Goal-Driven Continuous Risk Management

Goal Question Indicator Measure

Applied to

Risk Management

Measurement

- Measurement is the process by which numbers or symbols are assigned to attributes of entities in the real world in such a way as to characterize the attributes by clearly defined rules [Fenton 95]. Thus, measurement requires
- Entities (objects of interest)
  - Assigned staff
- Attributes (characteristics of entities)
  - team size
  - team experience
- Rules (and scales) for assigning values to the attributes
  - Number of people assigned
  - Level of domain experience
  - Years of programming experience

Goal, Question, Metric (GQM)

- The GQM (Goal, Question, Metric) is the collection of reasoning steps used to measure the impact of existing and new work practice
  - **Victor Basili & Dieter Rombach (89)**
  - Define the principle goals of the activity
  - Construct a comprehensive set of questions to help you achieve the goals
  - define and gather the data (measures) required to answer these questions

- The GQM can be applied to any process

GQ(I)M-Indicator

- The emphasis throughout goal-driven measurement is on gathering information that helps you achieve your defined goals - - and on maintaining traceability from measures back to defined goals, so that measurement efforts do not wander astray.

- The goal-driven measurement process is based on 3 precepts, and it consists of 10 steps.

- The three precepts are:
  - Measurement goals are derived from defined goals
  - Evolving mental models provide context and focus
  - GQ(I)M translates informal goals into executable measurement structures

The GQ(I)M 10 Step Process

1. Identify your defined goals
2. Identify what you want to know or learn
3. Identify your subgoals
4. Identify the entities and attributes related to your subgoals
5. Formalize your measurement goals
6. Identify quantifiable questions and the related indicators that you will use to help you achieve your measurement goals
7. Identify the data elements that you will collect to construct the indicators that help answer your questions
8. Define the measures to be used, and make these definitions operational
9. Identify the actions that you will take to implement the measures
10. Prepare a plan for implementing the measures

Step 1 - Establish Goals

- What Does the sponsor want to achieve?
- Start with the goals your sponsor is interested in implementing and willing to sustain the measurement effort ($)
- Initiate at any level where quantitative information about product, processes or resources would improve the abilities to plan, control and improve processes
- How
  - In teams with managers participating
  - Use process and risk assessments to help determine goals
  - Use the output of strategic planning sessions
  - Interview managers or personnel involved in the process
  - Structured brainstorming

Step 2 - What You Want to Know or Learn

- Now begin to identify what you would like to know in order to understand, assess, predict, or improve the activities related to achieving your goals
- How
  - By obtaining: who, what, where, when, why and how
  - Ask questions to help in understanding:
    - What activities do I manage or execute?
    - What do I want to achieve or improve?
  - And by completing statements such as,
    - To do this, I will need to …

Step 3 - Identify Your Subgoals

- Next translate your top-level goals into subgoals that relate specifically to activities that can be measured, managed or performed
- Procedure
  - Identify the questions you created about the entities
  - Group them
  - Identify the issues they address
  - Translate this into meaningful subgoals

Step 4 - Identify Entities and Attributes

- Procedure
  - Use subgoals, issues and questions to identify specific entities and attributes you want to measure
  - Establish weights, measures or an order to the attributes
  - Review the grouping identified in Step 3
  - List the entities and attributes associated with each question

Question
1.
2.
Entity
1.
Attributes
1.
2.
3.

Step 5 - Formalize Measurement Goals

- In step 5 translate the issues and concerns into clearly stated measurement goals using the subgoals in step 3 and any improvements in step 4
- What do formal goals look like?
- Well-structured measurement goals have four components:
  - an object of interest (an entity)
  - a purpose
  - a perspective
  - a description of the environment and constraints

Step 6 - Identify Quantifiable Questions and Indicators

- GQM is useful because it facilitates identifying not only the precise measures required, but also the reasons why the data are being collected. The “why?” is important because it defines how the data should be interpreted, and it provides a basis for reusing measurement plans and procedures in future projects and activities [Rombach 89].
- Indicator - means a display of one or more measurement results that is designed to communicate or explain the significance of those results to a reader.
- Procedure:
  - Select a measurement goal
  - Identify quantifiable questions related to the goal
  - Prepare sketches (indicators) that will help communicate your analysis results
  - Prioritize the indicators and identify those which will be most useful

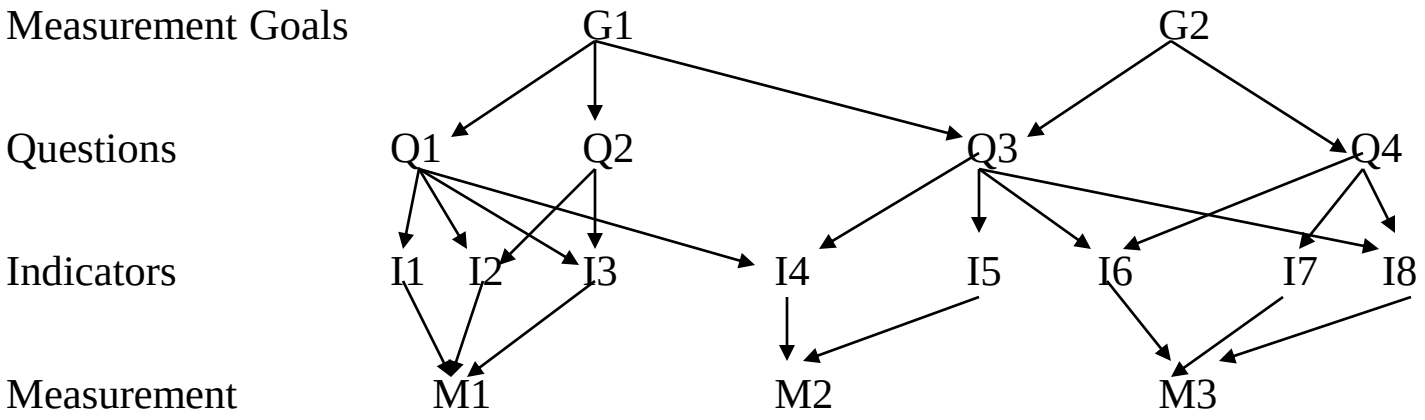
Step 6 - Identify Quantifiable Questions and Indicators (continued)

- Using the Measurement Goals and Questions to form Indicators
- The indicators are the data elements in a Figure form (plot, matrix, graph, etc)
- With pictures of what you want to plot identify the data elements required to create the Figures of the indicators
- The process followed thus far helps ensures that the data collected is based on defined goals and has meet the sponsors purposes

Step 7 - Identify Data Elements

- Developing Focused Measures (Data Elements)
  - Identify the data elements to collect in order to create the displays
- The two Activities in this step are:
  - Identify the data elements
    - selected from the answers to the questions solicited in step 6
  - Define how the measures will be collected
    - list the data elements and map them back to the indicators

Step 7 - Identify Data Elements (continued)



Quantifiable Questions and Indicators

Step 8 - Define the Measures

- It is a common human weakness to imagine that because a metric is intended to measure something, it actually does! - source unknown
- Names for measures alone do not suffice - - We must be able to tell others exactly how each measure is obtained, so they can interpret the values correctly. For example, we have 1,000 LOC in our program. What does this mean?
- Operational definitions must satisfy two important criteria:
  - Communication: Will others know what has been measured, how it was measured, and what has been included and excluded?
  - Repeatability: Could others, armed with the definition, repeat the measurements and get essentially the same results?

Step 9 - Define Implementation Actions

The three key activities related to step 9 are Analysis, Diagnosis, and Action

- Analysis - probing for facts that help you understand where you are starting from.
  - Identify measures now used and how they are collected
- Diagnosis - evaluating the data elements you're collecting now, determine how well they meet the needs of your goal-driven measures, and proposing appropriate actions.
- Action - translating the results of the analyses and diagnosis into implementable steps.
  - Find the solution and make the solution happen
  - Identify tasks and assign responsibilities and resources.

Step 10 - Produce Measurement Plan

- Procedure:
  - Write a plan for implementing the measures you have defined using the template
  - Get approval, endorsement, and resources for your plan from your sponsor
  - Implement the plan
  - Track (measure) your measurement programs effectiveness and adjust accordingly

Step 10 - Produce Measurement Plan (continued)

Template

- Objective
- Description
  - Background
  - Goals
  - Scope
  - Relationship to other S/W Processes improvement effort
  - Relationship to Other functional Activities
- Implementation
  - Activities, Products, and Tasks
  - Schedules
  - Resources, Responsibilities, Measurement and Monitoring
  - Assumptions, Risk Management
- Sustained Operation

Conclusion

- Measurement is important to understanding our defined goals
- Goal Question Indicator Metric as a method will help us:
  - “know where we are”
  - “how to get there”
  - “when we get there”
- GQ(I)M will enable us to:
  - characterize
  - evaluate
  - predict
  - improve