SOEN 384
Management, Measurement and Quality Control

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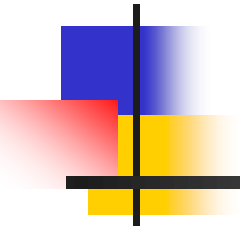


Instructor: Dr. Olga Ormandjieva

Lecture 2:

Software Measurement Feedback Loop. Goal-Question-Metric paradigm

1. Goal-Question-Metric paradigm, Fenton, Section 3.2.1
2. SWEBOK chapter 7

Course Topics by Areas

- **Part I:** Software Measurement
- **Part II:** Software Project Management
- **Part III**: Agile Estimating and Planning.

Agenda for today

- Characteristics of a successful software project
- Software Measurement Feedback Loop
- Next?

What is a successful software project?

- On time (schedule)
- Within budget (cost)
- Meeting customer expectations (quality)

Project managers' goal:
To delivering projects on time, within budget and according to scope and quality.

What is Quality?

- ISO 8402 definition of quality:

  The totality of features and characteristics of a product or a service that bear on its ability to satisfy stated or implied needs

- Quality also can be looked at in terms of user satisfaction:

  User satisfaction = compliant product
  + good quality
  + delivery within budget and schedule

Delivering projects on time, within budget and according to scope

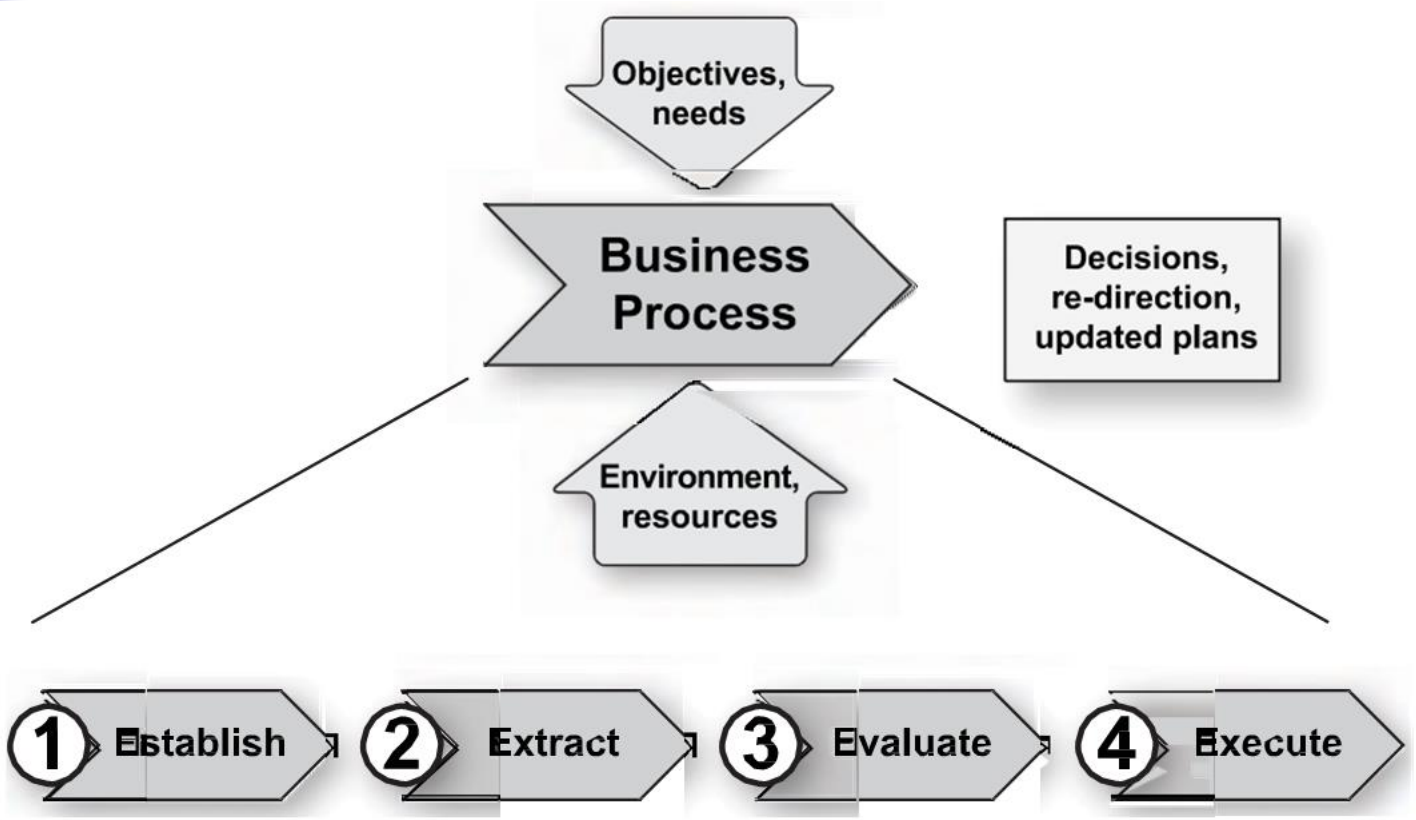
- Requires all work products to have defined, measurable specifications to which practitioners may compare to the output of each process
- Ensures that each work product meets the requirements placed on it through a series of inspections, reviews, and tests used throughout the software process
- Includes a feedback loop to the process that created the work product
- Combines measurement and feedback in order to adjust the process when product specifications are not met

Agenda for today

- Review
- Characteristics of a successful software project
- **Software Measurement Feedback Loop**
- Next?

A Generic Measurement Feedback Loop

Software Project and Process Measurement, Dr. Christof Ebert
Vector Consulting Services



Steps of the Measurement Feedback Loop

- **Establish**
  - concrete improvement or control objectives and the necessary measurement activities.
- **Extract**
  - Extract information (collect measurement data) for a specific need and record it for potential further usage.
- **Evaluate**
  - Use the extracted measurement data on the spot!
  - Statistical analysis and evaluation
- **Execute**
  - Execute decisions and actions to reduce the differences between status and objectives.
  - Management decisions are directly linked to the specific need of the stakeholder

Establishing and Sustaining Measurement Commitment :

Goal Question Metrics (GQM) Approach

1. Set goals specific to needs
   - Goals that are measured will be achieved.
2. Refine the goals into quantifiable questions that are tractable.
3. Deduce the metrics and data to be collected (and the means for collecting them) to answer the questions.

Goal-based framework for software measurement

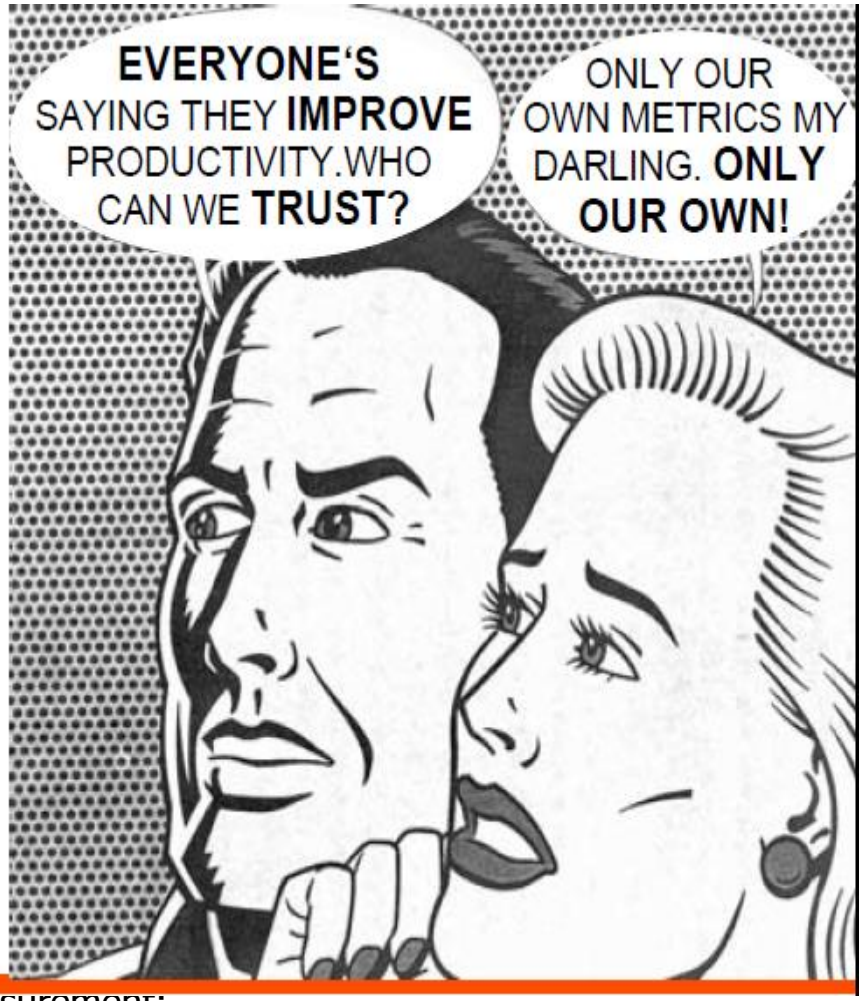
- You are using Goal-Question-Metric paradigm to decide what your project should measure.
- **Examples of High Level Goals:**
  - Improving productivity
  - Improving quality
  - Reducing risk

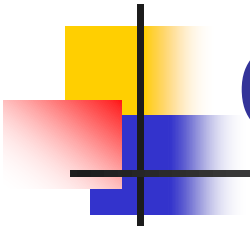
GQM: Set Realistic and Measurable Project Quality Goals

- Project goals should be clear and tangible:
- **BAD**
  - *reduce errors*
  - *improve quality by 50 percent*
- **GOOD:**
  - *Reduce the number of late projects by 50 percent for this year compared to the previous year.*

Measurement Stakeholders and their Goals

- **Senior manager:** needs figures on the business performance
- **Project manager:** needs timely and accurate information on project's parameters
- **Individual Engineer:** wants to improve its own performance and thus looks into quality of the deliverables. Concentrates on the team's objectives
- **Customers**: "In data we trust"
  - Certification of software components.
  - Maturity of organization CMM (I).

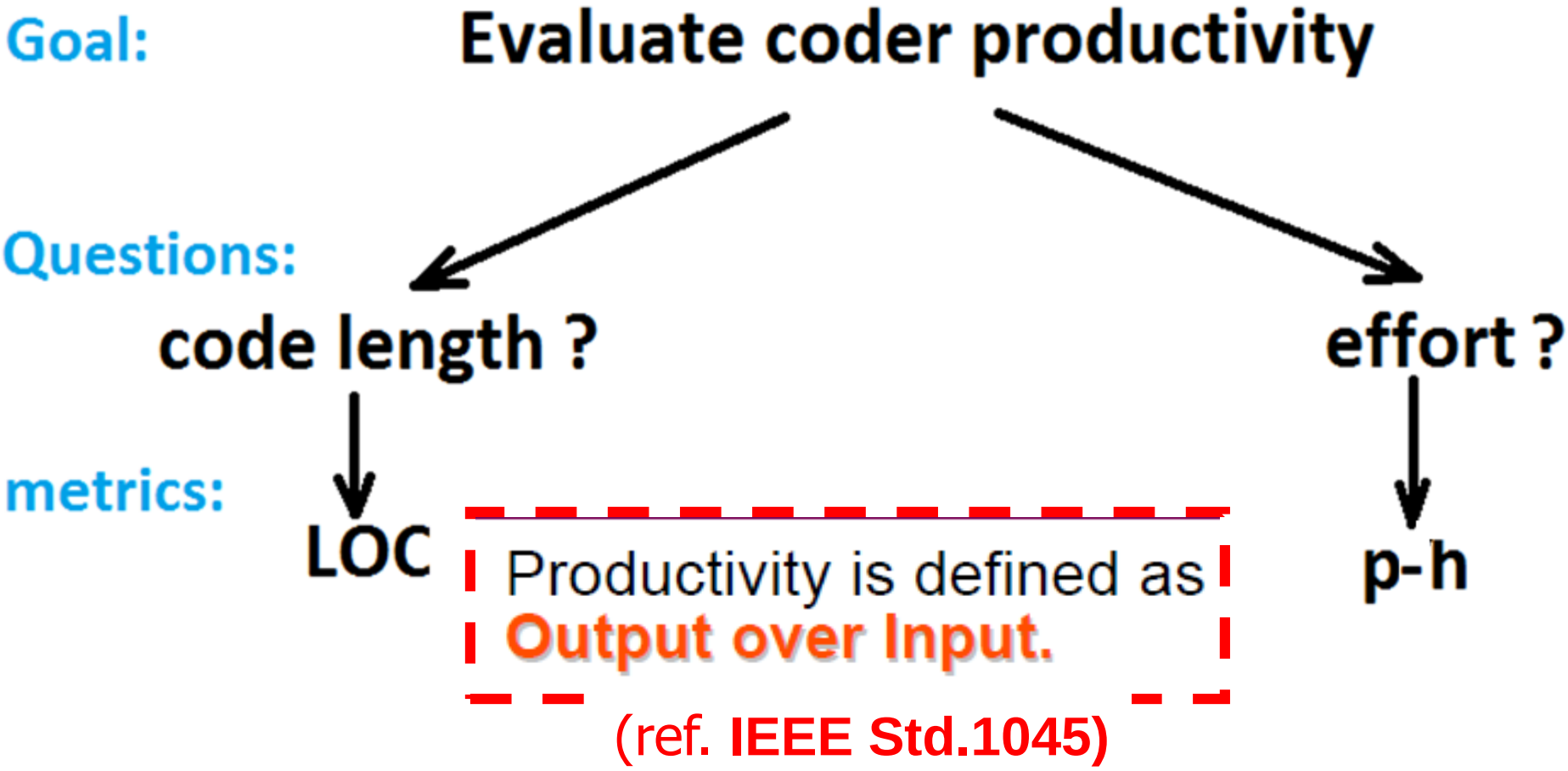




GQM: a simple example

- The project manager in this example needs to know past developers productivity in similar projects to estimate the number of developers required for a new similar project.
- This example assumes that historical data on past projects is available:
  - **coders productivity** data needs to be collected for every past project, and the average productivity computed for each project in the data store

GQM example


Goal:
Evaluate coder productivity
Questions:
code length ?
effort ?
metrics:
LOC
p-h
Productivity is defined as
Output over Input.
(ref. IEEE Std.1045)

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LOC, person-hours

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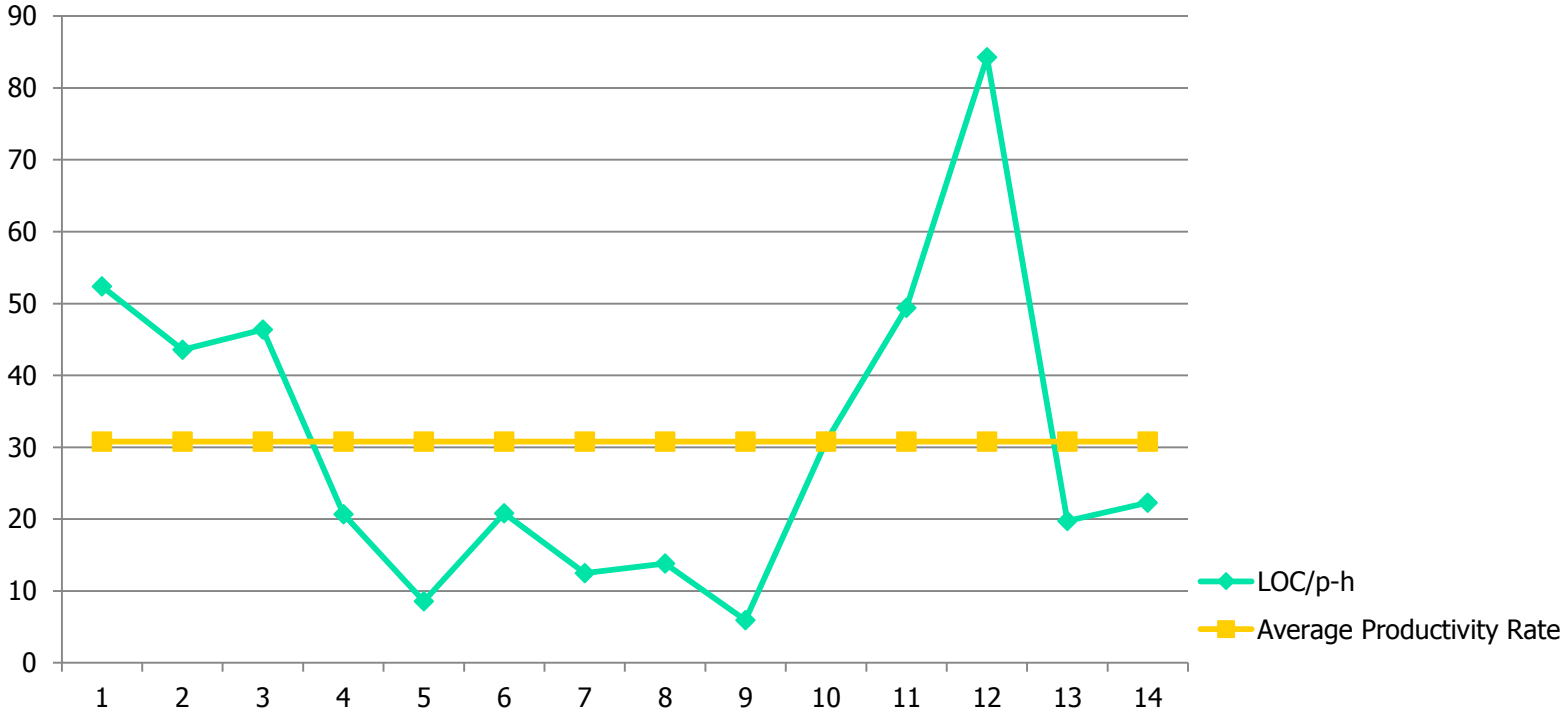
Average productivity

GQM example (analysis report)

- Productivity analysis:



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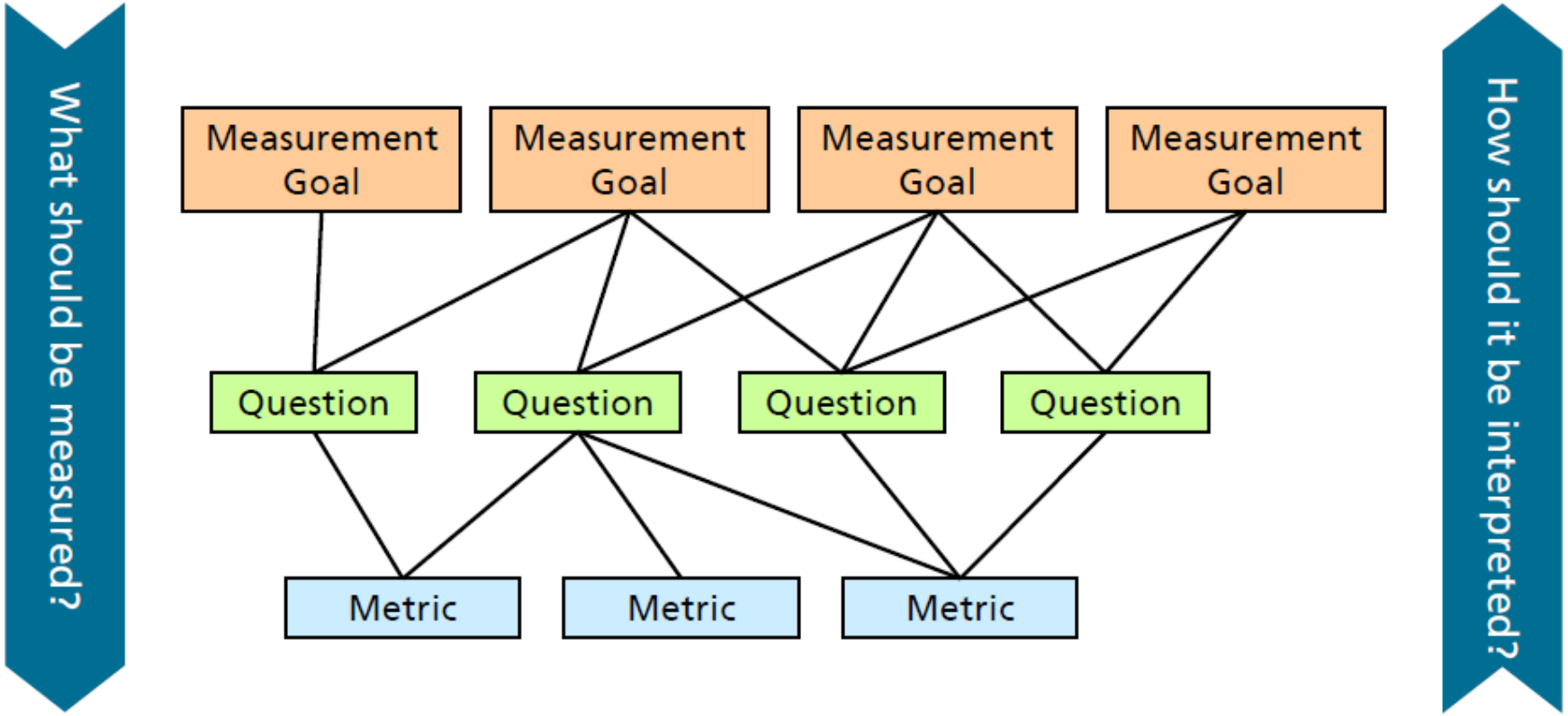
  - Execute decisions

Estimate the number of developers

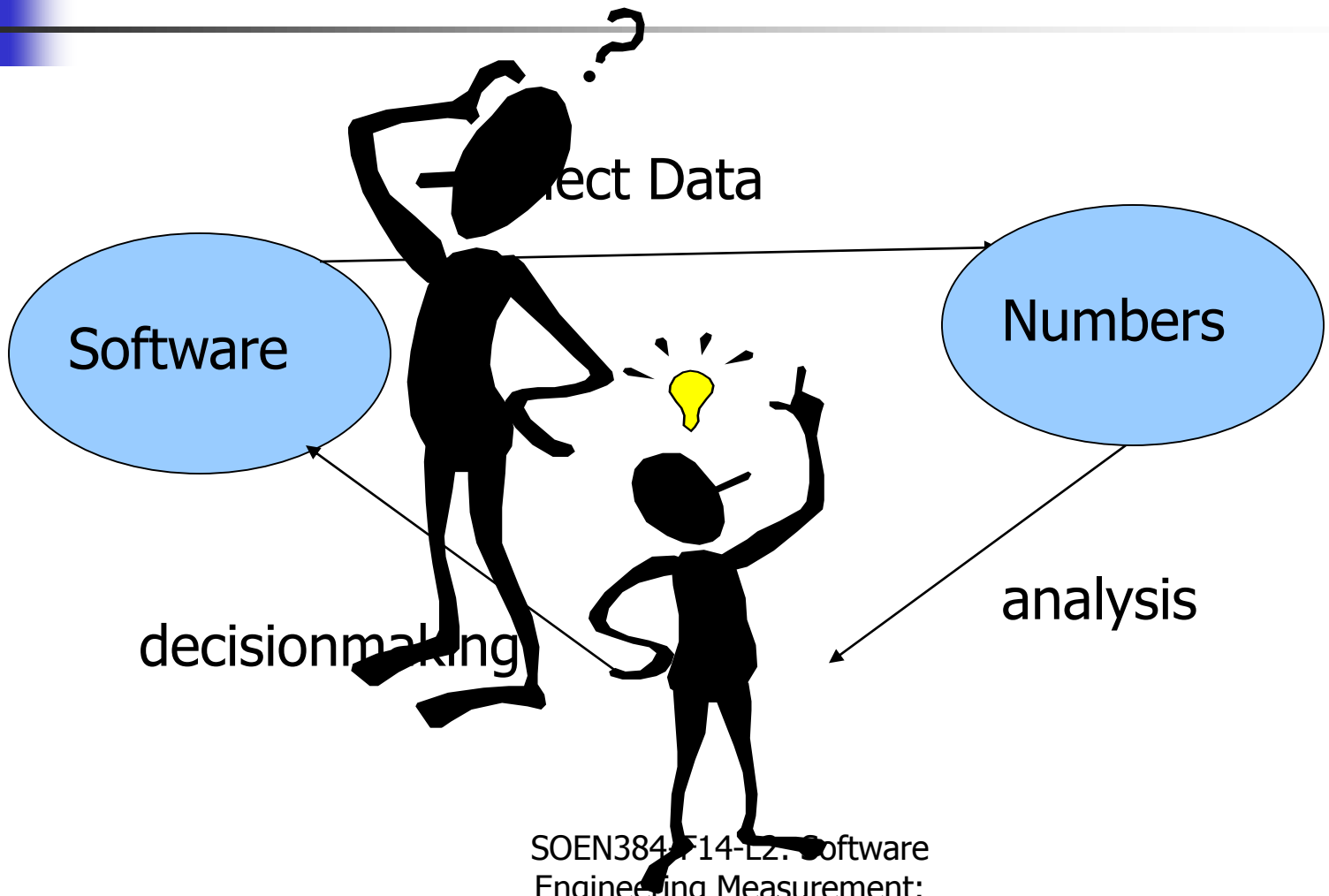
Example of a decision making:

- Average productivity: 30 LOC/p-h
- Estimated output (length of the code to be produced): 2400 LOC
- How many developers?
  - Fixed schedule: 2 weeks
  - 2400 LOC / 30 LOC/p-h = 80 p-h
  - Effort per developer for 2 weeks:
    - 4h/week x 5 days/week x 2 weeks = 40 h
  - 80 p-h / 40 h = 2 developers

Goal-Question-Metric (GQM) Structure



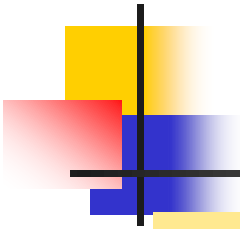
Key point: Measurement is a problem solving process



Establish and Sustain Measurement Commitment

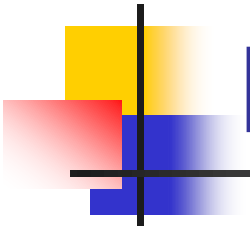
Each measurement endeavor should be guided by organizational objectives and driven by a set of measurement requirements established by the organization and the project:

- Define scope of measurement.
- Commitment of management and staff to measurement.
- Commit resources for measurement.



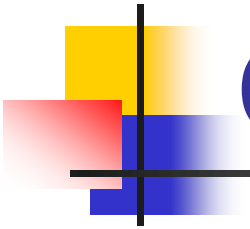
Measurement Process

the process for establishing, planning, performing and evaluating software measurement within an overall project or organisational measurement structure that meets the specific needs of software organisations and projects. [**ISO/IEC 15939**]



Next?

- Reading: "***3.2.1 Goal-Question-Metric paradigm***" (download from the course webpage)
- Next:
  - Planning the Measurement Process [ISO 15939]



Questions?

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