Fraunhofer IESE

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Measurement-based Alignment of Software Strategies and Business Goals

Session 3: Practical Exercises

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Exercise 1: Creating GQM Abstraction Sheets

Step 1: Define GQM Abstraction Sheet for Maintainability

Analyze an object-oriented code (e.g. Java, C++) with respect to its maintainability. Select a typical measurement purpose and viewpoint from your organization (if possible). Prepare a GQM abstraction sheet including your criteria for maintainability and the variation parameters that influence it.

Object	*Purpose*	*Quality Aspect*	*Viewpoint*	*Context*
Inspection	Understand	Effectiveness	Inspector	Project X

Quality Focus	*Variation Factors*
Q1: How effective? => M1: defects detected / (defects detected and slipped) Q2: How long? => M1: # hours per detection	M3: Experience of personnel (+, 0, -) M4: Size of program (+, 0, -)
Baseline Hypotheses	*Impact of Variation Factors*
M1: 75% M2: 3 h	If (M3='+') then (M1=90%) & (M4=2.5 h), …

Step 2: Define GQM Abstraction Sheet for Productivity

Compare the productivity of different development projects of your organization (from the same domain and application type) from the point of view of a manager that has to decide about outsourcing parts of the development. Prepare a GQM abstraction sheet including your criteria for productivity and the variation parameters that influence it.

Object	*Purpose*	*Quality Aspect*	*Viewpoint*	*Context*
Inspection	Understand	Effectiveness	Inspector	Project X

Quality Focus	*Variation Factors*
Q1: How effective? => M1: defects detected / (defects detected and slipped) Q2: How long? => M1: # hours per detection	M3: Experience of personnel (+, 0, -) M4: Size of program (+, 0, -)
Baseline Hypotheses	*Impact of Variation Factors*
M1: 75% M2: 3 h	If (M3='+') then (M1=90%) & (M4=2.5 h), …

Step 3: Define GQM Abstraction Sheet for User Friendliness

Analyze a word processing program that you know well (e.g. Word, OpenOffice, FrameMaker, LaTex) with respect to its user friendliness from the point of view of an analyst creating a draft for a “Requirements Document“ in a typical development project. Prepare a GQM abstraction sheet including your criteria for user friendliness and the variation parameters that influence it. (Hint: Make use of abstraction sheets.)

Object	*Purpose*	*Quality Aspect*	*Viewpoint*	*Context*
Inspection	Understand	Effectiveness	Inspector	Project X

Quality Focus	*Variation Factors*
Q1: How effective? => M1: defects detected / (defects detected and slipped) Q2: How long? => M1: # hours per detection	M3: Experience of personnel (+, 0, -) M4: Size of program (+, 0, -)
Baseline Hypotheses	*Impact of Variation Factors*
M1: 75% M2: 3 h	If (M3=‘+’) then (M1=90%) & (M4=2.5 h), …

Exercise 2: Creating GQM+Strategies® Grids

Step 1: Define Scope and Environment

Define the scope of the GQM+Strategies® application (i.e., those parts of a fictive organization that will apply the method) and select the areas that are most important for goal setting.

Scope	Restrict the scope (e.g., organization Z, division X, software development, etc.).

Elicit and document the general context according to the defined scope and identify any general underlying assumptions.

Context Factors	Environmental factors representing the organizational environment and determine the kind of models and data that can be used (e.g., application domain, project organization, organizational structure, applied IT technologies; available IT infrastructure, customer needs and expectations; market situation, etc.).
Assumptions	Estimated unknowns affecting the interpretation of the data (e.g., application domain, project organization, organizational structure, applied IT technologies; available IT infrastructure, customer needs and expectations; market situation, etc.).

Step 2: Define Levels and Elicit Existing Assets

Define the different abstraction levels of the organization that will be used to structure all goals and strategies (e.g., business, software, and project levels).

Levels	Organizational levels (e.g., management, software, project level).

For each specified organizational level, identify already defined goals and strategies and already collected measurement data. Try to identify relationships between goals, strategies, and measurement data.

Level	*Goals*	*Strategies*	*Data*
Management Level	Increase customer satisfaction	Test reliability in	Customer satisfaction
Software Level	Improve system test effectiveness	Introduce new system test	Customer-reported defects
Project Level	Reduce defect slippage	Analyze improvement	Defect slippage data

Step 3: Select and Formalize Level 1 Goal

Describe a typical goal on the first level of your organization and document the motivation that leads to this goal, taking into account context factors (facts) and assumptions.

Level 1 Goal	Articulate a corresponding Level 1 goal.
Basic Motivation	Ask for basic motivation (think of context and assumptions).

Formalize the Level 1 goal using the goal template. If you identified more than one goal, select the most important one from your point of view.

Activity	What is the main activity of your Level 1 goal? e.g., reduce, increase, achieve, pursue, provide, etc.
Focus	What is the main focus of your Level 1 goal? e.g., cost, profit, turnover, market share, prestige, customer satisfaction, etc.
Object	What is the main object of your Level 1 goal? e.g., people, market, a project, collection of projects, customer, services for the population, etc.
Magnitude (degree)	How would you quantify the focus of this Level 1 goal? e.g., x%, 1000K, y% more than last year, etc.
Timeframe	What is the timeframe for achieving the Level 1 goal? e.g., 3 years, 01 January 2008, permanently, from … to ... , etc.
Scope (context)	What is the scope (context, environment)? e.g., whole organization, business unit A, a person, etc.)
Constraints (limitations)	Are there any constraints? e.g., limited influence on certain factors, laws, mission statement & basic principles, etc.
Relations with other goals	Are there any relations to other goals? e.g., other Level 1 goals, tradeoffs, hierarchy, ordering, etc.

Step 4: Measure Level 1 Goal

Define a measurement goal and derive corresponding measures and models for measuring the achievement of your Level 1 goal. Define decision criteria that help you to determine whether the goal is achieved.

Define GQM goal	*Object*	Customer complaints trend for Splash
	Purpose	Evaluation
	Focus	10% improvement over history
	Viewpoint	Quality management
	Context	Web Products Division of XYZ
Measures and models		CC_{Splash} = Number of customer complaints in the first 12 weeks after release $CC_{History}$ = Average number of customer complaints in the first 12 weeks after release of a set of baseline products $CC_{Ratio} = CC_{Splash} / CC_{History}$
Decision criteria		If $CC_{Ratio} <= 0.9$, the Level 1 goal is achieved

Step 5: Select Strategies

Define a list of potential strategies for achieving the Level 1 goal and select the most promising one. Document all context factors and assumptions that led to your selection.

Potential Strategy Decisions	Identify potential strategies for achieving the Level 1 goal.
Strategy Decision Selection Criteria	Define the facts and assumptions in order to select one (or more) of the potential strategy decisions identified above.
Selected Strategy Decision(s)	Select the most promising strategy decision(s) considering selection criteria (feasibility, cost, and benefit).

Step 6: Select and Formalize Level 2 Goals

Describe the implications of your strategy on Level 2 of your organization (e.g., software development level, system development level, or service level) and identify corresponding goals from your organization. Document the criteria for selecting one (or more) goals.

Implications on Level 2	Elicit the implications of the chosen strategy with respect to Level 2.
Potential Level 2 Goals	Identify potential Level 2 goals.
Level 2 Goal Selection Criteria	Define the facts and assumptions in order to select one (or more) of the potential Level 2 goals identified above.
Selected Level 2 Goal(s)	Select the most promising Level 2 goal(s) considering selection criteria (feasibility, cost, and benefit).

Formalize the Level 2 goal using the goal template. If you identified more than one goal, select the most important one from your point of view.

Activity	What is the main activity of your Level 2 goal? e.g., reduce, increase, achieve, etc.
Focus	What is the main focus of your Level 2 goal? e.g., software reliability, development effort, product maintainability, etc.
Object	What is the main object of your Level 2 goal? e.g., process X, product Y, component Z, etc.
Magnitude (degree)	How would you quantify the focus of this Level 2 goal? e.g., x%, y% more than last year, etc
Timeframe	What is the timeframe for achieving the Level 2 goal? e.g., next 6 months, 12 weeks after next release, etc.
Scope (context)	What is the scope (context, environment)? e.g., division A, software product X, etc.
Constraints (limitations)	Are there any constraints? e.g., product functionality, development cost, etc.
Relations with other goals	Are there any relations to other goals? e.g., product development cost goals, schedule goals, etc.

Step 7: Measure Level 2 Goal

Define a measurement goal and derive corresponding measures and models for measuring the achievement of your Level 2 goal. Define decision criteria that help you to determine whether the goal is achieved.

Define GQM goal	*Object*	Customer complaints trend for Splash
	Purpose	Evaluation
	Focus	10% improvement over history
	Viewpoint	Quality management
	Context	Web Products Division of XYZ
Measures and models	CC_{Splash} = Number of customer complaints in the first 12 weeks after release $CC_{History}$ = Average number of customer complaints in the first 12 weeks after release of a set of baseline products $CC_{Ratio} = CC_{Splash} / CC_{History}$	
Decision criteria	If $CC_{Ratio} <= 0.9$, the Level 2 goal is achieved	