ULB

INFO-H420
Management of Data Science and Business Workflows
Part I
5. Process Redesign

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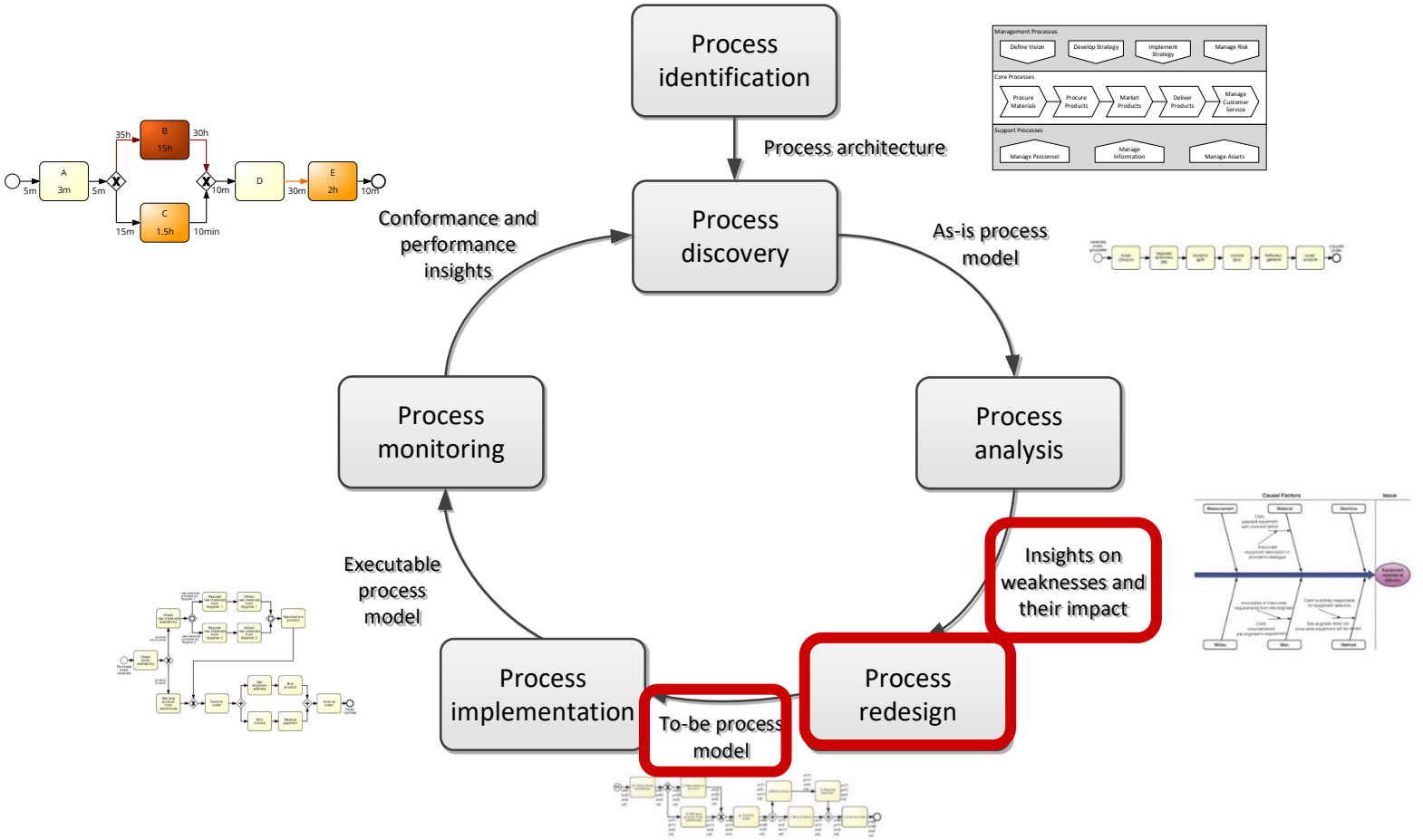
Process Redesign

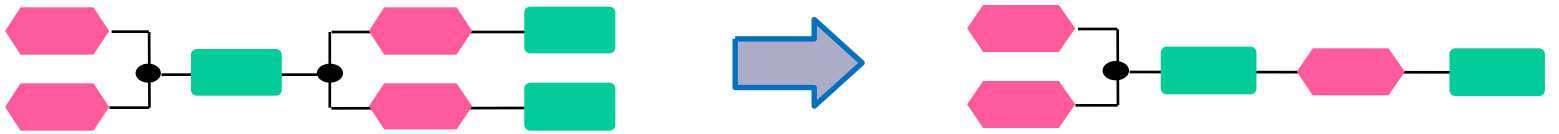


Process Redesign

Identify possibilities for improving the design of a process

AS-IS: **Descriprive** modelling of the real world

TO-BE: **Prescriptive** modelling of the real world



- No silver-bullet: requires **creativity**
- *Redesign heuristics* can be used to generate ideas

Process redesign approaches

Transformational Redesign

- Puts into question the fundamental assumptions and principles of the existing process structure
- Aims to achieve breakthrough innovation
- **Example: Business Process Reengineering (BPR)**

Transactional Redesign

- Doesn't put into question the current process structure
- Seeks to identify problems and resolve them incrementally, one step at a time
- Example: Heuristic redesign

Business Process Reengineering (BPR)

- **Transformative:** Puts into question the fundamental assumptions of the "as is" process
- **Analytical:** Based on a set of principles that foster:
  - Outcome-driven processes
  - Integration of information gathering, work and decisions

The Ford Case Study

Ford needed to review its procurement process to:

- Do it cheaper (cut costs)
- Do it faster (reduce turnaround times)
- Do it better (reduce error rates)

Accounts payable in North America alone employed > 500 people and turnaround times for processing POs and invoices was in the order of weeks

https://hbr.org/1990/07/reengineering-work-dont-automate-obliterate

The Ford Case Study

Automation would bring some improvement (20% improvement)

But Ford decided not to do it… Why?

a) Because at the time, the technology needed to automate the process was not yet available.
b) Because nobody at Ford knew how to develop the technology needed to automate the process.
c) Because there were not enough computers and computer-literate employees at Ford.

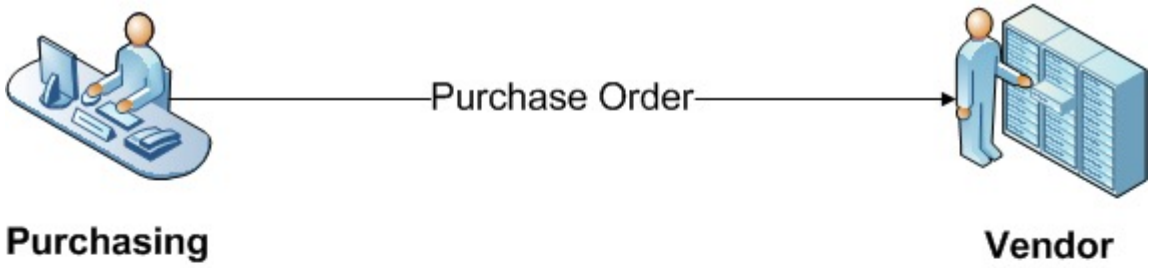
The correct answer is …

Mazda's Accounts Payable Department

Mazda's accounts payable team was about 5 people, versus a department of over 500 in Ford.

Even after considering differences of size, this was **5 times smaller** than Ford.

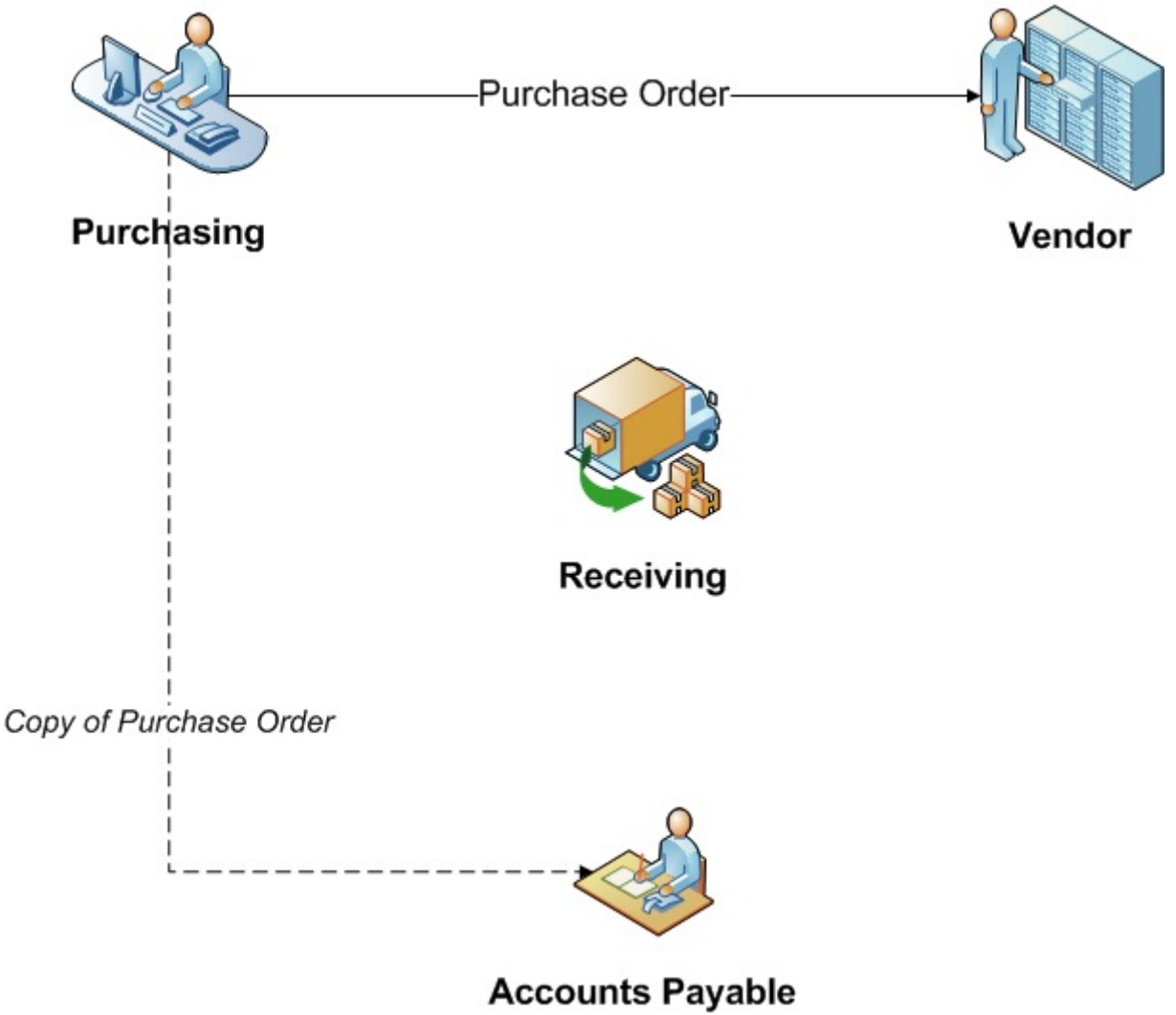
How the process worked? ("as is")



Receiving

Accounts Payable

How the process worked? ("as is")



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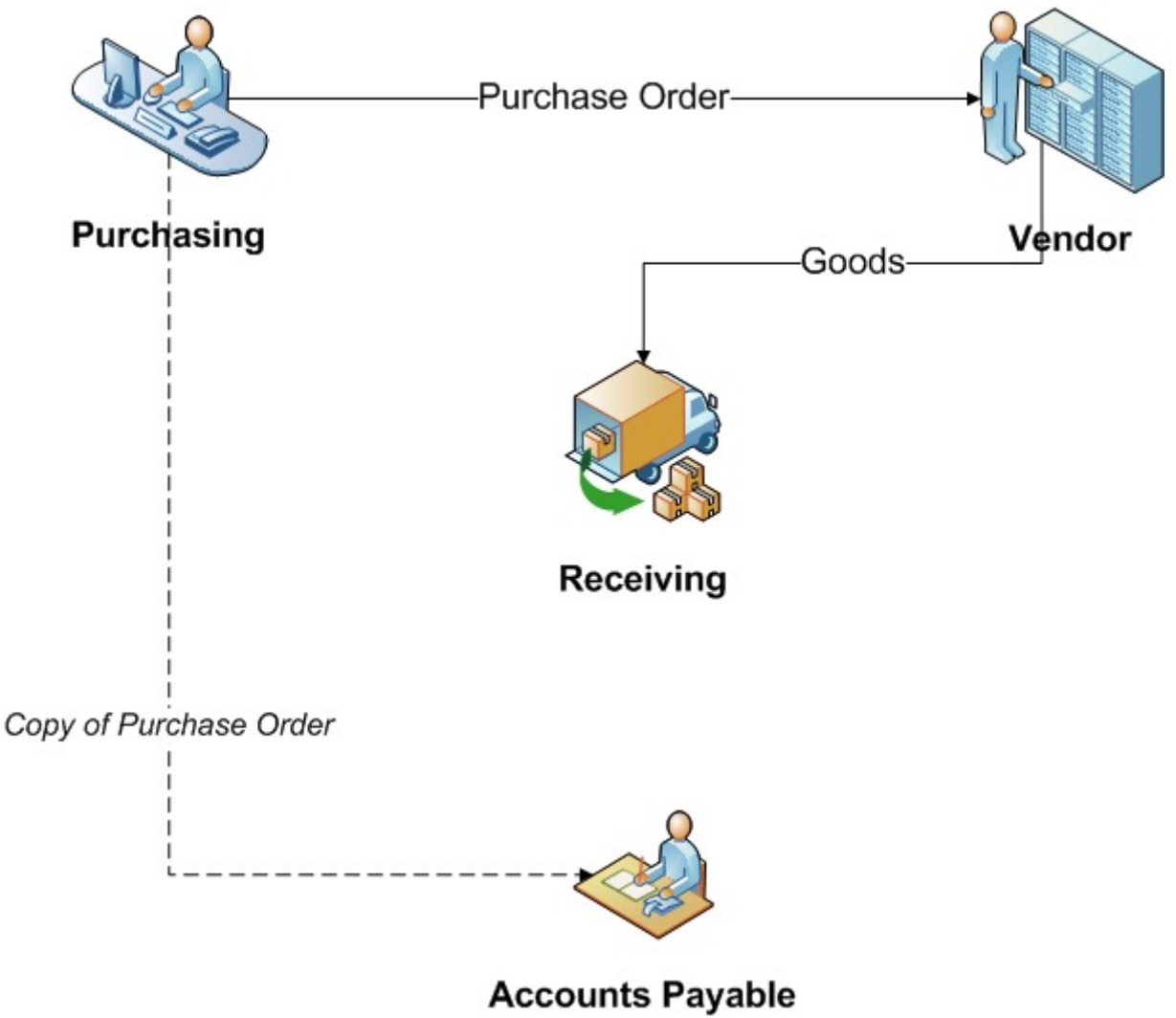

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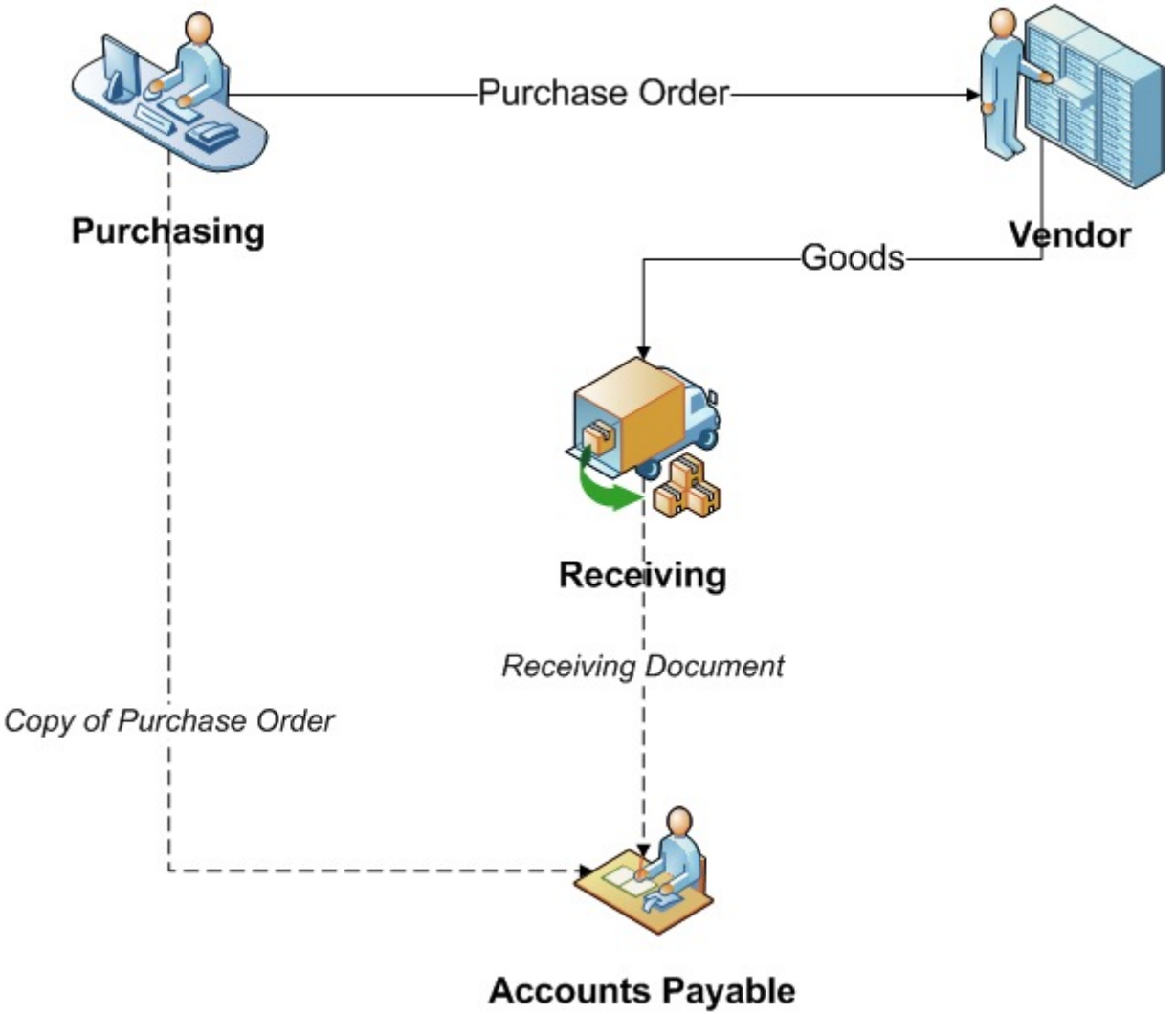

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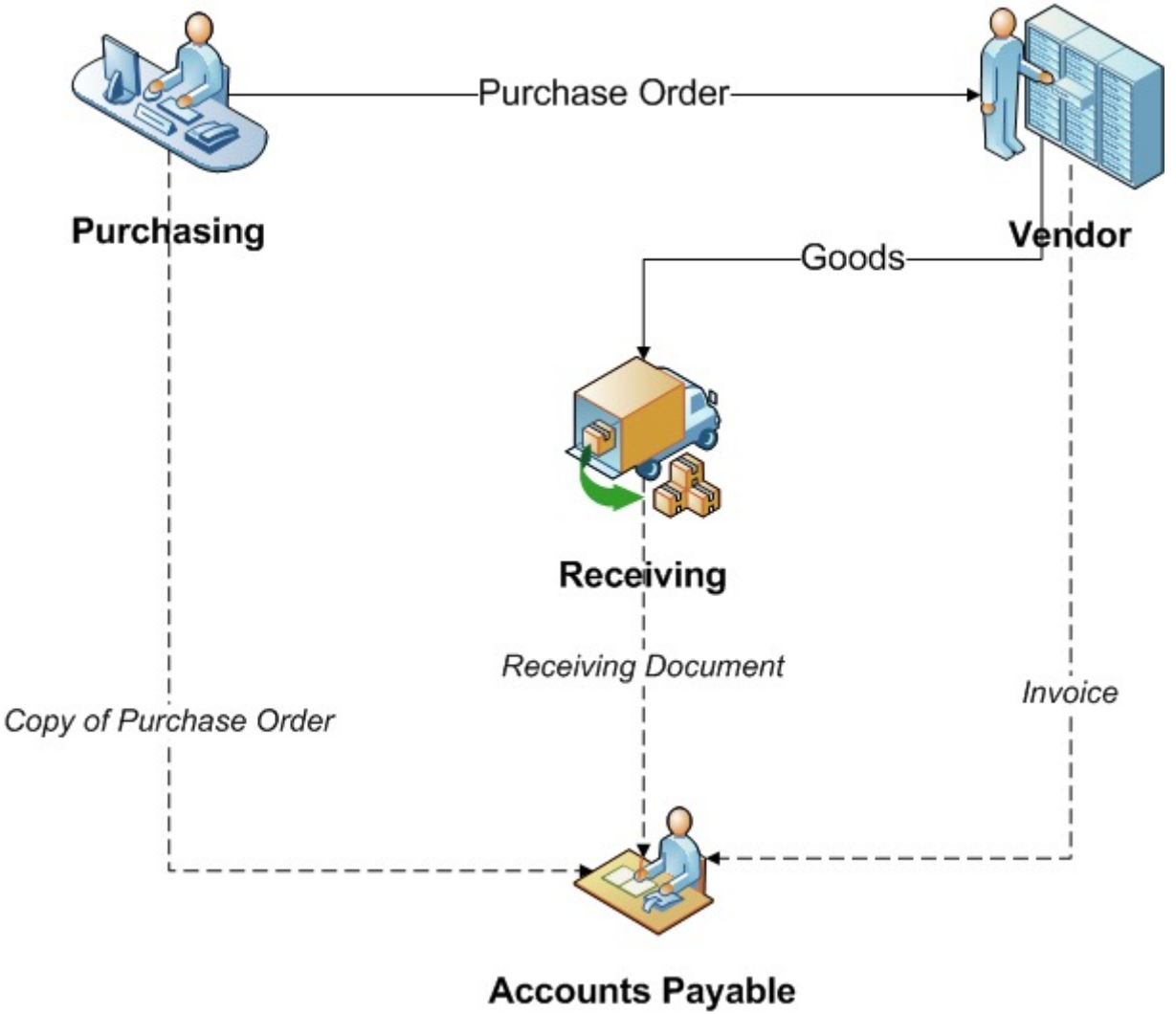

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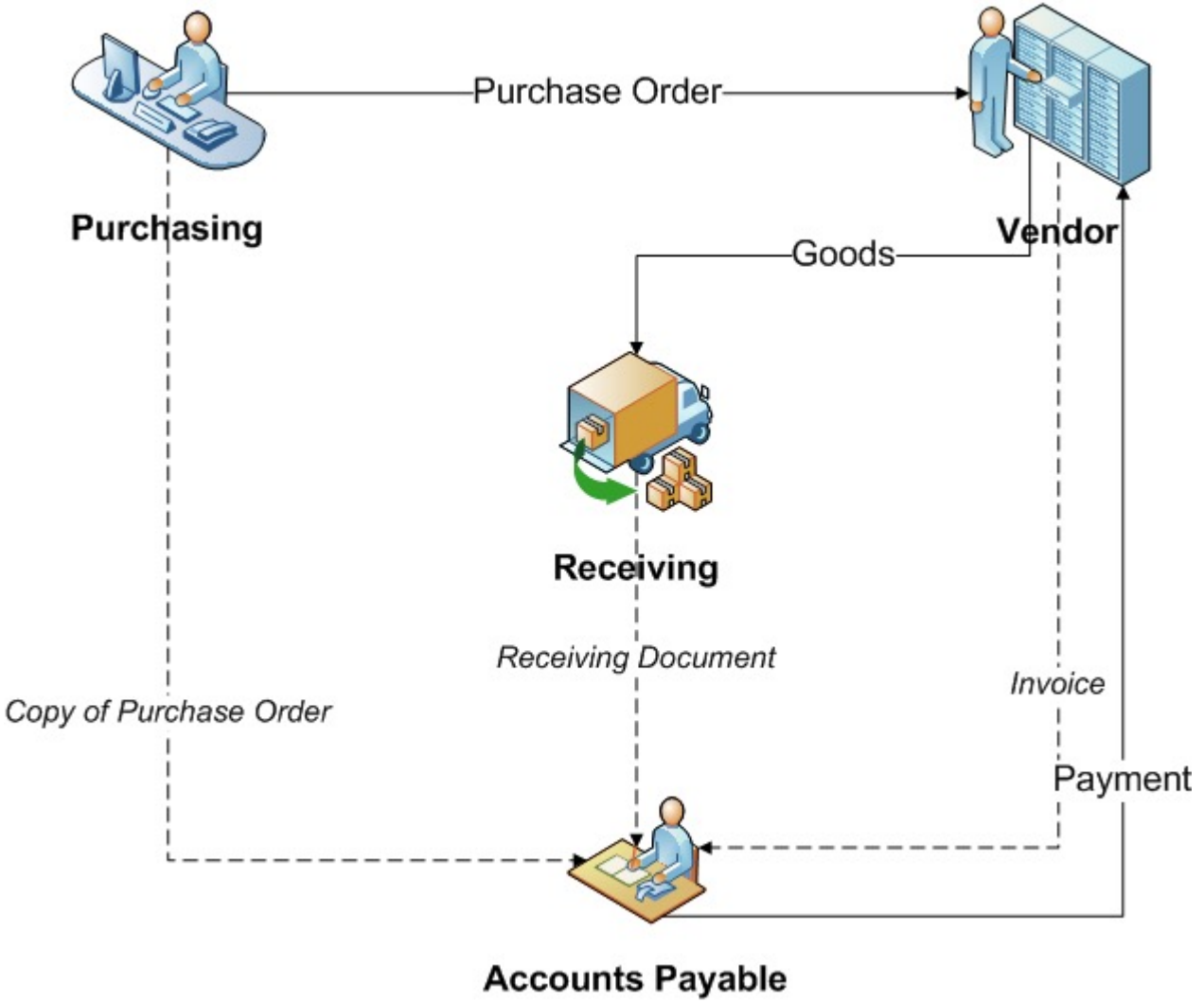
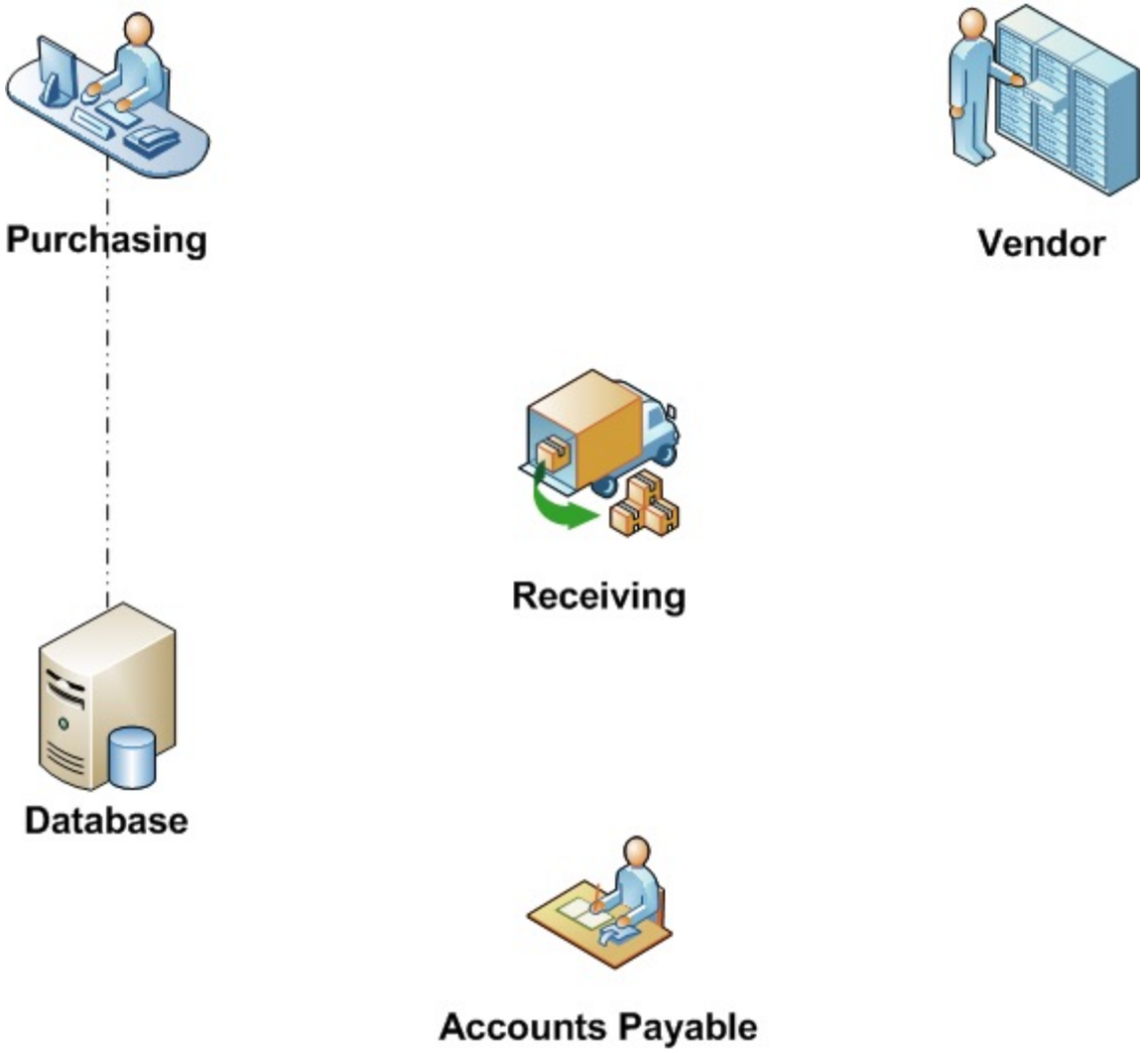


Reengineered Process (“to be”)



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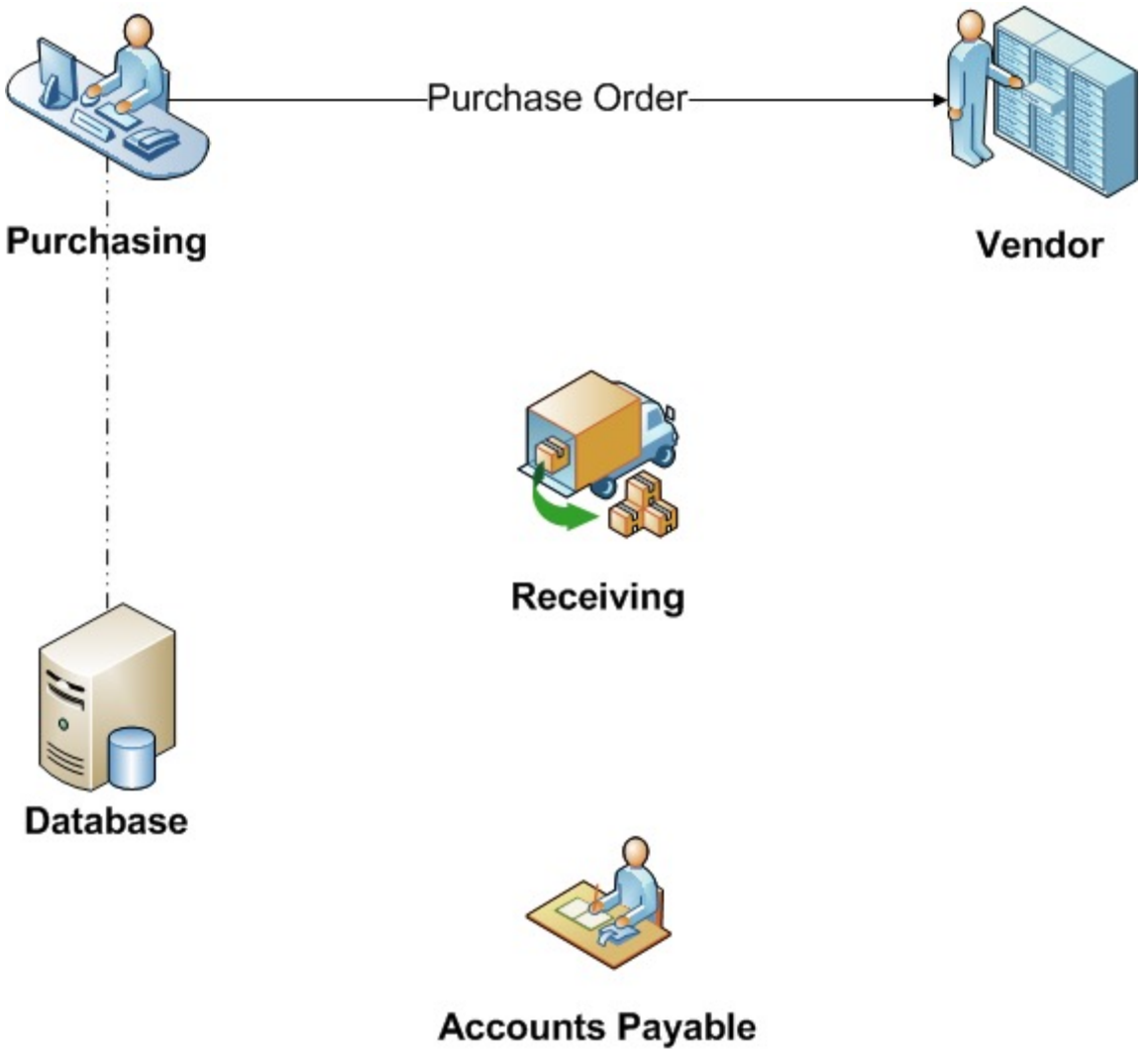

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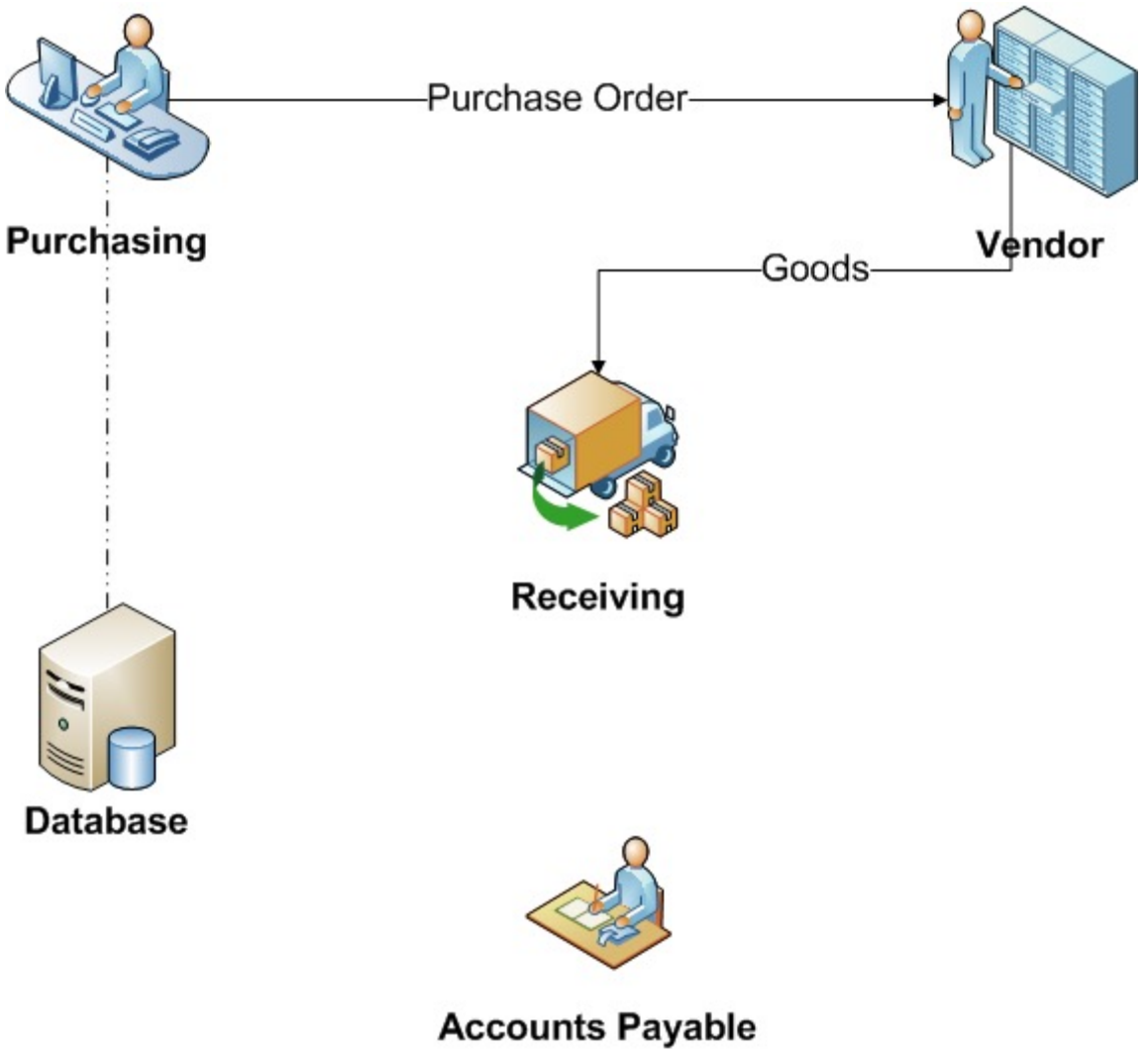

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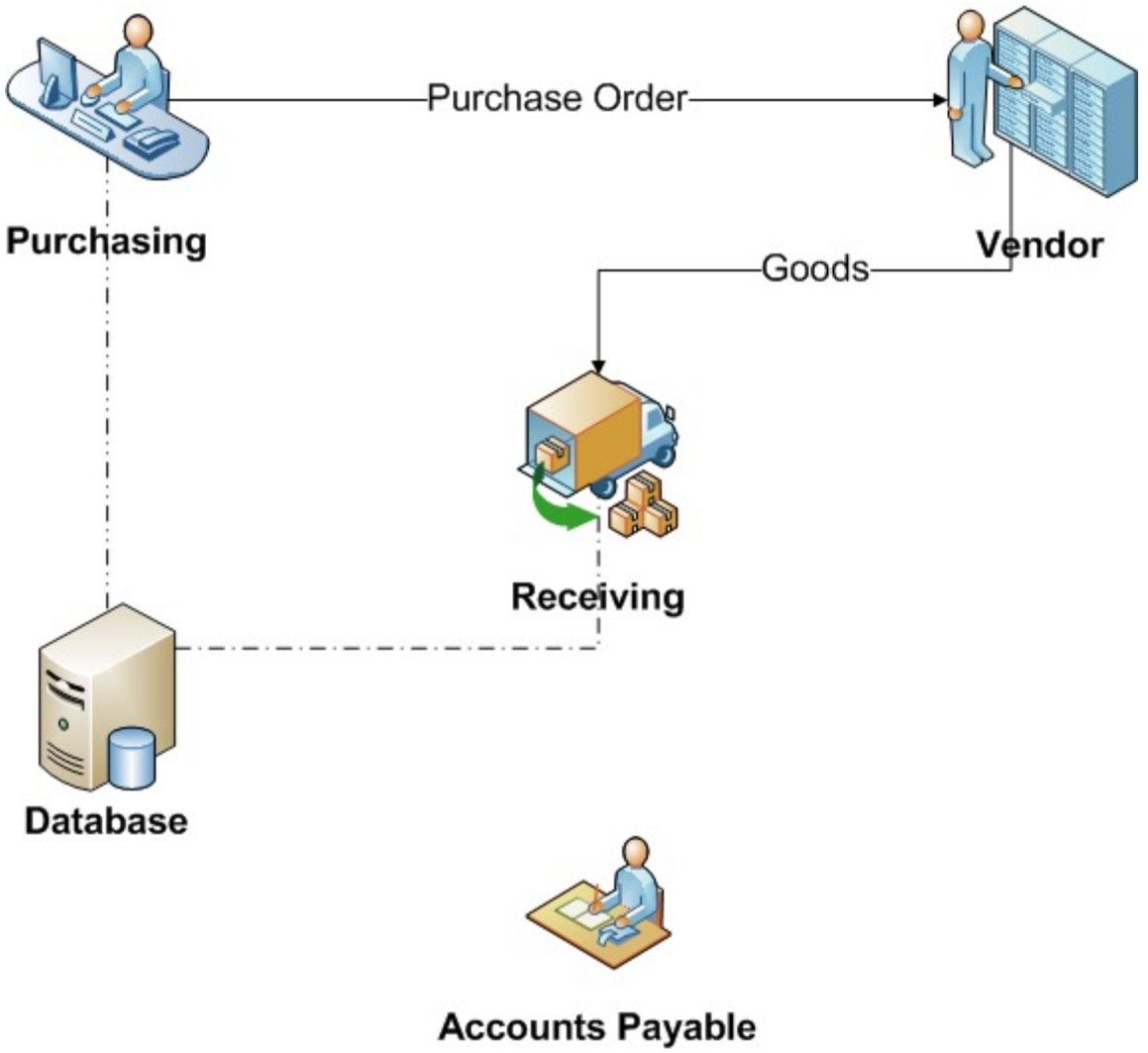

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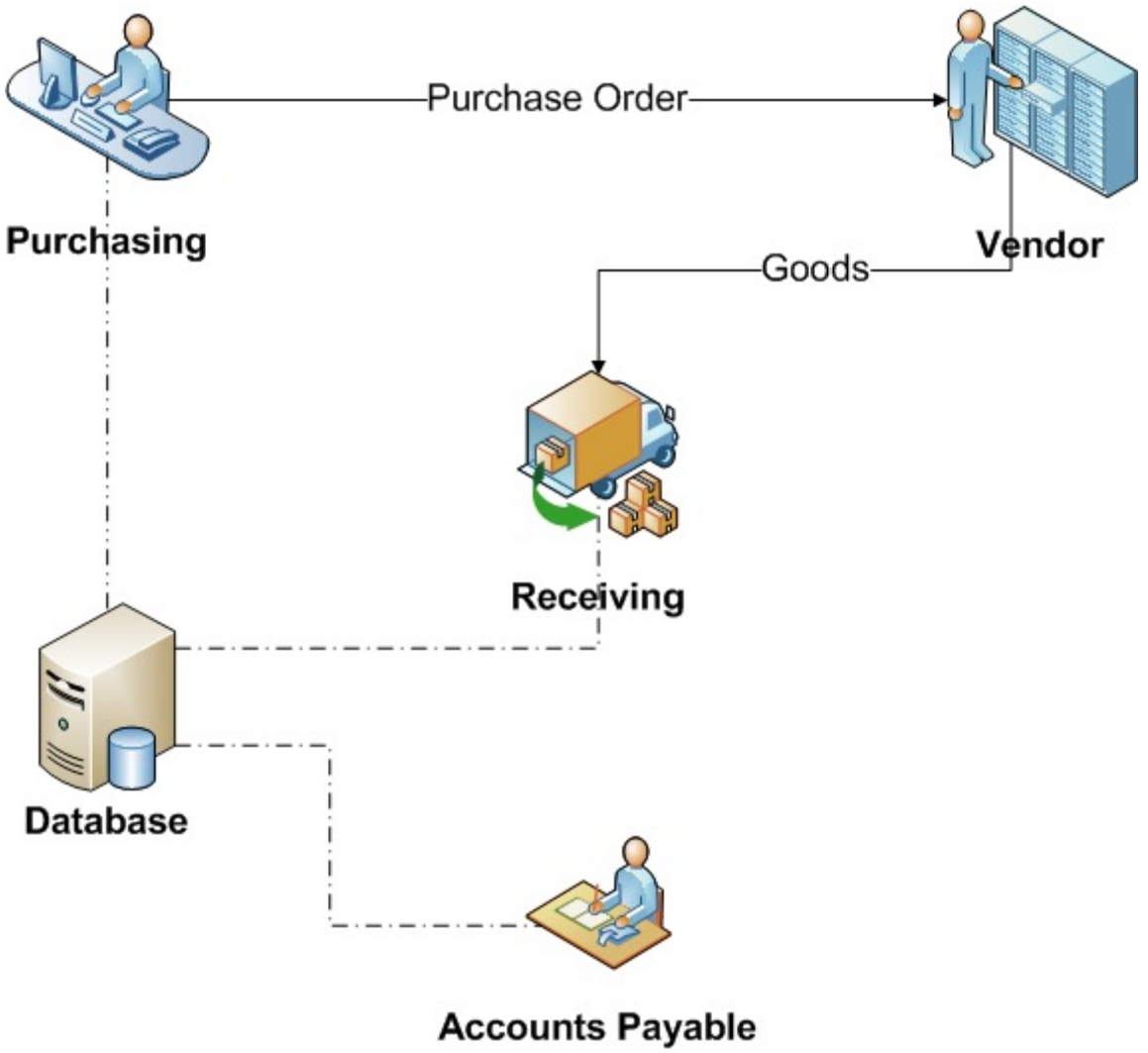

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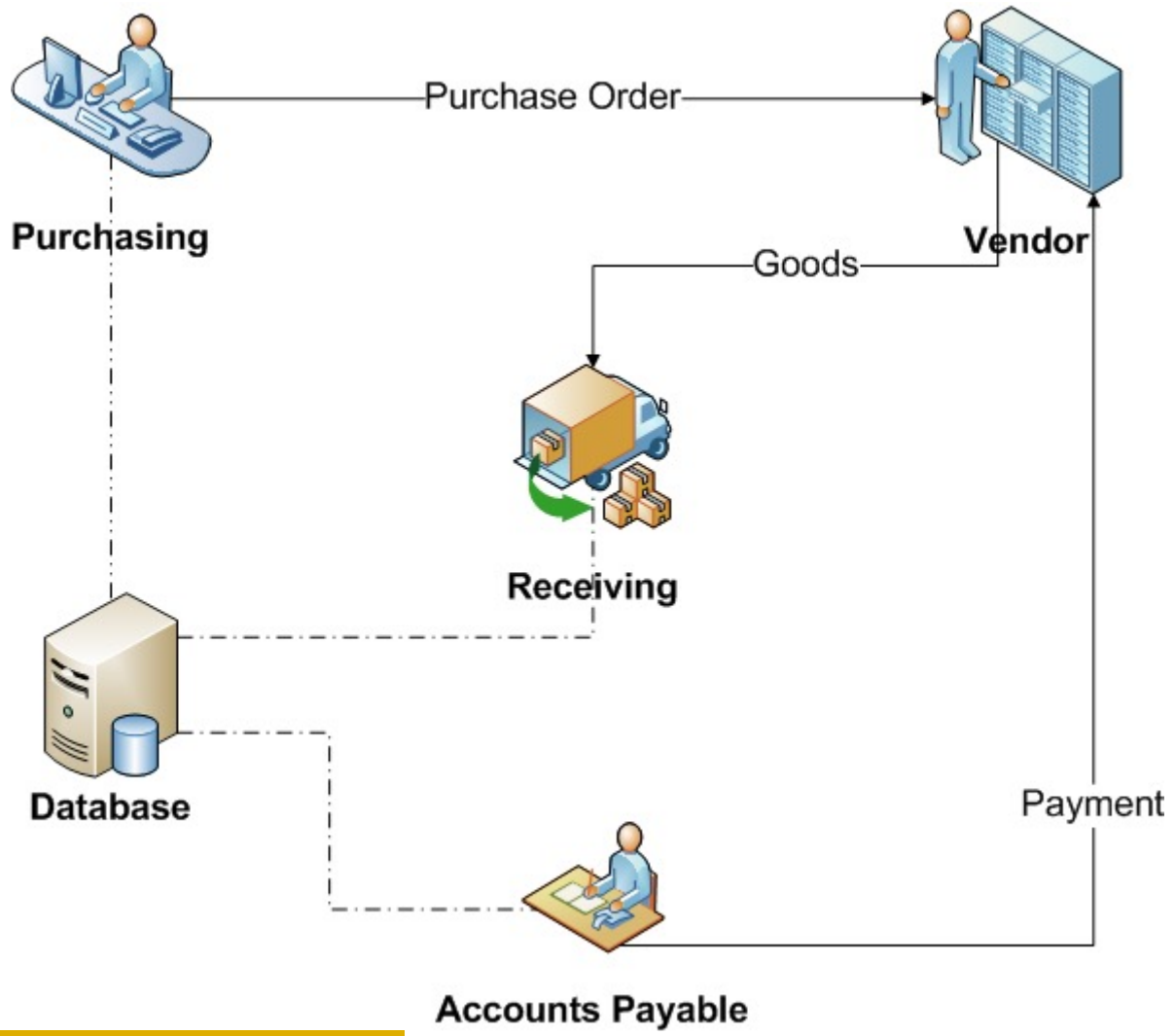


Evaluated Receipts Settlement

Outcome…

- 75% reduction in head count
- Simpler material control
- More accurate financial information
- Faster purchase requisition
- Less overdue payments

Lessons:

- Why automate something we don’t need to do at all?
- Automate things that need to be done.
- **Digitization** vs. **Digitalization**

“Don’t Automate, Obliterate!” (Hammer, 1990)

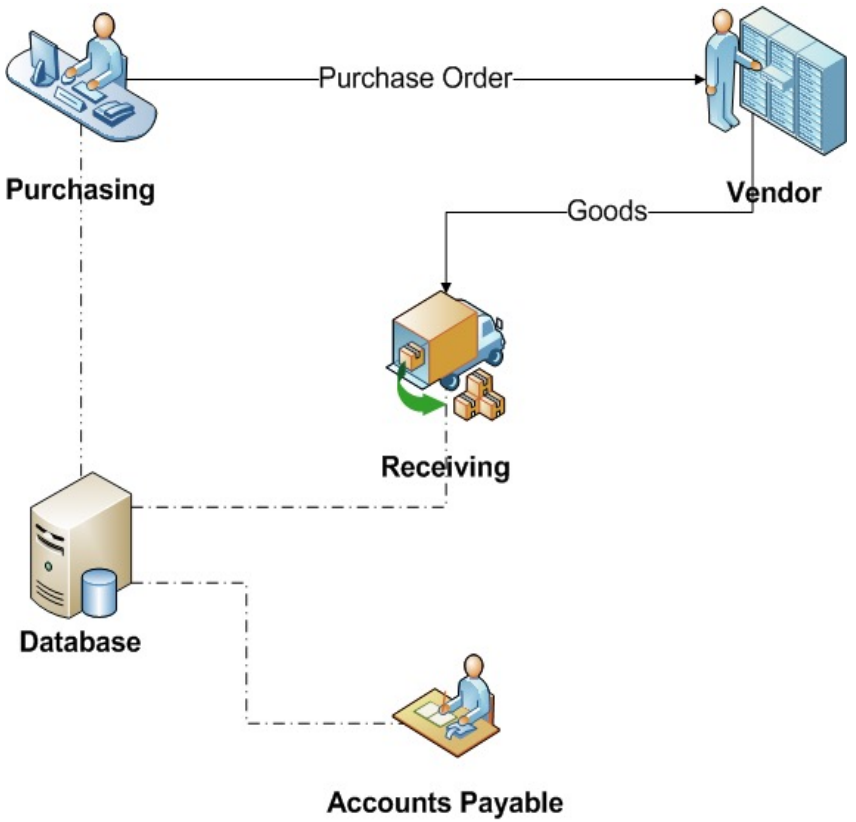
Some principles of BPR

1. Capture information once and at the source
2. Subsume information-processing work into the real work that produces the information
3. Have those who use the output of the process drive the process
4. Put the decision point where the work is performed, empower workers to decide, and build control into the process
5. Treat geographically dispersed resources as though they were centralized.

Principle 1

Capture information once and at the source

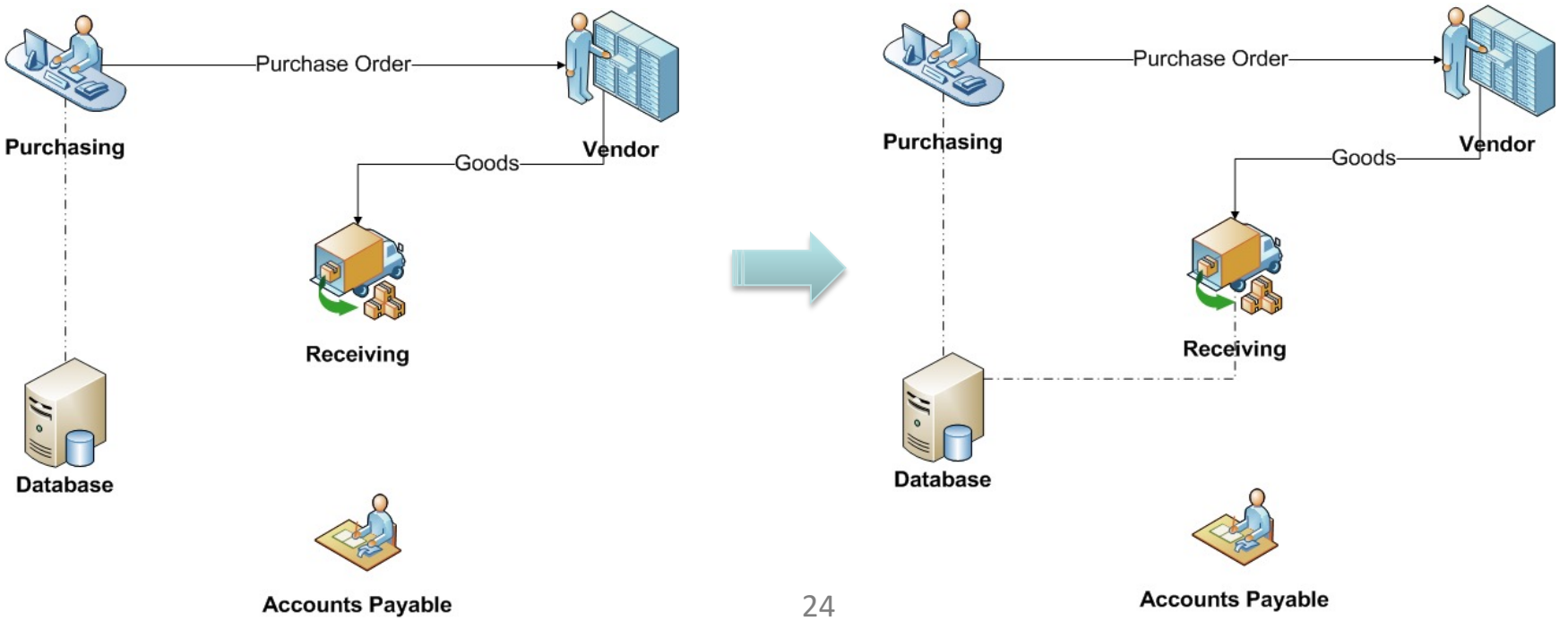
- Shared data store
  - All process workers access the same data
  - Don’t send around data, share it!
- Self-service
  - Customers capture data themselves
  - Customers perform tasks themselves (e.g. collect documents)



Principle 2

Subsume information-processing work into the real work

- Evaluated receipt settlement: when receiving the products, record the fulfillment of the PO, which triggers payment



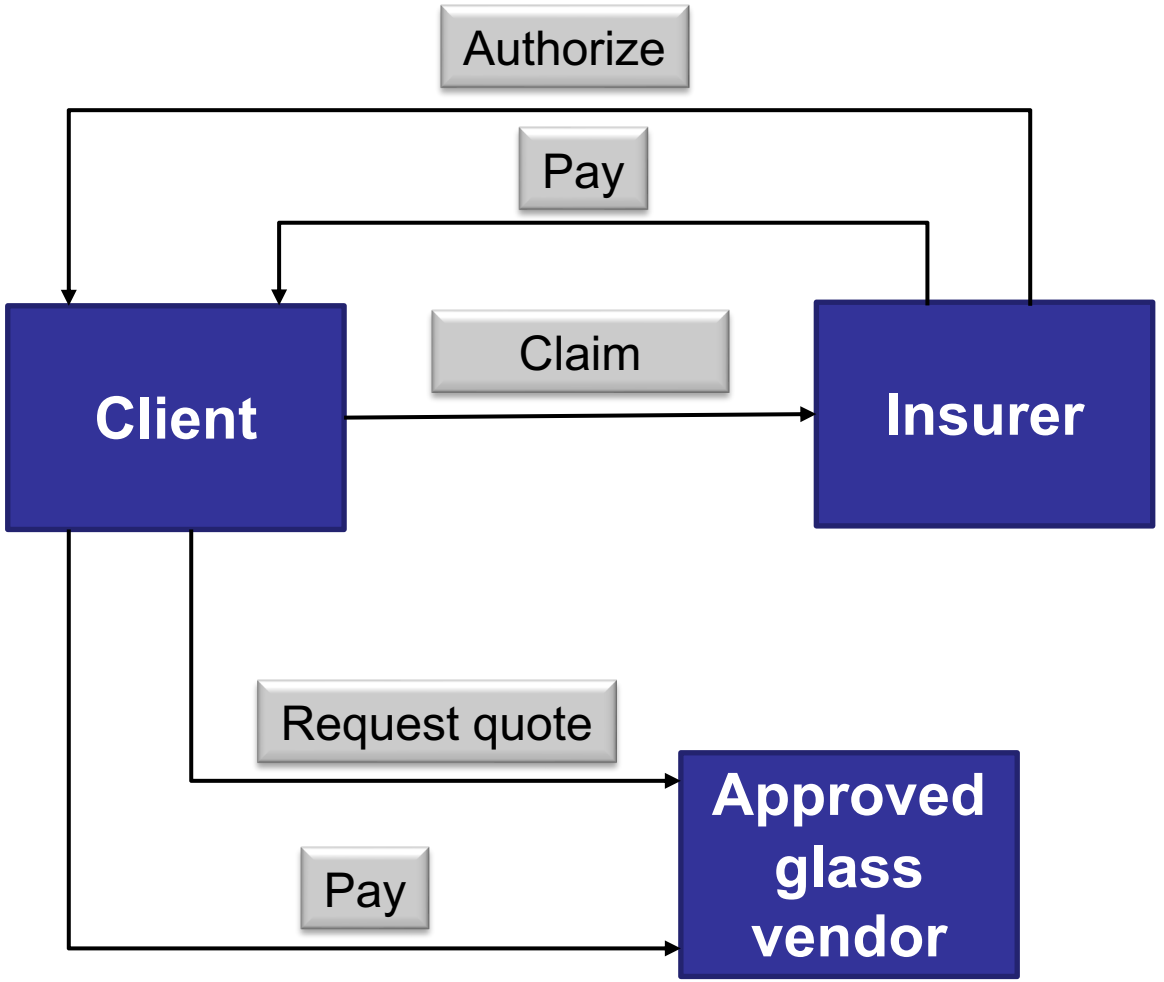
Principle 3

Have those who use the output of the process drive the process

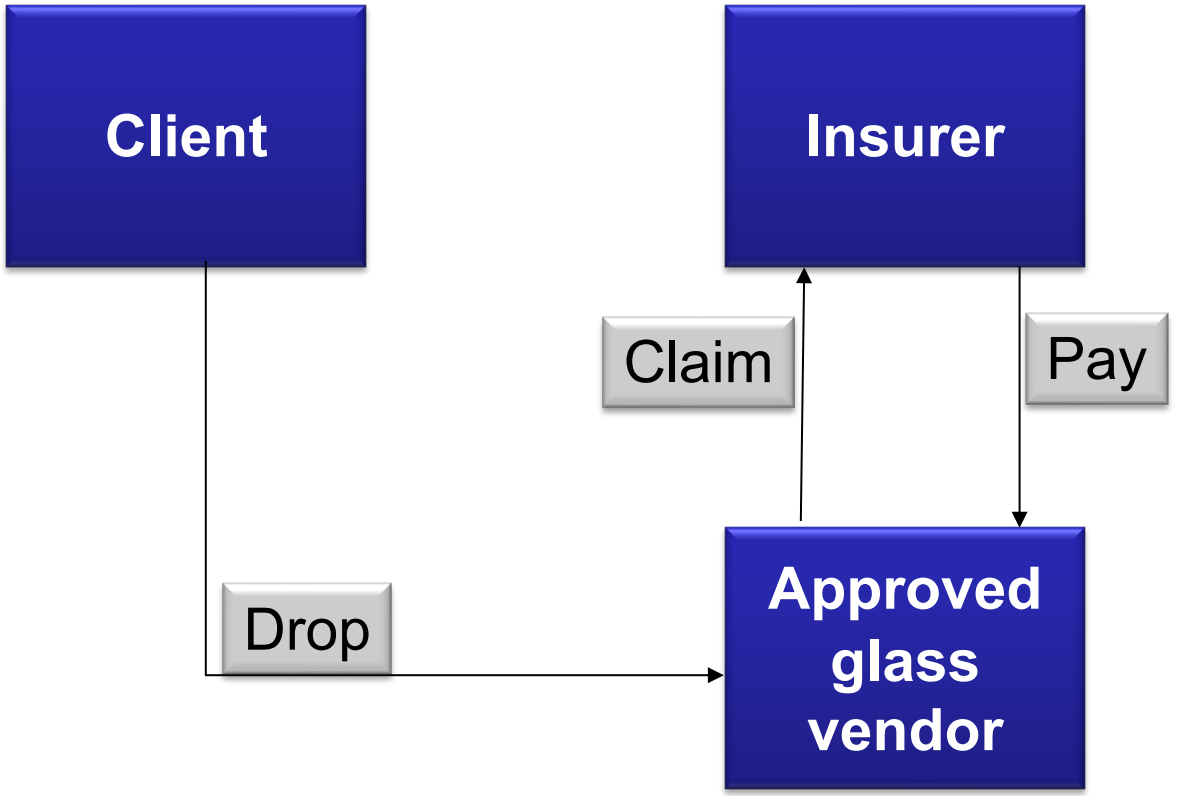
- Vendor-managed inventory
- Scan-based trading

Push work to the actor that has the incentive to do it

Example: problematic claims process



Redesigned claims process



Principle 4

Put the decision point where the work is performed, empower workers to decide, and build control into the process

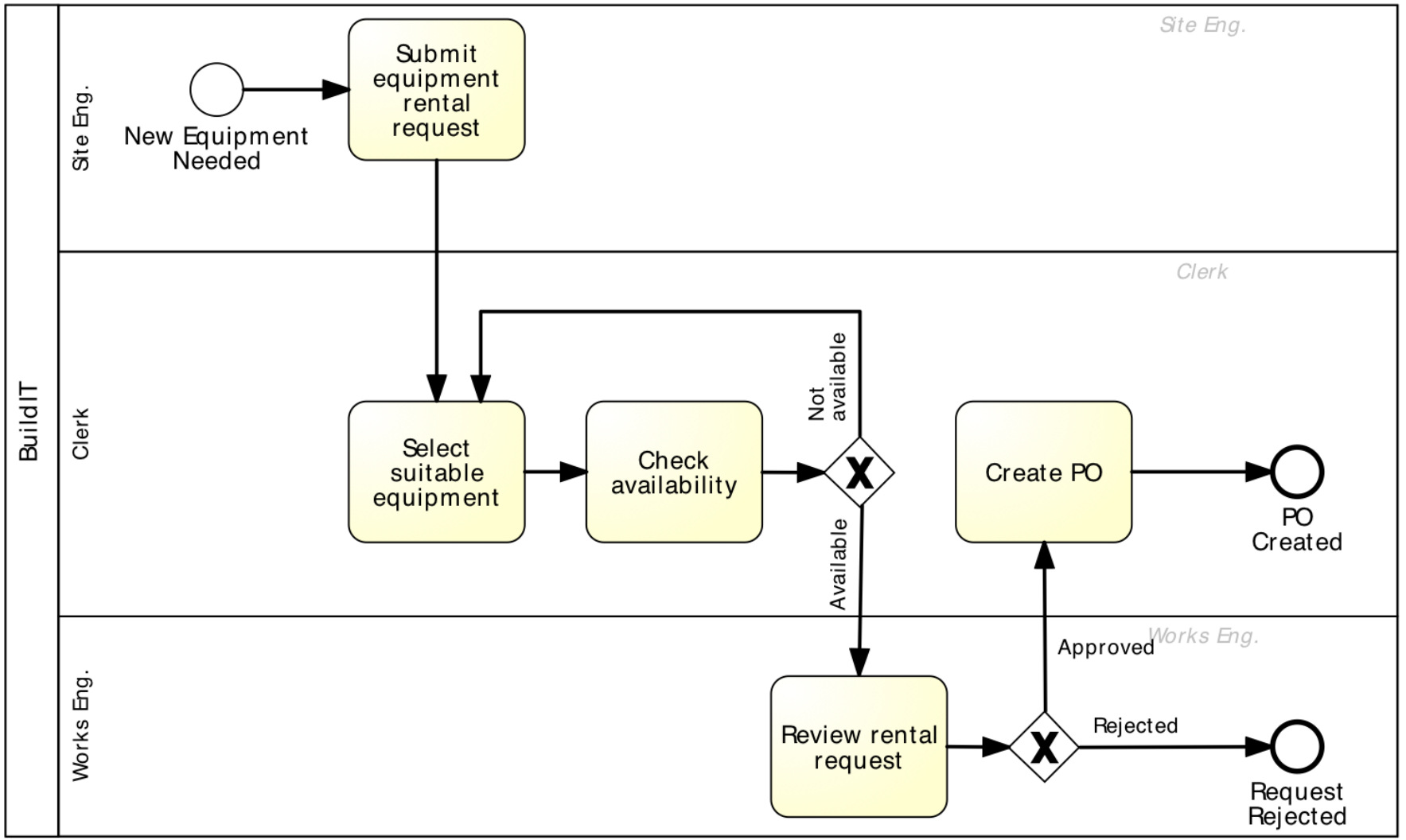
- Empower the process workers
- Provide process workers with information needed to make decisions themselves
- Replace back-and-forth handovers between workers and managers (transportation waste) with well-designed controls

Principle 5

Treat geographically dispersed resources as though they were centralized.

- If same people perform the same function in different locations, integrate and share their work wherever possible
- Larger resource pools → less waiting times even with relatively high resource utilization

Example: Equipment rental process



Example: Self-service-based redesign

Principles 1 & 2

- When equipment is needed, site engineer queries the suppliers' catalogue, selects equipment and triggers PO

Principle 3

- Supplier stocks frequently used equipment at construction site, site engineers scan to put them into use

Principle 4

- Site engineer is empowered with the authority to rent the equipment; works engineer performs statistical controls

Process redesign approaches

Transformational Redesign

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Transactional Redesign

- Doesn't put into question the current process structure
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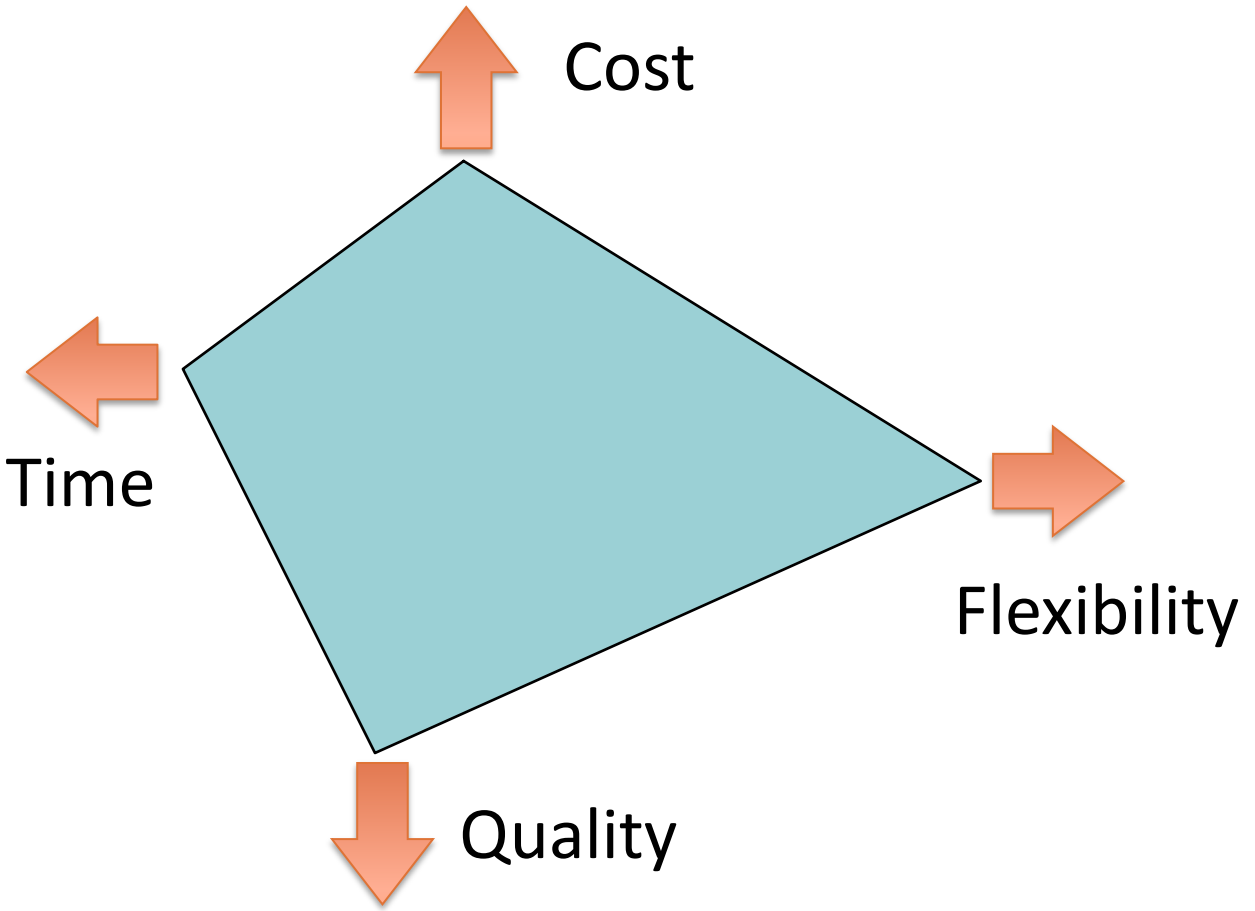
- **Example: Heuristic redesign**

Heuristic process redesign

- A method to identify changes to an “as is” process based on a collection of heuristics that strike tradeoffs between:
  - Cost
  - Time
  - Quality
  - Flexibility

Performance measures: the Devil's Quadrangle



Flexibility

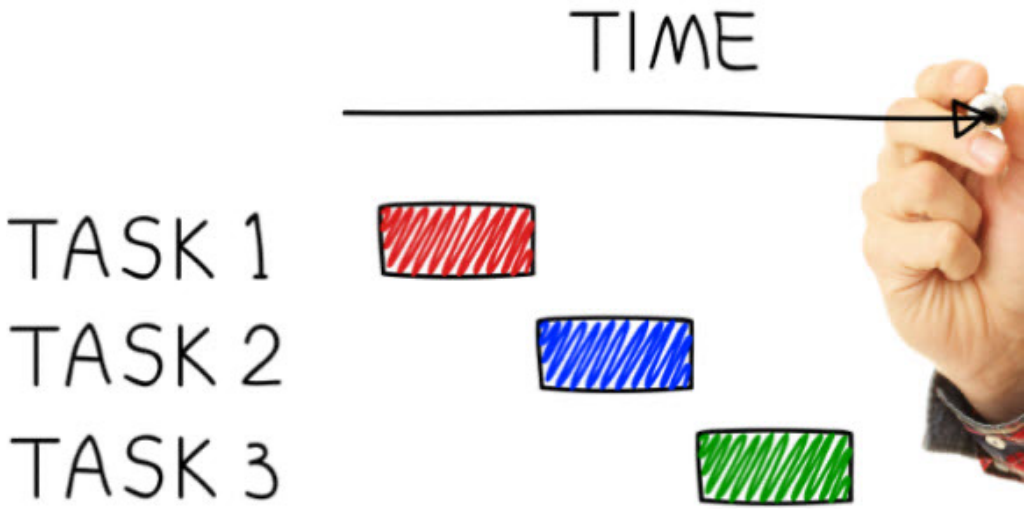
- Ability to react to changes in:
  - Workload
  - Customer demands and expectations
  - Resource and business partner availability and performance
- Example: Following natural disasters (e.g. storms), the number of home insurance claims increases by tenfold
- To address this surge, flexibility is required at:
  - Resource level: Staff redeployment, faster performance
  - Process level: Performing tasks differently to speed up the front-end
  - Management: Relaxing business rules and controls where possible

Redesign heuristics

Task-level	• Task elimination • Task composition/decomposition • Triage
Flow-level	• Re-sequencing • Parallelism enhancement
Process-level	• Specialization & standardization • Resource optimization • Communication optimization • Automation

Task-level redesign heuristics

1. Task elimination
2. Task composition/decomposition
3. Triage



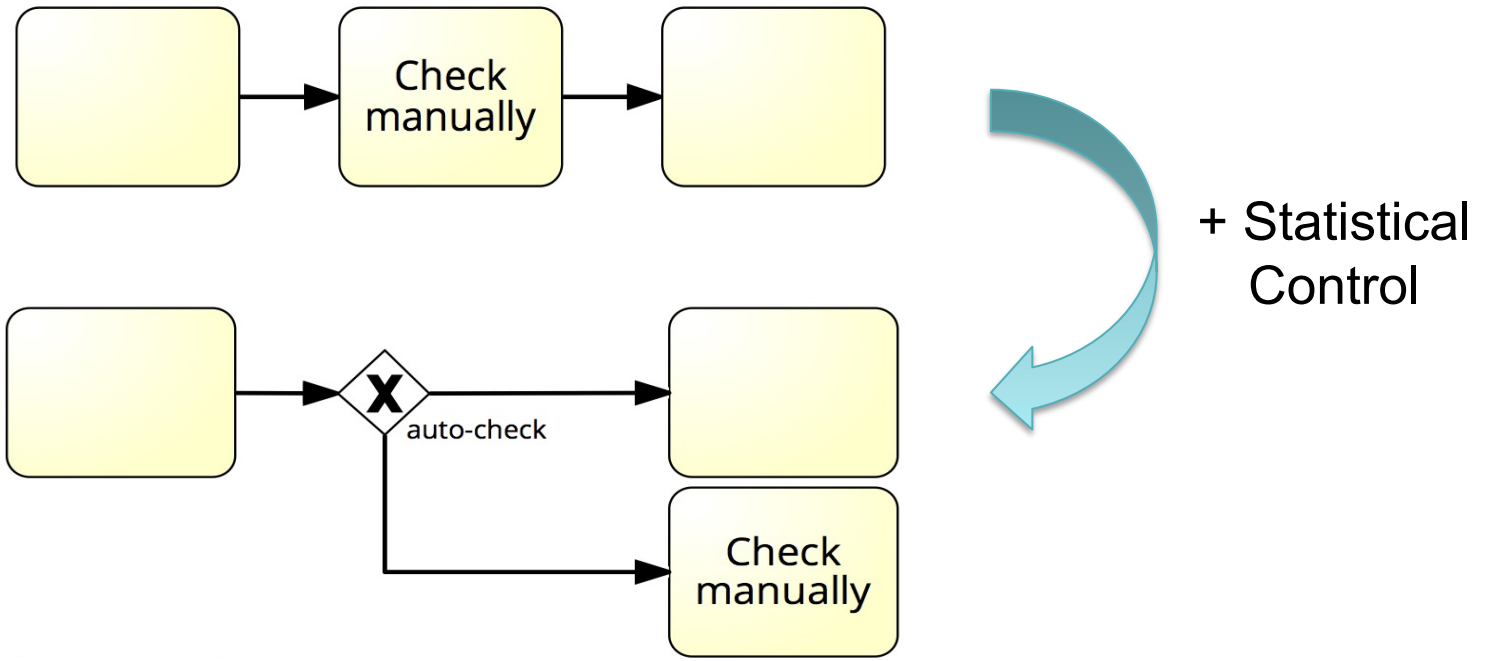
H1. Task elimination

Eliminate non-value-adding steps wherever these can be isolated

- Forward, send, receive, …

Consider reducing manual control steps (checks & approvals) by:

- Skipping them where feasible
- Replacing them with statistical controls
- Skipping them selectively



H1. Task elimination

(T+, C+/-, Q-)

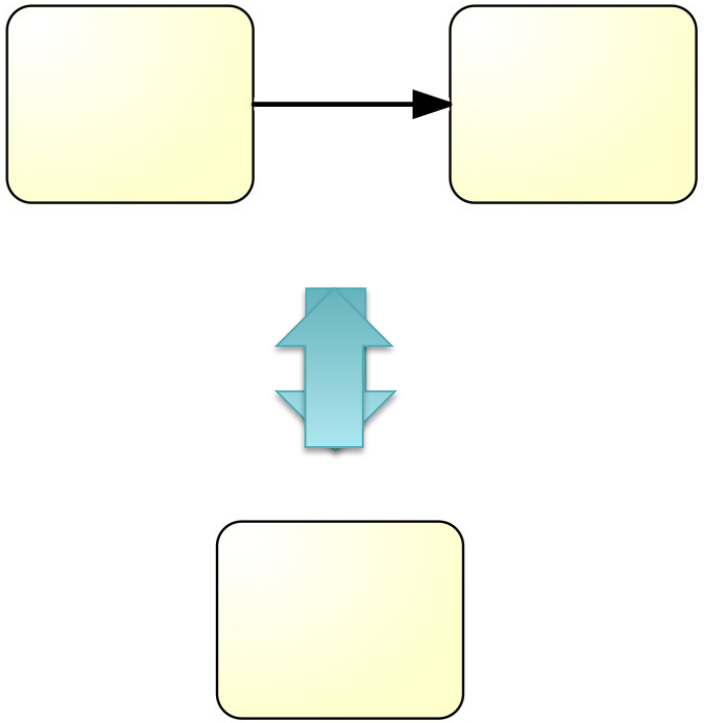
Consider trade-off between the cost of the check and the cost of not doing it

Examples:

- Procure-to-pay process: some types of employees are empowered to trigger isolated purchases below $500 without supervisor approval
- Order-to-cash process: invoices from trusted suppliers under $1000 are not checked on a one-by-one basis
- University admission process: authenticity check is very expensive, yet it leads to only 1% of applications being rejected

H2. Task composition/decomposition

- Consider composing two tasks to eliminate transportation and reduce “context switches”, OR
- Consider splitting a task into two and assign to separate, specialized resources



H2. Task composition and decomposition

Composition example:

- Procure-to-pay process: Merging two checks: “Check necessity of purchase” and “Check budget”

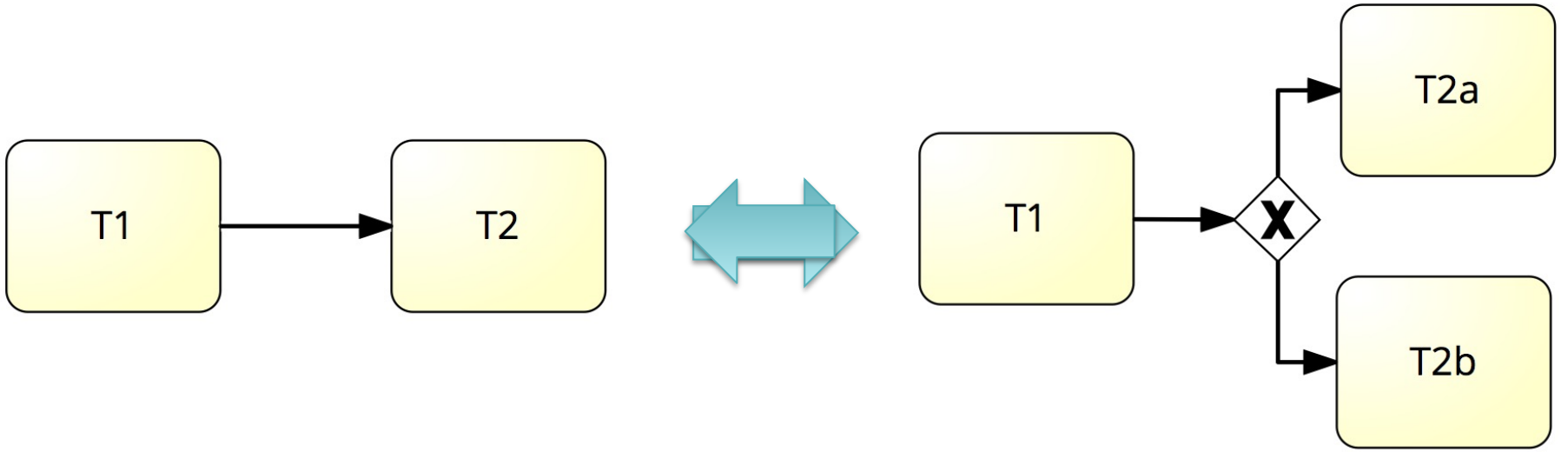
Decomposition example:

- Make-to-order process: Separate a single thick “prepare quote” task into “prepare bill of materials”, “prepare production plan” and “estimate costs and delivery time”

Composition: (T+, C+/-, F+)
Decomposition: (T-, C+, F-)

H3. Triage

- Specialize a task: divide a *general* task into two or more alternative tasks
- Generalize tasks: integrate two or more alternative tasks into one general task



H3. Triage

Specialization example:

- Procure-to-pay process: Separate approvals of *small* purchases, *medium* purchases and *large* purchases

Generalization example:

- Make-to-order process: Integrate quote preparation for two product lines into one single task

Specialization: (T+, C+/-, F-)
Generalization: (T-, C+/-, F+)

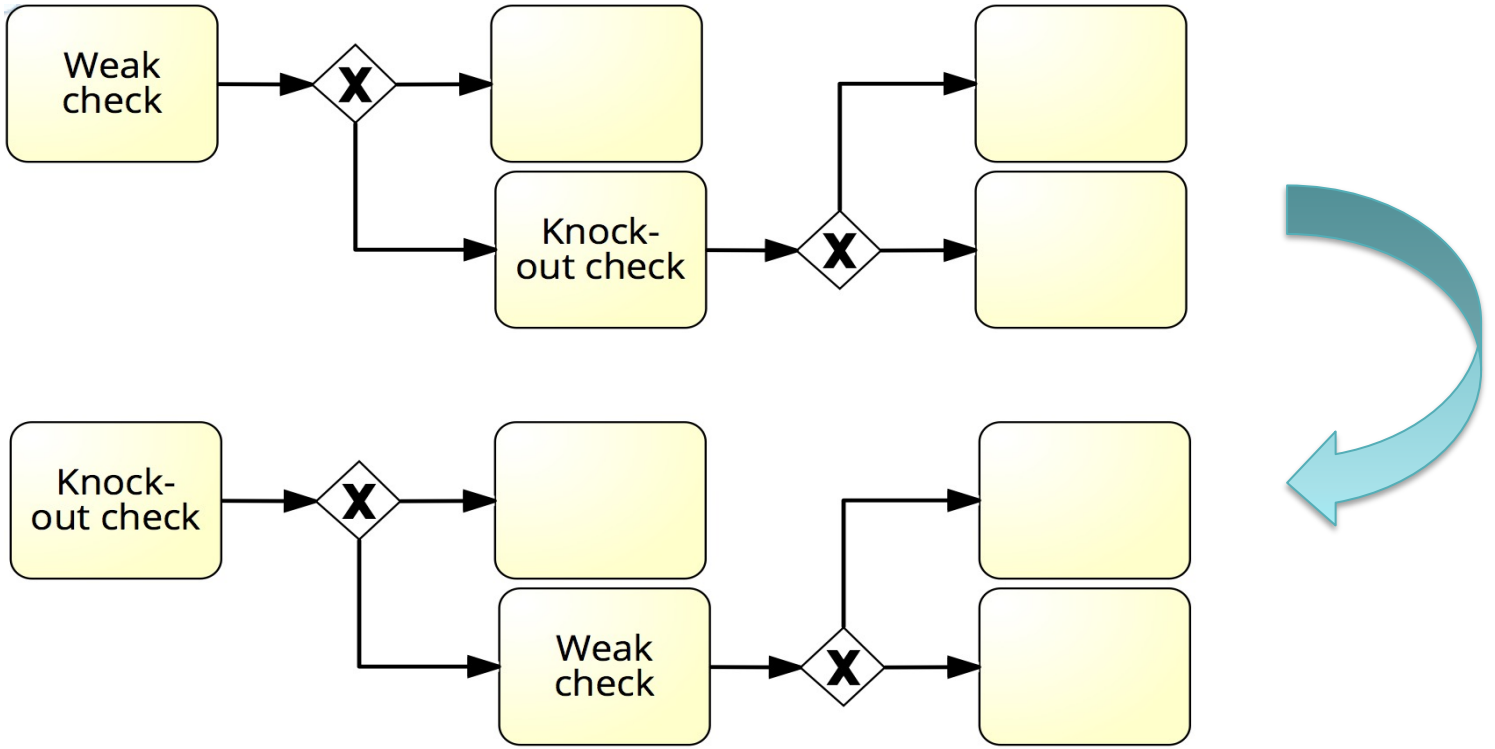
Flow-level redesign heuristics

4. Re-sequencing
5. Parallelism enhancement

H4. Re-sequencing

Re-order tasks according to their cost/effect ratio to minimize over-processing

- Postpone expensive tasks that may end up not being necessary until the end
- Put *knock-out* checks first in order to identify problems early



H4. Re-sequencing

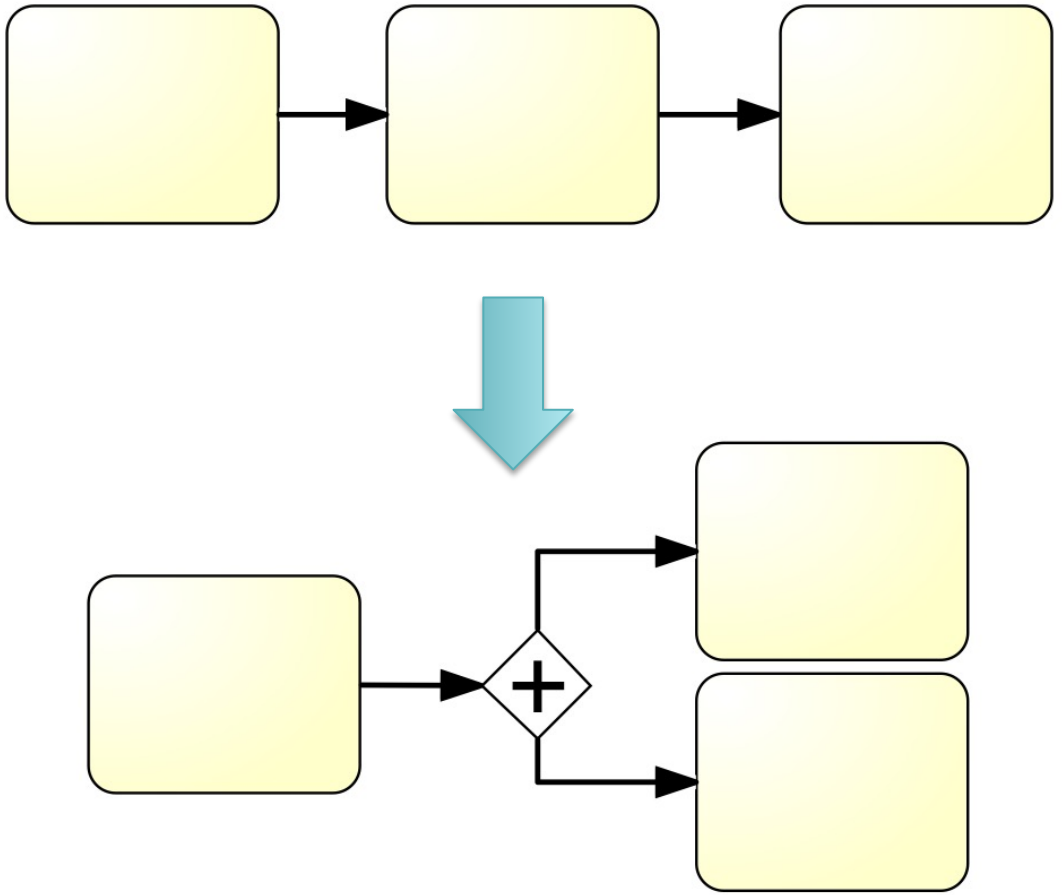
(T+,C+)

Examples:

- Make-to-order process: If “Prepare production plan” is time-consuming, postpone it until after the quote price has been tentatively accepted by the customer
- Procure-to-pay process: If “Check necessity of purchase” leads to 20% of knock-outs and “Check budget” leads to 2%, perform “Check necessity of purchase” first
- University admission process: authenticity check (very slow) leads to 1% of applications being rejected while committee’s check leads to 80% of applications being rejected. Put committee’s check first

H5. Parallelism enhancement

Parallelize tasks where possible in order to reduce cycle time

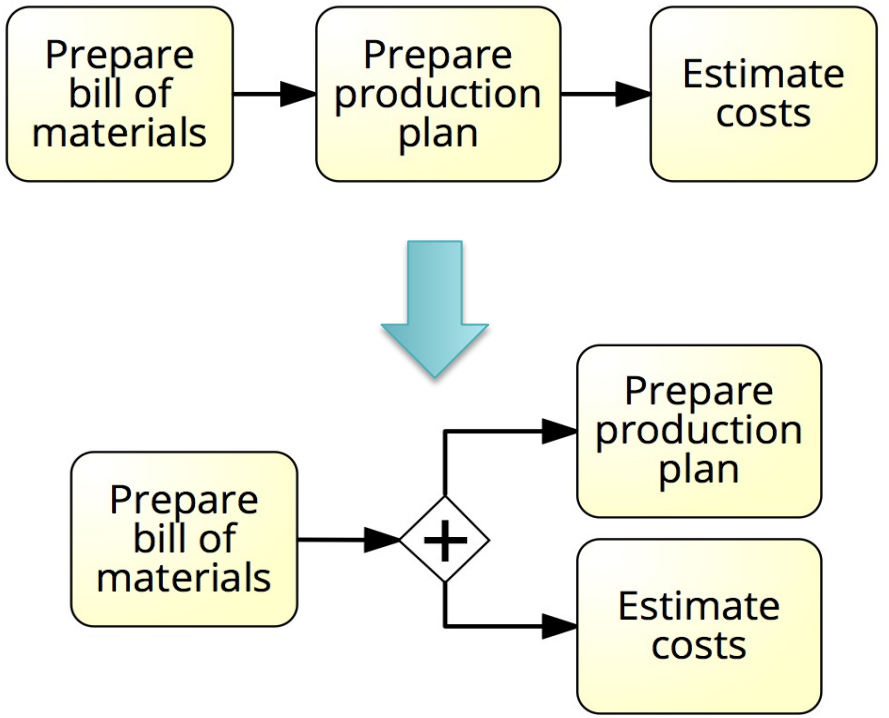


H5. Parallelism enhancement

(T+)

Examples:

- Procure-to-pay process: Parallelize “Approve budget” and “Approve necessity of purchase”
- Make-to-order process: After “Prepare bill of materials”, perform “Prepare production plan” and “Estimate costs” in parallel



Process-level redesign heuristics

6. Process specialization & standardization
7. Resource optimization
8. Communication optimization
9. Automation

H6. Process specialization/standardization

Process specialization

- One process is split into multiple ones: by customer class, by geographic location, by time period (winter, summer), etc.
- Resources are split accordingly

Process standardization

- Two processes are integrated
- Resources are pooled together

H6. Process specialization & standardization

Specialization example:

- Procure-to-pay process: One process for Direct procurement (e.g. raw materials) and one for Indirect procurement (MRO - Maintenance, Repair and Operations)
- Claims handling process: One claims handling process for the summer season (stormy season - peak) and one for the winter season (off-peak)

Standardization example:

- Claims handling process: Integrate claims handling for motor insurance across different brands of a group

Specialization: (C+/-, Q+/-, F-)
Standardization: (C+, Q+/-, F+)

H7. Resource optimization

Use resources of a given type as if they were in one room

- Avoid one group of people overloaded and another (similar) group idle

Let people do work that they are good at

- However, avoid inflexibility as a result of specialization

When allocating work to resources, consider the flexibility in the near future

- Allocate work to specialized resources first

Avoid setups as much as possible

- *Chain* multiple instances of the same task [sequential]
- *Batch* multiple instances of the same task [parallel]

H7. Resource optimization

Resource integration example:

- Claims handling process: Share resources across different types of claims (e.g. motor and personal insurance)

Batching example:

- Claims handling process: Batch all claims for a given geographic area and assign them to the same resources
- University admission process: Batch all applications and handle them to the assessment committee

(T+, C+, F+/-)

H8. Communication optimization

Automate handling, recording and organization of messages

Monitor customer interactions, record exceptions

Optimize

1. Number of interactions with customers and business partners
2. Type of interaction (synchronous vs. asynchronous)
3. Timing of interactions

(T+,Q+,C+/-,F-)

H8. Communication optimization

1. Optimize number of interactions
   - Gather sufficient information to get to the next milestone (reduce external interactions)

2. Optimize type of interaction
   - *Synchronous* interactions effective to resolve minor defects
   - *Asynchronous* to notify, inform, resolve major defects, request additional information to reach next milestone

H8. Communication optimization

3. Optimize timing of interactions:

- *Front-loaded process*: bulk of information exchange and processing happens upfront
  - Complete-kit concept
- *Back-loaded process*: bulk of information exchange and processing happens downstream
  - Example: Ford procurement process in the late 80s

H8. Communication optimization

Complete-Kit Concept: *“Work should not begin until all pieces necessary to complete the job are available”*

Boaz Ronen

Principles for complete-kit process design:

- Provide complete and easy-to-follow instructions for those who will initiate the process.
- If a process cannot start, the client should be notified of all defects that could be reasonably identified at the onset of the process
- Consider the tradeoff between “incomplete-kit” process initiation vs. roundtrip to revise and resubmit a request

H9. Automation

Use data sharing (Intranets, packaged enterprise systems) to:

- Increase availability of information to improve visibility and decision-making (subject to security/privacy requirements)
- Avoid duplicate data entry and transportation

Use network technology to:

- Replace physical flow (e.g. paper documents) with information flow
- Enable self-service via e.g. online forms and Web data services

H9. Automation

Use tracking technology to identify and locate materials and resources

- Identification: Bar/QR code, RFID
- Location: GPS, indoor positioning

Use business rules technology to automate information processing tasks (including decisions)

Automate end-to-end processes with a dedicated BPM system or system with process automation functionality

(T+,C+/-, Q+/-, F-)

Acknowledgements

- All material comes from Marlon Dumas, Marcello La Rosa, Jan Mendling, Hajo A. Reijers, authors of the “Fundamentals of Business Process Management” book.