Non Functional Requirements
Business Goals, and Architecture

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Requirements / Architecture Mismatch

"There is a deep and fundamental mismatch between the information that requirements specifications contain and the information that architects need."

Bass, Clemens, Kazman

1. Most of what is in a requirements specification does not determine or shape an architecture. Architectures are mostly driven or shaped by non functional quality requirements.
2. Much of what is useful to an architect is not in even the best requirement specification. Many concerns that drive an architecture do not manifest as observables in the system being specified and so do not appear in requirements specifications.

MOSCOW* style and user story based requirements just don't contain the right information.

* *Must have*, *Should have*, *Could have*, and *Would like but won't get*

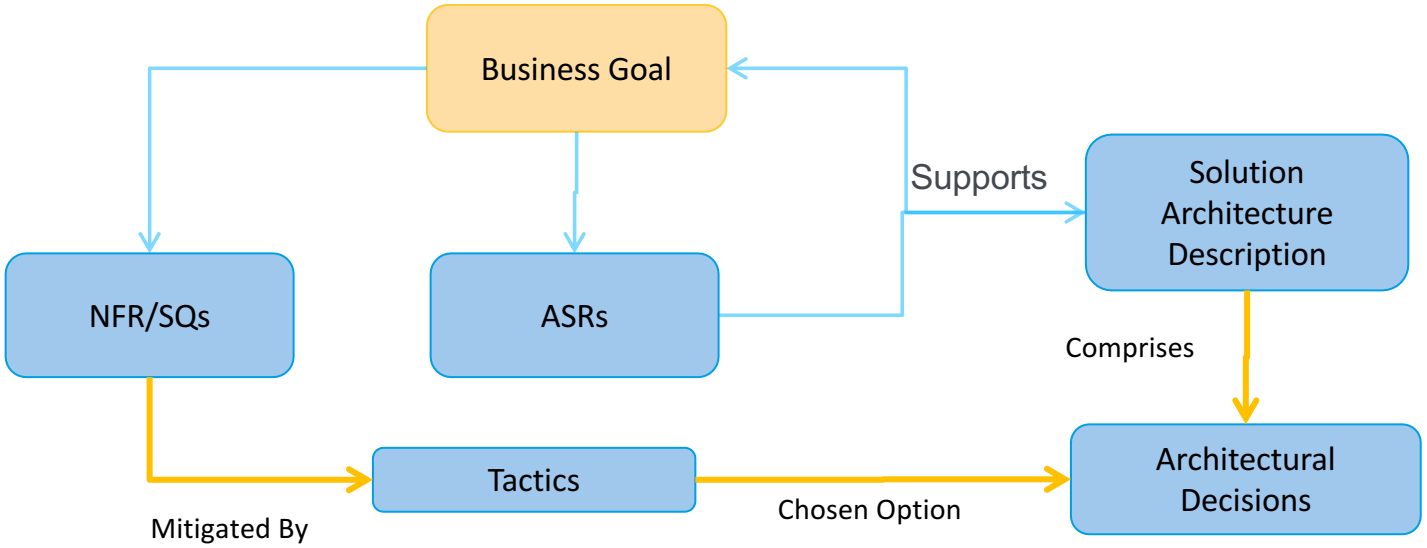
Architecturally Significant Requirements

"Architecturally significant requirements are those requirements that play an important role in determining the architecture of the system ...e.g., the system must record every modification to customer records for audit purposes. The system must respond within five seconds"

Eclipse Process Framework Project. Concept: Architecturally Significant Requirements.

A major source of architecturally significant requirements is the set of business goals that led to the system's being developed.

Business Goals not 'Functions' drive NFRs & Architecture



You should ask: "Why do you want this system to have a really fast response time? "

NFRs (Qualities) driven by Business Goals

Common Business Goals (Taxonomy) *:

- Maintaining growth and continuity of the business
- Meeting the company‘s financial objectives
- Meeting personal objectives
- Meeting responsibility to employees
- Meeting responsibility to society
- Meeting responsibility to country
- Meeting responsibility to shareholders Managing market position
- Improving business processes
- Managing quality and reputation of products

Within these environmental change has an impact: the social environment, legal and regulatory environment, competitive environment and technological change, and customer environment.

* Literature Survey by Bass, Clemens, Kazman

Generic Scenario Template for Business Goals

Goal	Business Goal description, e.g. from prior slide
Stakeholder	The stakeholder that owns the goal, the actor
Object	The entity to which the goal applies or derives benefit
Environment	The context for the goal, e.g. social, legal, competitive, customer, and technological
Target Measure (KPI)	The measurement value that determines achieval of the goal, the objective, a KPI; may have stretch targets.
Pedigree and value	The degree of confidence in the goal, the goal‘s volatility, and the value of achieving the goal.

For the system being developed, <Stakeholder> desires that <Object> benefit from <goal> in the context of <environment> and will be satisfied if <Target Measure>.

3 Different levels of Strategy - Stakeholders

Three different levels of strategy are commonly distinguished:

1. **Corporate level -** concerned with what businesses the company as a whole should be in, and with justifying why—in terms of added value—those business units should be grouped together corporately.
2. **Business -** involves determining what markets a business unit is competing in, how it should compete, where it wants to go and how it should get there. The answer to the last question will result in the creation of programmes of projects to enable business units to achieve their strategies.
3. **Operational -** focus on the role of individual departments and functions (marketing, human resources, manufacturing, finance, etc.), and on individual programmes or projects, in delivering the business level strategy.

Goal Object (X)

What do you wish to be true for or about X as a result of developing or acquiring this system?

X can be:

- Individual
- System
- Portfolio
- Employees
- Shareholders
- Organisation
- Nation
- Society

PALM – From Goals to Qualities

PALM = Pedigree Attribute Elicitation Method (Bass, Clemens, Kazman).

In a nutshell:

- **Gather** Key Stakeholder (those with high *salience**) workshop:

- **Elicit Goals:** Using the standard business goal categories (prior slide) to guide discussion, capture the important business goals.
  - Capture the effect of a change in any of the environmental factors on the business goal.
  - Prioritise the Goals.
  - Note that the Business Goals of importance may not be immediate to the Current Stakeholder or their systems, see Strategy Map later to resolve this.
- Look for business goals with the Object of **system, portfolio, product, product family, or proper names** of the organization‘s products or portfolios. We will also look for business goals that can easily be rewritten so that the object become becomes one of these.

PALM – From Goals to Qualities – Continued….

Identifying potential quality attributes from business goals.

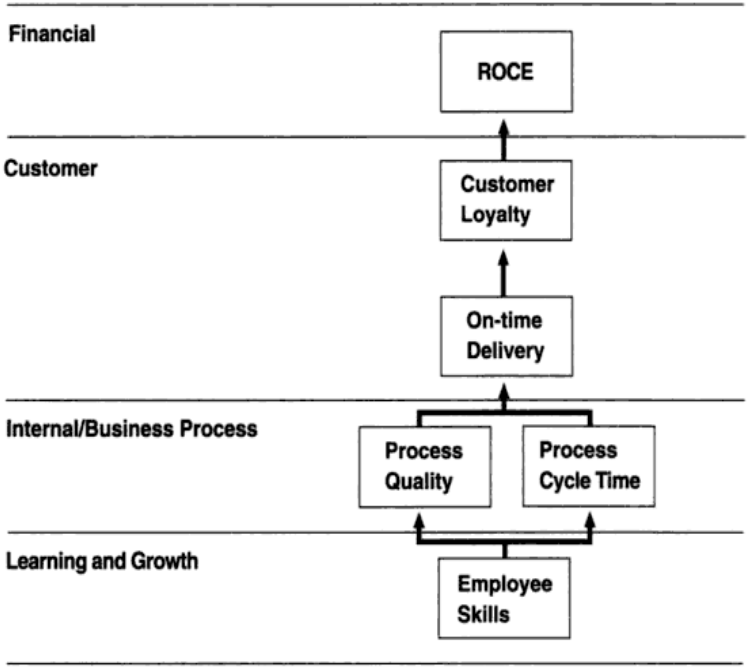
- For each important business goal scenario, participants describe a quality attribute that (if architected into the system) would help achieve it**.**
- For each business goal in our extracted set, we express the quality attribute requirements that would allow the business goal to be satisfied.

Examination of existing quality attribute drivers. Go through the list of Systemic Qualities and determine if any are relevant

For each Quality collect the attribute using the **NFR Template.**

Prioritise the NFRs

Using a Strategy Map to help describe Goals - Example



An Issue with Goals is that the Outcome may not be relevant to immediate Stakeholders. Strategy Map helps resolve this.

Makes explicit the sequence of hypotheses about cause and effect relationships between **outcome** measures and the **performance drivers** of the outcomes**.**

The four perspectives: **Financial, Customer, Internal processes and Learning and Growth.**

The top are outcomes (effects) and the bottom shows drivers (causes).

Example

- Return-on-capital-employed (ROCE) is a scorecard financial measure. The **driver** of this measure could be repeated and expanded sales from loyal customers.
- The hypothesis is that Customer Loyalty has a strong influence on ROCE. The outcome is to improve loyalty. A target level is set as the desired outcome, e.g. 85%. Currently it may be 64%. The measures are retentions, advocacy, and re-purchasing. First two are measured via surveys, later by purchase history.
- It is hypothesised that on-time Delivery will lead to Loyalty. The outcome is measured by % of deliveries meeting the delivery time specified. The outcome target is set at 99% of all deliveries.
- To achieve this Internal processes must be improved:
  - short cycle times
  - high-quality
- Improving quality means that more units produced can be immediately delivered. Failed units require waiting for a new unit to be produced or repaired before it can be delivered. Reducing cycle times means units can be delivered faster after receiving an order.

Initiatives to Improve Quality

A number of initiates are investigated to reduce cycle times and improve quality.

- Training as an initiative to improve skills of staff.
- Improvements in IT scheduling systems.

- IT scheduling system needs to be more available and more reliable. In many cases it is down or the information is just not right.
  - Now we can start defining the measureable Quality for this IT project.
  - Drill down into these goals and explore the NFR template

Important to note that fixing the IT system had no direct customer outcome, its an internal system, not customer facing, but the Strategy Map provided a chain of causality ending up with customer.

Scorecard and Strategy Maps

- A good scorecard (map) will have a mix of outcome measures and performance drivers. Outcome measures (lagging indicators) without performance drivers (leading indicators) do not communicate how the outcomes are to be achieved.
- Performance drivers give early indication about whether the strategy is being implemented successfully. For example although training is put in place now, the improvement on quality and cycle times will occur later. Even later in time, these affect the outcomes. It may be six months to a year later that customer loyalty is measurably improved.
- Performance drivers (e.g. cycle times & PPM defect rates) – without outcome measures may enable a business to achieve short-term operational improvements but will fail to reveal whether these have been translated into expanded business (new and existing customers) and to improved financial performance.
- The 4 perspectives of the strategy map permit a balance between short and long term objectives, between outcomes desired and the performance drivers of those outcomes.
- The common core customer outcome measures include: customer satisfaction, customer retention, new customer acquisition, customer profitability and market share in target segments. Specific market drivers include things that may impact loyalty such as short lead times or on-time delivery.
- The outcomes not only include the measures that the organisation wishes to improve but also the explicit and ambitious targets for these measures, stretch targets.