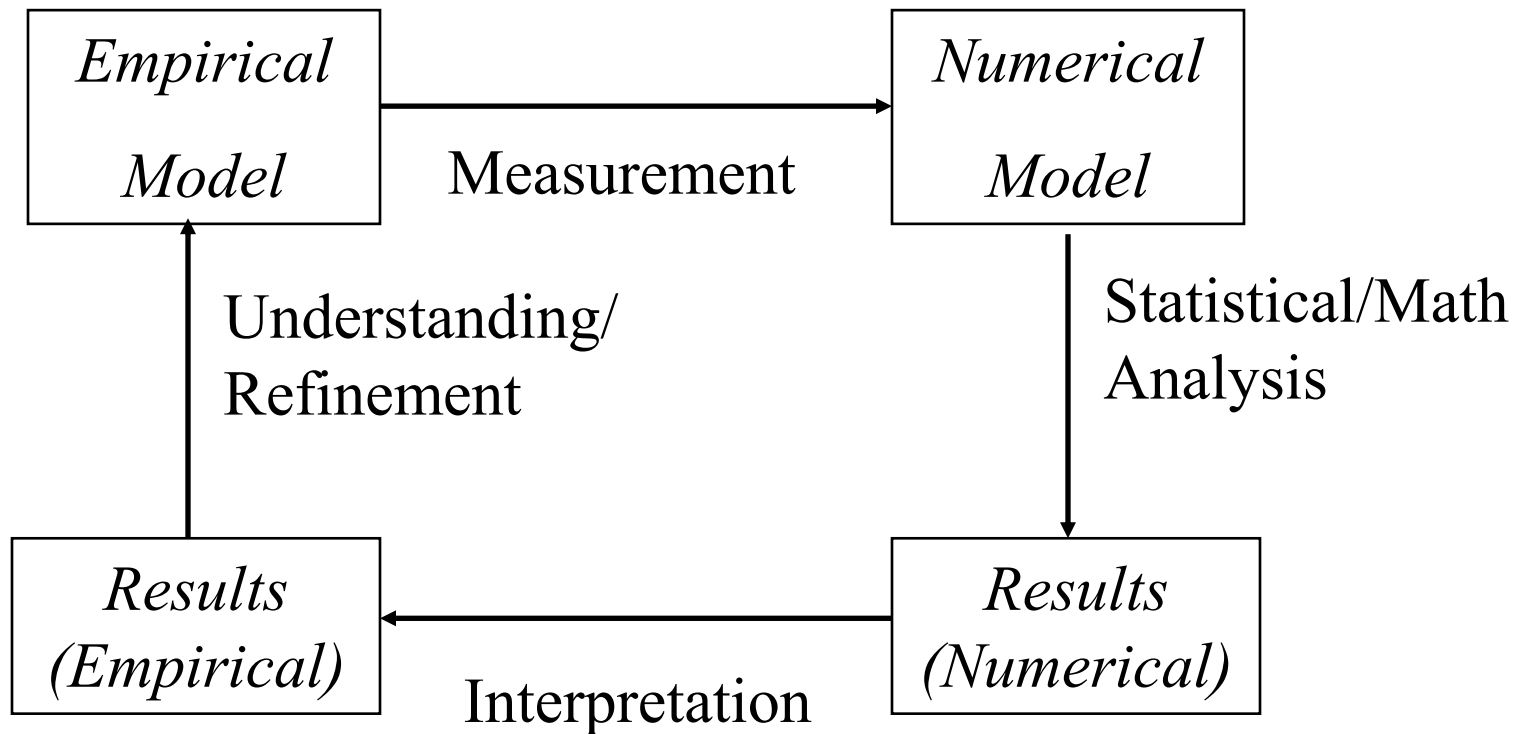


Software Measurement

- Measuring software indicators: metrics and methods
- Jalote-2002,

Models



Basic Concepts

- Project planning and tracking need measurement
- Purpose = control and visibility
- Metrics (Measures), quantified process attributes
 - e.g. size in LOC
- Plan based on organizational model and goals
 - e.g. using GQM method
- Continuous and including phase information
 - e.g. defect tracking

Core Metrics

- Management
 - Work and progress
 - Budget and cost
 - Staffing and team dynamics
- Quality
 - Change and stability
 - Modularity
 - Rework
 - MTBF

Metrics Characteristics

- Meaningful to all people involved
- Quantifiable correlation between process and business
- Objective and clear
- Displaying trends (extrapolation)
- Natural by-product of process
- Automation supported
- Correlated

Frequently-Used Metrics

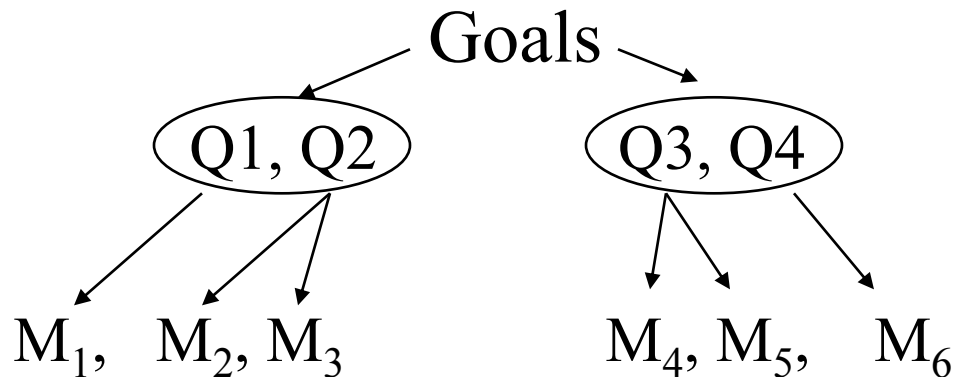
- Size
 - SLOC, FP, ...
 - Consider re-use and modification
 - Separate definitions for different languages/system
 - Compared to estimation (trend)
- Personnel
 - Number of staff
 - Specify experienced, support, ...
 - Lower in “total” estimates results in increase in “experienced”

Frequently-Used Metrics

- Volatility
 - Number of changes in requirements and defects
 - Includes developers' understanding of requirements
 - Change in requirements has to decrease and eventually freeze
- Computer Resource Utilization
 - CPU, memory, IO, ...
- Schedule
 - Months/weeks of work
 - Usual to fall behind initially
 - Relate to actual cost

GQM Method

- Goal-Question-Metric
- Goal-oriented measurement
- Based on Business and process model
 - Business model provides the goals
 - Process model provides the details and sub-goals



GQM Steps

- 1- Define business goals
 - High quality product
 - Customer satisfaction
 - Service improvement
- 2- Provide the process model (made of entities)
 - Inputs (resources, policies, ...)
 - Outputs (software, documents, ...)
 - Activities (analysis, design, ...)
 - Artefacts (knowledge, experience, meeting notes, ...)

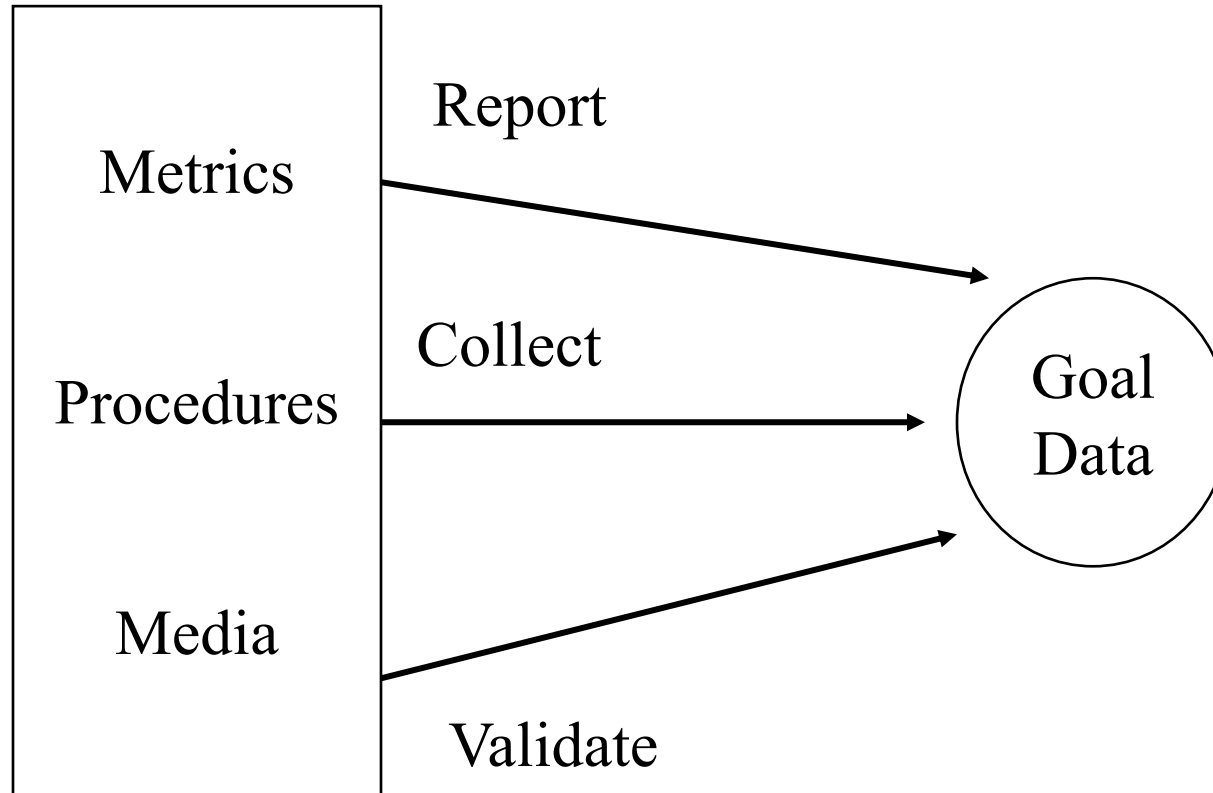
GQM Steps

- 3- Prepare general questions about entities (for each high-level goal)
 - People: Trained? (related to “quality” goal)
 - Reports: Signed off?
 - Code: Size?
- 4- Group the related questions into “groups” (based on entity) and then “sub-goals” (based on objective)
 - Group: Documents
 - Sub-goal: Improved requirement analysis
 - Question: Requirement document ready and clear for design?

GQM Steps

- 5- Find the entities under question and all the related attributes
 - Entity: review meetings
 - Attributes: # defects found
- 6- Formalized measurement goals
- 7- Quantifiable questions
 - Metrics
- 8- Data elements

Measurement Plan



Measurement Plan

- a name and definition for each unique metric;
- the classification for each metric;
- an association point in product development that identifies when and how data is to be collected;
- definitions of the data collection forms;
- the procedures for data reporting, collection, and validation;

Analysis Plan

- The last deliverable of MP is “analysis plan”
- AP describes how to analyze measured data into presentation formats like charts.

fault density for
the reuse categories.
bars are faults/KSLOC

