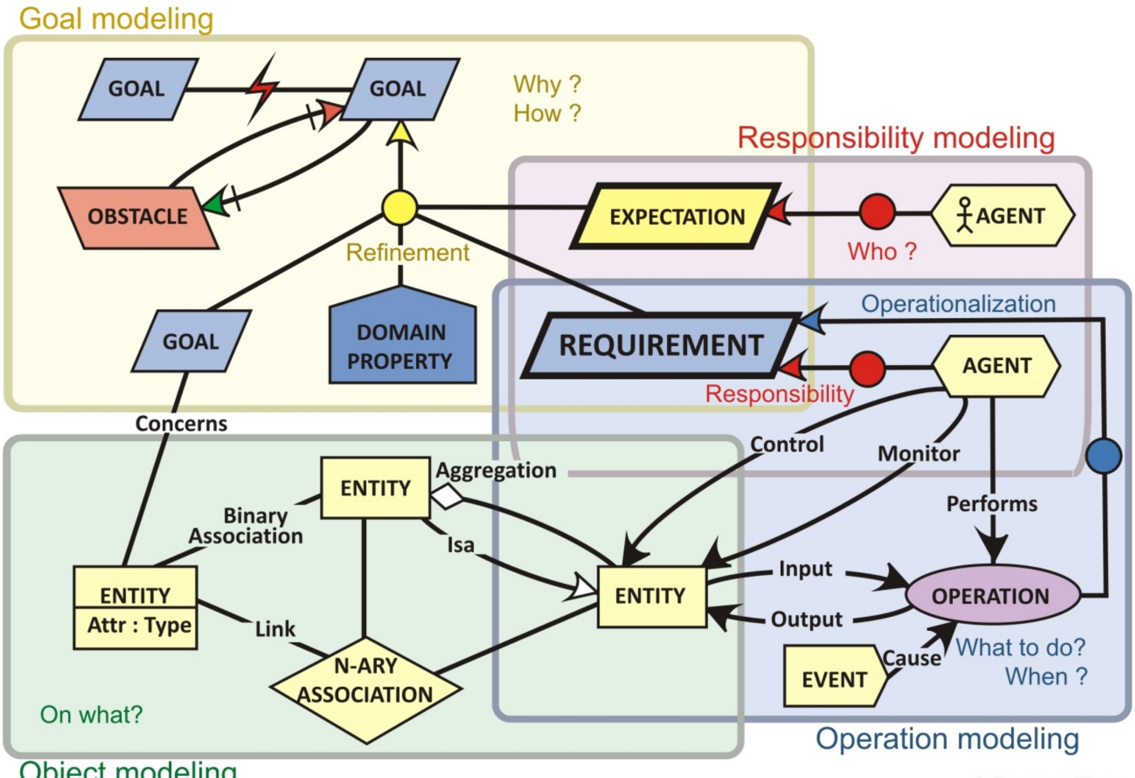
There is another interest in eliciting goals: goals are an excellent starting point for a focused **risk analysis** (and no longer, as often, an analysis based on a catalogue of predefined risks).



In goal orientation, a risk is modeled as an **obstacle** which prevents one or several requirements from being satisfied. Each obstacle is analyzed with the domain expert to study how pertinent it is, how critical it is and, if needed, to set up **countermeasures** to avoid or to detect the occurrence of the obstacle and to restore the system. These countermeasures are new goals to be analyzed.

An approach supported by a tool

Two complementary segments cover the market dedicated to requirements tools:

- **requirements management tools** which work on pre-existing requirement sets
- **requirements engineering tools** which support the creation of requirements from a "blank sheet of paper".

Nowadays most requirements engineers use tools originally designed for the architecture or the design phase. **Objectiver**® is one of the rare tools really designed for requirements engineering. It has been developed by requirements engineers according to their experience in writing requirements documents in various domain areas: **office applications** or **industrial applications**. In any case, goal orientation revealed to be of a fabulous asset to write **clear**, **structured**, **correct**, and **complete** requirements documents.

The main Objectiver functionalities

Objectiver allows you to do the following:

- **model requirements** and all related concepts: goals, obstacles, expectations, hypotheses, agents responsible for requirements or for expectations, domain concepts, operations or activities, flows. All those elements appear in typed diagrams: goal diagrams, risk diagrams, object diagram, responsibility diagram, operation diagrams.
- manage the **upfront traceability** between source documents (interview minutes, feasibility studies, user manual, technical documentation) and the model
- **query** the model to retrieve some model elements or to assess the quality of the model
- compute **traceability matrices** between model elements (V4)
- generate **reports** based on the model and on predefined templates
- generate **grids** to evaluate responses to the requirements document in a fair and compared way
- **export** in **XML** format (V4)
- **data exchanges** in **XMI** format (Eclipse EMF)
- publish an **electronic Web-based** version of the model
- support **collaborative work** between several analysts allowing them to edit a model simultaneously while preserving its consistency (V4)
- extend the meta-model with **plug-ins**
- support model **reviews** by allowing reviewers to **annotate** diagrams.

Our services

Besides being the acknowledged and appreciated **worldwide editor of the Objectiver tool**, Respect-IT offers the following services in requirements engineering:

- **realize** your **requirements documents**
- **coach** your **business analysts** to write requirements documents
- **train** your analysts in requirements engineering, goal orientation, Objectiver software
- grant you access to the **Objectiver Virtual Academy**: an **e-learning** site dedicated to goal orientation and to the Objectiver software

More information...

For more information please send an email to **sales@Objectiver.com** or browse our website: **www.objectiver.com**