Defining the Software Process

Why Define Processes?
(c.f. 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
  - evaluate/improve work
  - ...

SW Process Basics
(c.f. Humphrey, 1995, p. 442-445)

- 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
(c.f. Humphrey, 1995, p. 443)

- Accuracy
- Agent
- Development
- Enactable Process
- Fidelity
- Precision
- Process
- Scalability
- Tailoring

Process Design
(noun)
- Process Definition
- Enactable Process
- Process Element
- Process Enactment
- Process Step
- Process Script
- Process Architecture

Principles of Information Mapping
(Robert Horn, Information Mapping, Inc.)

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Ensure information is understood clearly</td>
</tr>
<tr>
<td>Agent</td>
<td>Place the things together that belong together</td>
</tr>
<tr>
<td>Development</td>
<td>Exclude extraneous items from each chunk</td>
</tr>
<tr>
<td>Enactable Process</td>
<td>Provide a unique label for each chunk</td>
</tr>
<tr>
<td>Fidelity</td>
<td>Ensure each chunk is complete</td>
</tr>
<tr>
<td>Precision</td>
<td>Ensure each chunk is complete</td>
</tr>
<tr>
<td>Process</td>
<td>Ensure each chunk is complete</td>
</tr>
<tr>
<td>Scalability</td>
<td>Ensure each chunk is complete</td>
</tr>
<tr>
<td>Tailoring</td>
<td>Ensure each chunk is complete</td>
</tr>
</tbody>
</table>

Information Mapping
(c.f. Humphrey, 1995, p. 445)

- Integrated Graphics
  - Use tables, illustrations, and diagrams as an integral part of the writing

- Accessible Detail
  - Make the development that will underlie the document enable for all readers

- Hierarchy of Chunking & Labeling
  - Design visual chunks around a single related 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.

3. Characterize Your Current Process
(cf. Humphrey, 1995, p. 450-453)

- "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

- 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

Process Model

- Requirements and Planning
- Review PIPs
- Define PIPs
- Test and update
- Post-mortem
- Further refinements?
  - yes

A Process Development Process

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

Homework #8

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

Humphrey Ch. 13 - slide 19
Humphrey Ch. 13 - slide 20
Humphrey Ch. 13 - slide 21
Humphrey Ch. 13 - slide 22