
This component, Fundamentals of Health Workflow Process Analysis & Redesign, covers fundamentals of health workflow process analysis and redesign as a necessary component of complete practice automation. Process validation and change management are also covered.

In two parts, Fundamentals of Health Workflow Process Analysis and Redesign: Process Mapping Theory and Rationale, Lecture a and Process Mapping Diagramming Tools, Lecture b, covers the background necessary for graphically representing processes. It uses flowcharts and basic flowchart symbols to provide an introduction to graphical process representation, also called process diagramming. Separate units cover complete symbol sets and conventions for different types of process diagrams.
The objectives for this unit, **Process Mapping Theory and Rationale and Process Mapping Diagramming Tools** are to:

- Articulate the value of process mapping.
- Describe standard process mapping symbols and conventions.
- Analyze an existing workflow process chart in terms of the information that could be generated, and the sequence of steps that are being communicated.
- Choose the correct scope and detail level for a process map.
- Choose an appropriate process mapping methodology.
- Create a process map for a health care system (or system component) using correct symbols and conventions.
There are 5 topics covered in this unit including:

- Purpose of graphic process representation,
- Process diagram vocabulary,
- Identifying process steps,
- Basic flowchart symbols, and
- Creating a basic flowchart.
Before written language, early humans used symbols to communicate. While we aren’t sure if a picture is really worth a thousand words, we do know that with some graphic representations, humans perceive more information and perceive the information faster than through verbal and written communication channels. (Wickens, 1999)
Humans directly perceive meaning through symbols. For example, the skull and cross-bones is a universal symbol for danger. United States road signs use images that directly convey meaning, for example, the no U-turn sign. Similarly, a road sign with a picture of a tipping truck lets drivers know that the road conditions are conducive to rolling vehicles. When it is important to communicate meaning quickly, we use signs and symbols.

These concepts have been applied to clearly communicate process information. For example, the steps and their order in a work process. Like signs that communicate messages, process maps are graphical representations of processes. They use standard symbols to communicate information about a process.
Similar to maps of subway routes, process diagrams often are drawn at a level of detail that enables them to fit on one or a few pages. As such, they provide a way to, in one place, see the whole process. Similar to road signs, process maps convey information through commonly understood symbols. Similar to subway maps, process diagrams show and focus attention on different aspects of processes. For example, subway maps posted in the station show the different routes, their location throughout the city, the stops on each line, and proximity to local landmarks. Subway maps don't usually show local highways that would be less relevant to riders.

In contrast to subway maps and road signs, process maps document tasks in a process and sequence of tasks. The act of documenting a process requires that each step be understood and made explicit. The graphical representation of process steps and the explicitness makes the knowledge about the process steps and relationships between them easier to share.

While on the surface, this seems simple, most processes are complex systems. They can be examined and viewed from different perspectives, including static and dynamic aspects, data flow versus workflow, and at different levels of detail. Process diagramming provides the ability to smoothly progress from abstract to detailed. Additionally, process diagrams are multidimensional, conveying different types of information about a process. Different types of diagrams are used to make explicit and document the “who, what, when, where, and how” of processes.
Consider the steps that you take to look up a phone number in the yellow pages. You might describe this as “looking up the number,” i.e., you may describe this as one process or task that is at a high-level. Or, you may describe it at a more detailed level and list each of the individual tasks that make up the larger task of “looking up a phone number.”

Processes also involve both physical and mental steps. Some of the physical steps include clicking to open the web browser, typing the URL for the phone book, and scrolling through the search results. Some of the mental steps are locating the icon to start the web browser, remembering the URL for the search engine or locating the link to the search engine or going directly to the yellow pages, and assessing each search result to decide if it is the restaurant that you are looking for.

The information exchange can be described apart from the workflow or process steps. For example, the user requires a data value such as a phone number for a certain restaurant, the user queries the yellow pages data store through the internet, then a set of potential data values is returned.
In the previous slides and example, we have introduced terms that may be new, or that may be used in a different way. In the next few slides, we will discuss and define the following terms that are used in workflow and data flow diagramming.

Process Vocabulary

- Process
- Process map, process diagram
- Task
- Workflow
- Data flow
- Flowchart
- Notation
- Symbols
First, we will look at the process.

A process is a series of steps and decisions involved in the way work is accomplished. (American Heritage Dictionary, 2009)

Everything we do in our lives involves processes. Some examples are preparing for work in the morning, cooking a meal, and scheduling an appointment with your doctor.

The health care system is an interconnected web of many processes. John Gall in his book Systemantics, stated that “A complex system that works is made up of simple systems that work” (Gall, 1978).
A process map is a visual representation of a process that shows:

- The boundaries, i.e. where the process begins and ends,
- The steps or tasks in the process,
- The sequence or order of the steps.

Process maps use standard symbols so that a process map created by one person can be understood and used by others. There are different approaches to process diagramming, each with its own symbol set. Process maps are also called process diagrams and flowcharts. However, there are more precise uses of these terms that we will cover.
A task in process lingo means the same as it does in everyday use: a step in a process. We further differentiate physical, informational (or computational), and mental tasks. Physical tasks are actions that humans or machines perform, e.g., moving supplies from the loading dock in to a manufacturing facility. Mental tasks are those that are performed by the human mind, e.g., reading or reasoning. Computational tasks are those performed by humans or machines that involve manipulations of values or calculations.

Also, it is helpful to think of tasks in terms of composite or higher-level tasks that are composed of smaller tasks and of the primitive tasks that cannot be broken down into smaller or sub-tasks.
Now, we will look at an example.

After these instructions, pause the slides. List the process tasks required to schedule an appointment with your physician using an on-line scheduler.

Pause the slides now.
Let’s go through this example step-by-step.

First, you must:
1. Identify the need for an appointment,
2. Sign on to a computer,
3. Open a search engine,
4. Find an electronic scheduler for your physician,
5. Search for acceptable dates and times by
6. Visually inspecting results from the scheduler,
7. Select the date and time, and then
8. Confirm the date and time.
The distinction between workflow and dataflow is sometimes very blurry. However, the distinction is important because the underlying things being represented, i.e., tasks versus information, are different. Workflow is usually defined as a sequence of connected steps or tasks. Dataflow involves the transformations or operations performed on data as it moves within and between systems. Data and information are often part of workflow, and vice versa – data flow impacts workflow.
For workflow, we care about the physical, mental, and computational steps that occur. In the phone number example, these steps are clicking the mouse to open the browser, then clicking to open the search engine, then typing in the search text, then the results being returned and the scrolling and assessment of each result.

Often, as in the phone number example, processes have both workflow and information components that need to be represented.
Dataflow

- Data and information content
- Care about:
  - The data points that are being communicated or transferred
  - Where the data are stored
  - How those data are transformed
- In the phone number example, we care about:
  - Where the name of the restaurant is stored
  - The data values returned by the search
  - Where the data are stored

On the other hand, dataflow is about data and information content. Often the mechanism and steps by which it is moved are unimportant. In data flow, what we care about are the data points that are being communicated or transferred, where the data are stored, and how those data are transformed. In the phone number example, we care about where the name of the restaurant is stored, e.g., was it recalled from memory or from a personal rolodex. We care about the data values returned by the search and about where the data are stored so we know where to search.
Adequately representing workflow or tasks and dataflow or information requires clear analysis. Tasks and information are two intertwined but distinct things. Sometimes, the emphasis on workflow or dataflow is less, and just one representation can be used. Other times, both are significant and both representations are needed.
“Flowchart” is probably the word that has come to mind most often so far in this presentation. The reason that we have not used the word flowchart is that flowcharts, in common use today, blur and muddy the two different concepts of dataflow and workflow. Often both are shown intertwined on a flowchart, and the chart is an incomplete representation of both the dataflow and the workflow. We make this distinction between work and dataflow, because it is important for the analyst to be clear and to deliberately make decisions about what aspects of each (dataflow and workflow) to show on a diagram.

There are several available definitions for Flowchart; some commonly used definitions are displayed on the slide. The Merriam-Webster Online Dictionary defines a flowchart as a “diagram that shows step-by-step progression through a procedure or system especially using connecting lines and a set of conventional symbols” (Merriam-Webster Online Dictionary 2010). The 1985 ISO/ANSI 5807 standard was an early definer of flowchart symbols and defines a flowchart as something that is “used to diagram the logic paths through computer programs”. Each communicates important aspects of flowcharts, e.g.,

- Shows step by step progression through a process
- Uses standard symbols
- Depicts logic or decision points and thus, paths

Flowcharts are the most common type of process map, and are easily understood by most people, thus, they are widely used. Most of the symbols needed to create flowcharts are included in word processing, drawing, and presentation software packages, such as the Microsoft Office packages.
By notation we mean the set of shapes and drawing conventions, e.g., straight lines or curved ones, that are used to create process diagrams. Shapes are also called symbols.
Flowchart Symbols

- **Terminal**: identifies the beginning or end of a process or origin and destination of data.
- **Process**: designates an activity or task.
- **Decision**: designates a decision point from which the process branches into two or more paths.
- **Document**: designates a human readable document pertinent to the process.
- **Arrowhead**: represents a process path, the arrowhead indicates the direction of the flow.
- **Circle**: designates continuation of flow.
The example flowchart on the slide depicts an over simplified version of the troubleshooting process for a lamp that doesn’t work. The first step in the process, noticing that the lamp doesn’t work, is depicted by a terminal symbol. The second step in the troubleshooting process denotes a decision, either the lamp is plugged in or not. If the lamp is not plugged in, the next process step is to plug it in. However, if the lamp is plugged in, the next step is to decide if the bulb is burned out – denoted by a decision box. If the bulb is burned out, the next task, denoted by a process box, is to replace the bulb. If the bulb is not burned out, the final step, denoted by a terminal symbol is to buy a new lamp. Note, color is not required in flowcharts. Sometimes it can be helpful if used carefully and for a purpose. We only use color here to draw attention to multiple uses of the same symbol, e.g., both terminal symbols are red.
Correct symbols are used for the decision boxes and the connectors.

Incorrect symbol use is:
• a matter of which notation one is following, and
• how formal or conformant to any one notation one wants to be., i.e., correctness with respect to notation is a relative matter.

Pause the slides now.

Comparing the flowchart on this slide to the symbols on the previous slide, we see that the rounded corner rectangle used as a terminator should be a different shape, one with parallel lines on the top and bottom and half-circle curvature on the left and right sides. The arrow heads should be shaded or filled in rather than open.
Next we have an example of a defined health care process flow. We will use the scenario on this slide to demonstrate representing a process in pictorial form, i.e. in a process flow chart.

Pause the slides and read this scenario - list the process steps.

After you restart the slides, we will go over the steps so that you can see how you did.

Pause the slides and list the process steps now.
Listing the tasks is essentially breaking the scenario down into discrete steps. Placing them in sequential order will help with drawing the flowchart later.

The discrete steps of the Patient Intake and Clinic Visit that you should have listed are:
1. Patient arrives at the clinic and signs-in and checks-in with the front desk.
2. Receptionist enters the patient into the visit system as present and confirms the contact and insurance information with the patient.
3. The nurse pulls the chart from the filing stacks and calls the patient to the exam area and escorts the patient to the exam room.
4. The nurse interviews the patient regarding symptoms and/or complaints and records into the Nurses/Progress notes.
5. Nurse takes and records vital signs in progress notes and alerts the Physician that the patient is ready to be seen.
6. The Physician examines the patient and records findings in the progress notes.
7. The Physician determines if a prescription, procedure, lab work or a referral is required and completes the necessary paperwork if applicable.
8. The Physician provides any additional instructions to the patient and concludes the visit.
9. The Physician provides the patient chart to the office staff for refiling.
10. The office staff refiles the patient chart.
11. The patient pays their co-pay and concludes the office visit.

Pause the slides and determine if these steps match the ones you listed.

Next, use the standard symbols and draw a flowchart that depicts the steps. Restart the slides when you are finished.
Pause the slides now.
Compare the flowchart you drew to the one on the next two slides. Remember that connector symbol denotes that this flowchart is continued on the next slide. The process steps depicted on this slide include:

1. Patient arrives at the clinic.
2. Patient signs-in/checks-in with the front desk.
3. The patient is marked as present, their contact and insurance information are confirmed.
4. The chart is pulled.
5. The patient is escorted to the exam room.
6. Chief complaint and vitals are recorded.
7. Provider is alerted that the patient is ready to be seen.

This flowchart is continued on the next slide.
Additional process steps depicted on this slide are:

1. Examination of the patient
2. Determining if an order is required
3. If an order is required, write one
4. Educate the patient and dictate their clinic note
5. The patient visit with the physician ends and the patient pays their co-pay and exits
6. The patient’s chart is refilled

In this lecture we have
- Described the value of process diagrams,
- Given an example list of the process steps from a healthcare scenario, and
- Described basic flowchart symbols.

At this point you should be able to
- List the information generated or used in the process and the sequence of workflow steps when given a workflow process chart consisting of basic flowcharting symbols, and
- Read a scenario and use basic flowchart symbols to represent the process steps and their sequence.
Process Mapping Theory and Rationale

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No audio.
Process Mapping Theory and Rationale

References – Lecture a

Images

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