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 #8
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>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Horn, Information Mapping, Inc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chunking</td>
<td>Group information into manageable chunks.</td>
</tr>
</tbody>
</table>
| Relevance | * Place “like things” together.  
  * Exclude unrelated items from each chunk. |
| Labeling | Provide the reader with a label for each chunk of information. |
| Consistency | Use consistent:  
  * terms within each chunk of information,  
  * terms in the chunk and label,  
  * organization, and formats. |
| Integrated Graphics | Use tables, illustrations, and diagrams as an integral part of the writing. |
| Accessible Detail | Write at the level of detail that will make the document usable for all readers. |
| Hierarchy of Chunking & Labeling | * Group small chunks around a single relevant topic.  
  * Provide the group with a label. |
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?

- “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.


- 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
- ...

AU INSY 560, Winter 1997, Dan Turk
Humphrey Ch. 13 - slide 11

AU INSY 560, Winter 1997, Dan Turk
Humphrey Ch. 13 - slide 12
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)

**Requirements and Planning**
- Review PIPs
- Step Definition
- Further refinements?
- Test and Update
- Post-mortem

**PIP Submissions**
- Forms and Templates
  - Scripts
  - Standards
  - Databases

Further refinements? yes
The Process Development

- 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

Homework #8

- Report R5
  - Final Report
  - cf. p. 772-775