Software Quality Engineering

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Testing, Quality Assurance, and Quantiable Improvement
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Chapter 5. Quality Engineering

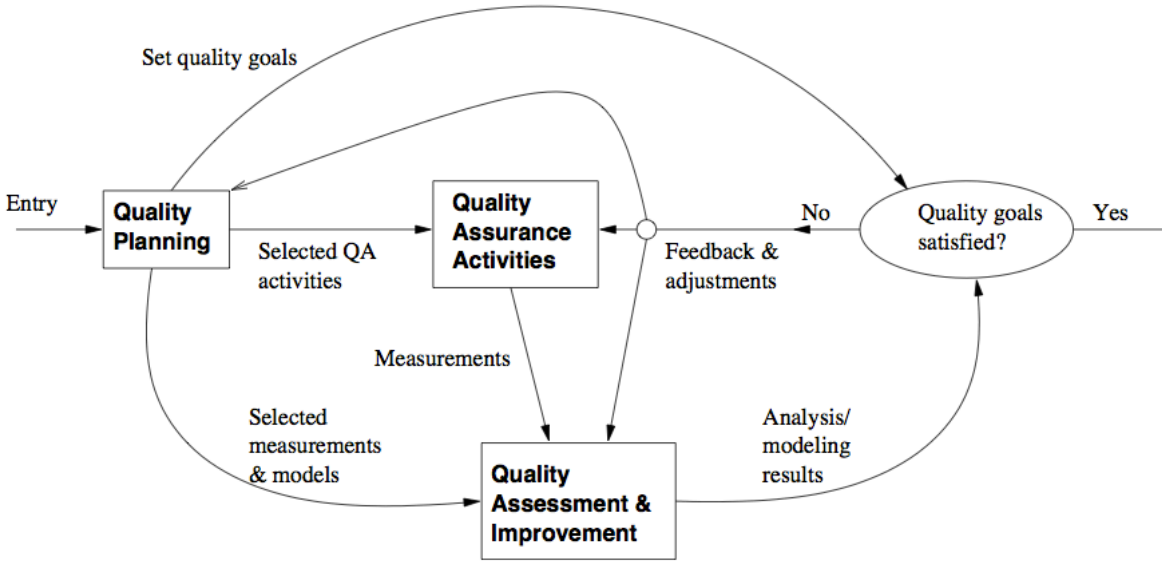
- `SQE: Software Quality Engineering`
- `Key SQE Activities`
- `SQE in Software Process`

QA to SQE

- `QA activities need additional support:`
  - Planning and goal setting
  - Management:
    - when to stop?
    - adjustment and improvement, etc.
    - all based on assessments/predictions
- `Assessment of quality/reliability/etc.:`
  - Data collection needed
  - Analysis and modeling
  - Providing feedback for management
- `QA + above`

=> software quality engineering (SQE)

SQE Process



- SQE process to link major SQE activities: Fig 5.1 (p.54)
  - Pre-QA planning;
  - QA: covered previously (Ch.3 & 4);
  - Post-QA analysis and feedback (maybe parallel instead of "post-")

SQE and QIP

- QIP (quality improvement paradigm):
  - Step 1: understand baseline
  - Step 2: change then assess impact
  - Step 3: package for improvement
- QIP support:
  - overall support: experience factory
  - measurement/analysis: GQM (goal-question-metric paradigm)
- SQE as expanding QA to include QIP ideas.

Pre-QA Planning

- Pre-QA planning:
  - Quality goal
  - Overall QA strategy:
    - QA activities to perform?
    - measurement/feedback planning
- Setting quality goal(s):

    - Identify quality views/attributes
    - Select direct quality measurements
    - Assess quality expectations vs. cost

Setting Quality Goals

- `Identify quality views/attributes`
    - customer/user expectations,
    - market condition,
    - product type, etc.
- `Select direct quality measurements`
    - direct: reliability
    - defect-based measurement
    - other measurements
- `Assess quality expectations vs. cost`
    - cost-of-quality/defect studies
    - economic models: COCOMO etc

Forming QA Strategy

- `QA activity planning`
    - evaluate individual QA alternatives
        - `strength/weakness/cost/applicability/etc.`
    - match against goals
    - integration/cost considerations
- `Measurement/feedback planning:`
    - define measurements (defect & others)
    - planning to collect data
    - preliminary choices of models/analyses
    - feedback & followup mechanisms, etc.

Analysis and Feedback

- `Measurement:`
    - defect measurement as part of defect handling process
    - other data and historical baselines
- `Analyses: quality/other models`
    - input: above data
    - output/goal: feedback and followup
    - focus on defect/risk/reliability analyses
- `Feedback and followup:`
    - frequent feedback: assessments/predictions
    - possible improvement areas
    - project management and improvement

- `Details in Part IV.`

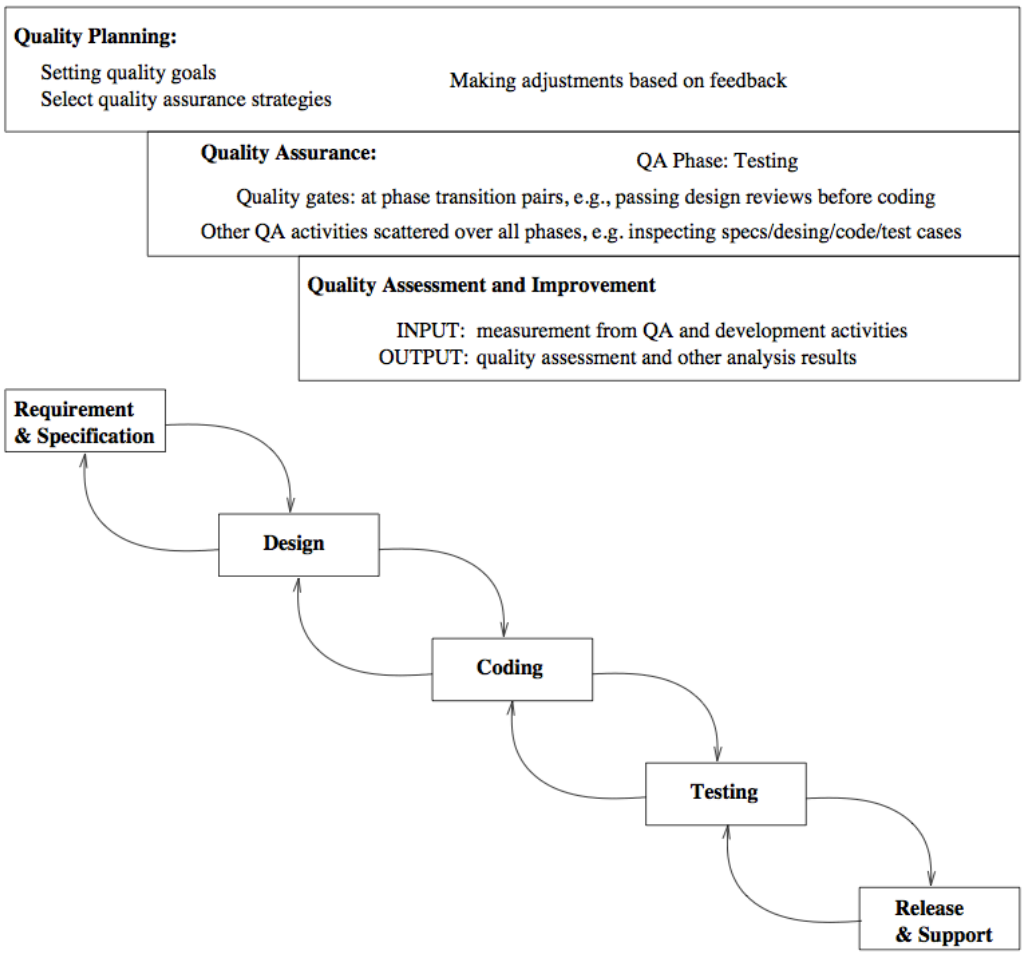
SQE in Software Processes

- `SQE activities (cid:26) development activities:`
  - quality planning (cid:26) product planning
  - QA activities (cid:26) development activities
  - analysis/feedback (cid:26) project management
- `Fitting SQE in software processes:`
  - different start/end time
  - different sets of activities, sub-activities, and focuses
  - in waterfall process: more staged

    (planning, execution, analysis/feedback)
  - in other processes:

    more iterative or other variations

SQE in Waterfall Process



- `Fig 5.2 (p.61) above`
    - activity start/finish line
    - different focus and effort (later)

SQE Effort Profile

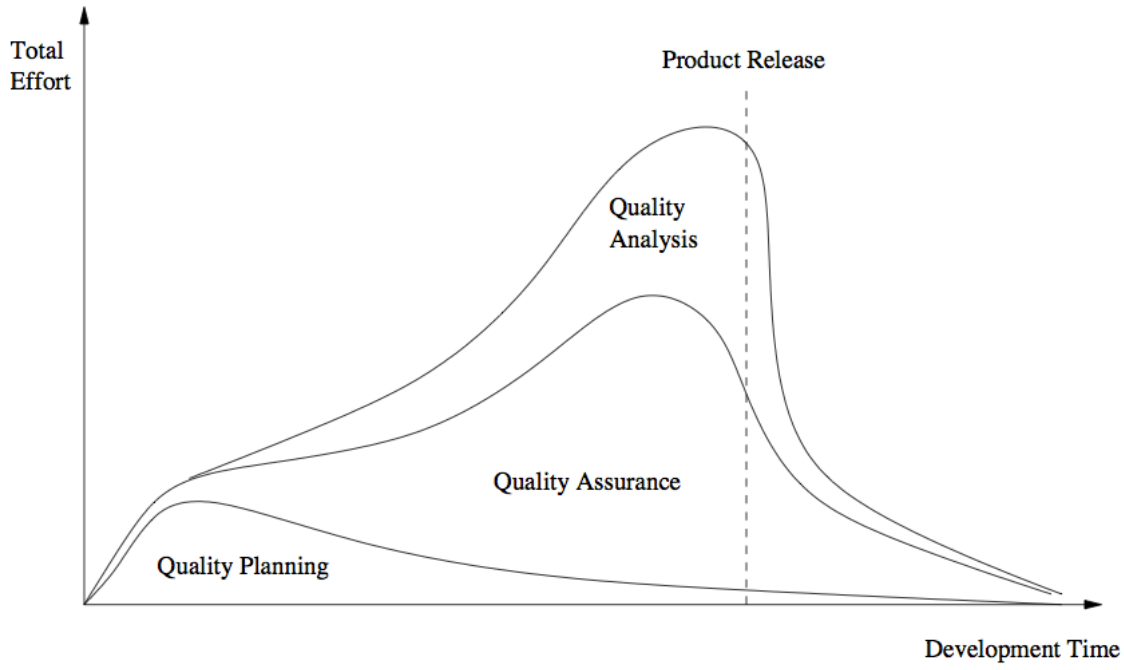
- `QE activity/effort distribution/dynamics:`
    - different focus in different phases
    - different levels (qualitatively)
    - different build-up/wind-down patterns
    - impact of product release deadline

      (deadline-driven activities)
- `planning: front heavy`
- `QA: activity mix`

  `(early vs. late; peak variability? deadline?)`
- `analysis/feedback: tail heavy`

  `(often deadline-driven or decision-driven)`

SQE Effort in Waterfall Process



- `Effort profile above (Fig 5.3, p.63)`
    - planning/QA/analysis of total effort
    - general shape/pattern only

(actually data would not be as smooth)

- in other processes:
    - similar but more evenly distributed