

*"Large and complex organizations are a tangible manifestation of advanced technology, more than machinery itself." (J.K. Galbraith)*

## **Introduction to workflow modeling**



Mario G. Cimino, Department of Information Engineering  
*Pisa, September-December 2018*

## **Course Schedule and Materials**

- ✓ The course will take about 30 hours in total
- ✓ Materials:  
<http://www.iet.unipi.it/m.cimino/wdis>  
user: \*\*\*\*\*  
password: \*\*\*\*\*
- ✓ Student's Tweets:  
<http://www.iet.unipi.it/m.cimino/note/>
- ✓ Contact:  
[mario.cimino@unipi.it](mailto:mario.cimino@unipi.it)
- ✓ Registration:

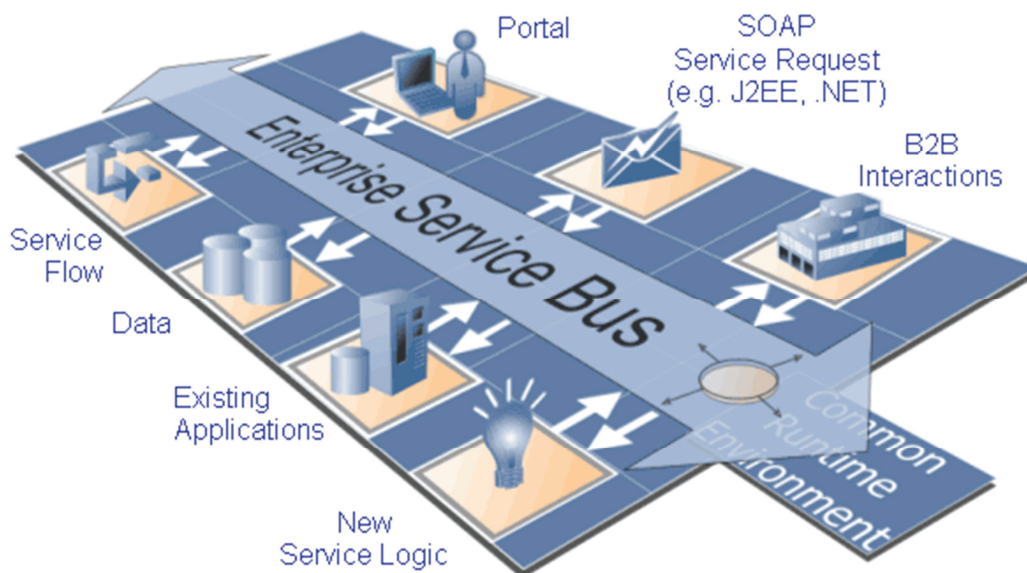
✓ The world is becoming a huge, system interconnected by the Internet



✓ Each element (object, service, human,...) plays different roles

*Cimino – Introduction to workflow modeling – 3*

✓ Enterprises look like enormous processors. Example: enterprise service bus



✓ We need **new languages** to model the flow of work (workflow) in this service-oriented environment.

✓ Object-Oriented programming is not sufficient to model the orchestration or collaboration business logic

*Cimino – Introduction to workflow modeling – 4*

## Basic ontology for process orientation approach

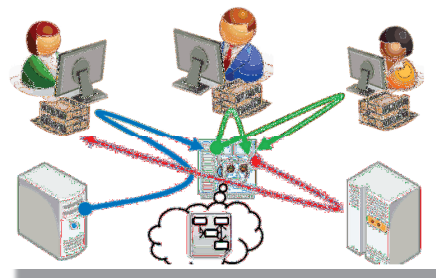
- Companies compete on the basis of business processes: simple/complex, flexible, robust, clear or ambiguous, partially automated, manual, ad-hoc,...
- **Business Process**: a collection of interrelated **activities**, initiated in response to a triggering **event**, achieving a specific discrete **result** for the **customer** and other stakeholders of the process.
- An **activity** is work that might be named as a single unit but can involve multiple actors, each separately making a contribution.
- A **task** is an actionable item that needs to be performed to complete an activity. An activity may consist of more tasks. A task consists of **steps**.
- A **result** is an individually identifiable and countable entity
- A **customer** is the recipient of beneficiary of the result (person, organization, broad marketplace, ...)
- An **event** is an action, a date or time reached, a condition (rule).



Cimino – Introduction to workflow modeling – 5

## Basic ontology for process orientation approach

- Business Process (BP) Analysis includes a broad meaning encompassing modeling, simulation, diagnosis, verification, performance of BP.
- A **workflow** is a (partial) automation of a business process. In a workflow (“flow of work”) resources, information, activities, follow a coordinated control flow established by a **BP modeling language**.
- **Business Process Modeling** is the creative act of producing a workflow from a business process.
- A BP modeling language is very different from a programming language:



Automation paradigm	Description language	Execution language	Core runtime	Complexity
Service oriented computing	UML/BPMN	XML	Workflow Management System	+++
Object oriented programming	Java/C#/C++	Byte code	Virtual Machine	++
Procedural programming	C	Assembler	CPU	+

Cimino – Introduction to workflow modeling – 6

# Business Process Model and Notation (BPMN 2.0)

- **BPMN is...**

- ✓ *human-readable*: a standard visual notation for modeling business processes;
- ✓ *accessible*: easy to understand for various roles: who analyzes and defines processes, who leads the technological implementation, who is responsible for management and control;
- ✓ *machine-readable*: a notation serializable to XML for process execution (e.g. WS-BPEL 2, SOA environments).

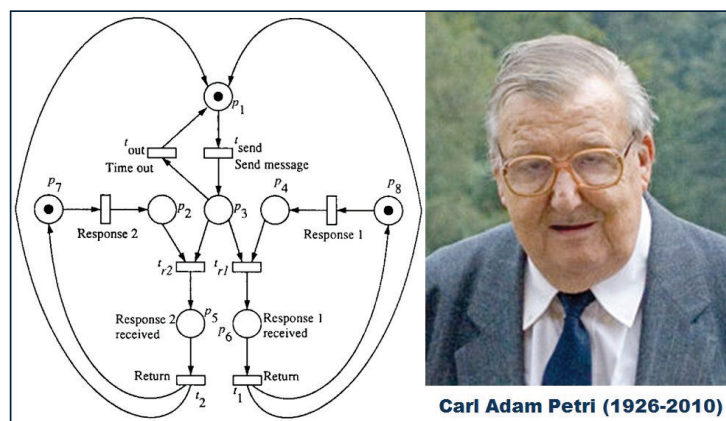
- **BPMN is not...**

- ✓ a language for representing data flows and object flows, although this can be done at a certain abstraction level;
- ✓ a notation to represent structures, functional decompositions, data models, organization strategies, business rules.

*Cimino – Introduction to workflow modeling – 7*

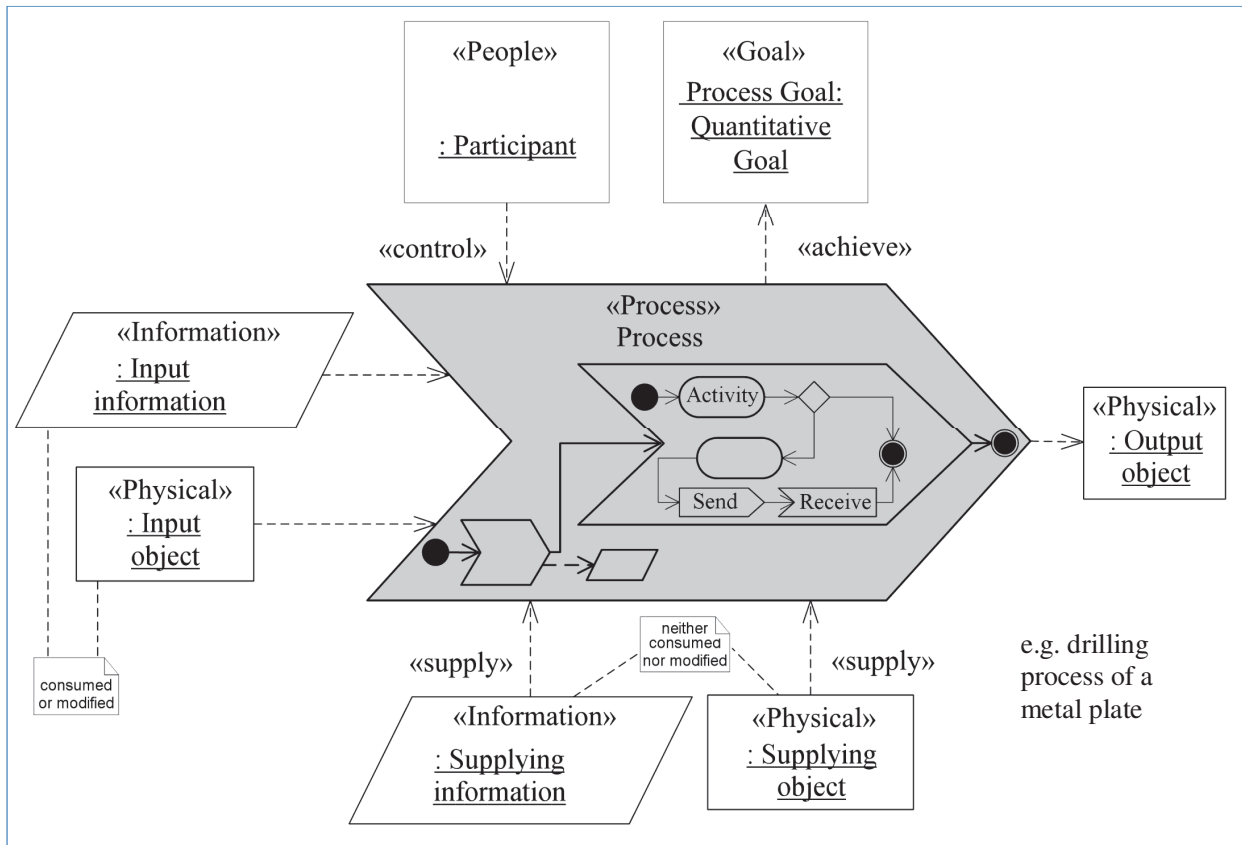
- **“Relatives” of BPMN (languages for workflow-based analysis)**

- ✓ *Petri Nets* (1962): formal language to model distributed systems, usable by computer scientist and designers of specialized software. It consists of a visual representation and a corresponding mathematical notation (graphs), allowing advanced analyses such as validation, verification (e.g. *soundness* to identify deadlock and livelock)



- ✓ *UML Activity Diagram* (OMG, 1997): language for visual modeling for the object-oriented paradigm, usable by software engineers. The extended UML of Eriksson e Penker (2000) is suitable for business process modeling, and usable also by business level (non-technical) roles.

*Cimino – Introduction to workflow modeling – 8*



## Workflow Modeling

### How to name a process

(Readings: pp. 40-46, Sharp, *Workflow modeling*, 2009)

A01) The process name must be in the form *verb-noun*

e.g. *Assign Inspector*.

A02) It might be in the form *verb-qualifier-noun* or *verb-noun-noun*

e.g. *Assign Backup Inspector*, *Assign inspector to route*

A03) Processes are almost always defined in the **singular**

e.g. ~~*Handle Orders*~~ → *Fill Order*, i.e. an (a specific) order.

A04) The verb-noun name must indicate the **result** of the process.

A05) **Guideline: if you flip the terms around into ‘noun is verbed’ form, the phrase should indicate the result of the process**

e.g. *Assign Inspector* → *Inspector is Assigned*

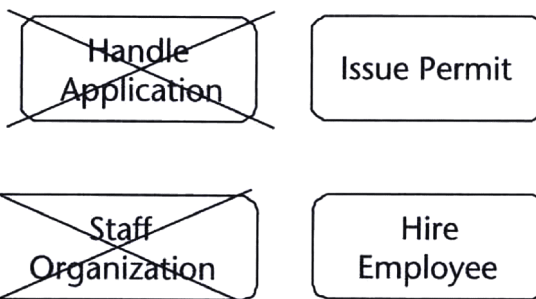
A06)

Examples of Potential Processes

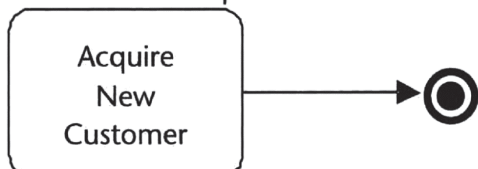
<i>Suggested Process</i>	<i>What We Call It</i>	<i>If Not a Process, Why Not?</i>
Customer Relationship Management	Process area	Doesn't deliver a single, specific result; a set of related business processes meeting an overall objective.
Acquire New Customer	Business process	Delivers a single, specific result, and meets all other criteria in this section. An "end-to-end business process."
Assess Prospect Financial Status or Set Up Customer	Subprocess	Too small—both deliver specific results, but are intermediate results in an end-to-end business process.
Calculate Customer Credit Limit or Create Customer Account	Activity, step, task, ... (no specific term)	Much too small—a part of a subprocess. Possibly described in a procedure, or use case and service.
Determine Customer Credit Limit or Set Customer Account Type	Activity, step, task, ... (no specific term)	Much, much too small—a single step or instruction. Possibly one line in a procedure, or step in a use case.
"The Inside Sales process"	Function	Doesn't deliver a single, specific result; an organizational unit that participates in multiple business processes.
"Our Oracle CRM process"	System	Doesn't deliver a single, specific result; a system that supports multiple business processes.
"Our e-business process"	Technology	Doesn't deliver a single, specific result; a technology employed by multiple business processes.

A07) How to name a process

Process naming—singular, customer perspective.



Process naming—name indicates process result.



**Process:**  
Acquire New Customer  
(action verb – noun)

**Result:**  
New Customer is Acquired  
(noun is verbed)  
• discrete  
• countable  
• essential



---

**A process delivers a specific, essential result**

The process result in 'noun is verbed' form must meet 3 criteria:

A08) **The result is discrete and identifiable:** you can differentiate individual instances of the result, and it makes sense to talk about 'one of them'

e.g. *Inspector is Assigned* → it makes sense in a business context to talk about *when was Joe assigned to the midtown route*

A09) **The result is countable:** you can count how many of that result you have produced in an hour, a day, a week, etc.

e.g. *How many inspector assignments were completed this week*

A10) **The result is essential:** it is fundamentally necessary to the operation of the enterprise, not just a consequence of the current implementation

e.g. *Fax Inspector Assignment* → the essence of the process has not been reached by the technology of notification → *Notify Inspector of Assignment* is ok ('what, not who or how')

A11) A process should be defined in terms of the essence of what it does, i.e., the result it delivers (what), not the technologies used to support it (how) or the organizations and roles that carry it out (who)

A12) Distinguish between result and objective:

- a *result* is the *output* of a single execution of a process  
e.g. '*employee is hired* from the process *Hire Employee*'

- an *objective* is some desired state or performance target, generally over many instances

- e.g. '*Hired employees will go on to have an average tenure of greater than five years*'

- e.g. '*Fewer than 10% of newly hired employees will leave the company within the first year*'

A13) An *action* verb indicates a single activity that happens at a particular point in time, for which it is easy to visualize a result.

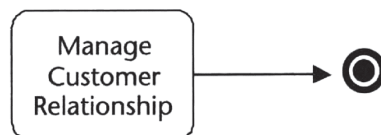
e.g. *count, evaluate, print, attach, return, prioritize, sort, provide Allocate Service Representative, Calculate Stock Index, Retrieve Sample, Issue Refund, Translate Document*

A14) Avoid mushy verbs: a *mushy* verb tends to indicate an activity or multiple activities that happen *over time*. While they might indicate some overall objective, they do not help us visualize a single, specific result.

A15) *Mushy verbs* are also called ‘360 verbs’, as they sound good but often say little about what was actually accomplished.

A16) A list of mushy verbs you should avoid using, except when naming process areas or other broad groups of activities:

- *Maintain;*
- *Administer;*
- *Process;*
- *Improve;*
- *Facilitate;*
- *Track;*
- *Analyze;*
- *Coordinate.*
- *Manage;*
- *Handle;*
- *Do;*
- *Support;*
- *Drive;*
- *Review;*
- *Monitor;*



**Process:**  
 Manage Customer Relationship  
*(mushy verb – noun)*

**Result:**  
 Customer Relationship is Managed  
*(noun is verbed)*

- *not discrete*
- *not countable*
- *not an essential result (an objective)*

Process naming—no mushy verbs.

A17) When describing a process it is necessary to be able to identify the *triggering* or *initiating* event.

Event categories:

A18) *Action event*: it happens when a person or an organization decides to do something, for any reason. You cannot predict exactly when

*e.g. a customer deciding to place an order, a manager deciding the company needs a new employee, a regulator deciding to issue a new guideline*

A19) *Temporal event*: it happens when some predetermined date or time is reached at which some activity must begin. You always know exactly when it will next happens.

*e.g. time to run the payroll, time to close the books, time to take inventory*

A20) *Condition or rule event*: it happens when a monitoring activity detects some exception condition. You cannot predict it in advance

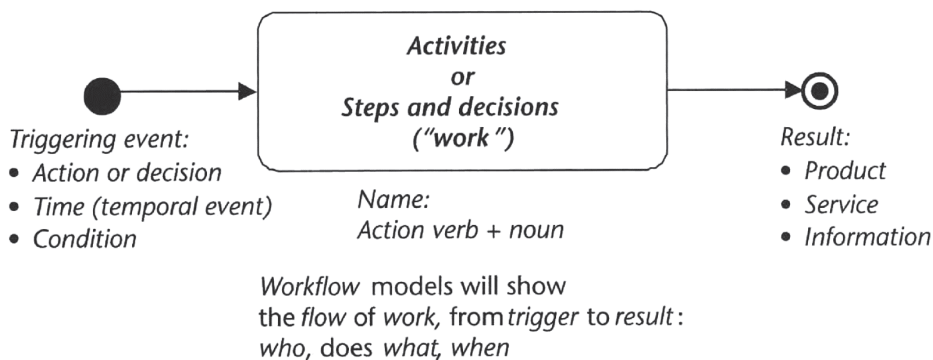
*e.g. a smoke alarm being set off, a stock price hitting a predetermined limit.*



A21) Do not confuse triggering events and preconditions: the former is what happens to make the process/activity start, the latter is a rule that must be enforced after the process/activity starts to proceed. E.g.

- *customer initiates contact to report service difficulty* (triggering event)
- *customer is in active status* (precondition)

The figure represents the *trigger-activities-result* conceptual framework.



It is in contrast with input-process-output (which sounds mechanical)

Summary

A22) the process comprises an identified body of work that can be characterized as a set of related activities or a defined sequence of steps and decisions.

A23) the process name is (essentially) in action verb-noun format, although it might have a qualifier or another noun.

A24) The name is in the singular.

A25) The name, if put in "noun is verbed" format, will indicate the intended result (output) of the process.

A26) The result must be discrete and countable. If a mushy verb is used, these criteria will not be met.

A27) The result is what the customer of the process wants.

A28) The process is initiated by a triggering event that could be action, time, or condition.

A29) Rule-of-thumb: **NO RESULT → NO PROCESS**

**Process and subprocess**

A30) a business process generally has  $5 \pm 2$  subprocesses

A31) a subprocess achieves a significant milestone to the achievement of the final result of the business processes and is often something that the organization would like to measure

A32) verify that within a single end-to-end business process it is the same “token” or “work item” that is moving through the process, although its state is being changed

**Establish scope and contents of the process:**

A33) WHAT the process is:

- a) Triggering events - *what* initiates the process?
- b) Results - *what* are the results expected by customer/stakeholder?
- c) Subprocesses - *what* are the main stages ( $5 \pm 2$ ) of the process?
- d) Cases - *what* are the major variations of the work item that lead to different flows?

A34) WHO is involved in

- a) Participating organizations - *who* participates
- b) Individual actors/responsibilities - *who and what* are main steps

A35) HOW it is currently supported

- a) Mechanisms - *how* is the process supported (equipment,...)
- b) Measures - *how* the process behaves via statistics

**How to discover business processes**

(Readings: pp. 129-132, Sharp, *Workflow modeling*, 2009)

A36) Identify the **nouns** that sit over the process

A37) Use <https://www.draw.io> (miscellaneous toolkit).

A38) Do not think too hard, you are doing discovery and not analysis

A39) Take each selected noun and ask the group to identify activities by thinking of which verbs go with it. Incrementally new discovered activities are added to the collection

A40) Clean up the activity names so they use an action verb and one or more nouns:

e.g. Designing -> design advertise;

Writing -> write editorial item;

Billing -> issue invoice

A41) Generalize any that refer to specific actors or technologies unless those references are key to understand the activity

A42) Eliminate duplicates, use the noun-is-verb-ed form to check the names, remind people the difference between result and objective

**Link the Activities and Determine Business Processes**

A43) The purpose is to uncover a set of related business processes by linking the activities into “result-trigger” chains, analyzing the linkages and determining business process boundaries

A44) Rules: a cluster of activities with 1:1 links generally is a well-formed business process, whereas 1:M and M:1 connections are not coordinated within the same process

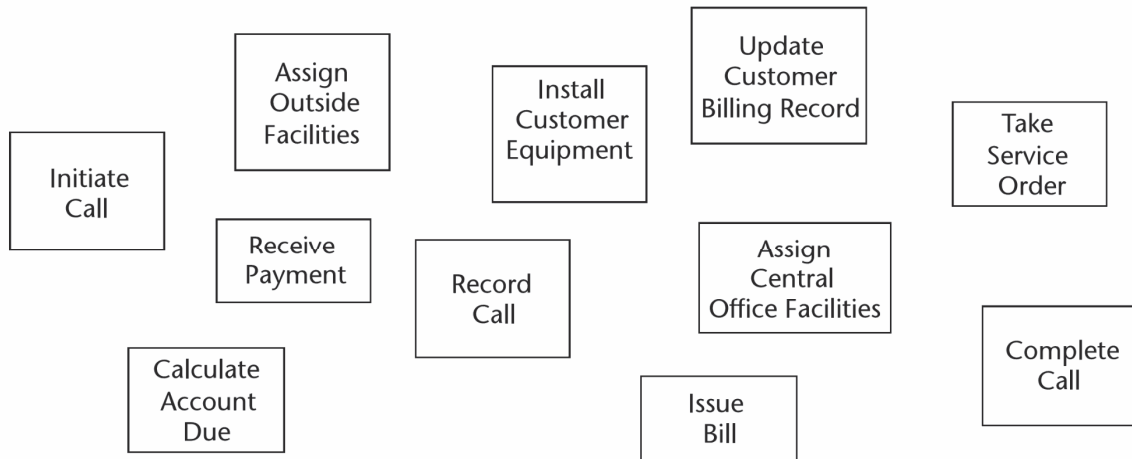
A45) The group places, on long sheets of plotter pages, the activities in sequence. Simply ask to identify cases when an activity is generally preceded or followed by another activity

A46) This sequencing makes missed activities more evident.

A47) Activities can be made of a long chain, but also of some parallel streams. Sometimes M:M linkages are also possible. Focus on ‘happy path’ (do not worry about looping or instances 1:0).

A48) Identify the business process boundaries and name the business processes.

Example: a Brainstorm Diagram to discover real processes in a Telephone Company

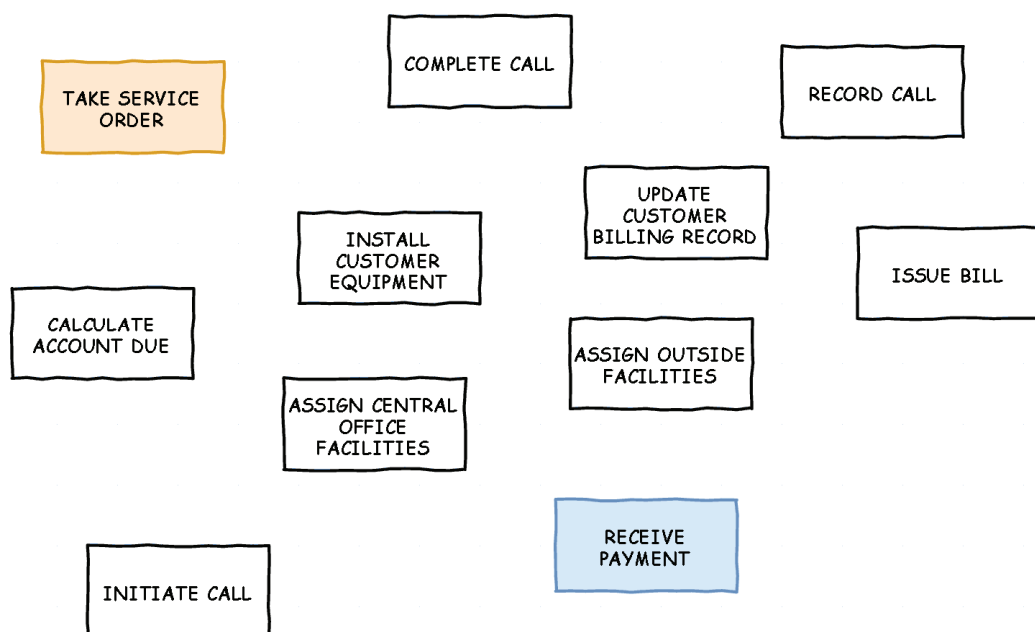


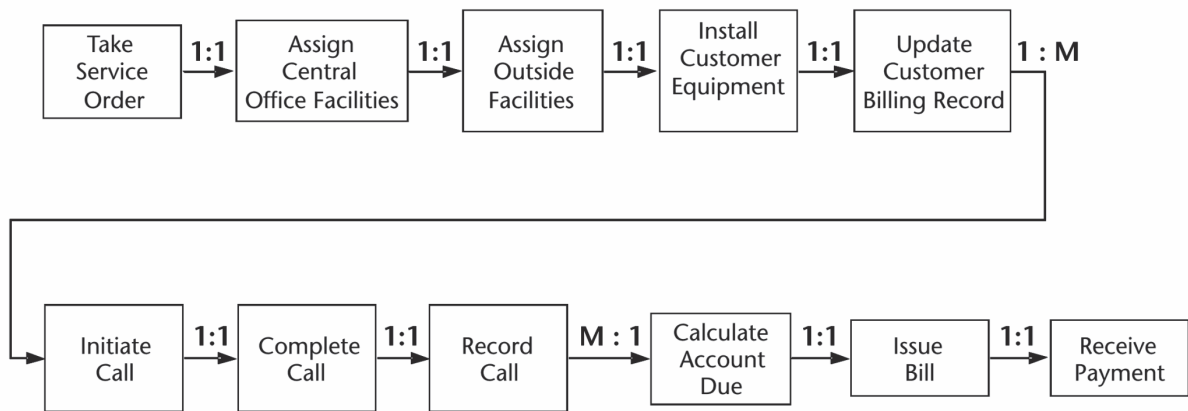
Partial results from activity identification.

<https://www.draw.io/>

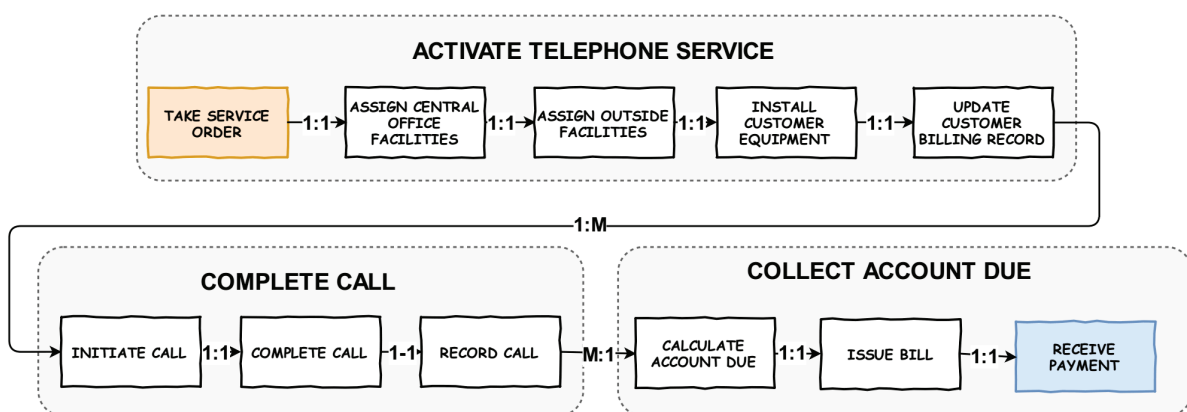
File > Save as > download > html

File > Open from > device > html





Sequence activities and analyze linkages.



Identify business processes

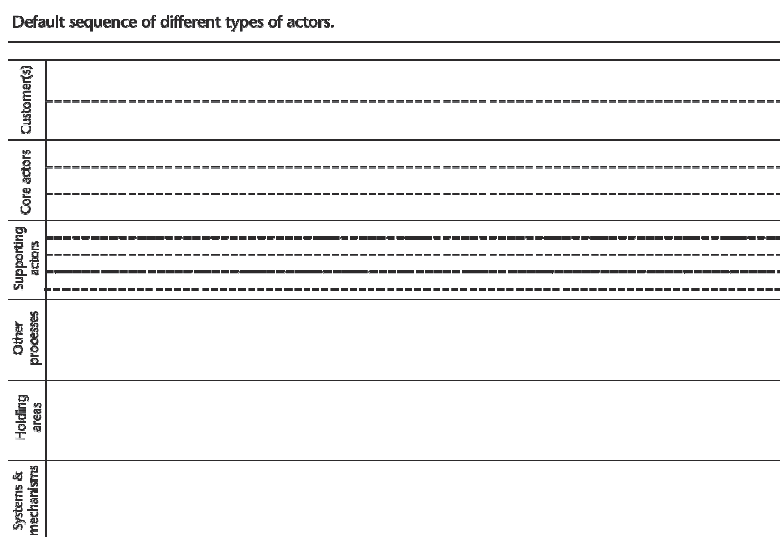
A49) A swimlane diagram depicts the actors involved, their steps, and the flow of work between them

A50) Actor can appear from top to bottom in an order that makes sense: order of appearance (default), starting from the busier actor (to highlight the points of the flow with main participants), according to their physical position (in *Lean* practice, to limit “up-and-down”)

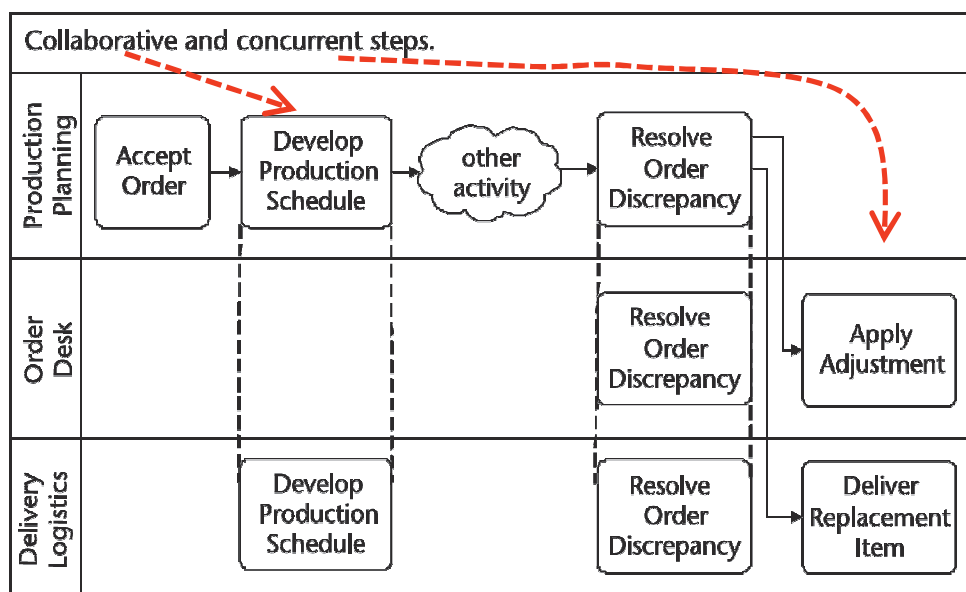
A51) A default order related to the type:

1. Customers
2. Core Actors,
3. Supporting Actors,
4. Other Processes,
5. Holding areas,
6. Systems and mechanisms (machinery, equipment,...)

(Readings: pp. 216-227, Sharp, *Workflow modeling*, 2009)



A52) Do not confuse *collaborative* work with *concurrent* (parallel) work: in a collaborative step, the actors are working together on the same step, while in concurrent work they are working independently on separate tasks.

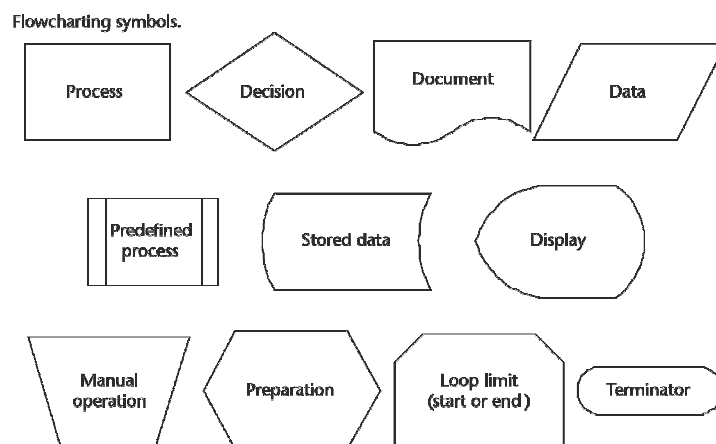




A53) Avoid notations used for modeling specialized processes (e.g. software engineering, industrial engineering).

A54) Swimlane diagram aims at the key aspect of the process (the flow of work): anything else distract attention, add noise, not information.

A55) Workflow modeling needs the participation of a large range of people: avoid overformalization with IT flowcharts.



### Which steps to include?

A56) An actor might tell you about many activities is responsible for, but you are modeling a specific process, from trigger to result

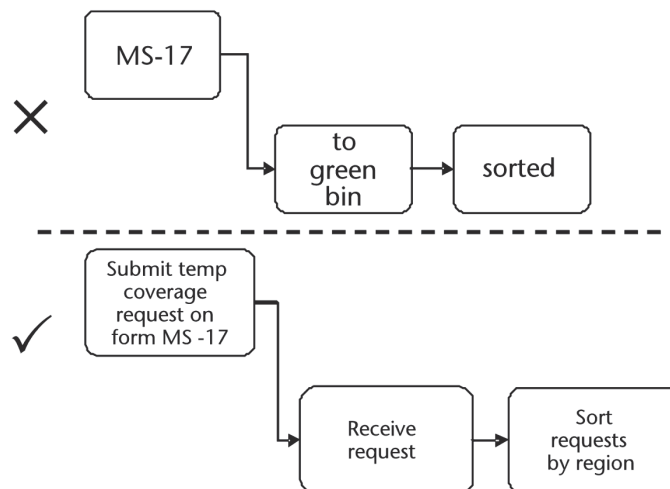
A57) The process usually traces a single work item or “package” of work items, such as a service problem, an order, an engineering upgrade, a building permit request, an item being manufactured, a material requisition, a replacement part.

A58) Any activity that “holds” one of these work items should be part of the process, whether is adds value or not to the process. It may introduce delay, move the work along, subtract value.

### Guidelines for naming process steps

A59) Avoid cryptic step names. Follow the same guidelines for naming a process (*verb-noun* or *verb-object* format) with additional detail.

A60) The step name should convey the result achieved by the step, if flip the verb-noun format.



A61) Basic structure:

- + Action verb (assign, validate, sort,...)
- + Optional qualifier (initial, replacement,...)
- + Noun(s) (service request, payment,...)
- + Optionally, information on how (by form, by fax,...)

A62) Remind, the name is **not**:

- an area or function such as *titling, accounting, inventory*
- an event or result such as *claim arrives, claim is registered*
- a state such as *sorted*
- based on mushy verbs or jargon

**Flow**

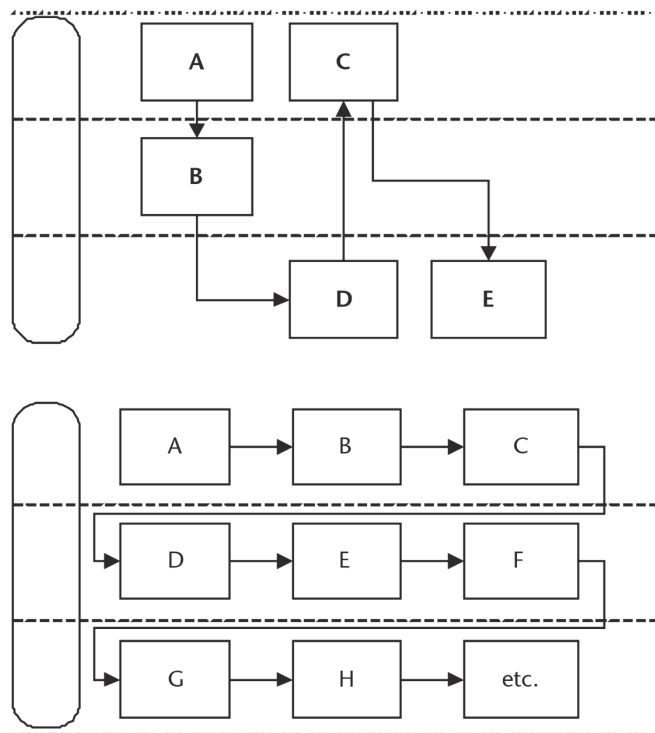
A63) Is the passing of work from one step to another. The next step cannot start until the previous step has been completed.

A64) A **handoff** is a special kind of flow where the work passes from one actor to another. It is often a place of delay, errors, expenses.

A65) Avoid the layouts represented Figure:

A66) The objective of a workflow diagram is to graphically show sequence, dependency, time.

A67) The objective is **not** to save paper



A68) Distinguish the concepts of *data flow* and *work flow*.

A69) When data flow is superimposed on a workflow model, the latter is not so evident any more

*Data Flow* -

data from Provide Quote is used by Issue Invoice



*Work Flow* -

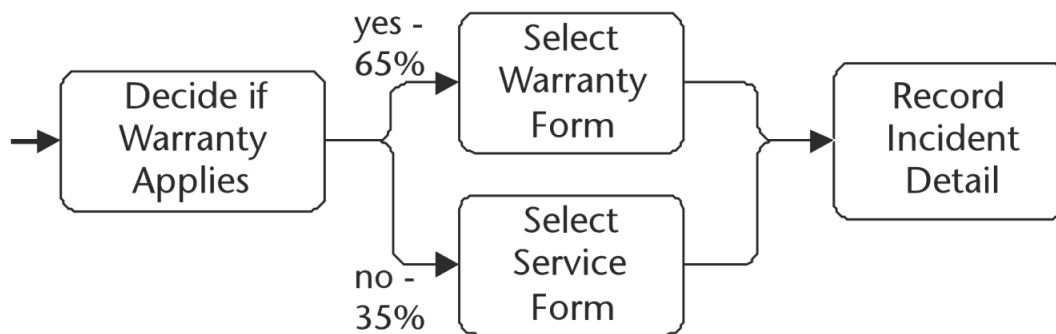
various steps between Provide Quote and Issue Invoice



*Exclusive flows*, key points:

A70) the decision is computed before the diamond, use a dedicated step for this: *decide/determine if...*

A71) label each branch to indicate which decision outcome will follow that path, along with statistics if appropriate



Showing decisions (conditional flows).

**Managing progressive details:**

(Readings: pp. 234-244, Sharp, *Workflow modeling*, 2009)

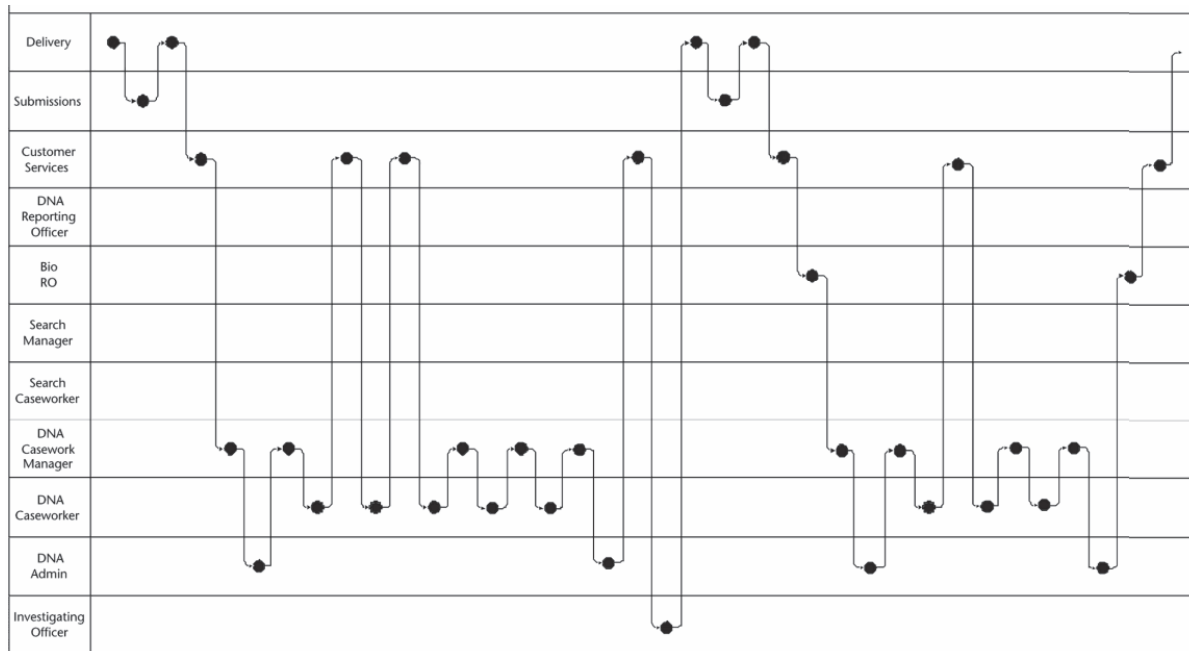
A72) To avoid facing with unmanageable complexity, do not jump immediately into modeling minute details instead of building layers of progressively detailed models: overall process map → business processes → sub-processes → process steps.

A73) Save your energy by avoiding **the curse of detail**: if you add more and more detail, seemingly unable to stop, your project will be canceled and you will never get to work on the *to-be* process!

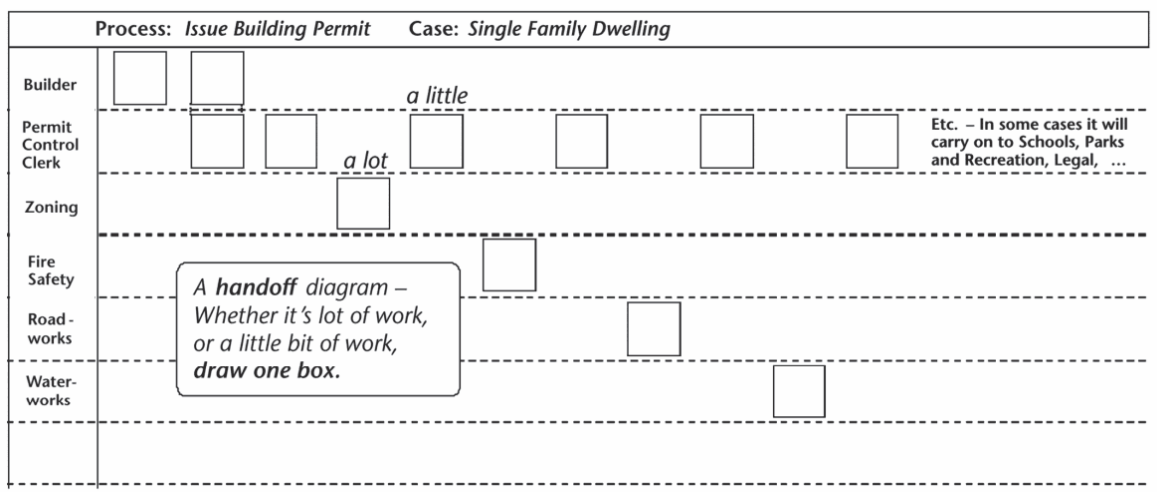
A74) There are three levels of a workflow diagram:

- Level 1 or *handoff-level* diagram (i.e., the flow of work)
- Level 2 or *service-level* diagram (related to SOA and BPM)
- Level 3 or *task-level* diagram (rarely used)

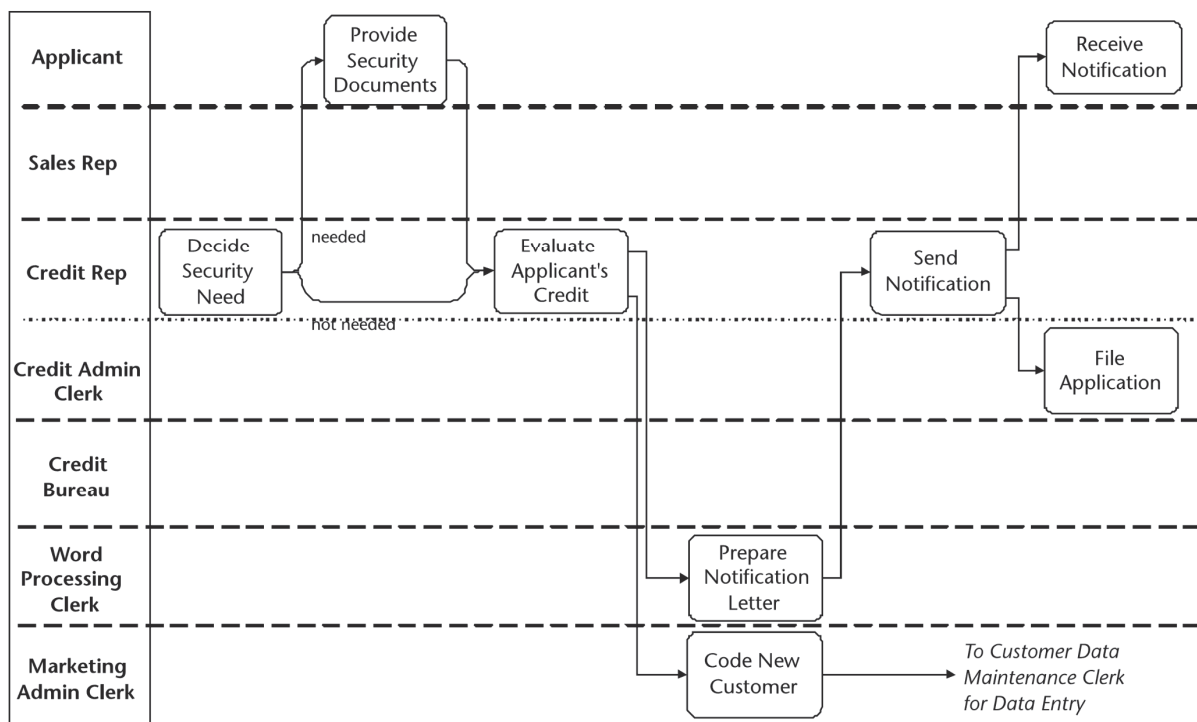
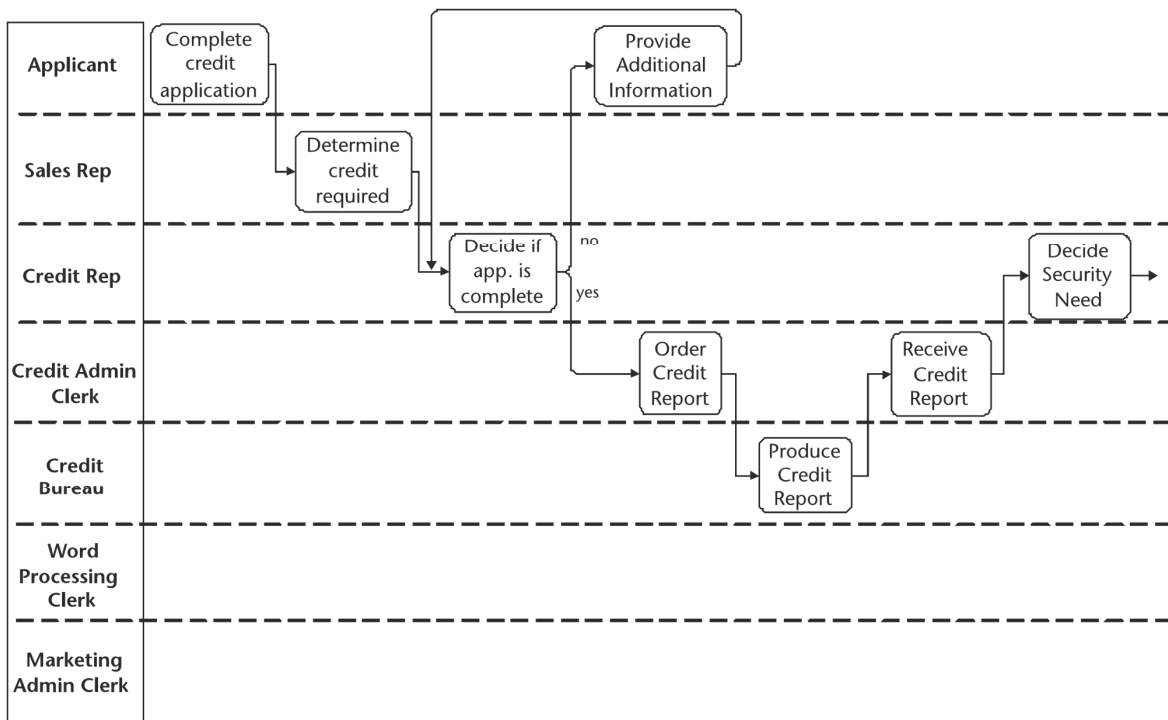
A75) An example of minimalist handoff diagram for DNA in forensic sciences: dots indicate *work goes here then move on*



A76) A handoff diagram does not contains consecutive boxes in the same lane



A77) An example of workflow model segmented into two sub-diagrams





**Handoff diagram:**

A78) It makes the overall structure in which each step summarizes the actor's involvement at a specific time in a process: whenever an actor does a lot or a little of work, draw *one* box and *move on*.

A79) The visual distinction in terms of relative amount of work becomes apparent with the service diagram

A80) Simplify steps, not actors. Handoff diagram is important to highlight "delay, errors and expenses". It makes "yo-yoing" immediately evident, in contrast with a detailed diagram.

**When to stop modeling**

A81) You can stop modeling the *as-is* process as soon as you are able to understand why the process behaves the way it does

A82) This can happen at the handoff level, if something like a timing issue, convoluted workflow, or bottleneck is identified as the root cause of performance problem

A83) Usually we have to proceed to a second-level diagram.

### The service-level diagram

A84) It shows the primary contributions made by each actor. Steps at the service-level are “smaller” than steps in a handoff diagram. It still represents significant activity, suitable for presentations

A85) Break each step in the handoff diagram into separate steps on the service diagram, as necessary, to show:

- (a) Completion of significant achievement or **milestone**, which is a service to the process
- (b) Decisions **affecting the flow** in a significant way

A86) Example of decisions affecting the flow: “Decide if claim requires extended handling”; if that caused a handoff to actors that would not otherwise be involved (b). Do not depict minor decisions within one actor’s involvement, unless this led the actor achieving milestone (a)

A87) Milestone: **significant event** in the life of the work item, which usually changes the state moving the work item toward completion

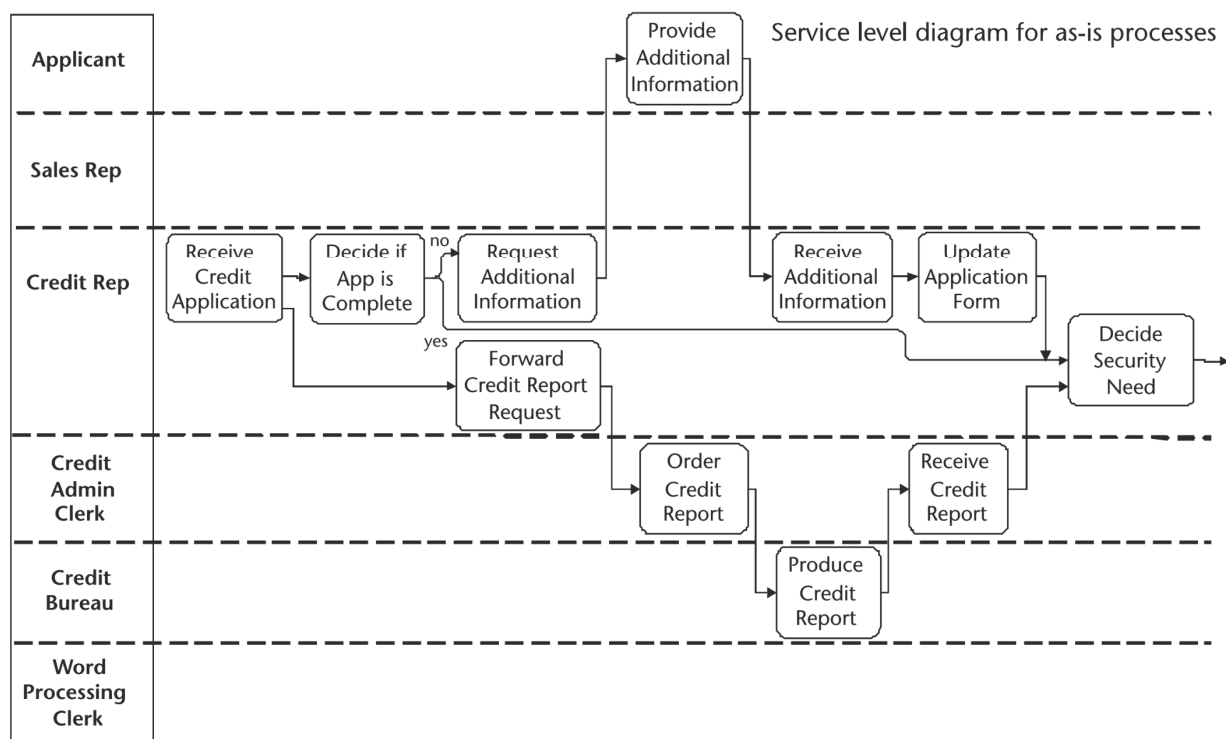
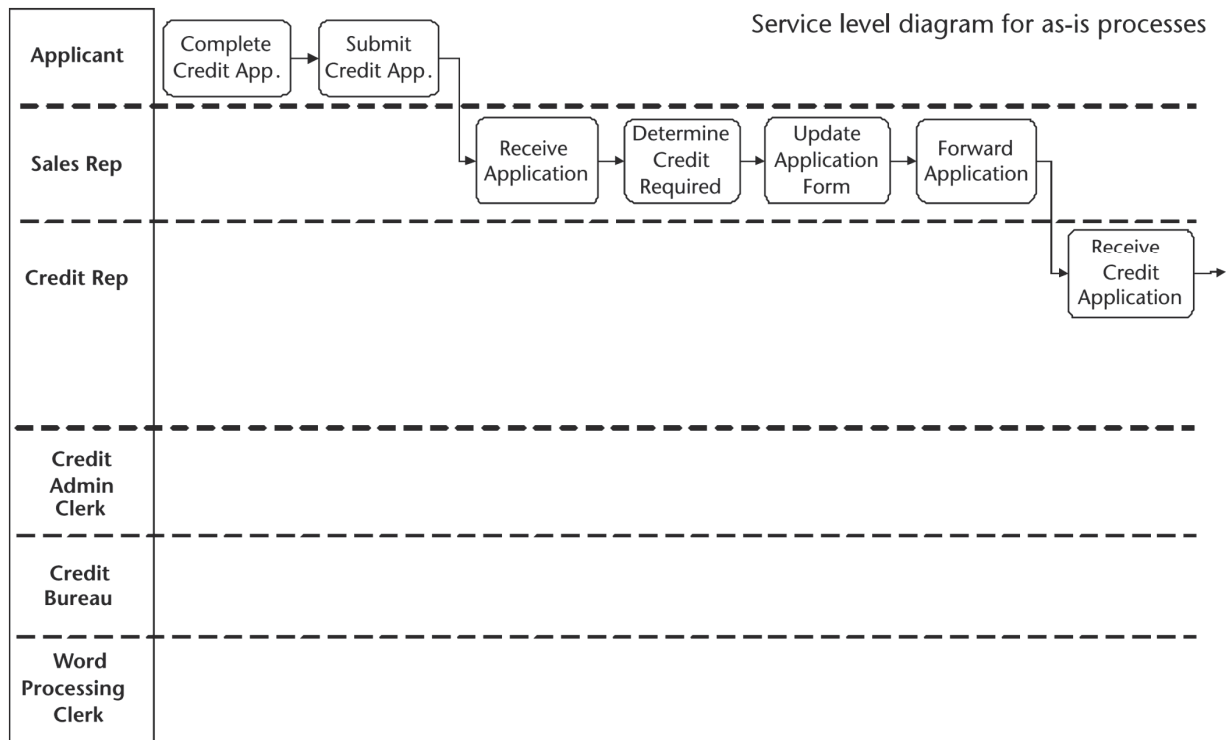
A88) E.g. the step *File claim* in a handoff diagram, on the service diagram is broken down into individual services: *Record Incident Detail, Register Claim, Describe Loss, Confirm Coverage, Schedule Appointment*

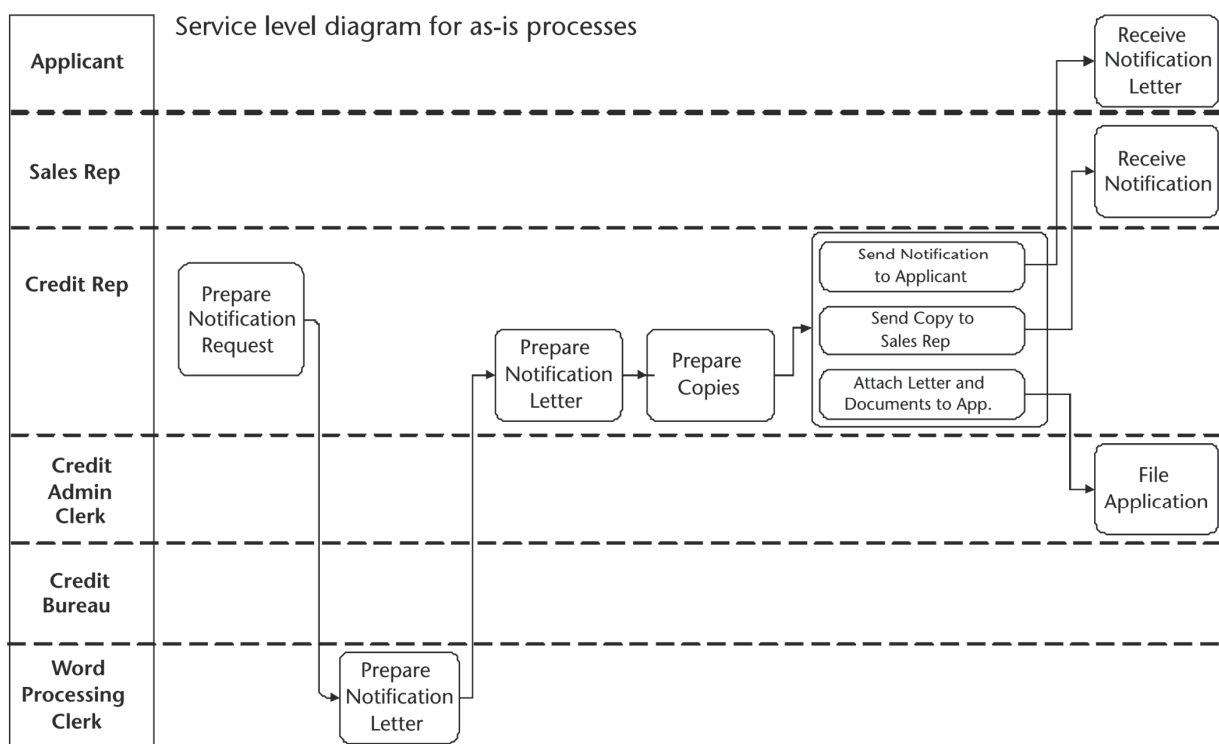
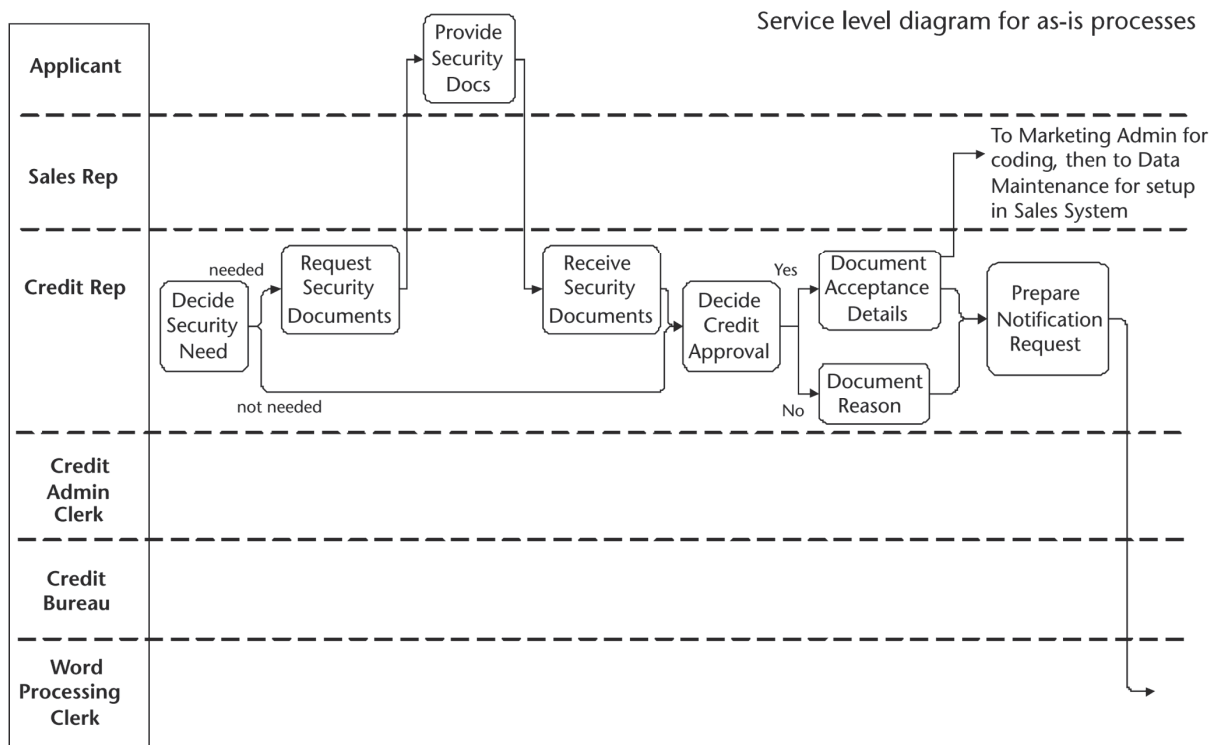
A89) A level 2 (service) diagram is usually three to five times as large as level 1 (handoff) diagram

A90) Again, steps on the service diagram will tell us *what* is being done, but should say little about *how*.

A91) Use post-it to break each step of the handoff diagram without permanently alter it: list what we believe to be the main accomplishments that go into that step.

A92) An example of service-level diagram:





The task-level diagram

A93) The previous levels show *who* is involved *when*, and *what* is accomplished. A task diagram describes *how* some individual tasks carried by an actor leading up to a milestone are implemented

A94) Example: *Retrieve estimate from file, Photocopy estimate, Mail estimate to shop, Set up appointment using X system*

A95) Do not capture step-by-step instructions of the entire workflow model, it is a flow model, not a user manual. It should not be captured on a swimlane diagram.

A96) Documents that can include this kind of details:

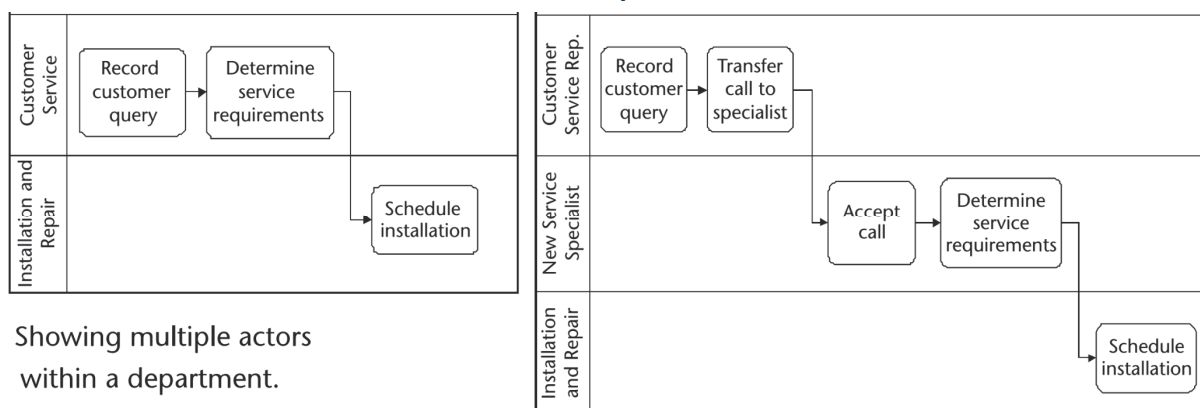
- Procedure descriptions;
- Use cases;
- Check lists;
- Decision trees or table;
- Traditional flowcharts;
- User manuals;
- Online help facilities;
- Other step-by-step formats

Show every actor that holds the work

A97) If someone/something handles the work item in any way, shape, or form, it is an actor, and you must show it.

A98) If included, you can assess whether their participation is value added, neutral, or a source of delay, error, or expense

A99) Showing every actor is very beneficial at the highest (handoff) level, because it makes the overall pattern of the flow visible



Showing multiple actors within a department.

B01) Especially if the distinct actors perform different steps, and the handoff will surely affect the process, show all of them.

B02) If you have different job titles, perhaps based on seniority, but all performing the same steps, you can represent just a single swimlane

B03) Do not show actors within an organization when we have no control over “who, does what, when”, for instance because they are not within an internal department

B04) Example: a Postal Service or Courier Company actor, as an external agency, is not broken in all their internal actors

B05) When the job is strictly to look at flow across organizations and not within them, the model will show the major departments involved but not the individual actors within them, because that was not part of the study

### **Jobs, Roles and Committees**

B06) Often there is no practical reason to differentiate between actor (e.g. a job role such as customer service representative or investigating officer) and a role (a specific part played in a process).

B07) The step names make it clear what role is that each playing.

B08) *Two actors with the same job title but different roles*

E.g., two clerks, each with the same job title, handling a cash deposit. One’s role is to prepare the deposit, while the other confirm the accuracy of the deposit slip. Simply retail clerk #1 and retail clerk #2.

*One person performing two distinct roles*

B09) Start giving a pool to the person and two internal lanes to his roles. If the work done by each is of a different nature, and id being handled by one person because of resource constraints, keep two separate swimlanes.



B10) If there are not really handoffs, or the work flows seamlessly from one role to another (they do not do role A work in the morning and role B work in the afternoon), then you do not have separate roles.

B11) However, if the handoffs prove to be a source of delay, error, or expense, then leave the swimlanes separate to highlight situation

- *Committee as an actor*

B12) An actor may perform as an individual as well as a member of a committee. In any case we model the committee as an actor, even if all of its members are already represented on the swimlane diagram because of their separate responsibilities in the process.

B13) Hence, sometimes you can explicitly show the member's participation in committee work as a collaborative activity instead of as a unique swimlane.

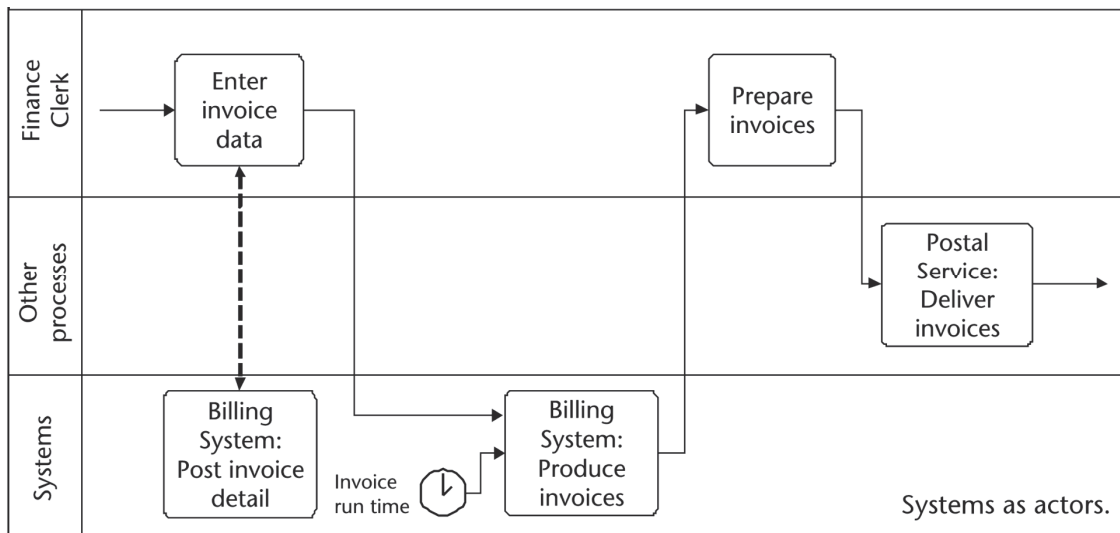
### Systems as Actors

B14) If much of the process is done by the system, then delay, error and expense may be introduced by the system itself rather than by humans. The system needs to be shown, although it might be simplified and abstracted to avoid entering into IT issues

- *Systems supporting human actor*

B15) E.g., Web-based online shopping system, human resources system. The system can be simply mentioned in the step name (*create order via web, assign employee using human resources system*) or represented as a separate swimlane and interaction with it is represented by dashed lines.

B16) Even if you have many systems, generally you can use a unique swimlane labeled "systems". Preface the step description with the name of the system and, if appropriate, the system function used



• **Batch Systems**

B17) E.g., an overnight production of invoices. It takes the control of the work items, adds values, and introduces a delay because subsequent steps wait its result.

B18) The main difficulty in representing systems is to find IT resources who have the technical skills to trace through the batch processes, but who can also explain in everyday language what it being accomplished without getting into the complexity of processing steps

B19) Creating swimlane diagrams where each subsystem is represented as a separate step (or even has its own swimlane) works well when the subsystems are clearly delineated

B20) Splitting work across subsystems often drives you to too low level of detail, so no business person could follow the diagram

B21) Sometimes to show each day as a separate swimlane highlights the delays and serial nature of the process. E.g.

- day 4: Transmit contract record to national clearinghouse
- days 5 and 6: no activity
- day 7: Receive activity report from national clearinghouse

B22) It is usually hard to synthesize out the main milestones without the support of experienced professionals

B23) Human actor supporting Systems

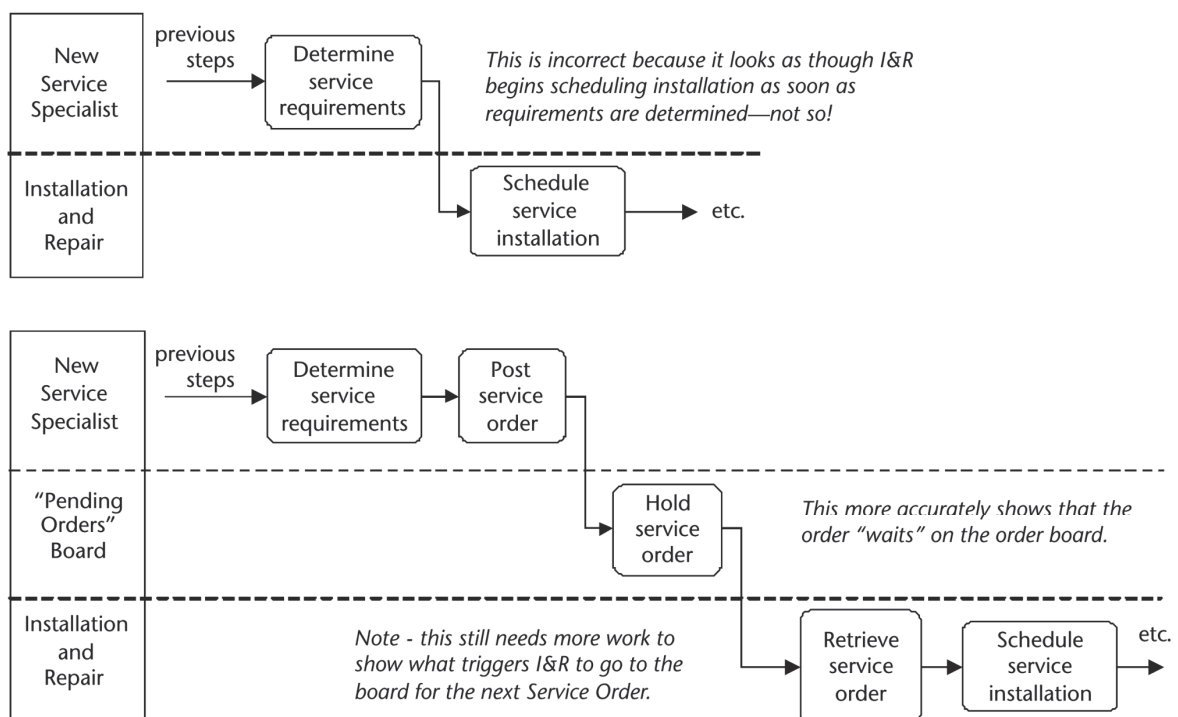
IT staff monitoring batch jobs for successful completion, recovering from failures, checking report outputs, correcting bad data “by hand” and so on, have to be shown as actors. They have a role in the process. Sometimes process steps are less automated than many people are aware. E.g. an e-commerce site where orders are captured on the Web, printed, and manually entered into the order entry system! This “human glue” must be shown.

B24) Devices and machines as actors

When they take control and add value, show them as actors.

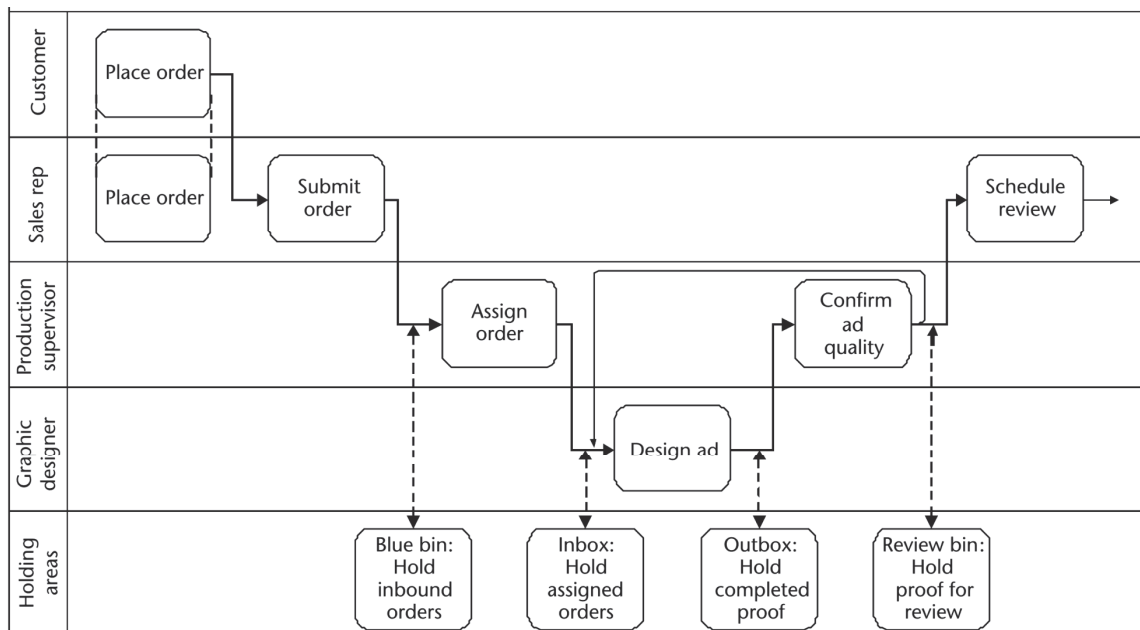
Passive Actors

B25) Sometimes, a passive storage or holding area like an inbox, outbox, or staging area at a warehouse can be shown as an actor, even if it does not do something. This way, it is easy to see all the points in the process where work is waiting.



A passive holding area as an actor.

B26) To show all the “hold work” steps may make the diagram too long. A more compact alternative is to represent an holding areas as a supporting system.



A holding area supporting a flow.

- *Transmission Mechanisms as actors.* Some example.

B27) A telephone network is not represented, because it is instantaneous, it does not hold work, it does not produce delay.

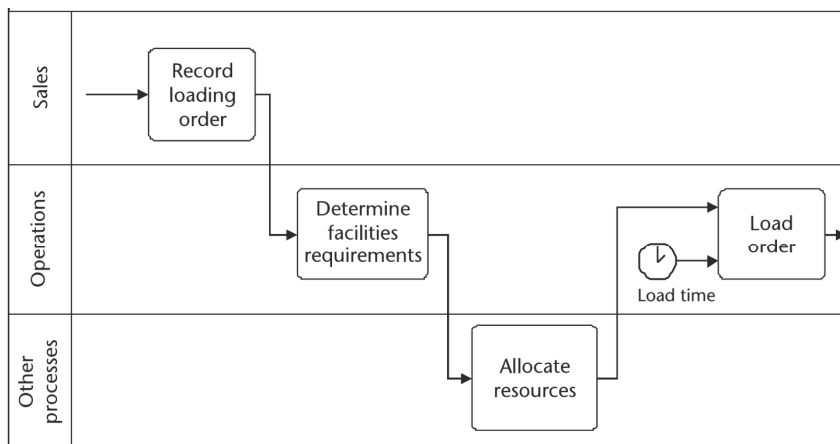
B28) An e-mail communication is asynchronous, i.e., the actor does not interact instantaneously, and then it holds the work in the meantime. An e-mail inbox is often represented as an actor.

B29) Do not show something that physically holds the work but is in turn held by, or is under the control of, another actor (truck, delivery cart, mailbag)

- *Processes as Actors*

B30) A separate process can appear as an actor if your process depends on it, i.e., there is a handoff of work to the separate process and a wait for something to come back from that process. E.g., a process providing shared services to many concurrent instances of another process.

- B31) E.g., A bulk marine shipping terminal. Every day multiple orders are pending to load ships with the commodities stored at the terminal

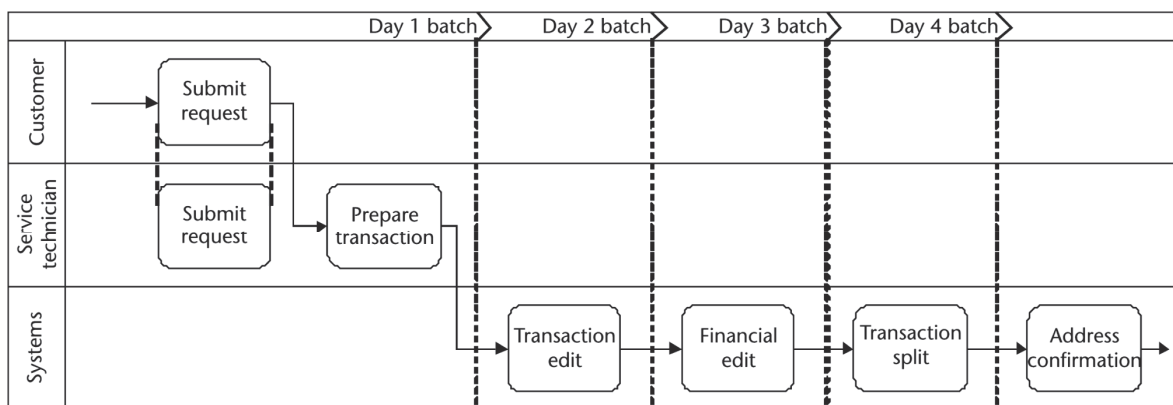


Other processes as actors.

### Some types of steps

*B32) Scheduled step:* is triggered by temporal events, which are labeled so as to clearly express the temporal condition.

*B33) Time on a diagram.* Add vertical lines to the diagram, each indicating some labeled time boundary or milestone



Adding a time scale to a diagram.

*B34) A part of the process you do not know/care about yet.* Use a cloud icon, with a textual comment. The cloud can be also used to indicate collaborative, creative work in a process that cannot be reduced to a sequence of steps and decisions.

---

**Starting from over-complex diagram**

B35) Sometimes you will face with overly convoluted and detailed diagram. Cleaning up these diagrams is a good source of income.

B36) Order the diagram with the main flow going strictly from left to right (except for some looping back, of course)

B37) Ensure that the diagram contains a single process. If not, separate out different processes

B38) With separate processes, you will be able to simplify even further by separating out variations for one part of a process where alternative flows have been depicted.

B39) Each variant should be diagrammed separately, including the most common case on the main diagram.

B40) If a diagram is still too much detailed, combine steps until you have an approximation of a service diagram.

B41) Rearrange the order of the swimlanes. Combine steps in the service diagram to produce a handoff diagram.