

# Fundamentals of Health Workflow Process Analysis and Redesign

Unit 10.3b  
Process Mapping  
ISO 5807

Component 10/Unit 3b

Welcome to the ISO 5807 Flowcharting Subunit. This is the first Subunit of of the Process Mapping Unit.

## Upon successful completion of this sub-unit the student is able to:

- Describe standard ISO 5807 processing diagramming symbols and conventions.
- Analyze an existing ISO 5807 workflow process diagram in terms of the information that could be generated and the workflow steps that are being communicated.
- Create an ISO 5807 process diagram for a health care system (or system component) using correct symbols and conventions.

Remember in the main set of slides for Unit 2 we introduced the concept of ISO 5807 flowcharting notation to diagram a process.

In this subunit, we will provide further details about the ISO 5807 symbols and conventions.

We will describe the standard diagramming symbols and conventions so that you will become familiar with standard flow chart symbols and be able to read a flowchart and understand the data or process flow being communicated.

We will also give examples to help you understand how to use standard symbols to document and communicate a process and then be able to create your own process diagrams using standard flowchart form.

# Methods for Diagramming Processes

Process Aspects	ISO 5807	Yourdon	Gane-Sarson	UML	E-R diagram
Context		X			
Process steps	X	X	X	X	
Information content				X	X
Information transformation	X	X	X	X	
Sequencing / control / state	X			X	
Roles involved	X			X	

\*UML extends beyond basic process features and models other aspects such as sequence, communication, and interrelationships. We do not cover these aspects here.

Also, remember that each of the methods for diagramming a process has its own set of capabilities.

With ISO 5807 flowcharts a process analyst is able to represent the process steps, any information transformations that occur or should occur, the order or sequence of the steps involved in the process, and the roles of the persons completing the steps in the process.

The flowchart is a useful tool in mapping the workflow processes in the clinical health care system.

# Flowchart

- A graphic depiction of the steps or activities that constitute a process
- There is an ISO standard, ISO 5807, that specifies the standard flowchart symbols for information processing.
- International Organization for Standardization (ISO)
  - “Graphical representation of the definition, analysis, or method of solution of a problem in which symbols are used to represent operations, data, flow, equipment, etc.”

A flowchart is a graphic depiction of the steps or activities that constitute a process. The International Standards Organization (ISO) defines flowchart as “Graphical representation of the definition, analysis, or method of solution of a problem in which symbols are used to represent operations, data, flow, equipment, etc.” Many organizations require the documentation of dataflow and or process flow. Some organizations require a flowchart to accompany every SOP. Organizations also use flowcharts to document and communicate the data flow and or process flow for a research project.

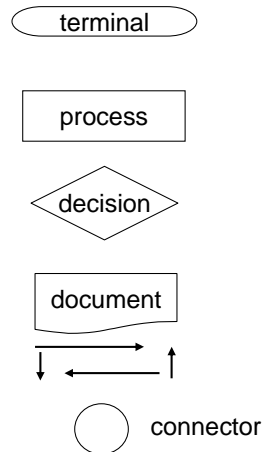
# Flowchart

- Flowcharts are constructed from standard symbols.
- Flowcharts are used to communicate processes.
- The functionality that is important to flowcharting is that the standard shapes are available and that there are “connectors” that latch to the shapes and stay attached until you detach them.
- Connectors facilitate editing the flowchart.

Flowcharts are constructed from standard symbols. It is important that standard symbols are used because flowcharts are used to communicate processes. When people see a specific symbol in a chart, they understand a specific meaning. Thus, to read, use, and create flowcharts knowing the meaning of the standard symbols is important. There is an ISO standard, ISO 5807, that specifies the standard flowchart symbols for information processing. Excerpts in this set of slides are taken directly from the ISO standard.

Many software applications have flowcharting functionality. Some of these are Microsoft word, Microsoft PowerPoint, and Visio. The functionality that is important to flowcharting is that the standard shapes are available and that there are “connectors” that latch to the shapes and stay attached until you detach them. This facilitates editing the flowchart.

# Flowchart Symbols<sup>5</sup>



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The terminal symbol is a rounded rectangle which identifies the beginning or end of a process or origin and destination of data.

The process symbol is a rectangle which designates an activity. Within the rectangle is a brief description of that activity.

The decision symbol is a diamond which designates a decision point from which the process branches into two or more paths. The path taken depends on the answer to the question which appears within the diamond. Each path is labeled to correspond to an answer to the question.

The document symbol is a human readable document pertinent to the process.

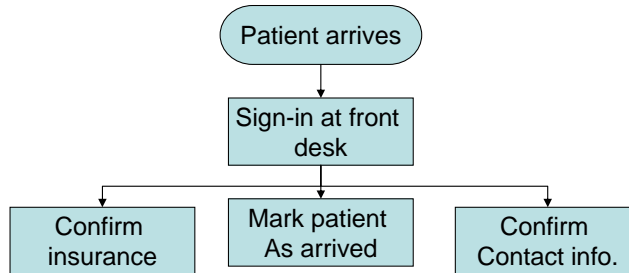
The flow line represents a process path which connects process elements. The arrowhead indicates the direction of the flow.

The connector is a circle which is used to indicate a continuation of the flow diagram.

## ISO 5807 section 9.4.2 Terminator

Example: Terminator symbol use

“This symbol represents an exit to, or an entry from, the outside environment, for example, start or end of a program flow, external use and origin or destination of data.”



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This is an example of the Terminator symbol.

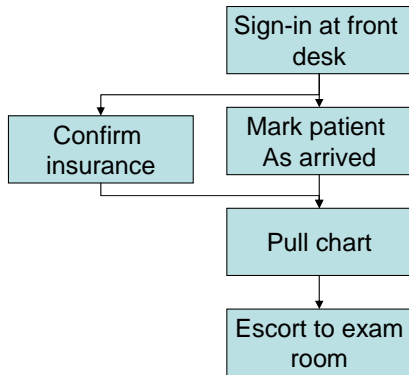
The Terminator “symbol represents an exit to, or an entry from, the outside environment, for example, start or end of a program flow, external use and origin or destination of data.”

This symbol is described in section 9.4.2 of the ISO 5807 documentation.

Here the Terminator symbol is used to represent the entry of the patient into the process (health care workflow setting)

## ISO 5807 section 9.2.1 Basic process symbol

Example: Process Symbol



“This symbol represents any kind of processing function, for example, executing a defined operation or group of operations resulting in a change in value, form or location of information, or in the determination of which one of several flow directions is to be followed.”

The Basic process “symbol represents any kind of processing function, for example, executing a defined operation or group of operations resulting in a change in value, form or location of information, or in the determination of which one of several flow directions is to be followed.”

In this example, the basic process symbol represents the following:

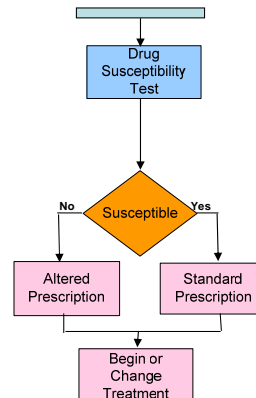
- Patient signs-in and checks-in with the front desk.
- Receptionist enters the patient into the visit system as present and confirms the insurance information with the patient.
- The nurse pulls the chart from the filing stacks and
- escorts the patient to the exam room.



## ISO 5807 section 9.2.2.4 Decision

“This symbol represents a decision or switching type function having a single entry but where there may be a number of alternative exits, one and only one of which may be activated following the evaluation of conditions defined within the symbol. The appropriate results of the evaluation may be written adjacent to the lines representing the paths.” Decision symbols can show nominal decisions (yes / no), or decisions with multiple possible outcomes.

Example decision symbol use



The decision, or diamond, “symbol represents a decision or switching type function having a single entry but where there may be a number of alternative exits, one and only one of which may be activated following the evaluation of conditions defined within the symbol. The appropriate results of the evaluation may be written adjacent to the lines representing the paths.”

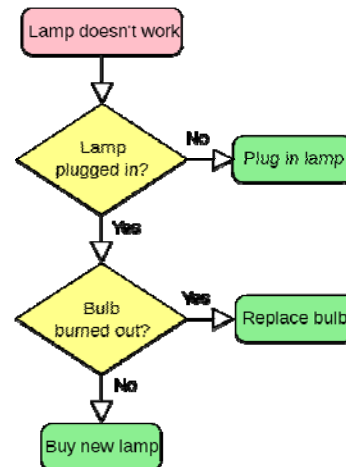
Decision symbols can show nominal decisions (yes / no), or decisions with multiple possible outcomes.

In this example the patient is given a drug susceptibility test and a decision is made as to the appropriate type of prescription to write based on the test results. As you can clearly see the actions are different for the patients who are susceptible and the patients who are not.

This decision in the process is clearly represented with the ISO 5807 symbols.

# Flowchart Example

Examine the flowchart closely. Take a few minutes and list the symbols that are correctly and incorrectly used according to the flowchart symbols on the previous slide from Juran's Quality Control Handbook.



Example flowchart reprinted from Wikipedia<sup>6</sup>

Correct symbols are used for the decision boxes and the connectors. Incorrect symbol use is 1) a matter of which notation one is following, and 2) how formal or conformant to any one notation one wants to be., i.e., correctness with respect to notation is a relative matter. Comparing the flowchart on this slide to the Juran list of symbols, 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.

# Example: Patient Intake

**A patient arrives at the healthcare setting/clinic and is signed in by the receptionist. The receptionist enters the patient into a visit system as present and confirms the contact and insurance information with the patient. At this point the patient is ready to be seen by the nurse who will conduct the initial examination and interview with the patient. 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, interviews the patient regarding symptoms and/or complaints and records into the Nurses/Progress notes, and takes and records vital signs in progress notes. She/he then alerts the Physician that the patient is ready to be seen. Subsequently, the Physician examines the patient and records findings in the progress notes, determines if a prescription, procedure, lab work or a referral is required and completes the necessary paperwork if applicable. The Physician provides any additional instructions to the patient and concludes the visit. Finally, the Physician provides the patient chart to the office staff for refiling and the office staff refiles the patient chart. Also, the patient pays their co-pay and concludes the office visit.**

Next we have an example of a defined health care process flow. We will use this scenario to demonstrate the process of representing a process in pictorial form, i.e. in a process flow chart.

Pause the slide show.

Read this scenario.

# Patient Intake and Clinic Visit

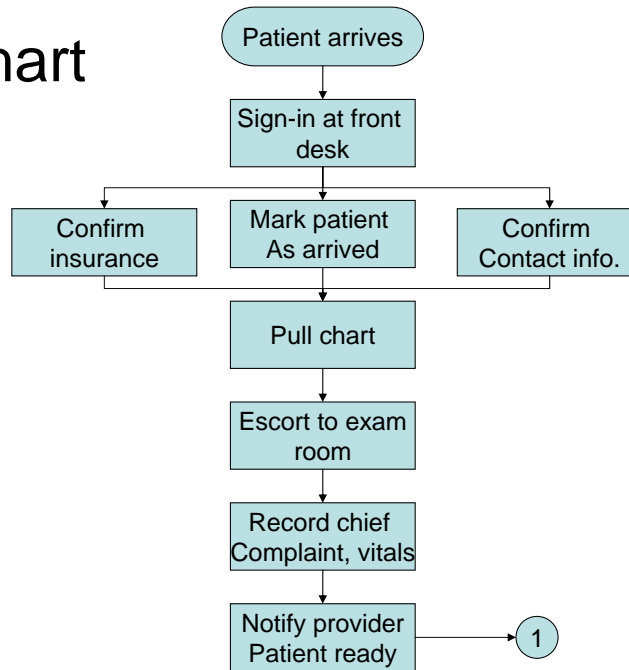
1. Patient arrives at the clinic, signs-in and checks-in with the front desk.
2. Receptionist enters the patient into the visit system as present and confirms the contact and insurance information with the patient.
3. The nurse pulls the chart from the filing stacks and calls the patient to the exam 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.
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.

The scenario will first be broken down into discrete steps. The tasks are placed in sequential order.

## **Pause the slide show.**

Read through these steps and determine if they matched the ones that you listed.

# Flowchart



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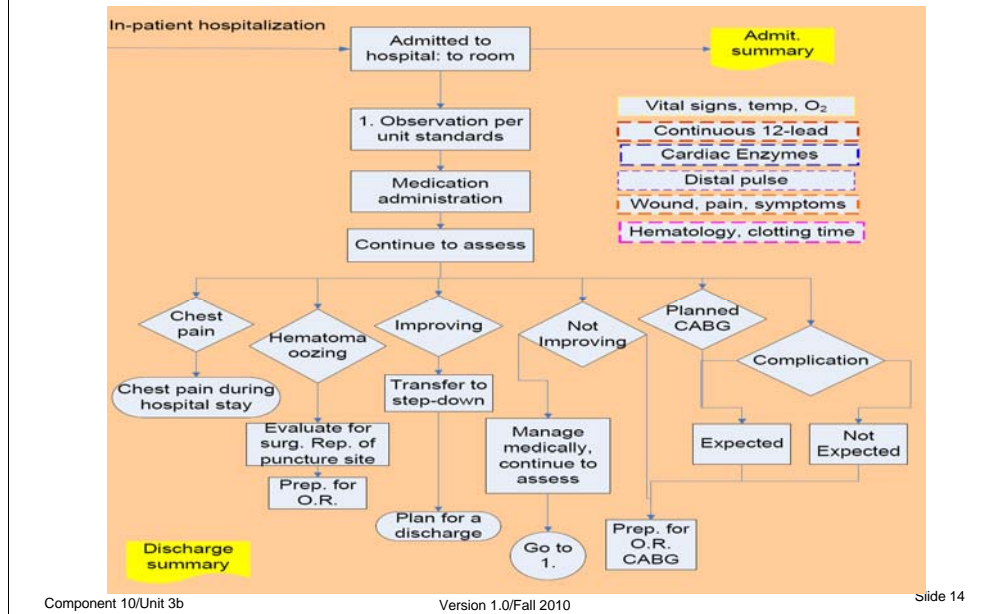
Pause the slides.

Read the sequence of the slides.

Compare the flowchart to the list of steps. Remember that connector symbol. This flowchart is continued on the next slide.

# Decision With Multiple Outcomes

This particular example is part of a larger chart. Note the line entering from the left.



The process flow diagrams can become quite complicated. The example in front of you is taken from a hospital setting where there are multiple decisions to be made and multiple actions based on these decisions.

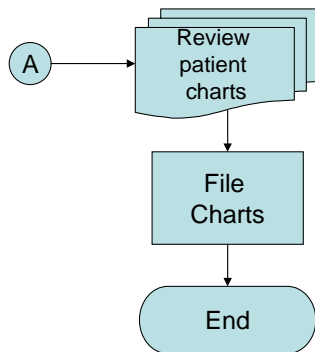
This complexity is found in most health care settings.

PAUSE

Walk through key decisions and actions in this slide.

# ISO 5807 section 9.1.2.4 Document

Example document symbol use



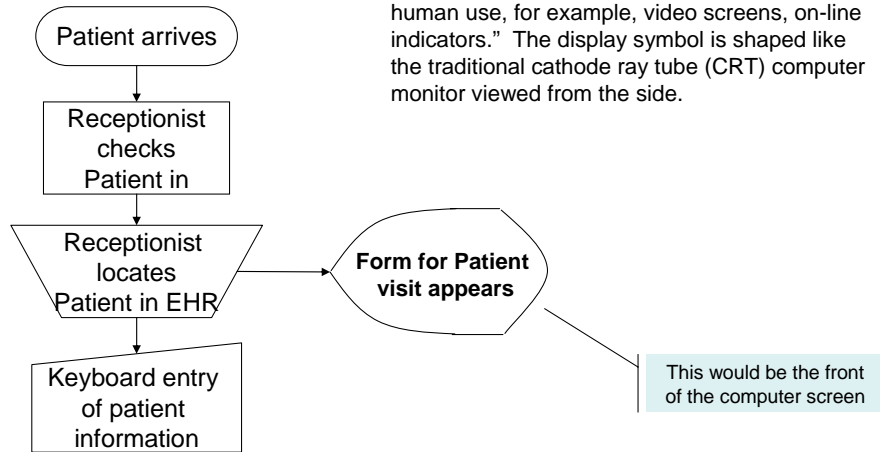
“This symbol represents human readable data, the medium being, for example, printed output, an OCR [optical character recognition] or MICR [magnetic ink character recognition] document, microfilm, tally roll, data entry forms.”

This symbol represents human readable data, the medium being, for example, printed output, an OCR [optical character recognition] or MICR [magnetic ink character recognition] document, microfilm, tally roll, data entry forms.”

Here the staff member reviews the patient’s charts and files them.

# ISO 5807 section 9.1.2.8 Display

Display example



"This symbol represents data, the medium being of any type where the information is displayed for human use, for example, video screens, on-line indicators." The display symbol is shaped like the traditional cathode ray tube (CRT) computer monitor viewed from the side.

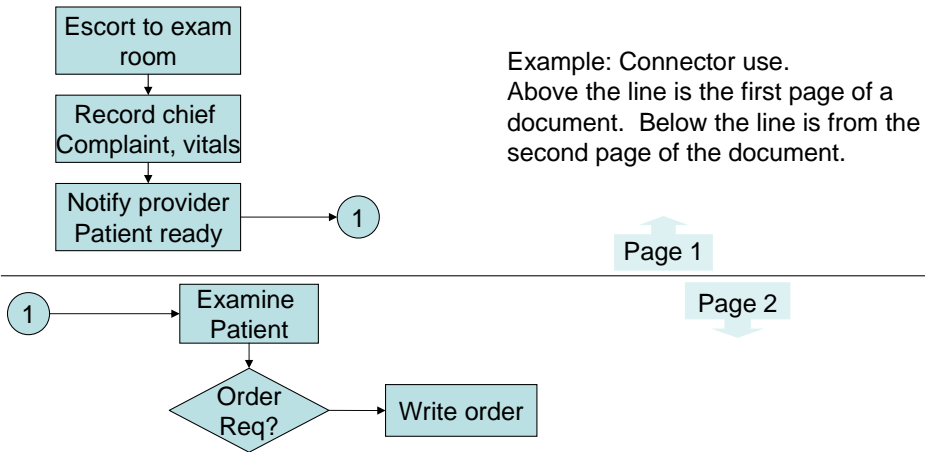
"This symbol represents data, the medium being of any type where the information is displayed for human use, for example, video screens, on-line indicators."

The display symbol is shaped like the traditional cathode ray tube (CRT) computer monitor viewed from the side.



## ISO section 9.4.1 Connector

“This symbol represents an exit to, or an entry from, another part of the same flowchart, and is used to break a line, and to continue it elsewhere. The corresponding connector symbols shall contain the same unique identification.”



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Read introductory paragraph

Pause

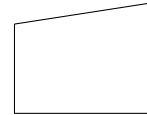
Read Example

Note that the connector with a “1” connects the process across pages 1 and 2.

# Manual input versus manual operation

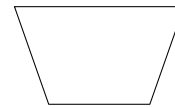
## ISO 5807 section 9.1.2.5 Manual input

“This symbol represents data, the medium being of any type where the information is entered manually at the time of processing, for example, on-line keyboard, switch settings, push buttons, light pen, bar-code wand.”



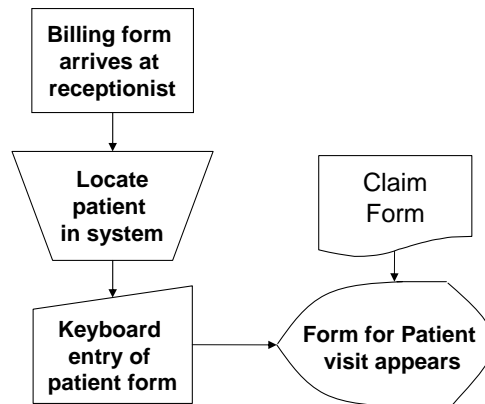
## ISO 5807 section 9.2.2.2 Manual operation

“This symbol represents any process performed by a human being.”



Read the two paragraphs.

## Example: Manual Operation and Manual Input Example



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In this example the manual operation of receiving the forms and

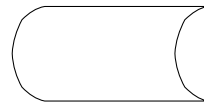
The manual input of keyboard entry of data are represented.

# Data Symbols

ISO 5807 section 9.1.1.1 Data  
"This symbol represents data, the  
medium being unspecified."

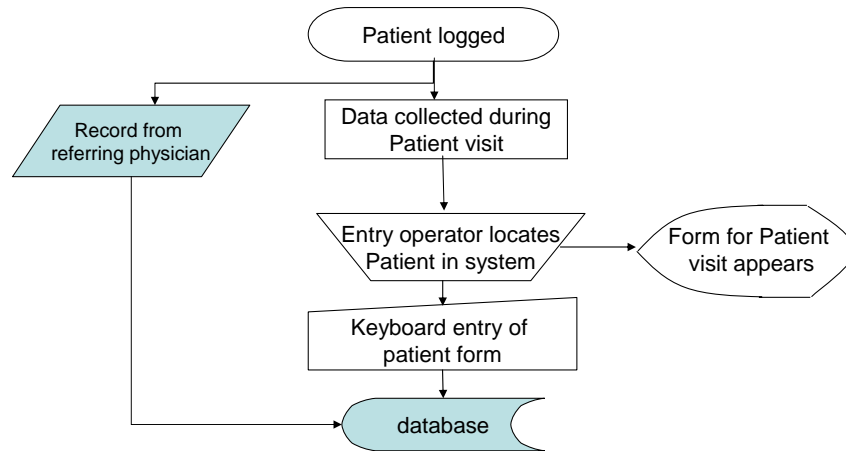


ISO 5807 section 9.1.1.2 Stored  
data "This symbol represents stored  
data in a form suitable for processing,  
the medium being unspecified."



Read the slide

# Data Symbol Example



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In this example data are represented in two distinct ways.

Note that the generic data symbol is used for data from the referring physician.

It does not specify medium, such as disc or electronic file transfer.

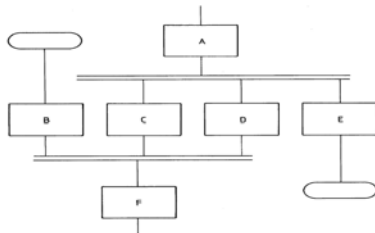
Use of the stored data symbol for the office database also signifies data, however, the symbol is specific to stored data. The vertical cylinder could have also been used.

# Delay



The symbol used to represent a delay in a process looks like a “bullet”. Although not listed in ISO 5807, this symbol is commonly used because in logic diagrams, it represents an “and gate”. An and gate denotes that two or more things (thing 1 AND thing 2, two inputs) have to happen before proceeding.

Diagram from ISO 5807



Two parallel lines are used to denote that things above them must be done before things below them can be done. “Processes C, D and E cannot commence until process A has been completed; similarly process F should await completion of B, C and D; but process C may start and/or end before process D has started and/or ended respectively.” ISO 5807

The symbols used to represent a delay in a process are given here. The “bullet”, although not listed in ISO 5807, is commonly used because in logic diagrams, it represents an “and gate”. An and gate denotes that two or more things (thing 1 AND thing 2, two inputs) have to happen before proceeding

Two parallel lines are used to denote that things above them must be done before things below them can be done. “Processes C, D and E cannot commence until process A has been completed; similarly process F should await completion of B, C and D; but process C may start and/or end before process D has started and/or ended respectively.” ISO 5807

# Non-symbol Flowcharting Standards

This section covers:

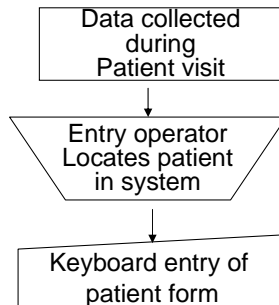
- Use of text descriptions
- Detail level
- Flow direction
- Lines

Read slide

# Text Descriptions

Text descriptions are done using “annotations” aka call-outs. This keeps the text in the box to a minimum so the chart is more readable. Lengthy text descriptions can be referenced to another page or footnote if necessary.

If text descriptions refer to more than one box in a flowchart, a dotted line can be drawn around the steps that the text describes or refers to.



It is often important to include text descriptions in a process representation. This is done using “annotations” aka call-outs. This keeps the text in the box to a minimum so the chart is more readable. Lengthy text descriptions can be referenced to another page or footnote if necessary.

If text descriptions refer to more than one box in a flowchart, a dotted line can be drawn around the steps that the text describes or refers to.

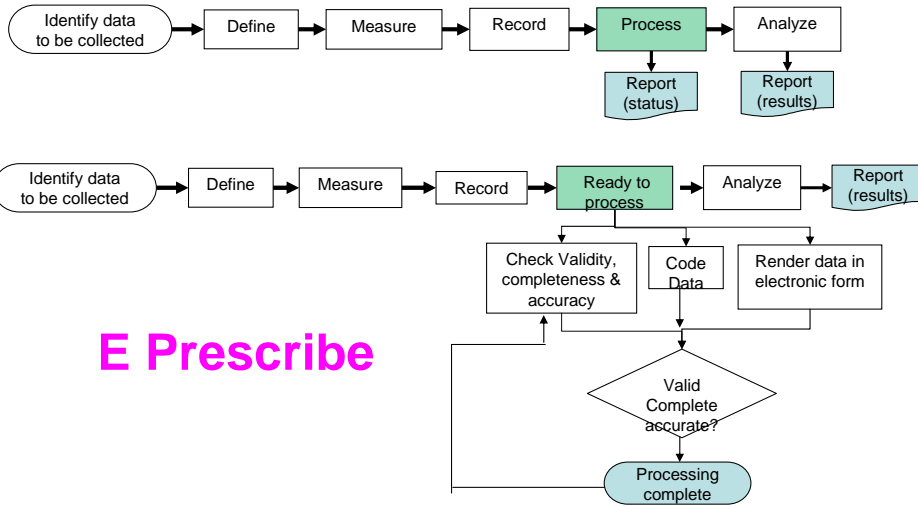


## Detail Level

- Items shown on the same diagram should be at the same detail level.
- For example, in the diagram above, each box represents one of the main components. This is a high level view of the process.
- The following is an example of combining items at different detail levels on the same diagram. Combining items at different detail levels can cause confusion.

Read slide

# Detail Level



**E Prescribe**

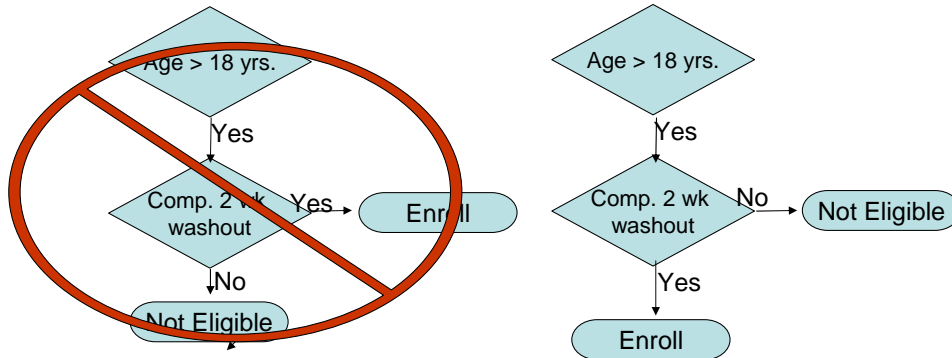
Walk through the details of this slide.

Pause

Note the different level of detail in the second flowchart which includes the data processing steps. This might be better in a second flowchart.

# Flow

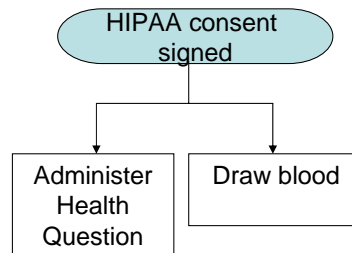
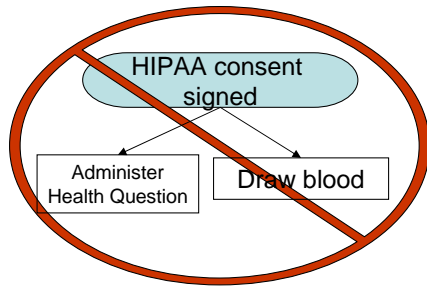
Flowcharts should “read” from top to bottom or right to left. Affirmative responses to yes/no decisions should all be in the same direction. Flow direction for process steps that show re-work (i.e. queries for data discrepancies going back to sites) should be opposite of the direction of the progressing process.



Read slide

# Flow

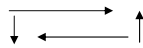
Flowcharts should “read” from top to bottom or left and right. Lines should run up & down or left and right. Do not use diagonal lines.



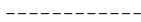
Read slide.

Note this is left and right; not left to right.

## Lines



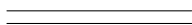
A solid line is used to denote data or process flow. Arrows represent the direction of the flow.



A dashed line is used to denote an alternate path. Arrows represent the direction of the flow.



A jagged line is used to denote data transfer by a telecommunications link. Arrows represent the direction of the flow.



Two parallel lines denote a synchronization between two parallel processes. i.e. that the things above it have to happen and all come to the denoted state before the things below it can occur. There are no arrows on synchronization lines.

All lines that represent flow based on decisions should be labeled.  
Lines should run up & down or left and right. Do not use diagonal lines.

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There are multiple ways to connect process and data flow.

Read slides