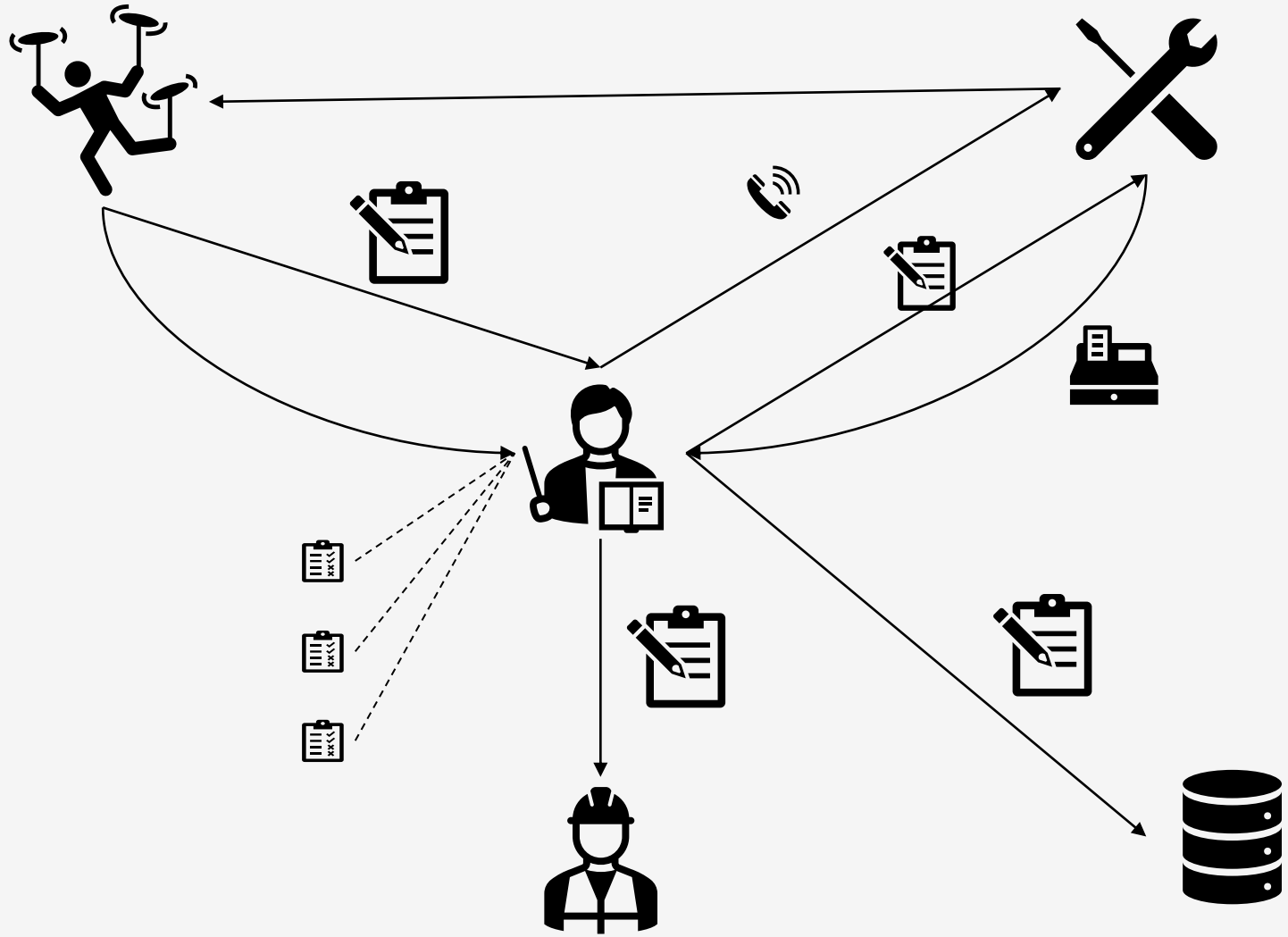
Introduction to Process view of the organization

The Organization

- **Functional Units**
- **Business Processes**

Equipment rental at BuildIT



Equipment Rental Request

Business Process

- **Business Process**: A collection of inter-related events, activities, and decision points that involve several actors and objects, which collectively lead to an outcome that is of value to a customer.

Business Process

- **Event**: Events correspond to things that happen atomically, which means that they have no duration.

- **Activities**: Both fine-grained or coarse-grained units of work.
  - **Tasks**: refers to a fine-grained unit of work performed by a single process.

- **Decision points**: points in time when a decision is made that affects the way the process is executed.

- **Actors**: Human actors, organizations, or software systems acting on behalf of human actors or organizations.
  - Internal - process participants.
  - External

Business Process

- **Physical objects: E**quipment, materials, products, paper documents.
- **Informational objects:** Electronic documents and electronic records.
- **Outcomes**: an outcome should deliver value to the actors involved in the process.
  - Negative outcome
  - Positive outcome
- **Customer:** The one who consumes the output.

Processes and Outcomes

- Every Process leads to one or more outcomes – Positive or Negative
  - Positive outcomes add value
  - Negative outcome reduce value

- Outcomes:
  - Items received as requested
  - Items received but different from requested
  - Items requested rejected by supervisor
  - Items not available
  - Items received as per changed request from supervisor

Business Process

- **Business Process**: A collection of inter-related events, activities, and decision points that involve several actors and objects, which collectively lead to an outcome that is of value to at least one customer.

- **Business Process Management:** A body of methods, techniques, and tools to identify, discover, analyze, redesign, execute, and monitor business processes in order to optimize their performance.

Business Process Management (BPM)

- Art and science of overseeing how work is performed in an organization to ensure consistent outcomes and to take advantage of **improvement** opportunities.

- Improvement:
  - Reducing costs
  - Reducing execution times
  - Reducing error rates
  - Gaining competitive advantage through innovation.

- Improvement initiatives may be one-off or of a continuous nature; they may be incremental or radical.

Examples of Business Processes

- ***Order-to-cash***
- ***Quote-to-order***
- ***Procure-to-pay***
- ***Issue-to-resolution***
- ***Application-to-approval***
- ***Claim-to-Settlement***

Business Process Management

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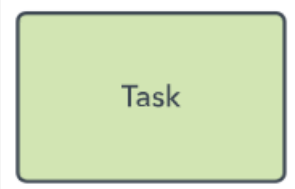
Business Process Model and Notation

- Supported by numerous tools: http://www.bpmn.org/ lists over 70 tools
- Both for conceptual and executable models
- Based on popular graphical flowcharts

Rules

- Events are represented by circles

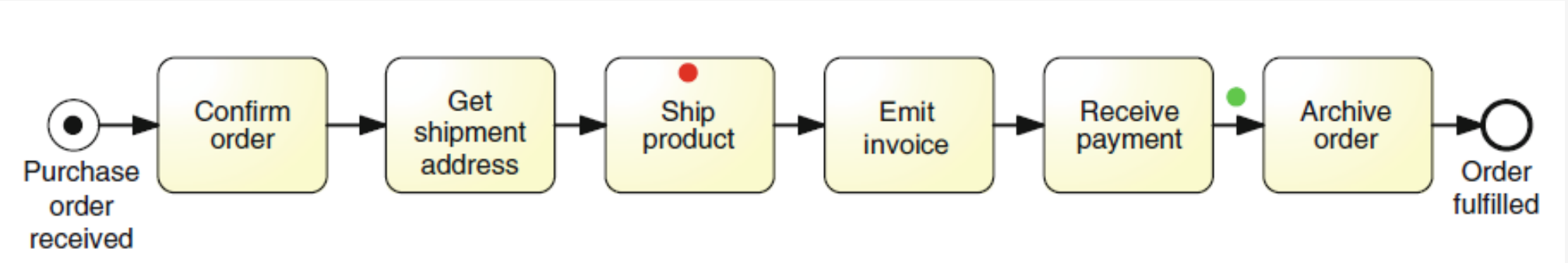
- Task or Activities by rounded rectangles



- Sequence flows (also called arcs) are represented by arrows with a full arrow-head

Token

- Represents state of an Instances of a process

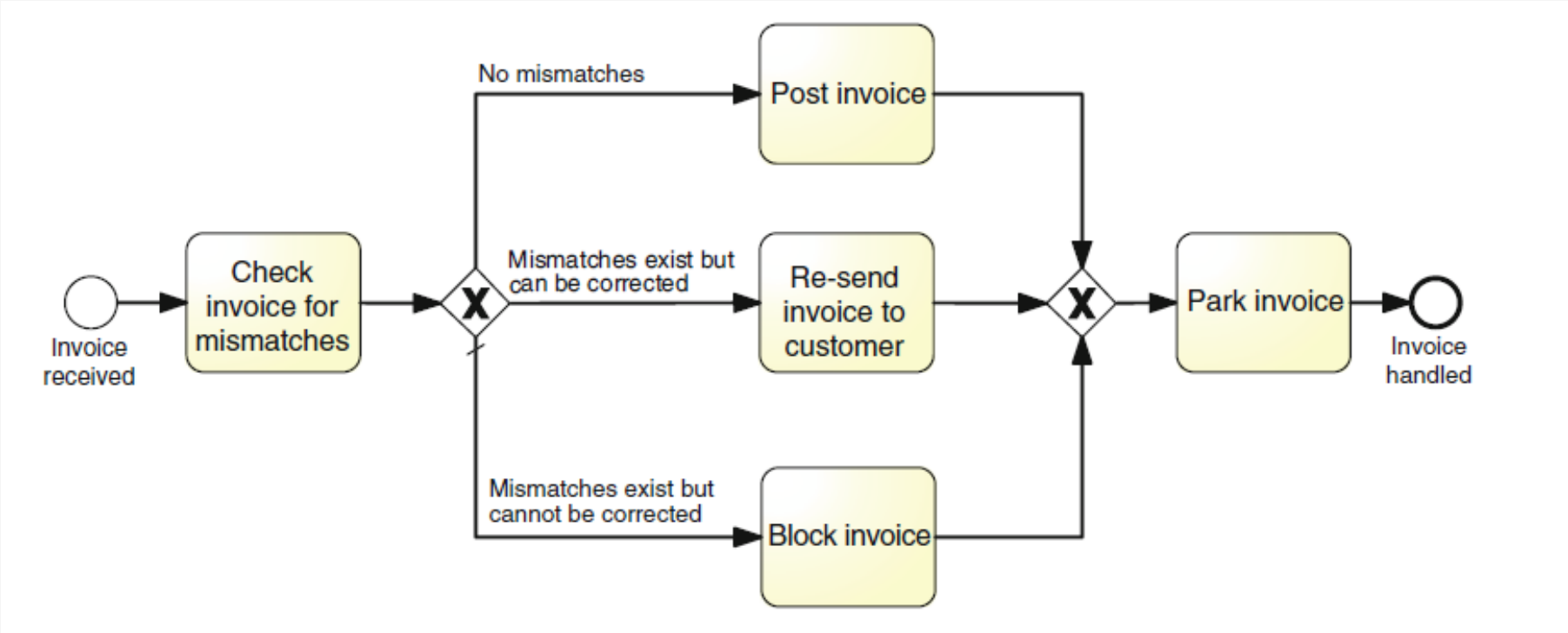


Invoice checking process

- As soon as an invoice is received from a customer, it needs to be checked for mismatches. The check may result in any of the following three options:
  1. there are no mismatches, in which case the invoice is posted;
  2. there are mismatches but these can be corrected, in which case the invoice is resent to the customer;
  3. there are mismatches but these cannot be corrected, in which case the invoice is blocked.
- Once one of these three activities are performed the invoice is parked and the process completes

Branching and Merging - Mutually exclusive paths

- Gateways – XOR gateway
  - XOR split
  - XOR join



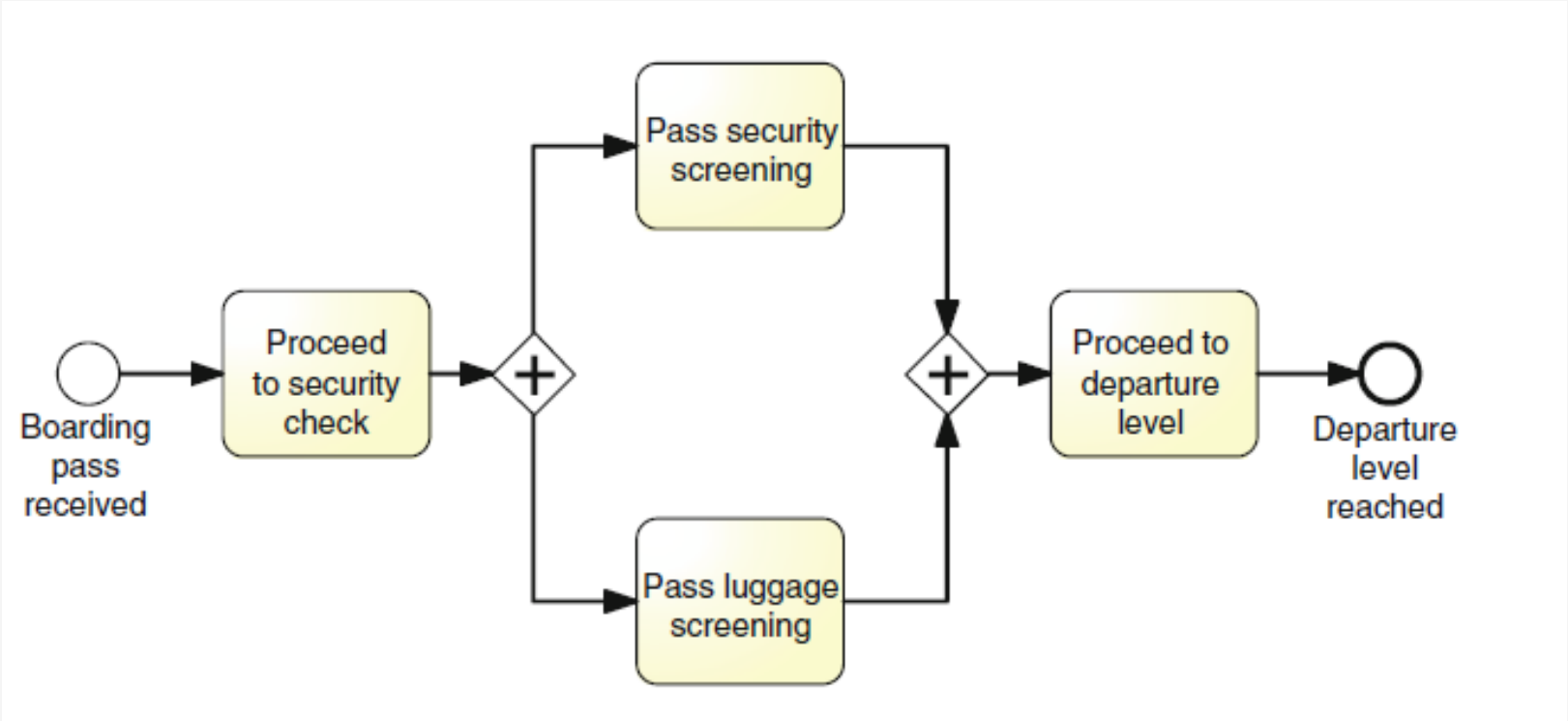
- Default flow

Security check at an airport

- Once the boarding pass has been received, passengers proceed to the security check. Here they need to pass the personal security screening and the luggage screening. Afterwards, they can proceed to the departure level.

Branching and Merging – Parallel paths

- Gateways – AND gateway
  - AND split
  - AND join

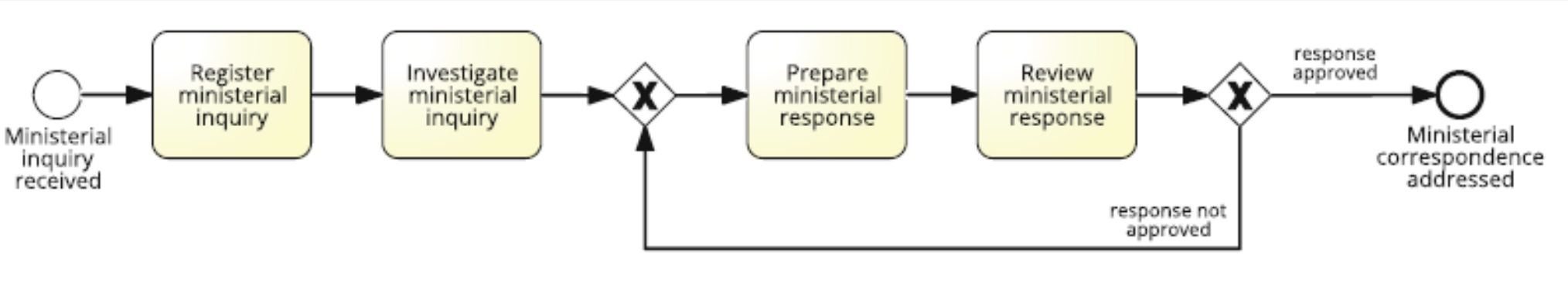


- Synchronization

Addressing ministerial correspondence.

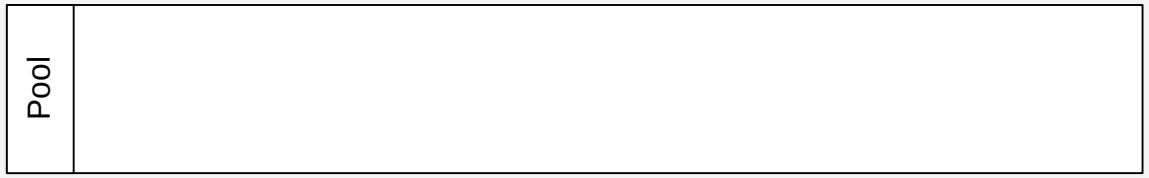
- In the treasury minister’s office, once a ministerial inquiry has been received, it is first registered into the system. Then the inquiry is investigated so that a ministerial response can be prepared. The finalization of a response includes the preparation of the response itself by the cabinet officer and the review of the response by the principal registrar. If the registrar does not approve the response, the latter needs to be prepared again by the cabinet officer for review. The process finishes only once the response has been approved.

Branching and Merging – Repetition block

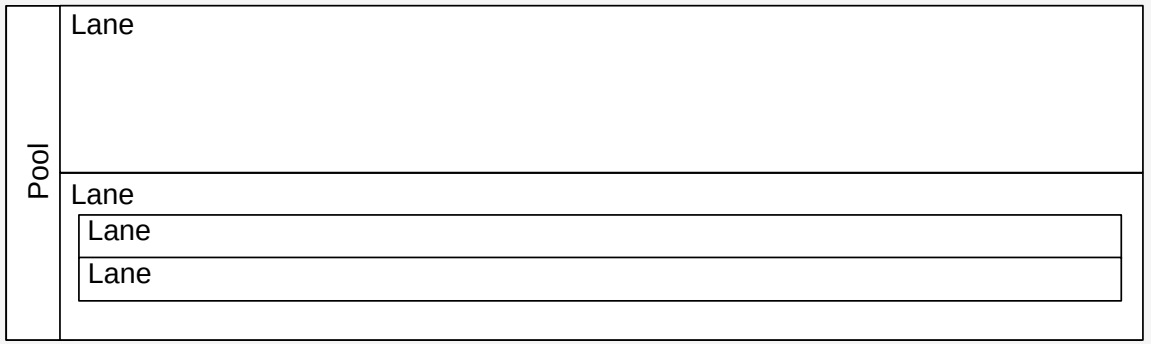


Resources – Pools and Lanes

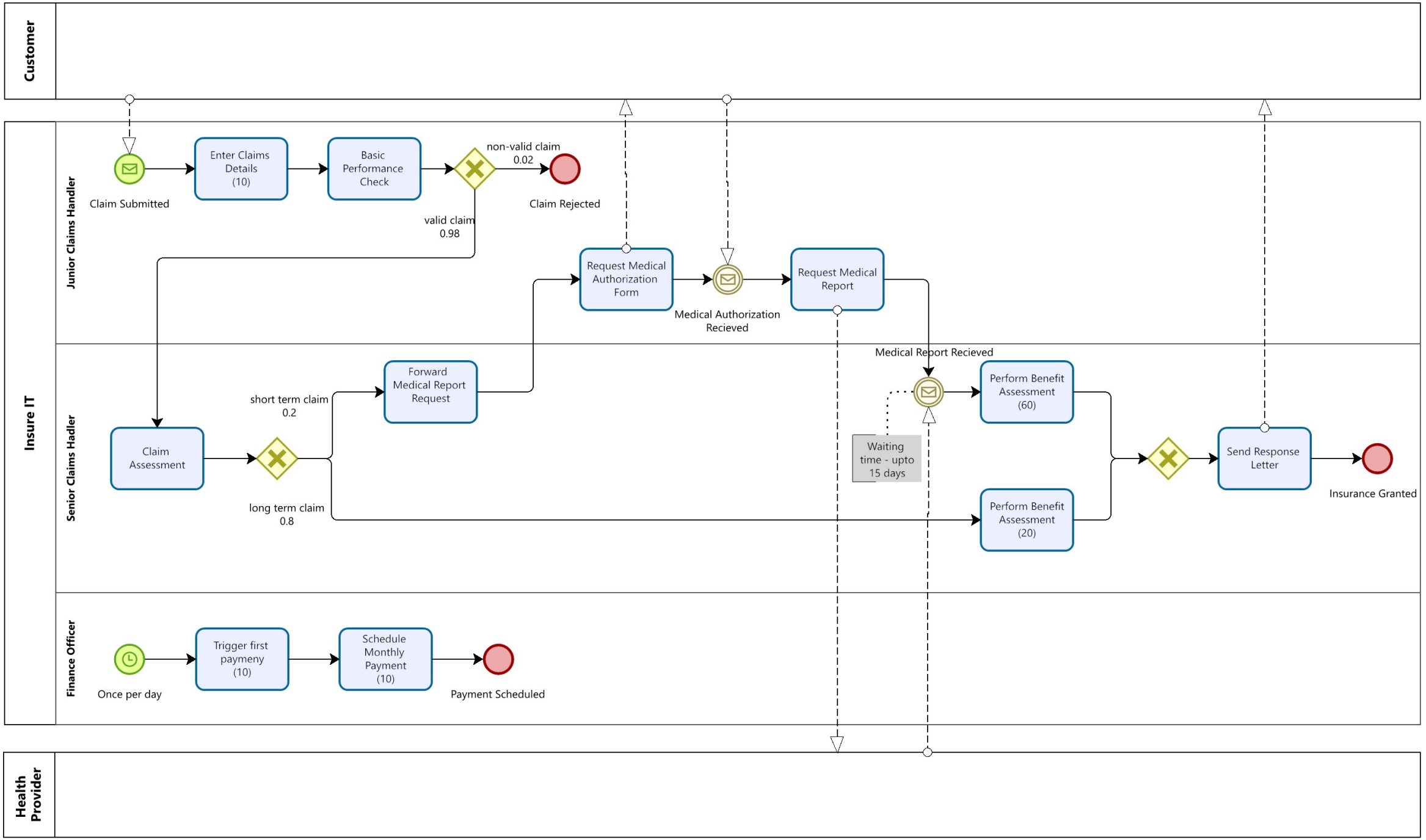
- Pools are generally used to model resource classes
  - To model a business party like a whole organization



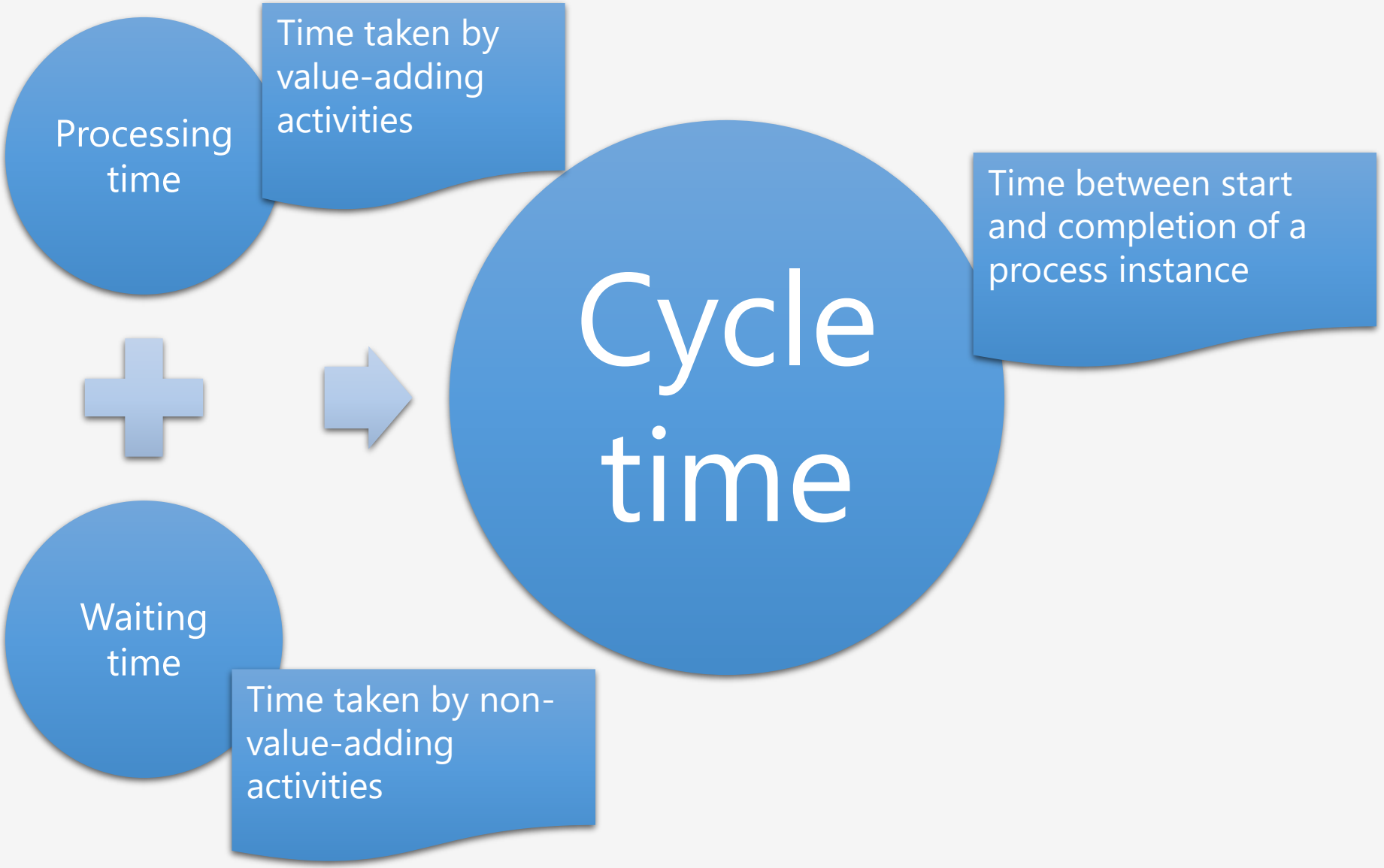
- Lanes are used to partition a pool into sub-classes or single resources.
  - To model a department, unit, team, software system, or equipment within that organization.



Disability Insurance Claims Handling at InsureIT

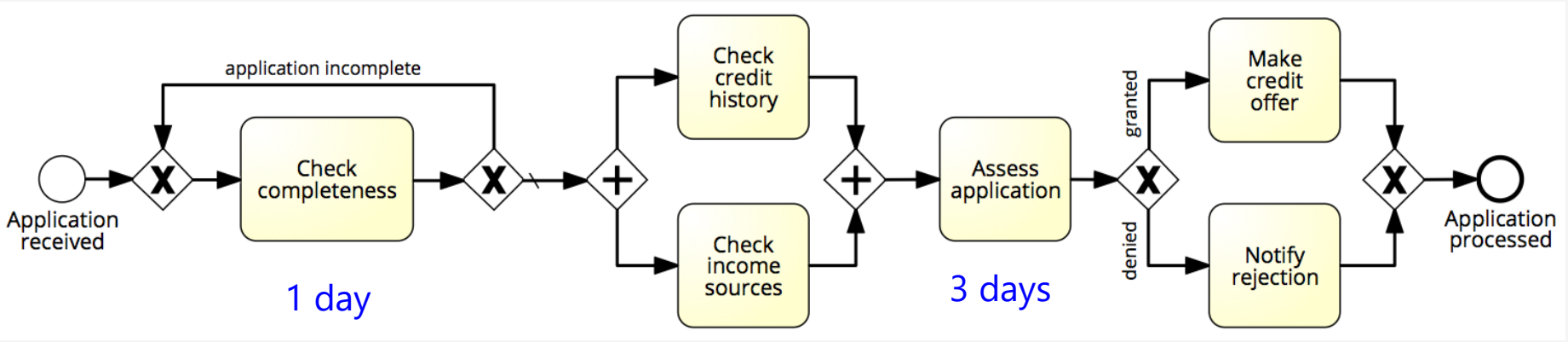

Customer
Insure IT
Junior Claims Handler
Senior Claims Hadler
Finance Officer
Health Provider
Claim Submitted
Enter Claims Details (10)
Basic Performance Check
non-valid claim 0.02
Claim Rejected
valid claim 0.98
Request Medical Authorization Form
Medical Authorization Recieved
Request Medical Report
Medical Report Recieved
Claim Assessment
short term claim 0.2
Forward Medical Report Request
long term claim 0.8
Waiting time - upto 15 days
Perform Benefit Assessment (60)
Perform Benefit Assessment (20)
Send Response Letter
Insurance Granted
Once per day
Trigger first payment (10)
Schedule Monthly Payment (10)
Payment Scheduled

Common time-related measures



Cycle time efficiency

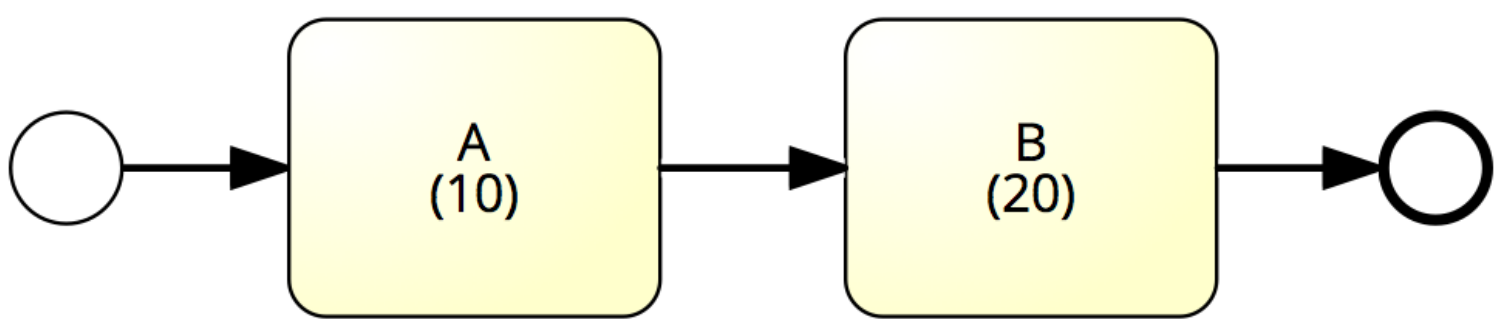
Flow analysis of cycle time



Cycle time = X days

Sequence – Example

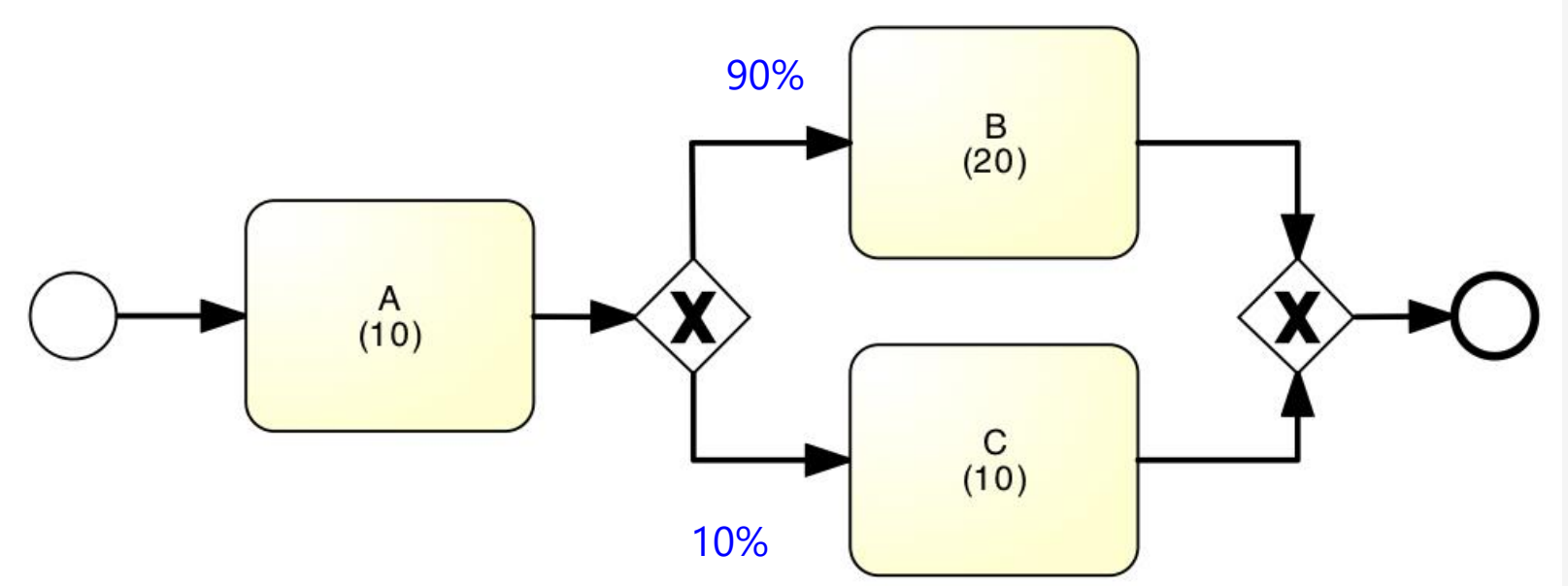
- What is the average cycle time?



Cycle time = 10 + 20 = 30

Example: Alternative Paths

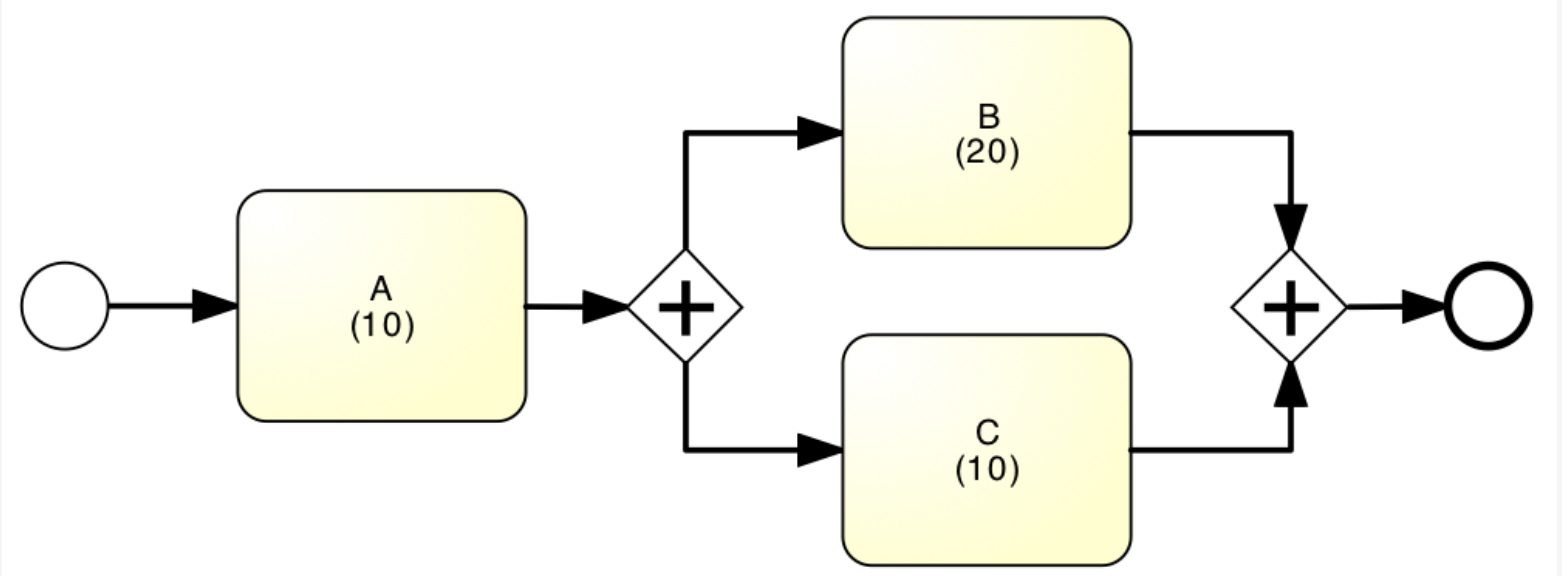
- What is the average cycle time?



Cycle time = 10 + 0.9*20+0.1*10 = 29

Example: Parallel paths

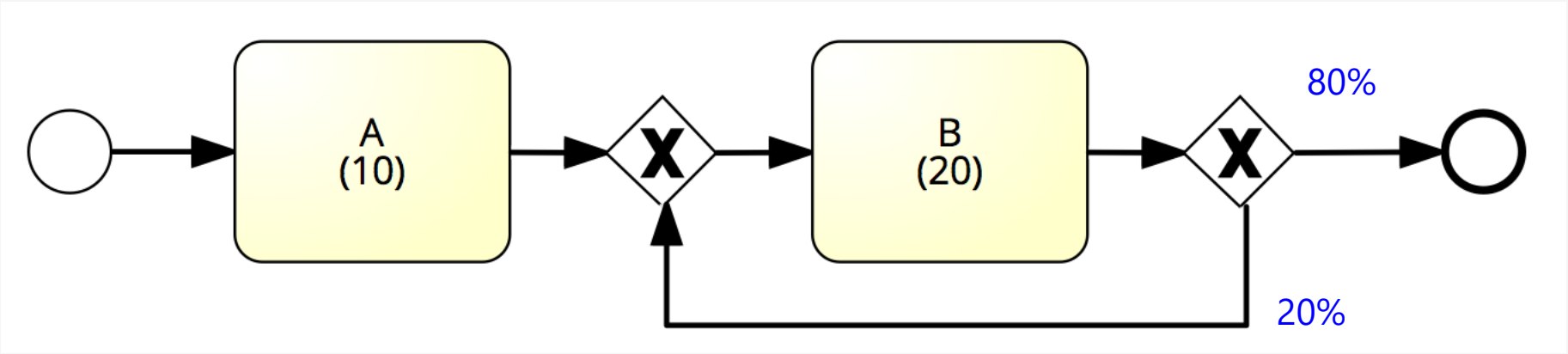
- What is the average cycle time?



Cycle time = 10 + 20 = 30

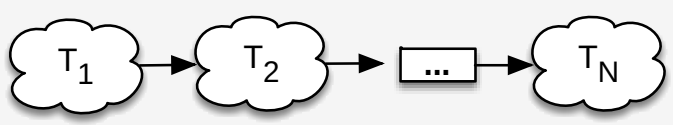
Example: Rework loop

- What is the average cycle time?

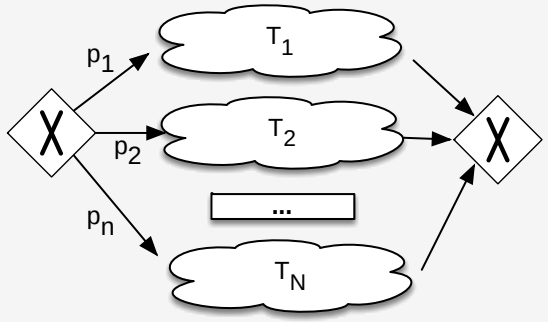


Cycle time = 10 + 20/0.8 = 35

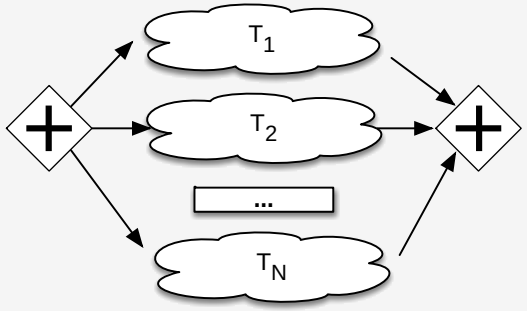
Flow analysis equations for cycle time



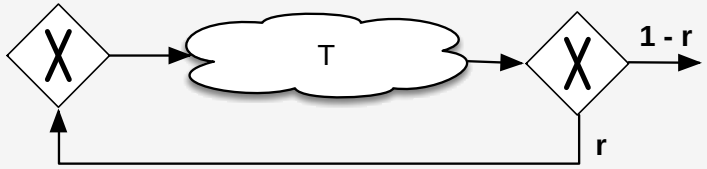
$$CT = T_1 + T_2 + \ldots + T_N$$



$$CT = p_1 * T_1 + p_2 * T_2 + \ldots + p_n * T_N$$

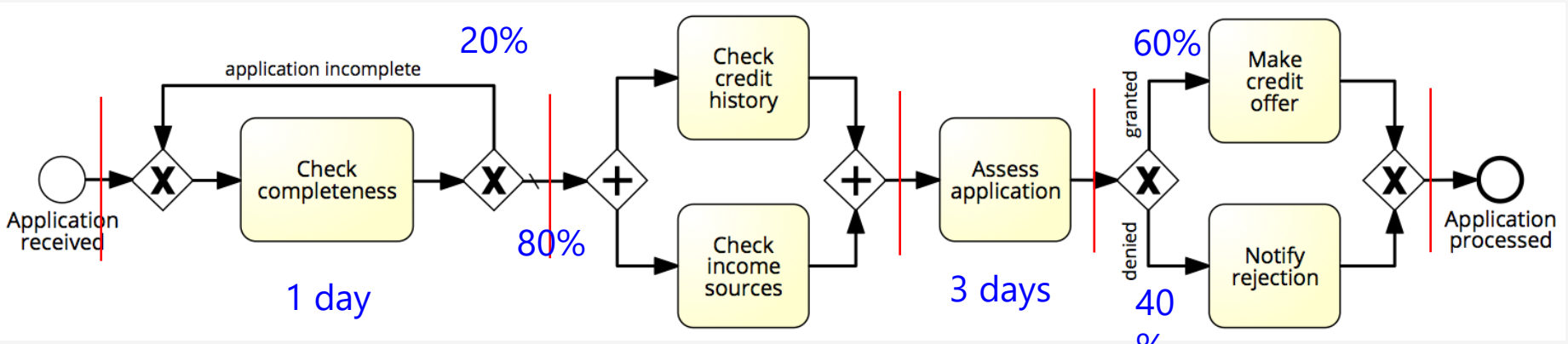


$$CT = \max(T_1, T_2, \ldots, T_N)$$



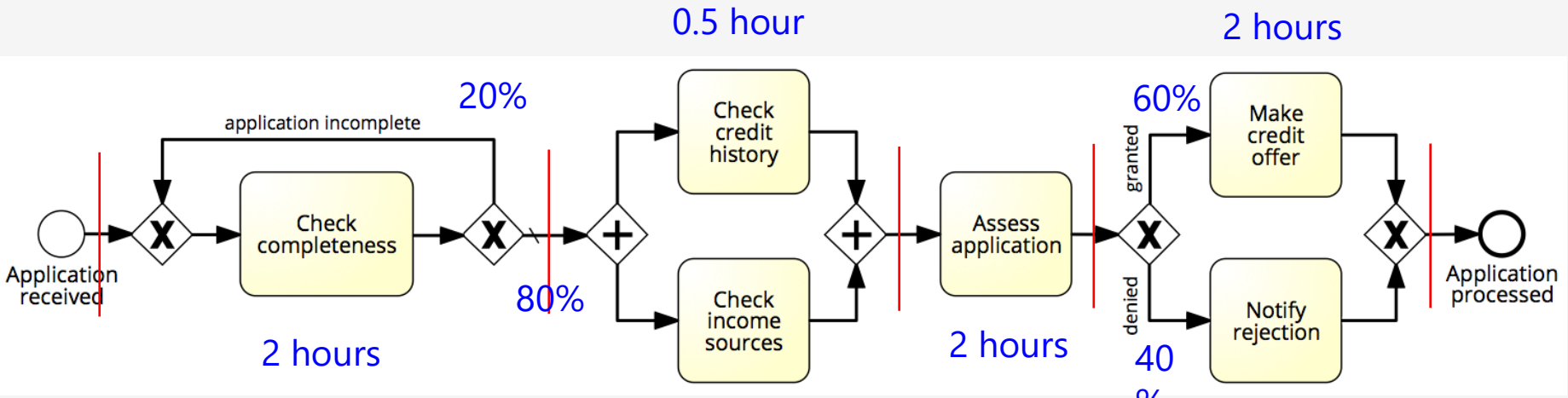
$$CT = T / (1-r)$$

Flow analysis of cycle time



Cycle time = 1.25 + 3 + 3 + 1.4 = 8.65 days

Flow analysis of processing time



Processing time = 2.5 + 3 + 2 + 1.4 = 8.9 hours

Cycle time efficiency = 8.9 hours / 8.65 days = 12.9%

Cycle Time & Work-In-Progress

- WIP = (average) Work-In-Process
  - Number of cases that are running (started but not yet completed)
  - E.g. # of active and unfilled orders in an order-to-cash process
- Little's Formula: WIP = $\lambda \cdot CT$
  - λ = arrival rate (number of new cases per time unit)
  - CT = cycle time

Exercise

A fast-food restaurant receives on average 1200 customers per day (between 10:00 and 22:00). During peak times (12:00-15:00 and 18:00-21:00), the restaurant receives around 900 customers in total, and 90 customers can be found in the restaurant (on average) at a given point in time. At non-peak times, the restaurant receives 300 customers in total, and 30 customers can be found in the restaurant (on average) at a given point in time.

1. What is the average time that a customer spends in the restaurant during peak times?
2. What is the average time that a customer spends in the restaurant during non-peak times?

Exercise

- Little's law tells us that CT = W IP/λ.
- At peak time, there are 900 customers distributed across 6 h, so the mean arrival rate λ = 150 customers per hour. On the other hand, WIP = 90 during peak time. Thus, CT = 90/150 = 0.6 h (i.e., 36 min).
- During non-peak time, λ = 300/6 = 50 customer per hour while WIP = 30, thus CT = 30/50 = 0.6 h (again 36 min)

Cycle time efficiency

- Processing Time
  - Enter claims details (10) + 0.98 *(0.2 * Perform benefit assessment (20) + 0.8 * Perform benefits assessment (60) + Send response letter (10)) + 0.02*0
  - 10 + 0.98 * (0.2 * 20 + 0.8 * 60 + 10) = 70.76 minutes

- Cycle Time
  - 3 working days (1440 minutes) for short term disability claims
  - 20 working days (9600 minutes) for long term disability claims
  - 0.2 * 1440 + 0.8 * 9600 = 7968 minutes
  - 0.2 * 3 + 0.8 * 20 = 16.6

  - Arrival Rate = 5.47/ day

- CTE
  - 70.76 / 7968 = 0.008880522 = **0.9 %**

Process Change

Reference

- Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2018). *Fundamentals of business process management* (Vol. 2). Heidelberg: Springer.