

Reflective Software Engineering

Module 11:

Goal-Question-Metric

(1)



Objectives

To understand

- The goal-question-metric (GQM) paradigm
- How to use GQM to guide Leap data gathering

(2)



The Goal-Question-Metric (GQM) Paradigm

The GQM paradigm establishes a framework for gathering and using data.

- It starts with an explicit statement of data gathering goals
- Next it defines the questions the data are to answer
- And then defines the data metrics

We'll first look at GQM in general, then how it applies in Leap.

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Measurement Goals

What are the goals for which data are required?

- these may be personal, project, or business
- they should be explicit

Be clear on whose goals these are

- yours, your project's, your management's
- try to understand the goals at all these levels

Relating your goals to other's goals provides

- a clearer context for the measurements
- more likely support for your work

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Measurement Questions

What will it take to meet the goals?

- plan the actions required
- who must take these actions?

Do people need to be convinced to act?

- are data needed to convince them?
- how will these data be used?

What is needed to implement the actions?

- what data are required?
- how will these data be used?

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Measurement Metrics

Precisely what data are needed?

- define the data so others could gather them for themselves

How will these data be gathered?

- provide data gathering forms
- define the data gathering process

How will these data be retained and used?

- define the specific calculations/analyses
- work through some test cases

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Making the Measurements

You are now ready to start the data gathering process

First

- communicate the entire GQM framework
- ensure that the process is understood
- conduct a test if necessary

Start data gathering

- monitor data quality
- provide feedback

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GQM in Leap

The GQM framework is an excellent way to decide which of the many data collection and analysis capabilities of Leap you need to use.

You can document your GQM decisions for each project using the "GQM" tab in Hee.

By documenting GQM for each project, it also creates information you can use in future to decide whether the data gathered for the project is applicable to some future analysis.

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Example GQM in Leap

Goal:

- Improve my design capabilities

Question:

- What significant mistakes do I make during design?

Metric:

- Record all significant defects injected during the design phase for this project.

Why is this documentation critical to future use of this data?

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The GQM "context"

Suppose in six months you wanted to assess overall defect density in a set of projects.

Without the preceding GQM data, you could not distinguish between:

- You having made only design defects in this project.
- You having **recorded** only design defects in this project.

With GQM data, you know that this project's data is not appropriate for defect density analysis.

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Leap GQM goal guidelines

Leap GQM goals should be:

- focussed on your own personal development
- applicable to the current project in question
- recorded in the GQM tab

Examples:

- To improve my design abilities
- To improve my time estimation abilities
- To improve my size estimation abilities
- To write a highly optimized Java vector class
- To build a extensible, user-friendly GUI
- To remove all defects prior to test

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Leap GQM Question Guidelines

Leap GQM questions should:

- relate to one or more goals for this project
- connect goals to specific metrics

Example Leap GQM questions:

- How accurate is my size estimate for this project?
- Is my time estimate more accurate for this project more accurate than in my last project?
- What is the performance of my vector class vs. that of a native C implementation?
- What is the typical user reaction to my GUI?
- How many defects remained after implement.?

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Leap GQM metric guidelines

Leap GQM metrics should:

- provide data that can help answer one or more of the questions about this project
- can exploit Leap tools for data collection, or can involve other kinds of data

Example Leap GQM metrics:

- Estimated vs. Actual size and % error
- % error in time estimate vs. last project's
- Java vs. C vector times on sample dataset
- Questionnaire results from 10 typical users
- Number defects post-implementation

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A GQM screen image



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So, now what?

GQM provides:

- motivation for collecting data
- context useful for understanding appropriate uses of data in future retrospective analysis

GQM does not by itself result in improvement!

You must act upon the GQM results in order for it to have an effect.

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GQM practice

Go through all projects, and add/update the GQM tab to accurately reflect the goals, questions, and metrics for each project.

Be sure to provide results as well when appropriate.

You will be responsible for defining GQM data for all future projects.

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End of module

