University of Pisa

MSc in Computer Engineering

Supply Chain & Operation Management

"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, March-May 2017, Tuesday 08.30-11.30, Room: ADII2

Course Schedule and Materials

✓The course will take about 30 hours in total

✓Materials:

http://www.iet.unipi.it/m.cimino/sc&om
user: ********
password: ********

✓Student's Tweets:
http://www.iet.unipi.it/m.cimino/note/

✓Contact:

mario.cimino@unipi.it
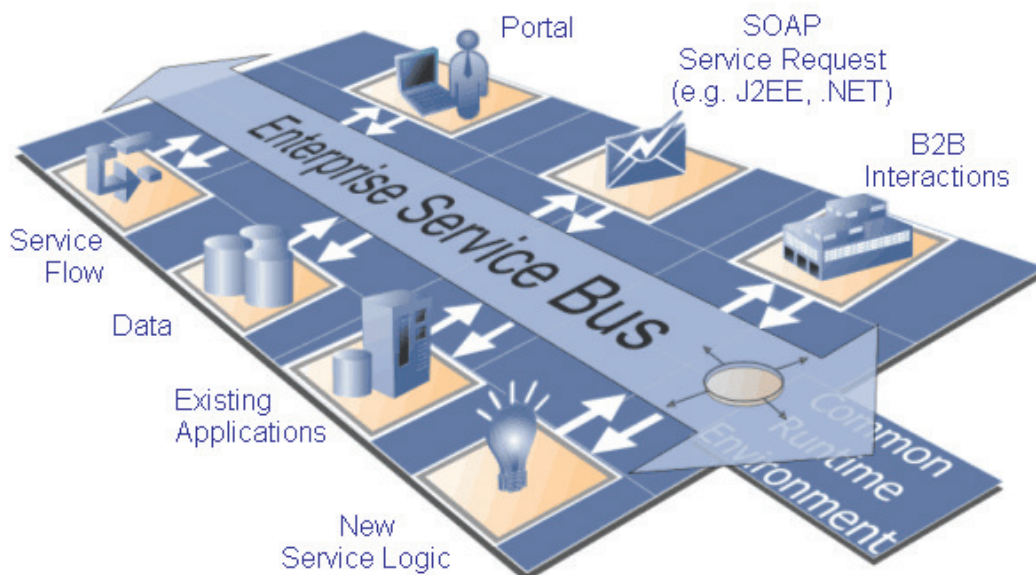
✓Registration:

https://sites.google.com/site/bpmpisa/

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

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

✓ 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

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).

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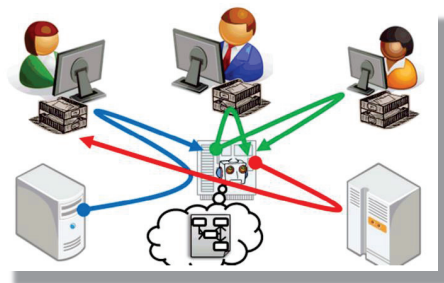
Automation paradigm	Description language	Execution language	Core runtime	Complexity
Service oriented computing	UML/BPMN	XML	Workflow Management System	+++
Object oriented programming	Java/C#/C++	Byte code	Virtual Machine	++
Procedural programming	C	Assembler	CPU	+

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.

- ## "Relatives" of BPMN (languages for worlfkow-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)

Carl Adam Petri (1926-2010)
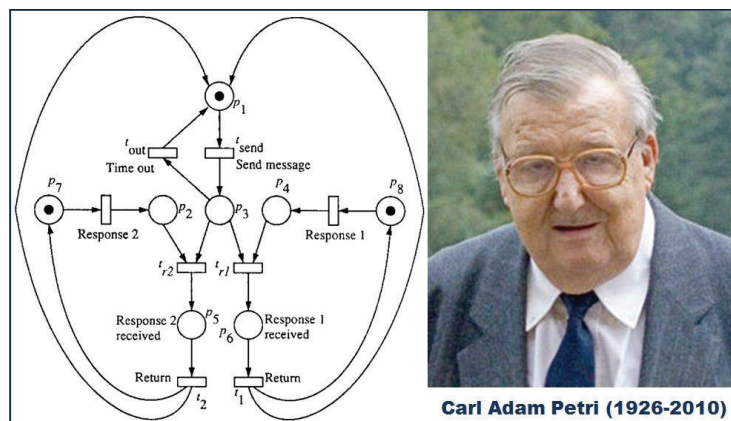
  - ✓ *UML Activity Diagram* (OMG, 1997): language for visual modeling for the object-oriented paradigm, usable by software engineers. The extended UML of Eriksson e Penker (2000) is suitable for business process modeling, and usable also by business level (non-technical) roles.

Generic example of a process diagram, with **UML extension of** Eriksson-Penker
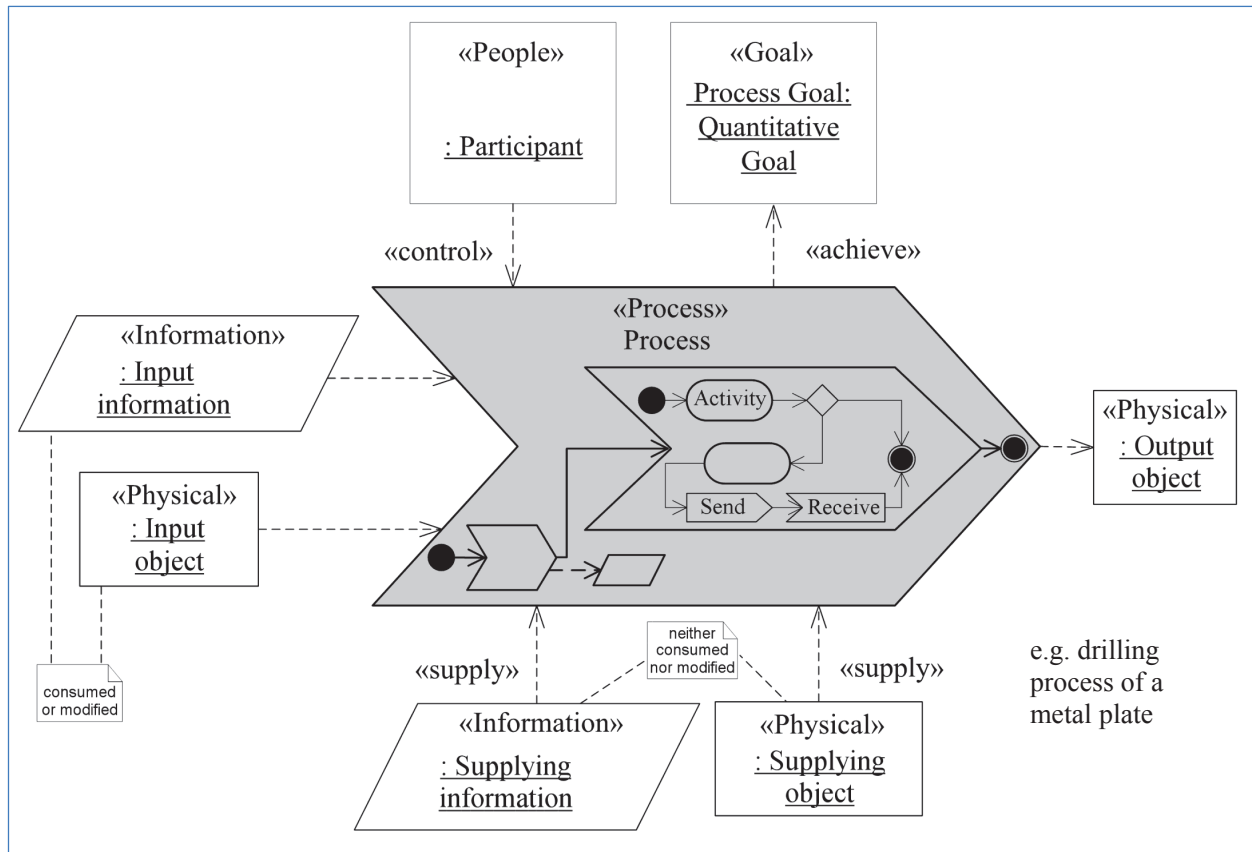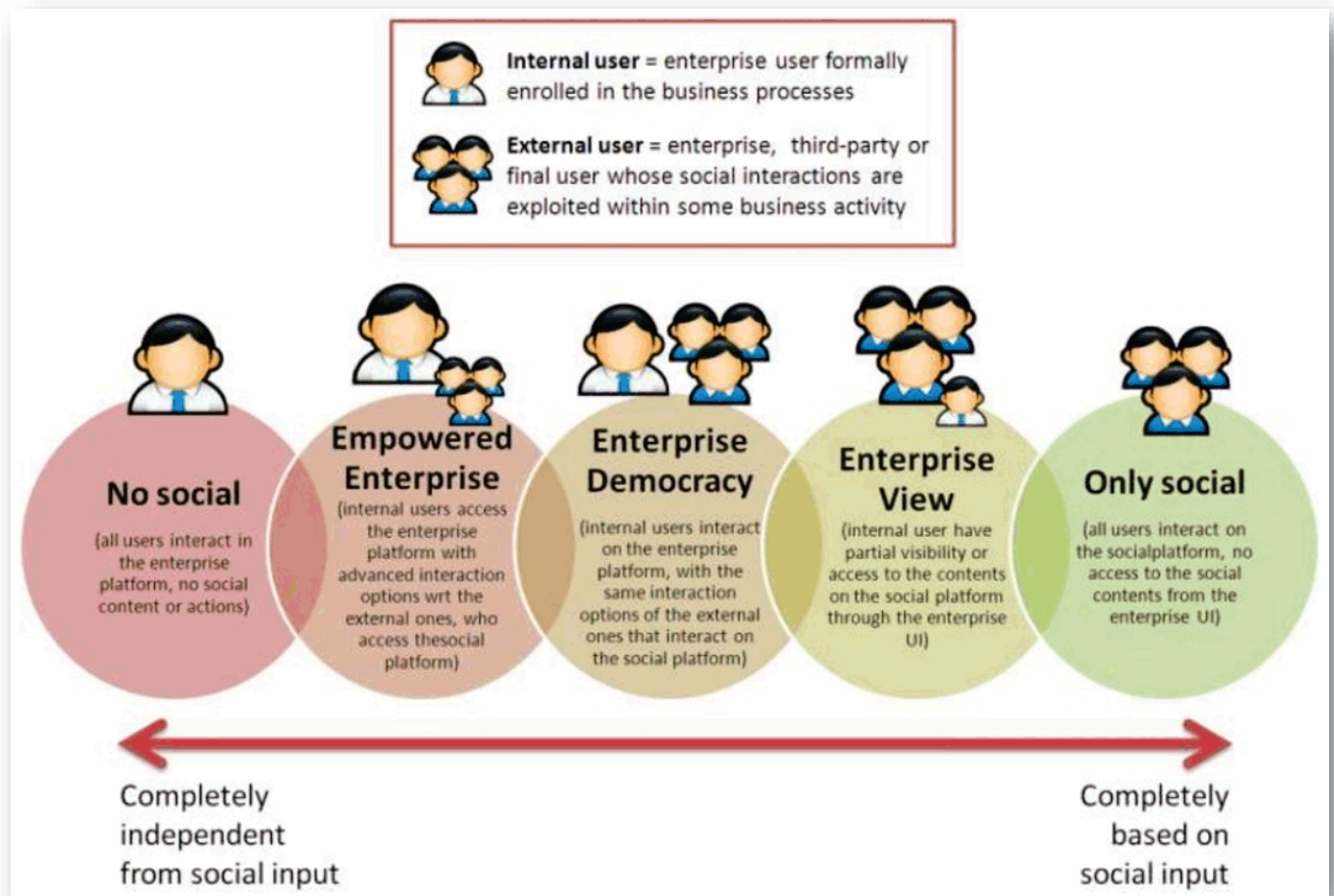
Introduction to *enterprise 2.0*

Social BPM describes collaboratively designed and iterated processes (→ also *social enterprise, enterprise 2.0*). It can support B2B organizations, especially SMEs, to exploit the flexibility of Social BP Design and deployment

Social Design Patterns:

a) Dynamic enrollment: involving people external to the process. Enterprise Social Network (ESN, such as *Yammer, Jive, LinkedIn*) are exploited for inviting external actors of a social pool to sign into the process and to start contribute.

b) Poll: cooperating to a social decision. An internal performer publishes to a ESN an invitation to answer to a question, with a termination condition (e.g. deadline) after which contributions are collected and used to produce the decision.

c) People/skill search: Finding competencies for an activity. The ESN is exploited to find people with required expertise, via a call-for-people, ending with the selection of the right candidate

d) Social publication: a process artifact is published to the ESN, with a termination condition, e.g. a required number of content views/comments.

Internal user = enterprise user formally enrolled in the business processes

External user = enterprise, third-party or final user whose social interactions are exploited within some business activity

No social
(all users interact in the enterprise platform, no social content or actions)

Empowered Enterprise
(internal users access the enterprise platform with advanced interaction options wrt the external ones, who access thesocial platform)

Enterprise Democracy
(internal users interact on the enterprise platform, with the same interaction options of the external ones that interact on the social platform)

Enterprise View
(internal user have partial visibility or access to the contents on the social platform through the enterprise UI)

Only social
(all users interact on the socialplatform, no access to the social contents from the enterprise UI)

Completely independent from social input

Completely based on social input

Social requirements for BPMN at task level.

Requirement	BPMN notation	Comment
Task Type: Social broadcast	Annotation of task	Data flow to a community pool
Task Type: Social posting	Annotation of task	Data flow to a single user in a community pool
Task Type: Invitation to activity	Annotation of task	Dynamic enrollment to a task in the process case
Task Type: Commenting	Annotation of task	Submission of comments about the activity
Task Type: Voting	Annotation of task	Voting (y/n) on an activity, either within a social network platform or directly in the BPM system

| Requirement	BPMN notation	Comment
Task Type: Login	Annotation of task	Use a social profile to login into a system
Task Type: Invitation to join a network in a community (e.g., friendship)	Annotation of task	Invitation between community members to join a specific network (e.g., friend network, group, and so on)
Task Type: Search for actor's information	Annotation of task	Lookup query to the community to search for actor with specific profile attributes

Social requirements for BPMN at task level.

Social requirements for BPMN at event level.

Requirement	BPMN notation	Comment
Community-generated events		(Generic) events raised by the community
Event: New user engaged in the social community		An event is raised when a user dynamically enrolls to the process case
Event: New social relationship link		An event is raised when a user establishes a social relationship with another user
Event: Invitation acceptance/rejection		An event is raised when a user accepts/rejects an invitation

The Social BPM Space: a continuum from closed to open social BPM, where each organization can find the mix of control and flexibility needs

Closed BPM

Participatory design

Participatory enactment

Social enactment

Process mining
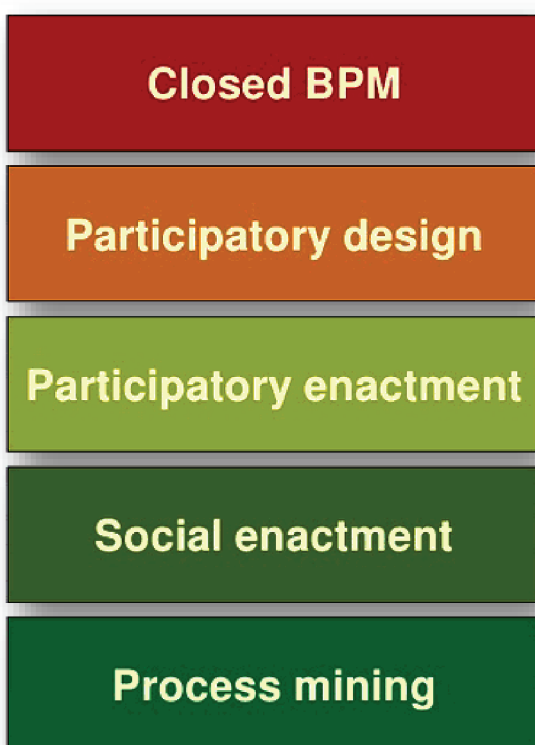
Closed BPM
- traditional approach supported by state-of-the-practice BPM suites
- the schema of the process is decided centrally (top-down) and deployed to an execution platform
- tasks are defined rigidly, the process actors are preregistered
- allocation of actors to task follows statically defined assignment and escalation rules
- the communication among the actors is channeled through the task execution interfaces, with the exception of notifications, which can be delivered through informal channels (email, SMS)

The Social BPM Space: a continuum from closed to open social BPM, where each organization can find the mix of control and flexibility needs

Closed BPM
Participatory design
Participatory enactment
Social enactment
Process mining

Participatory Design
- process design is open to multiple actors.
- stakeholders can actually participate to the definition of the process model
- multiple process versions can be fused into one shared process model, e.g., after merger and acquisition, when companies have to align different versions of the same process
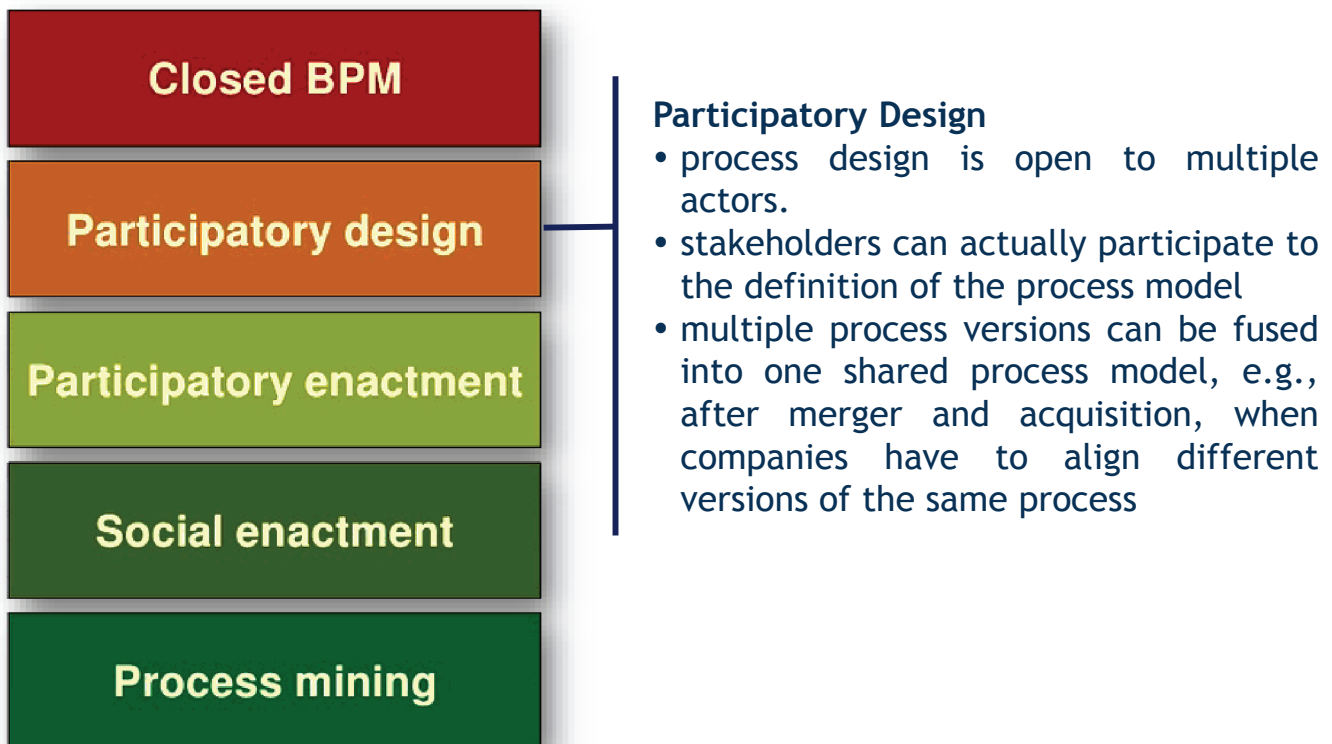
The Social BPM Space: a continuum from closed to open social BPM, where each organization can find the mix of control and flexibility needs
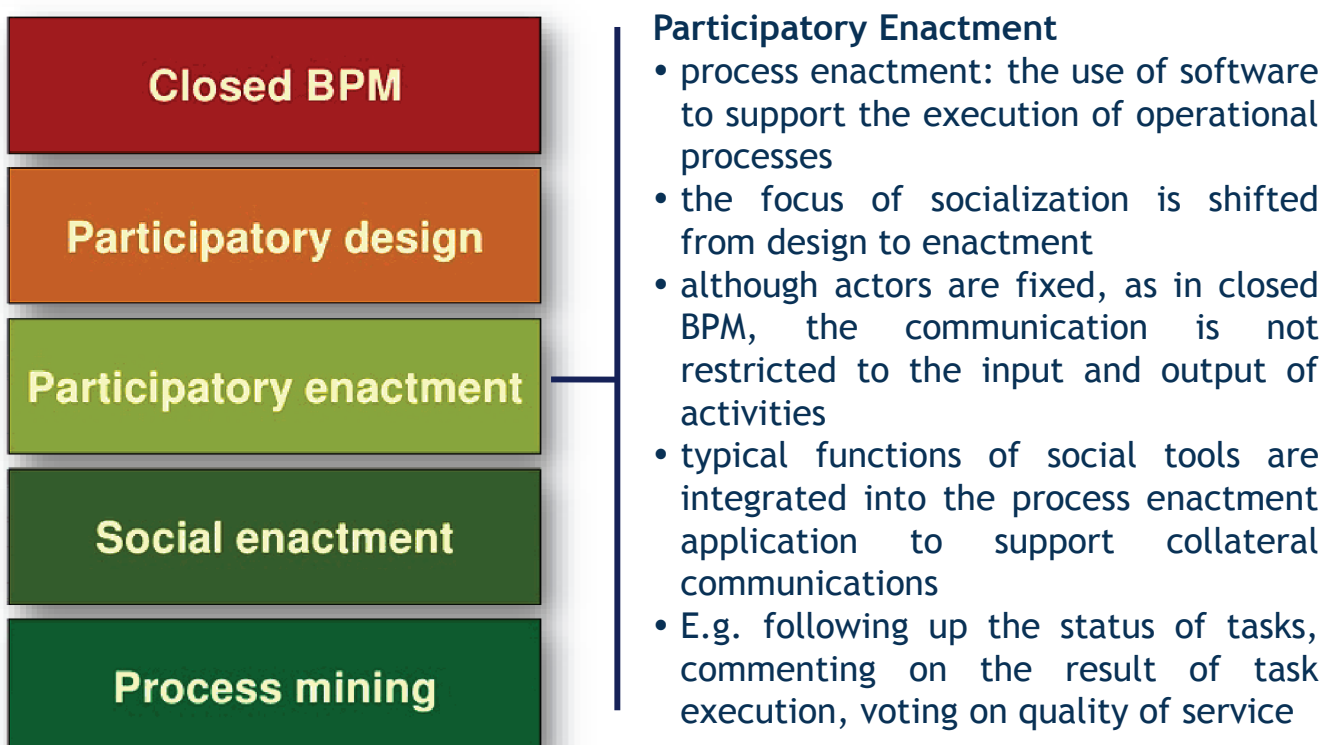
Closed BPM
Participatory design
Participatory enactment
Social enactment
Process mining

Participatory Enactment
- process enactment: the use of software to support the execution of operational processes
- the focus of socialization is shifted from design to enactment
- although actors are fixed, as in closed BPM, the communication is not restricted to the input and output of activities
- typical functions of social tools are integrated into the process enactment application to support collateral communications
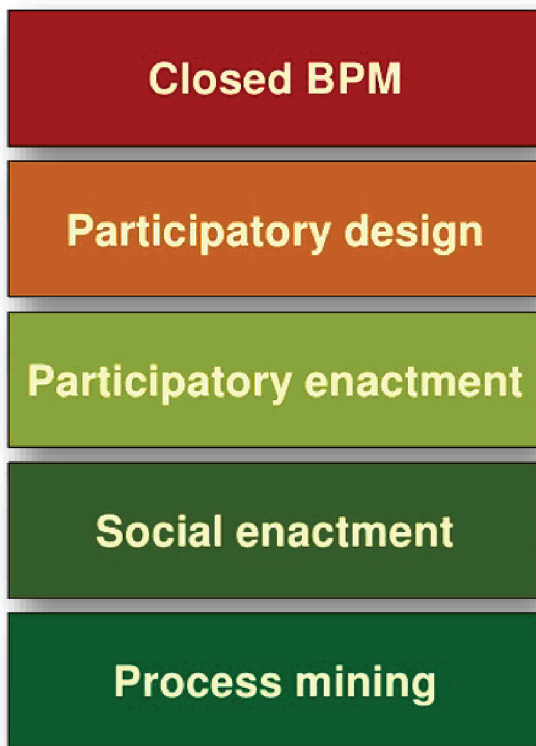- E.g. following up the status of tasks, commenting on the result of task execution, voting on quality of service

The Social BPM Space: a continuum from closed to open social BPM, where each organization can find the mix of control and flexibility needs

Closed BPM
Participatory design
Participatory enactment
Social enactment
Process mining

Social Enactment
- It implies opening the process execution (at least in part) to actors that are not known at process deployment time and allowing the collective execution of a task.
- Social task execution can take a variety of forms: from the most structured (like using crowd-sourcing platforms for micro tasks execution) to less controlled forms (like community-based product and content rating, cooperative software development and testing)
- the common denominator of social task execution is the capability to launch a task to be executed by an open-ended community of performers and to monitor its progress until completion.
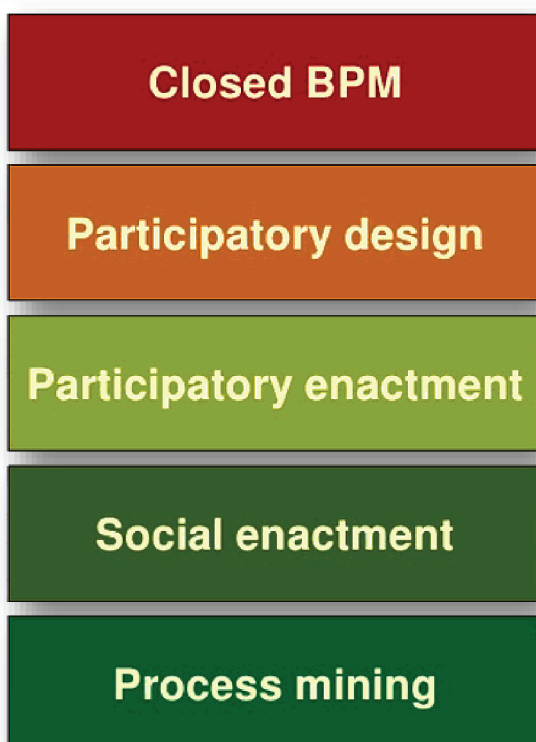
The Social BPM Space: a continuum from closed to open social BPM, where each organization can find the mix of control and flexibility needs

Closed BPM
Participatory design
Participatory enactment
Social enactment
Process mining

Process Mining
- It is the less structured approach
- activities are executed by using an emergent approach (self-organization)
- the process constraints are recovered a posteriori, by observing the behavior of the actors, e.g., inspecting execution traces (logs)

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 v*erb-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 sould indicate the result of the process**

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

A06)

Examples of Potential Processes

Suggested Process	What We Call It	If Not a Process, Why Not?
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
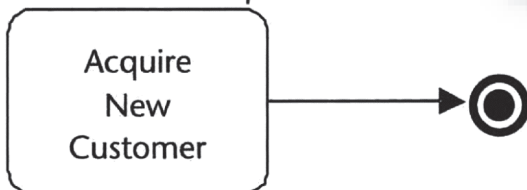
Process naming—singular, customer perspective.

~~Handle Application~~

Issue Permit

~~Staff Organization~~

Hire Employee

Process naming—name indicates process result.

Acquire New Customer

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 <u>single execution</u> of a process
   e.g. '*employee is hired* from the process *Hire Employee*'

   - an *objective* is some desired state or performance target, <u>generally over many instances</u>
   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 <u>single</u> activity that happens at a particular <u>point in time</u>, for which it is easy to visualize a result.
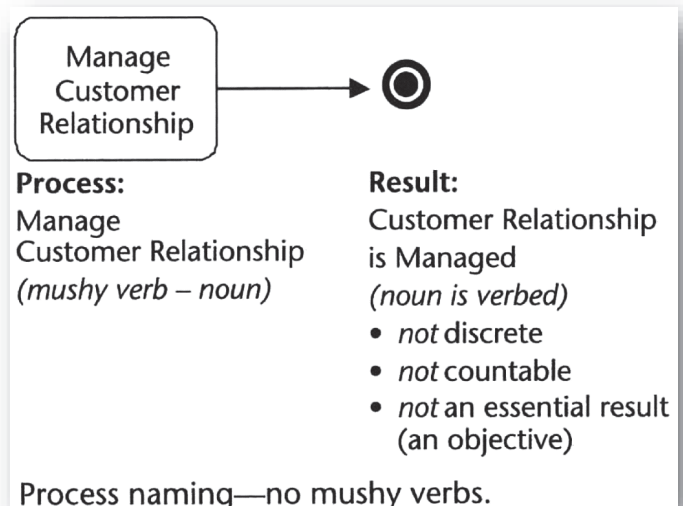e.g. *count, evaluate, print, attach, return, prioritize, sort, provide Allocate Service Representative, Calculate Stock Index, Retrieve Sample, Issue Refund, Translate Document*

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

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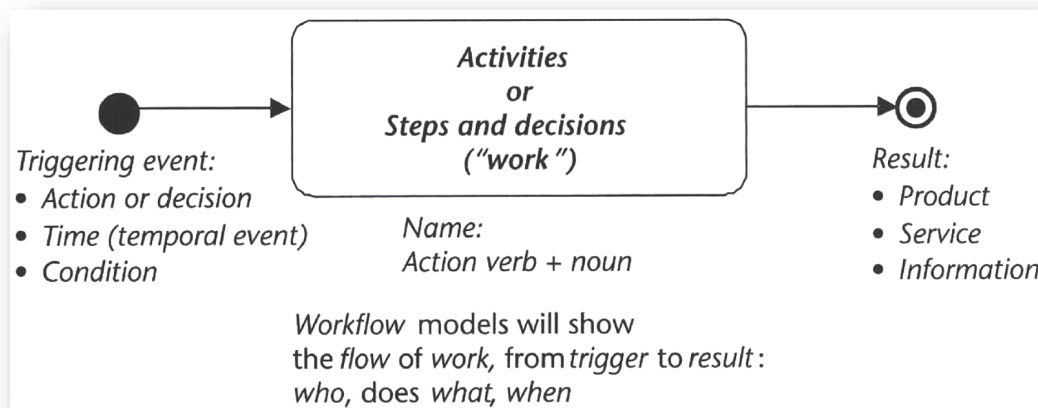
It is in contrast with input-process-output (which sounds mechanical)

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 ± 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 ± 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 unles those references are key to understand the activity

A42) Eliminate duplicates, use the noun-is-verbed 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 of 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.

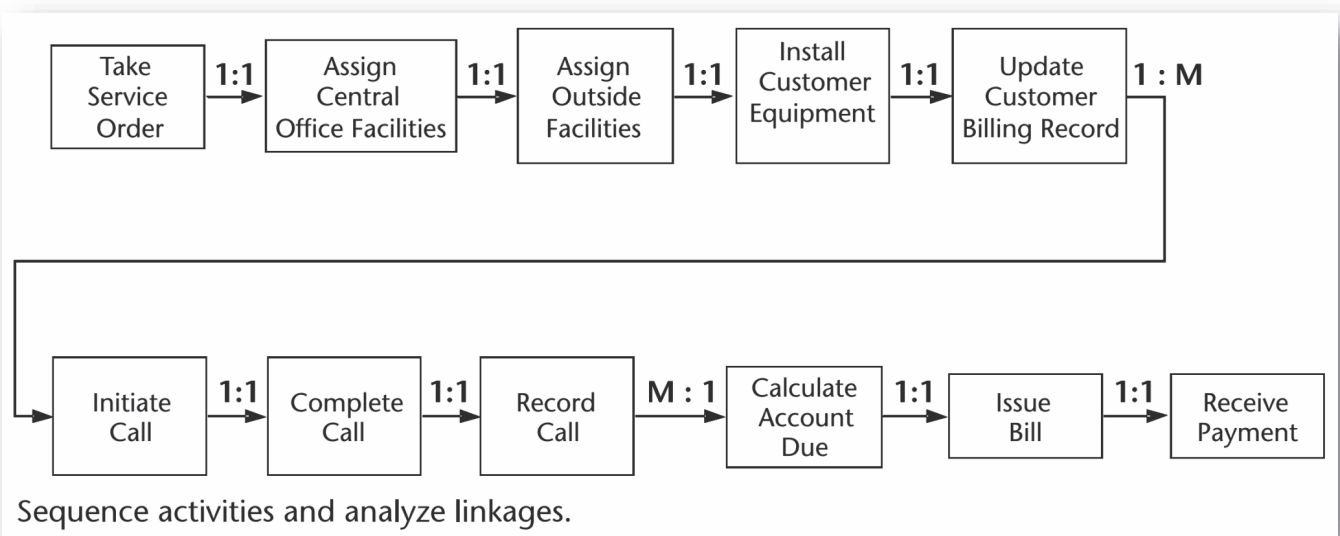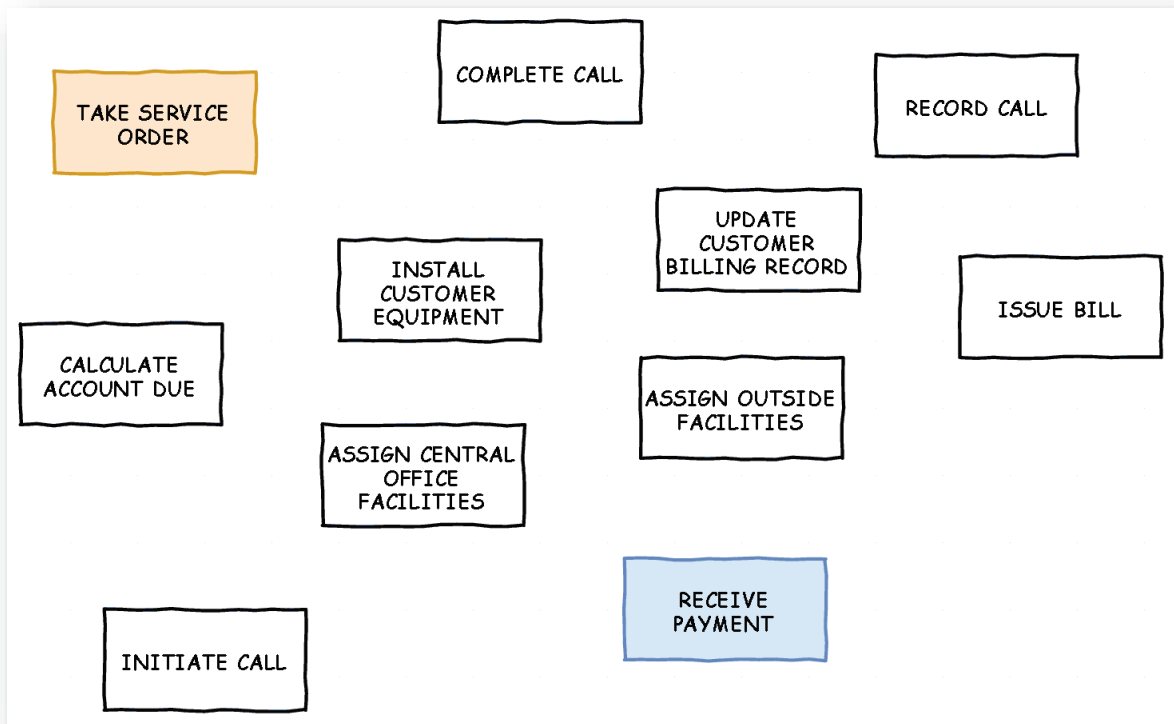Example: a Brainstorm Diagram to discover real processes in a Telephone Company

Partial results from activity identification.

https://www.draw.io/
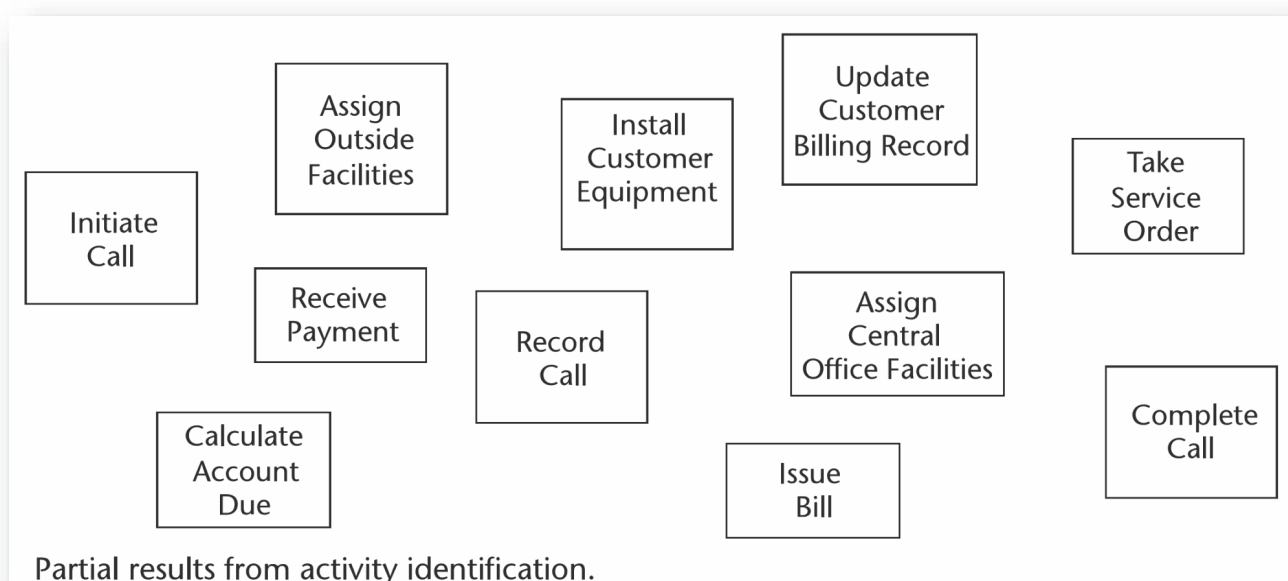
File > Save as > download > html   File > Open from > device > html

Sequence activities and analyze linkages.
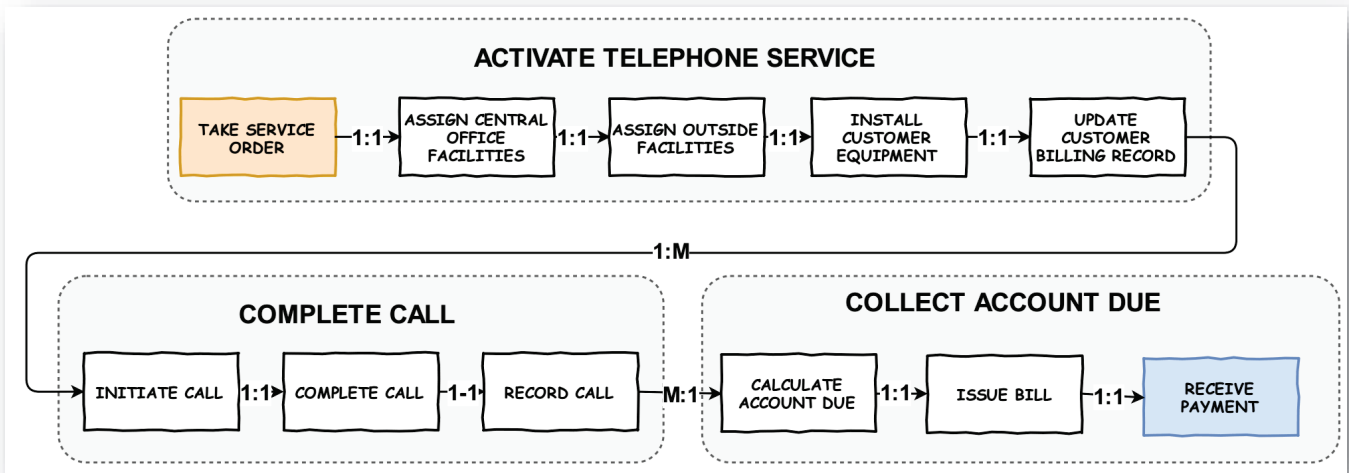
Identify business processes

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)

Default sequence of different types of actors.

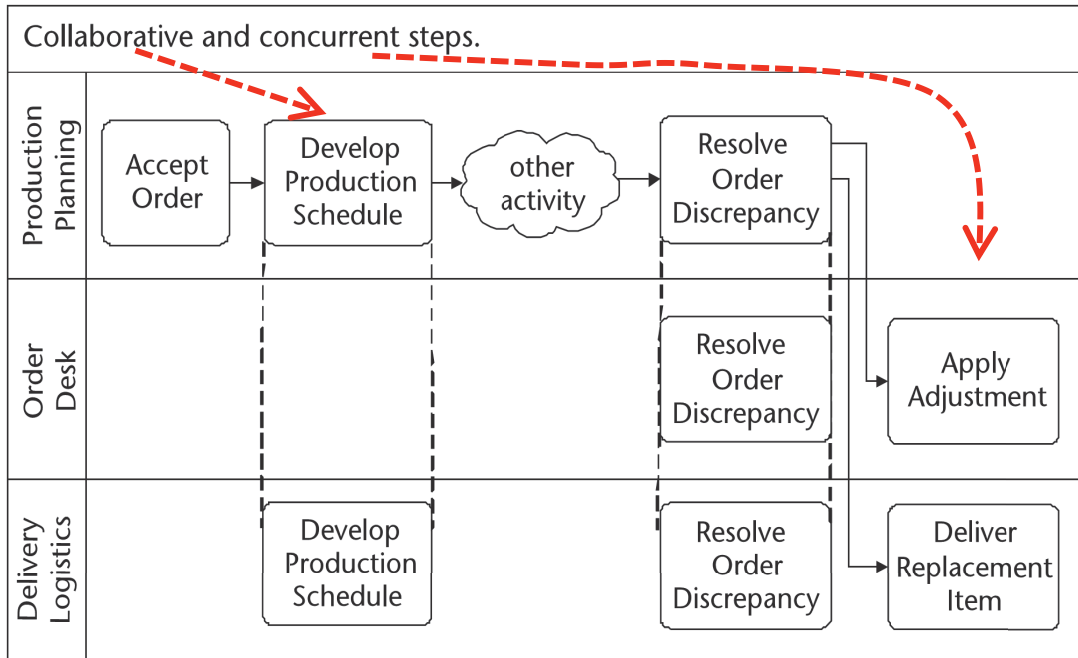A52) Do not confuse *collaborative* work with *concurrent* (parallel) work: in a collaborative step, the actors are working together on the same step, while in concurrent work they are working independently on separate tasks.

Collaborative and concurrent steps.

Production Planning	Accept Order	Develop Production Schedule	other activity	Resolve Order Discrepancy	
Order Desk				Resolve Order Discrepancy	Apply Adjustment
Delivery Logistics		Develop Production Schedule		Resolve Order Discrepancy	Deliver Replacement Item

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.

Flowcharting symbols.

Process · Decision · Document · Data · Predefined process · Stored data · Display · Manual operation · Preparation · Loop limit (start or end) · Terminator
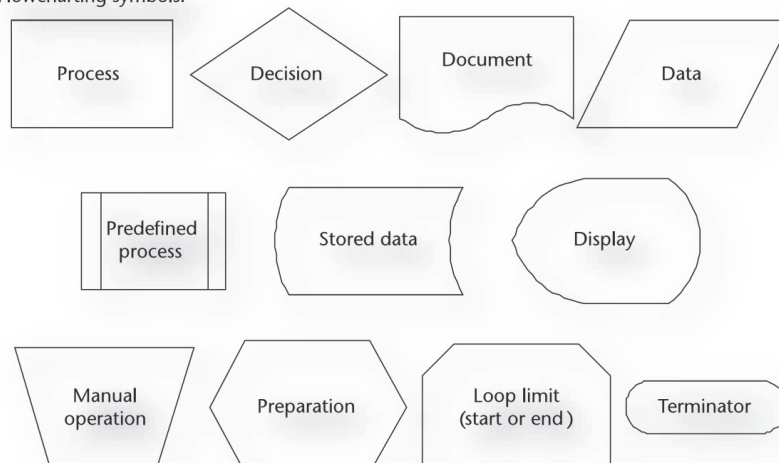
Which steps to include?

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.
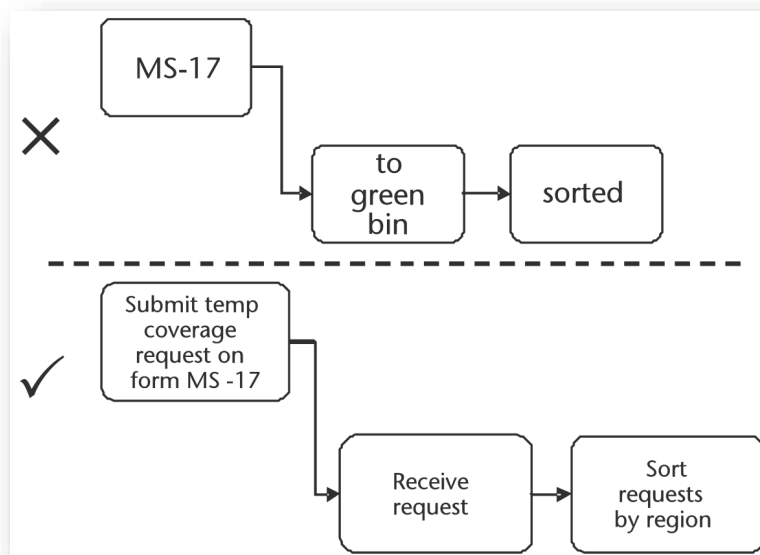
A61) Basic structure:

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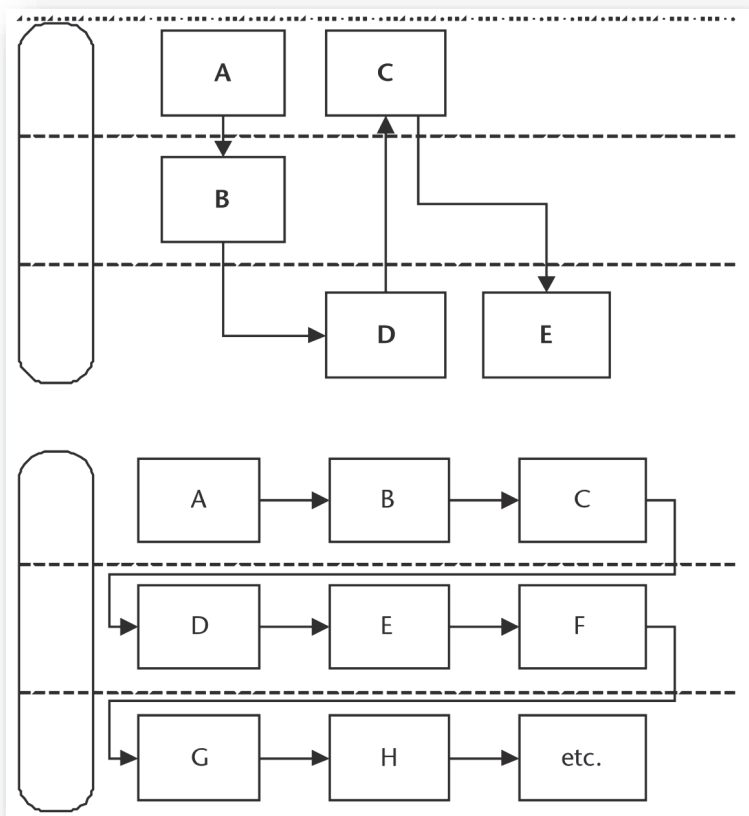
A68) Distinguish the concepts of *data flow* and *work flow.*

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

Provide Quote → Issue Invoice

Work Flow -
various steps between Provide Quote and Issue Invoice

Provide Quote → Finalize Order → Assemble Order → Ship Order → Issue Invoice
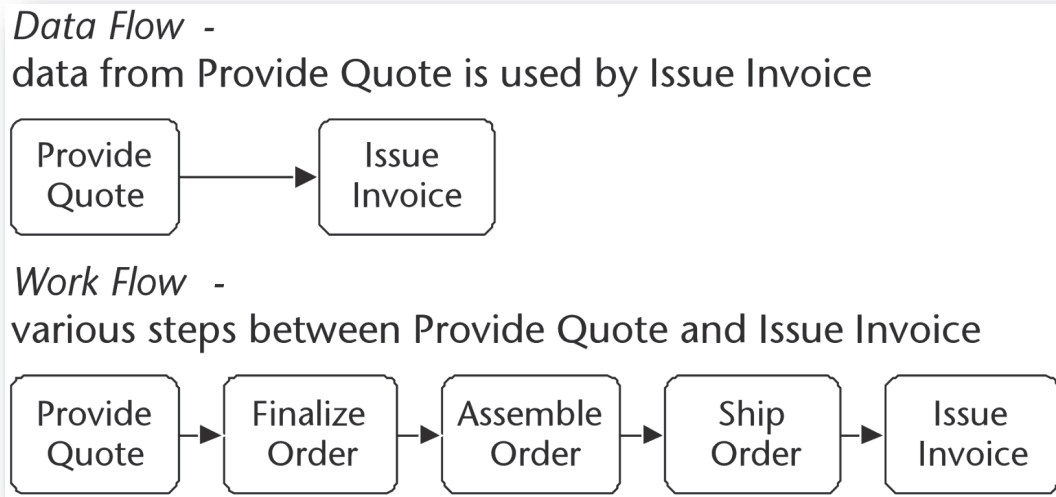
Exclusive flows, key points:

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 wil follow that path, along with statistics if appropriate

Decide if Warranty Applies
yes - 65% → Select Warranty Form
no - 35% → Select Service Form
→ Record Incident Detail
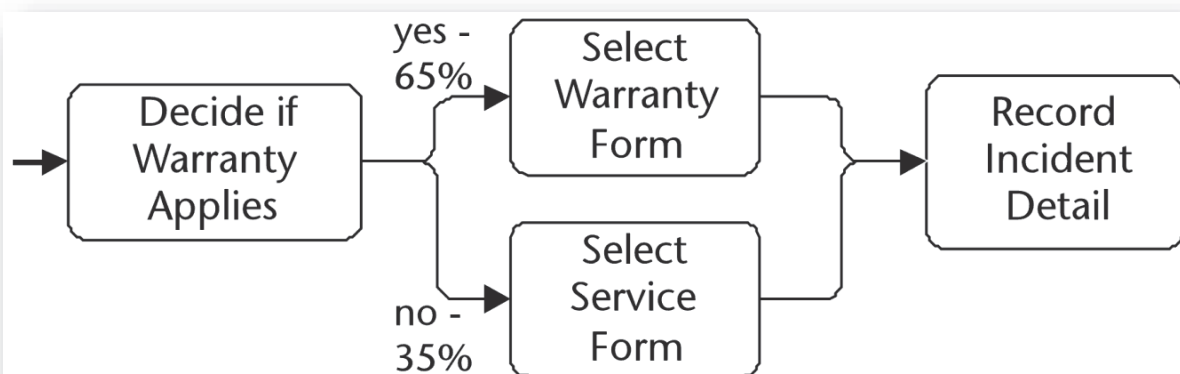
Showing decisions (conditional flows).

Managing progressive details:

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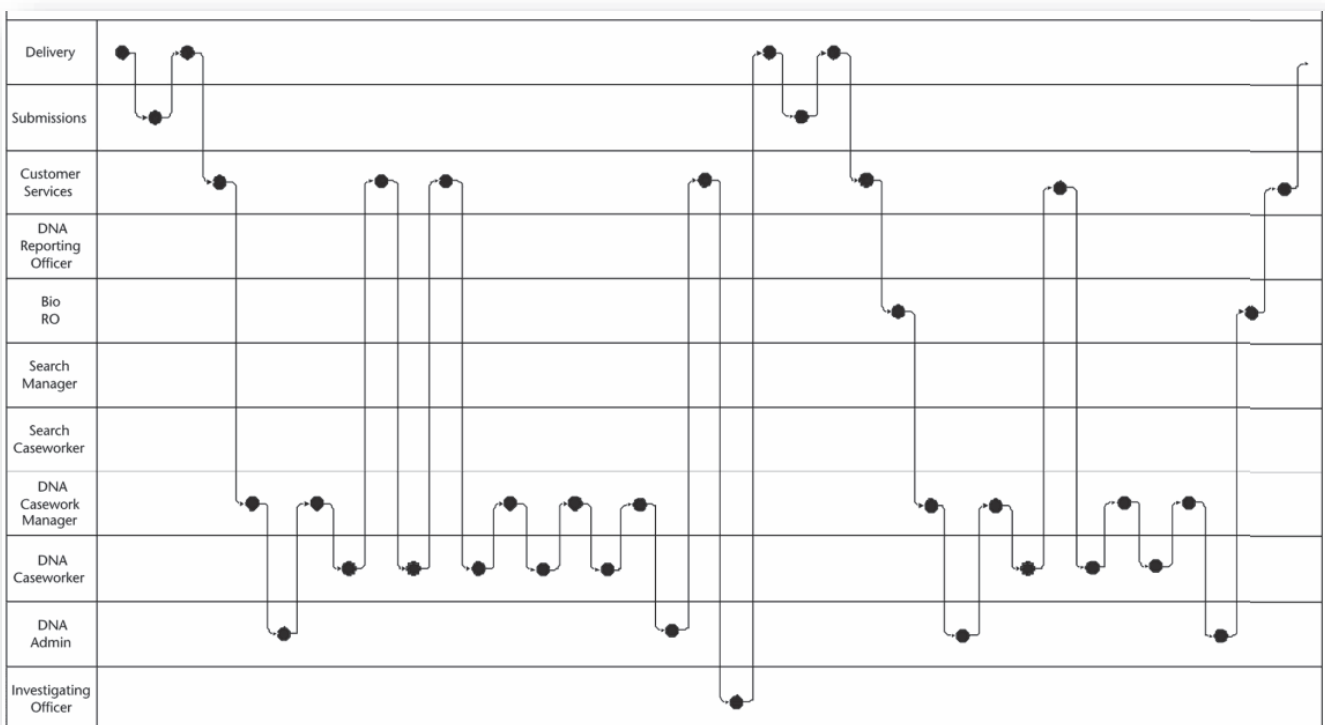
A76) A handoff diagram does not contains consecutive boxes in the same lane

Process: *Issue Building Permit*   **Case:** *Single Family Dwelling*

Builder	
Permit Control Clerk	*a little*
Zoning	*a lot*
Fire Safety	
Road-works	
Water-works	

Etc. – In some cases it will carry on to Schools, Parks and Recreation, Legal, ...

A **handoff** diagram –
Whether it's lot of work,
or a little bit of work,
draw one box.
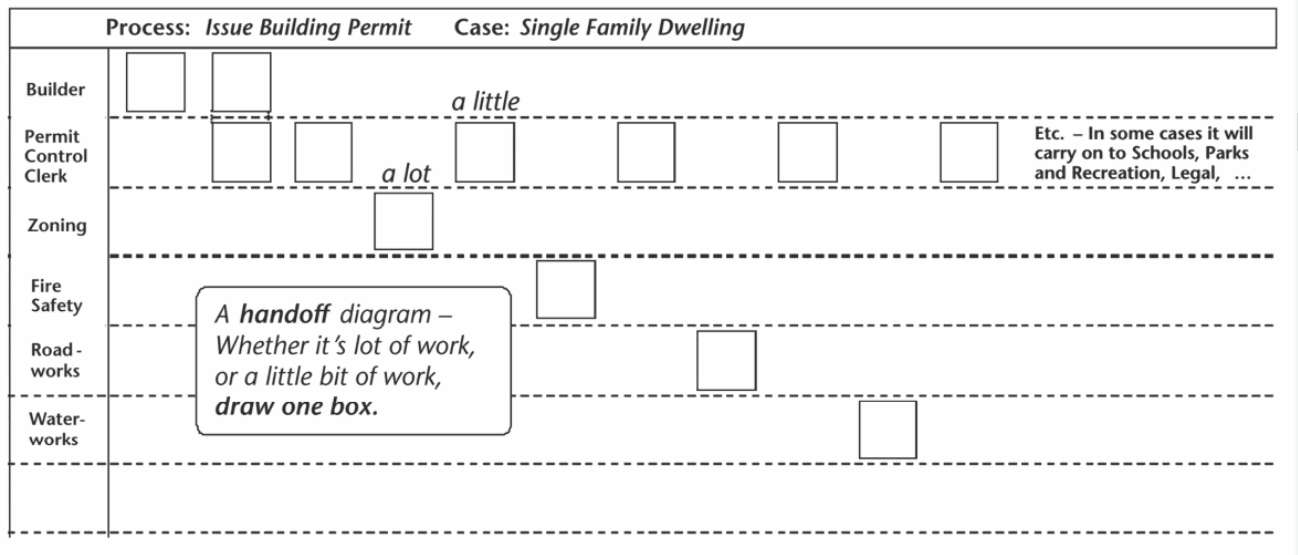
A77) An example of workflow model segmented into two sub-diagrams

Applicant	Complete credit application → Provide Additional Information
Sales Rep	Determine credit required
Credit Rep	Decide if app. is complete — no / yes → Decide Security Need
Credit Admin Clerk	Order Credit Report → Receive Credit Report
Credit Bureau	Produce Credit Report
Word Processing Clerk	
Marketing Admin Clerk	

Applicant		Provide Security Documents			Receive Notification
Sales Rep					
Credit Rep	Decide Security Need	needed	Evaluate Applicant's Credit	Send Notification	
Credit Admin Clerk		not needed			File Application
Credit Bureau					
Word Processing Clerk			Prepare Notification Letter		
Marketing Admin Clerk			Code New Customer	*To Customer Data Maintenance Clerk for Data Entry*	

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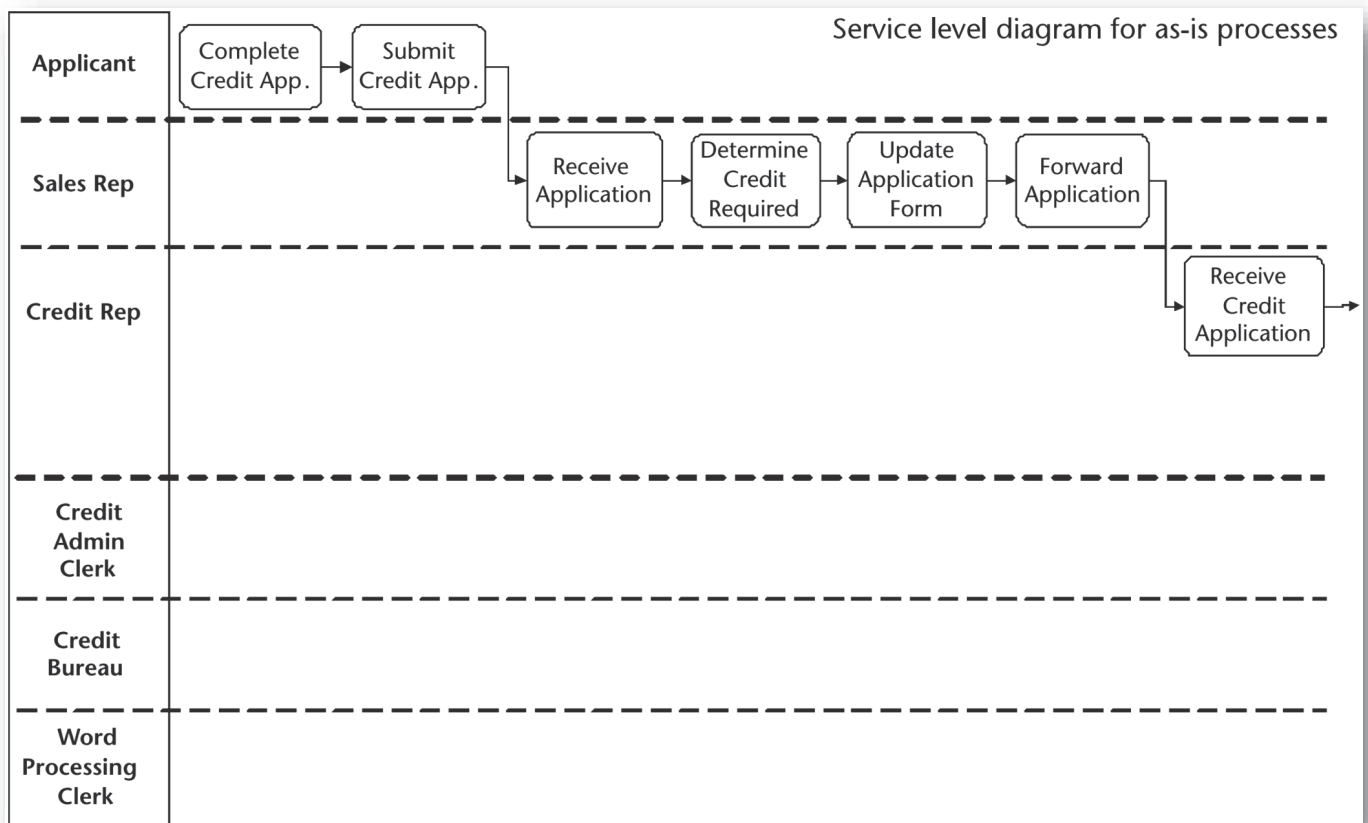
A88) E.g. the step *File claim* in a handoff diagram, on the service diagram is broken down into individual services: *Record Incident Detail, Register Claim, Describe Loss, Confirm Coverage, Schedule Appointment*

A89) A level 2 (service) diagram is usually three to five times as large as level 1 (handoff) diagram
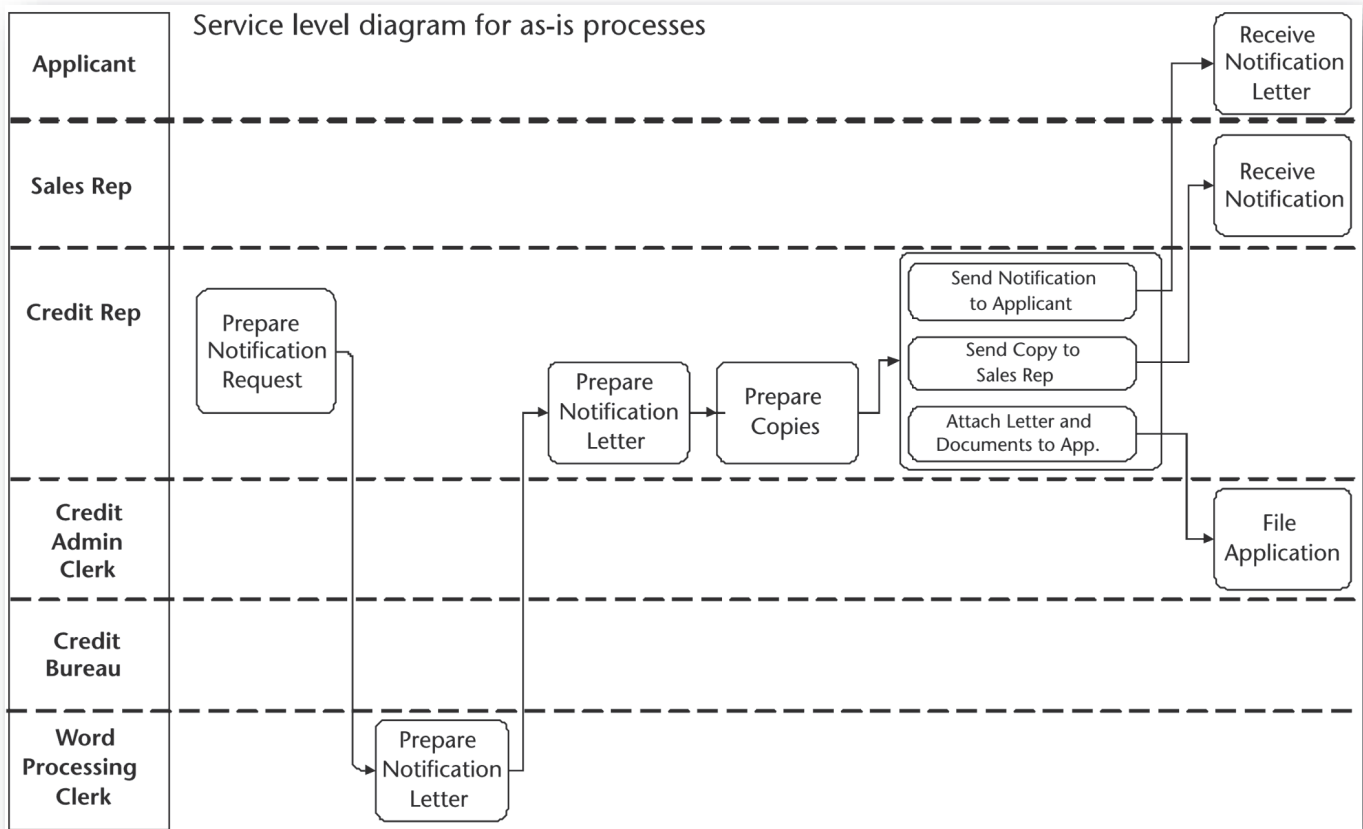
A90) Again, steps on the service diagram will tell us *what* is being done, but should say little about *how*.

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:

Service level diagram for as-is processes

Service level diagram for as-is processes

Service level diagram for as-is processes (Applicant, Sales Rep, Credit Rep, Credit Admin Clerk, Credit Bureau, Word Processing Clerk swimlanes): Receive Credit Application → Decide if App is Complete → (no) Request Additional Information → Provide Additional Information → Receive Additional Information → Update Application Form → Decide Security Need. (yes) Forward Credit Report Request → Order Credit Report → Produce Credit Report → Receive Credit Report.

Service level diagram for as-is processes

Service level diagram for as-is processes (Applicant, Sales Rep, Credit Rep, Credit Admin Clerk, Credit Bureau, Word Processing Clerk swimlanes): Decide Security Need → (needed) Request Security Documents → Provide Security Docs → Receive Security Documents → Decide Credit Approval → (Yes) Document Acceptance Details / (No) Document Reason → Prepare Notification Request. To Marketing Admin for coding, then to Data Maintenance for setup in Sales System. (not needed)

Service level diagram for as-is processes

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 <u>every</u> 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 od 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.
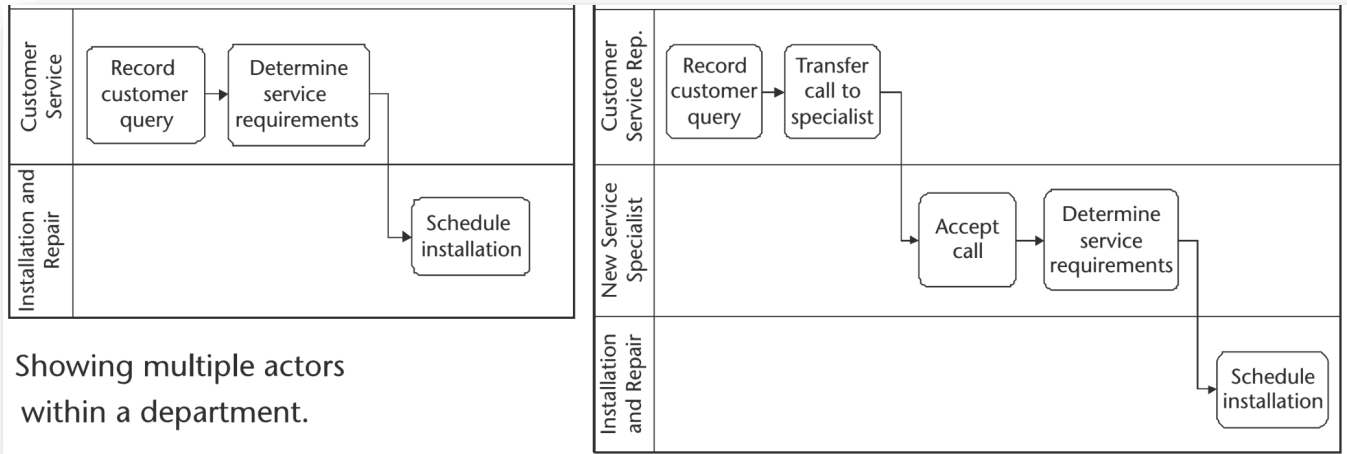
(Readings: pp. 246-261, Sharp, *Workflow modeling*, 2009)

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 Commitees

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 seamlessy 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

Systems as actors.
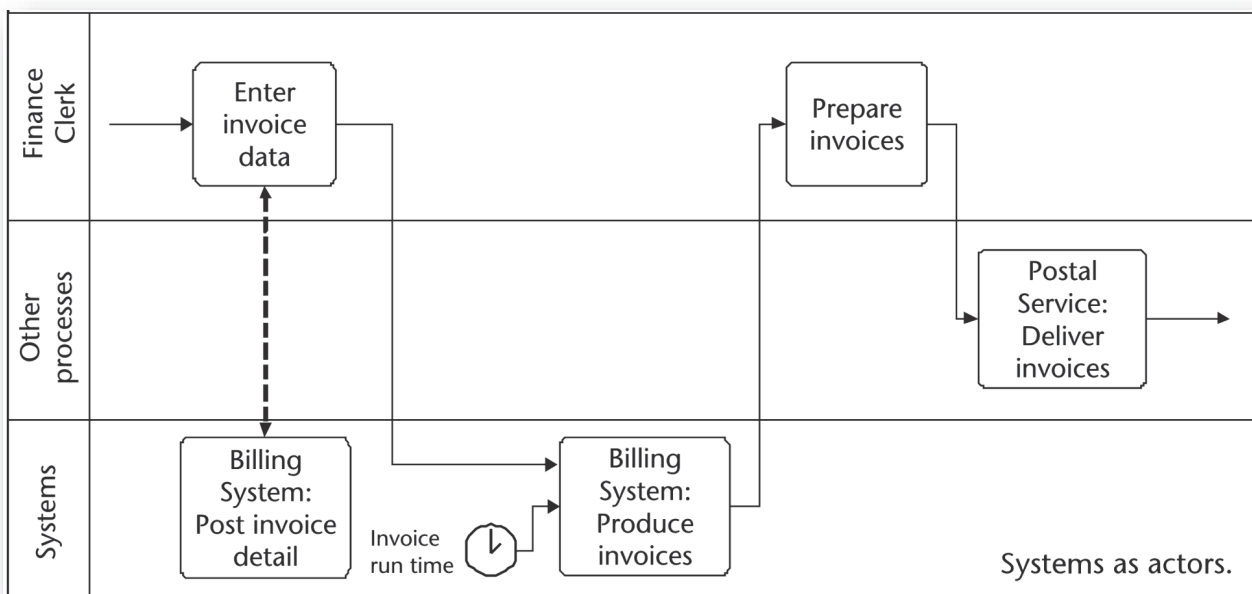
- *Batch Systems*

  B17) E.g., an overnight production of invoices. It takes the control of the work items, adds values, an introduce 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
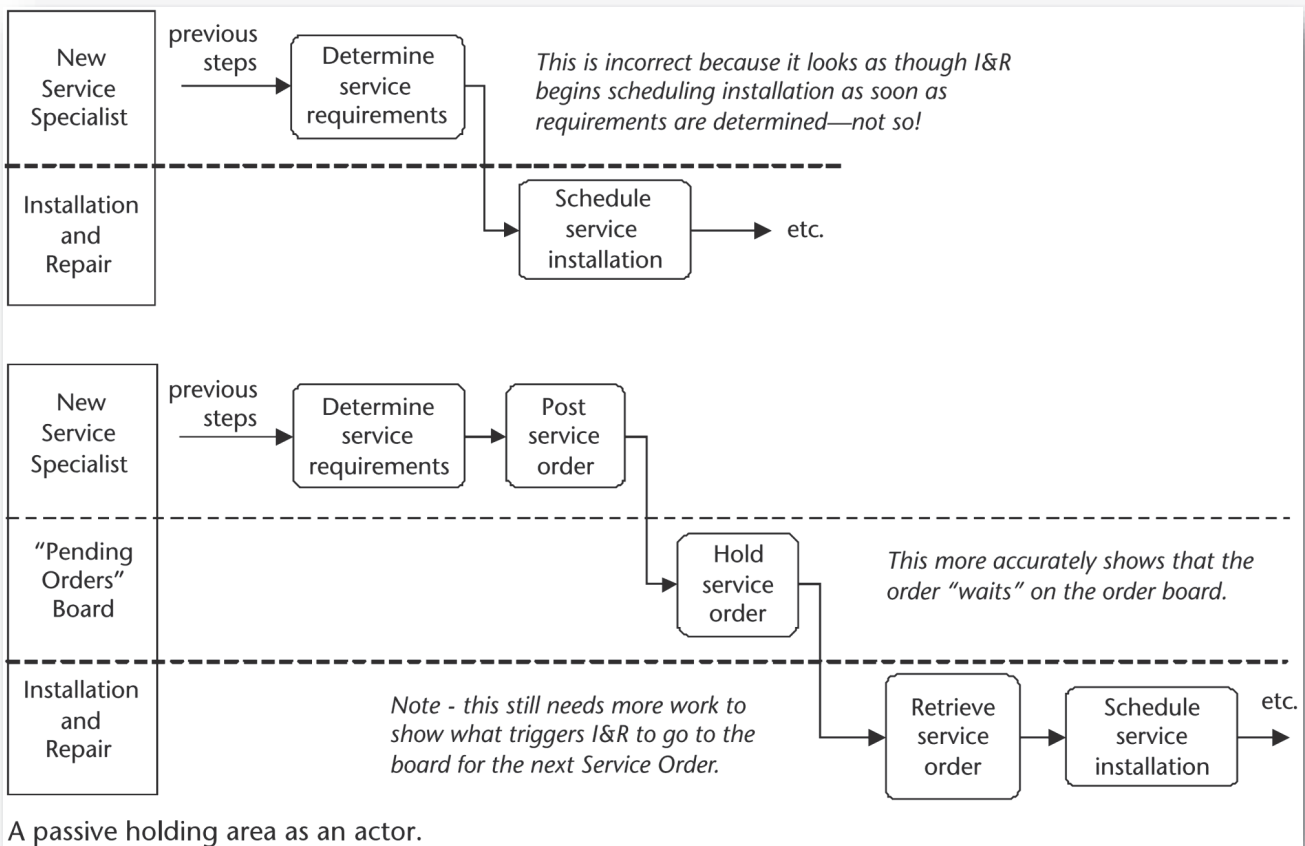*B23) Human actor supporting Systems*

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.
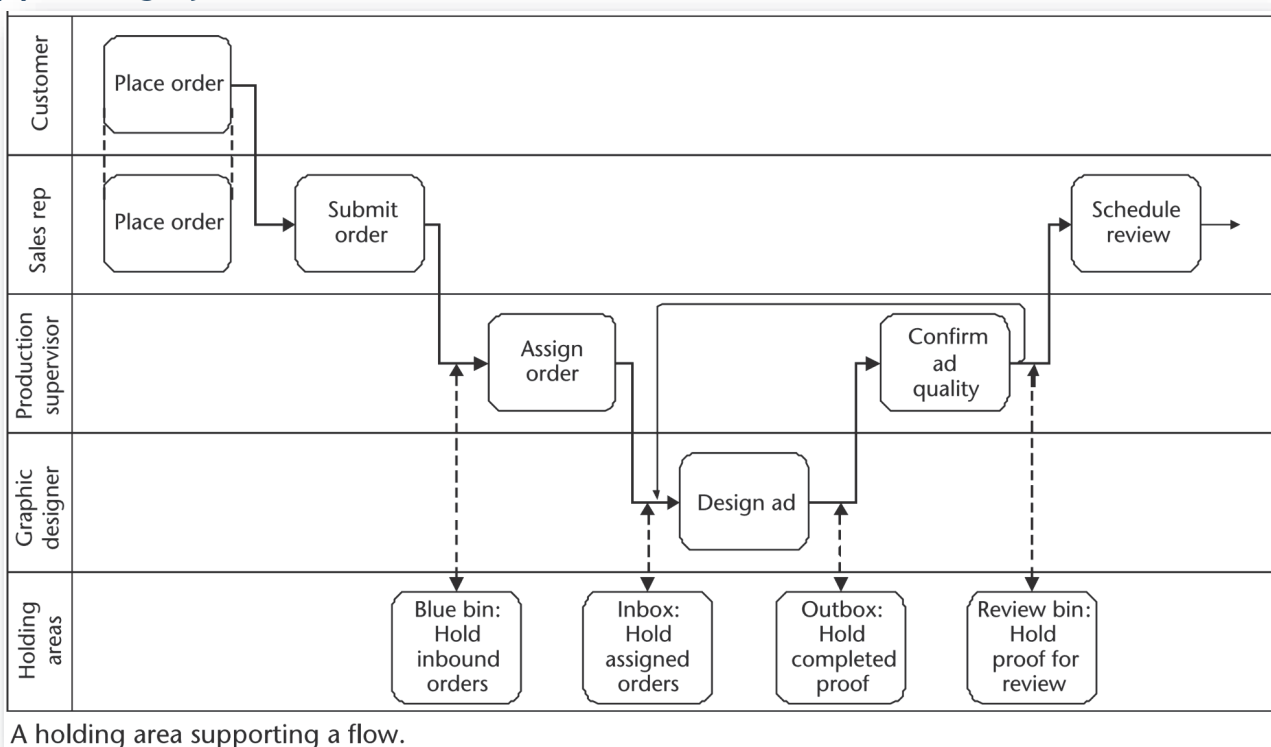*B24) Devices and machines as actors*

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.

New Service Specialist — previous steps → Determine service requirements

This is incorrect because it looks as though I&R begins scheduling installation as soon as requirements are determined—not so!

Installation and Repair — Schedule service installation → etc.

New Service Specialist — previous steps → Determine service requirements → Post service order

"Pending Orders" Board — Hold service order

This more accurately shows that the order "waits" on the order board.

Installation and Repair

Note - this still needs more work to show what triggers I&R to go to the board for the next Service Order.

Retrieve service order → Schedule service installation → etc.

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.

Customer — Place order

Sales rep — Place order → Submit order → Schedule review

Production supervisor — Assign order → Confirm ad quality

Graphic designer — Design ad

Holding areas — Blue bin: Hold inbound orders | Inbox: Hold assigned orders | Outbox: Hold completed proof | Review bin: Hold proof for review

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.
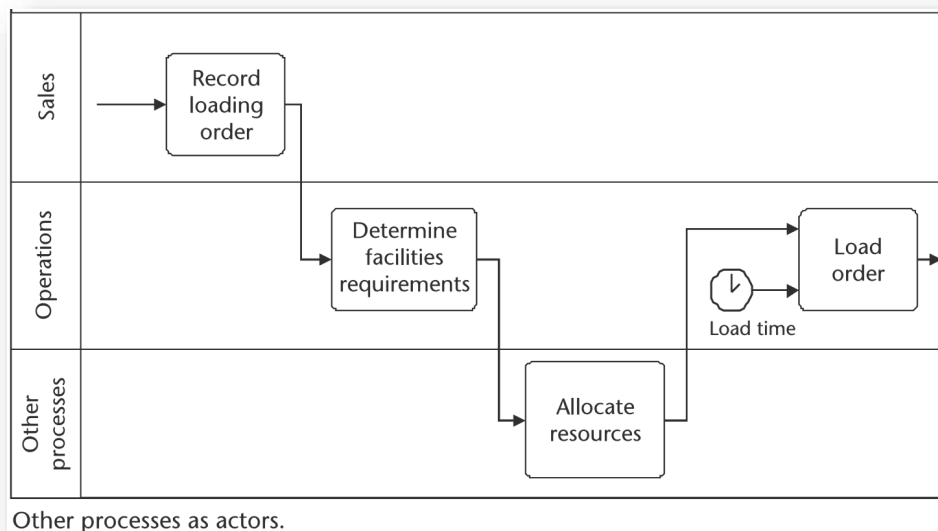
Some types of steps

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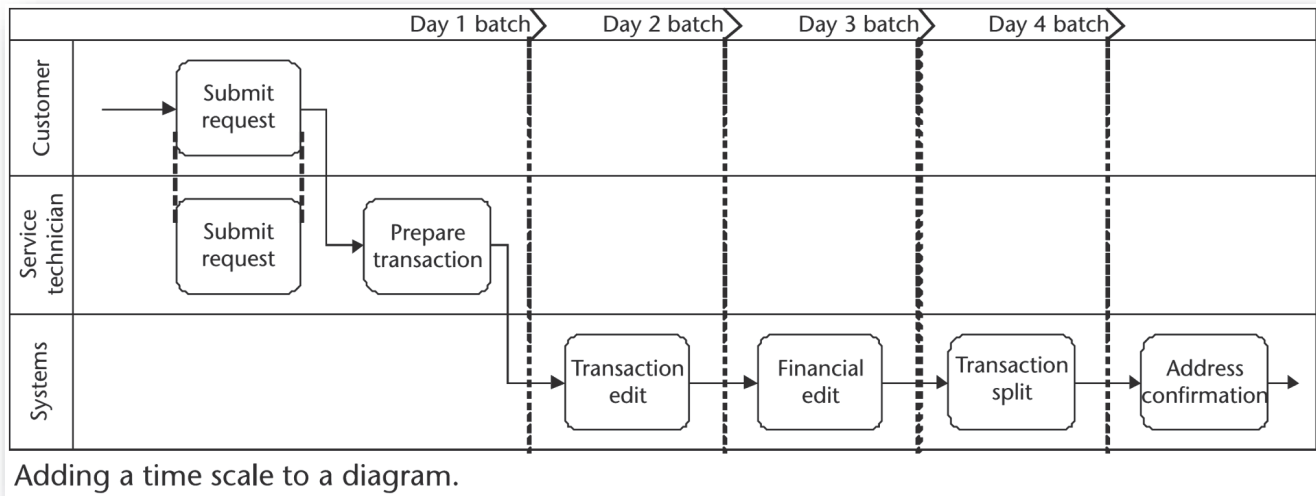
B34) A part of the process you do not know/care about yet. Use a cloud icon, with a textual comment. The cloud can be also used to indicate collaborative, creative work in a process that cannot be reduced to a sequence of steps and decisions.

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.