Defining the Software Process

Outline

- Why Define Processes?
- SW Process Basics
- Process Definition
- Defining Process Phases
- Process Development Considerations
- Process Evolution
- The Process Development Process
- Homework #7 - Part 2
Why Define Processes?

(cf. Humphrey, 1995, p. 441-442)

- The processes you have are not adequate for what you do or want to do.
  - new or more complex tasks
  - need to interact with teams
  - ...

- You want to perform some repetitive activity:
  - write a program or report
  - analyze a requirement, run a test
  - plan and track work
  - guide in performing tasks
  - evaluate / improve work
  - ...

SW Process Basics


- Process Elements
  - Scripts
  - Forms
  - Standards
  - Process Improvement Provisions

- Process Formats
  - Processes are principally enacted by people.
  - Use simple methods, and
  - Adopt new techniques only when they will clearly help you.
  - Focus on the process content, and
  - Don’t let technology become too important.
Process Terms
(cf. Humphrey, 1995, p. 443)

- Accuracy
- Agent
- Development
- Enactable Process
- Fidelity
- Fitness
- Precision
- Process
- Process Architecture
- Process Design (noun)
- Process Definition
- Process Element
- Process Enactment
- Process Script
- Process Step
- Scalability
- Tailoring

“Information Mapping”
(cf. Humphrey, 1995, p. 445)

<table>
<thead>
<tr>
<th>Principles of Information Mapping</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept</strong></td>
<td>Description</td>
</tr>
<tr>
<td>Chinking</td>
<td>Group information into manageable chunks.</td>
</tr>
<tr>
<td>Relevance</td>
<td><strong>Place “like things” together.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Exclude unrelated items from each chunk.</strong></td>
</tr>
<tr>
<td>Labeling</td>
<td>Provide the reader with a label for each chunk of information.</td>
</tr>
<tr>
<td>Consistency</td>
<td>Use consistent:</td>
</tr>
<tr>
<td></td>
<td>• terms within each chunk of information,</td>
</tr>
<tr>
<td></td>
<td>• terms in the chunk and label,</td>
</tr>
<tr>
<td></td>
<td>• organization, and</td>
</tr>
<tr>
<td></td>
<td>formats.</td>
</tr>
<tr>
<td>Integrated Graphics</td>
<td>Use tables, illustrations, and diagrams as an integral part of the writing.</td>
</tr>
<tr>
<td>Accessible Detail</td>
<td>Write at the level of detail that will make the document usable for all readers.</td>
</tr>
<tr>
<td>Hierarchy of Chunking &amp; Labeling</td>
<td><strong>Group small chunks around a single relevant topic.</strong></td>
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<tr>
<td></td>
<td><strong>Provide the group with a label.</strong></td>
</tr>
</tbody>
</table>
Activities in Process Definition
(cf. Humphrey, 1995, p. 446)

- Determine your needs and priorities.
- Define the process objectives, goals, and quality criteria.
- Characterize your current process.
- Characterize your target process.
- Establish a process development strategy.
- Define your initial process.
- Validate your initial process.
- Enhance your process.

NOTE: These activities need not be performed in this exact sequence. Just be sure to address them all.

1. Determining Needs & Priorities: The QFD Method
(cf. Humphrey, 1995, p. 446-448)

- QFD (quality function deployment) method provides a way to relate process characteristics to user needs:
  - Determine nature of products your process is to produce
  - Identify principal product attributes
  - Determine relative attribute priorities (cf. PSP Ex. p. 447)
  - Determine process features necessary for producing these attributes (cf. Table 13.3, p. 448)
  - Note strong/medium/weak relationships between process features and attributes (cf. Table 13.4, p. 449) - Product “house of quality”
  - Prioritize process features as high priority, priority, needed, or not needed (cf. list, p. 448)
2. Defining Obj’s, Goals, & Quality Criteria (cf. Humphrey, 1995, p. 448-453)

- PSP Process Quality Criteria:
  - Develop quality software
  - Be measurable
  - Be predictable

- Create a process “house of quality” by combining product needs and process priorities (cf. Tables 13.5 & 6, p. 451, 452).

- Combine product and process needs (cf. Table 13.7, p. 453).

- Create objectives (based on prioritized product / process needs), associated goals, and metrics (cf. Table 13.8, p. 454) - GQM.


- “If you don’t know where you are, a map won’t help.”

- Plan multiple incremental improvements from your current process to your target process.

- Answer key questions about your current process:
  - How well do you understand it?
  - Do you have serious problems?
  - Do your steps have explicit entry / exit criteria?
  - Do you have good measurements to base improvements on?
  - Do you have a process baseline?
4. Characterize Your Target Process


- “If you don’t know where you are going, any map will do.”
- Relate your goals & objectives to the target process.
- Identify principal elements of the target process.
  - This may be very difficult. You may not even know how to start. Look at PSP and other processes.
- Ask questions about the target process, compare to current process, and see what are most useful / important aspects.

5. Establish a Process Development Strategy

(cf. Humphrey, 1995, p. 455)

- Start collecting data on your current process
- Always include planning and post-mortem phases
- Create forms / reports
- Observe others, talk with them about their processes
- Start with previously-successful steps
- ...
6. Define Your Initial Process  
(cf. Humphrey, 1995, p. 456)

- Document your current process
- Include a few, small changes that move you toward your target process
- Define each task in whatever level of detail you are able
- Improve these over time as you come to better understand less-understood activities

7. Validate Your Initial Process  
(cf. Humphrey, 1995, p. 456)

- Test your process
- Walk through a simulated enactment
- Use data from previous projects
- Then try the process on a small project or prototype
- Refine / modify as indicated in the tests
Defining Process Phases

- Phase definitions include:
  - Purpose
  - Responsible Agent
  - Entry Criteria
  - Tasks (and Description References)
  - Exit Criteria
  - Next Phase (and Conditions or Selection Criteria)
- cf. Table 13.9 & 10, p. 458, 459 for example form
- Refine the phase so that you have multiple levels of detail described (you may proceed in a top-down, bottom-up, or middle-out fashion).
- Once you have the desired level of detail, produce & validate forms, scripts, templates, standards, ...

Process Development Considerations  (cf. Humphrey, 1995, p. 460, 461)

- Make sure your process descriptions are at the level you need to describe your work and are understandable.
- Describe steps that you do not understand well… (You usually describe steps you do well, not those you don’t…)
- Continually revise after each use
  - Process scripts and forms are hard to develop and rarely are “good” or “right” the first time.
  - Start simple, then revise and refine.
Process Evolution
(cf. Humphrey, 1995, p. 461-462, and lecture notes)

- To evolve and improve your process:
  - it must be defined
  - it must reasonably represent what you do
- You must:
  - know where you want to go
  - be willing to experiment
  - observe and measure your own performance
- Expect process evolution to take time.

Convergence and Getting Where You Want to Be
(Humphrey, 1995, p. 461-462, and lecture notes)

- Your first objective should be to converge what you do, what you think you do, and what you are supposed to do to a common process.
- Convergence is an iterative process that lasts throughout process development and evolution.
Importance of Convergence
(Humphrey, 1995, p. 461-462, and lecture notes)

- Process convergence is critical because:
  - until converged, improvement actions will often not affect behavior
  - convergence provides a deeper understanding of the current process
  - convergence can result in substantial behavior modification

A Process Development Process Model
(Humphrey, 1995, p. 463)

- Even the process of developing a process can be defined and managed!
  - Start simple
  - Include planning
  - Record time by step and product category
  - Track number of items produced in each category
  - Define productivity measures
  - Keep record of each process development
  - Produce a summary report for each process development

- cf. Example, p. 464-468

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Homework #7 - Part 2

- See “Homework Assignments” list and textbook instructions