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

(cf. 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

(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)

Principles of Information Mapping Robert Horn, Information Mapping, Inc.	
Concept	Description
Chunking	Group information into manageable chunks.
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.

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 (cf. Humphrey, 1995, p. 453-454)

- "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

(cf. Humphrey, 1995, p. 457-459)

- 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.

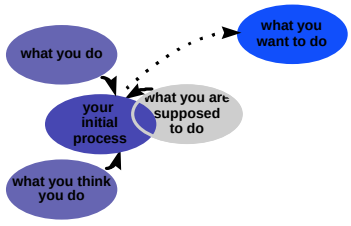
Process Evolution

(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)



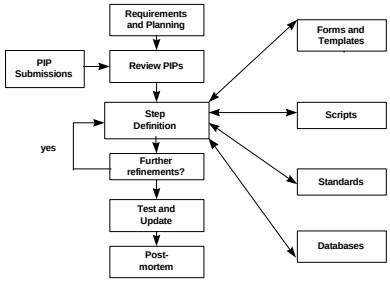
- Your first objective should be to converge what you do, what you think you do, and what you are supposed to do to a common process.
- Convergence is an iterative process that lasts throughout process development and evolution.

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)*



The Process Development Process *(cf. Humphrey, 1995, p. 462-468)*

- 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