# Process modeling II

PV207 – Business Process Management
Spring 2019

Jiří Kolář, Lubomír Dočkal, Lubomír Hruban

# Last lecture recap

- Why process modeling?

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- Why process modeling?
- BPMN L1, L2, L3

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- Quality aspects of process model

# Last lecture recap

- Why process modeling?
- BPMN L1, L2, L3
- Quality aspects of process model
- Process interactions
    - Private process
    - Abstract process (Black box/Collapsed Pool)
    - Collaboration (Global) process

# Last lecture recap

- Pool and Lane
- Task (User, Service, Abstract/None)
- Subprocess (Collapsed, Expanded)
- Start Event (None, Message, Timer)
- End Event (None, Message, Terminate)
- Gateway (Parallel, Exclusive)
- Sequence Flow
- Message Flow
- Data Object (Data store, Message)
- Text Annotation
- Link Event Pair

# Lecture overview

- Information sources
- From L1 to L2
- L2: timing precision
- BPMN 2.0 Level 2:
  - Subprocess
  - Activity call
  - **Events**
    - Messages
    - Signals
    - Errors
    - Escalations
  - Gateways
  - BPMN 2.0 summary

# Information sources

- BOOK: BPMN method and style / Bruce Silver
  - ISBN:9780982368107, Library FI, Amazon 33$
- BPMN 2.0 poster
  - http://www.bpmb.de/images/BPMN2_0_Poster_EN.pdf
- Signavio modeler – academic licence
  - http://academic.signavio.com/p/login
- BPMN official OMG website
  - http://www.bpmn.org

# BPMN 2.0: from L1 to L2

- Level 1
  - Flowcharting
  - Business experts <=>  analysts/developers
  - The goal is to express simple activity sequences
  - Minimum of nesting and interprocess interactions
  - Simple events only
- Level 2
  - Analytical BPMN model
  - Process analysts <=> Process developers
  - Precise activity execution timing
  - Subprocess nesting and interprocess interactions
  - Events and signals, exception handling

# Level 2: timing precision

- Each activity has exact start and completion
- Service task
  - Starts immediately when reached
  - Being performed immediately and completed
- User task
  - Starts immediately when reached
  - Being performed once user open it in a ”worklist” = task “claim”

# Activity states

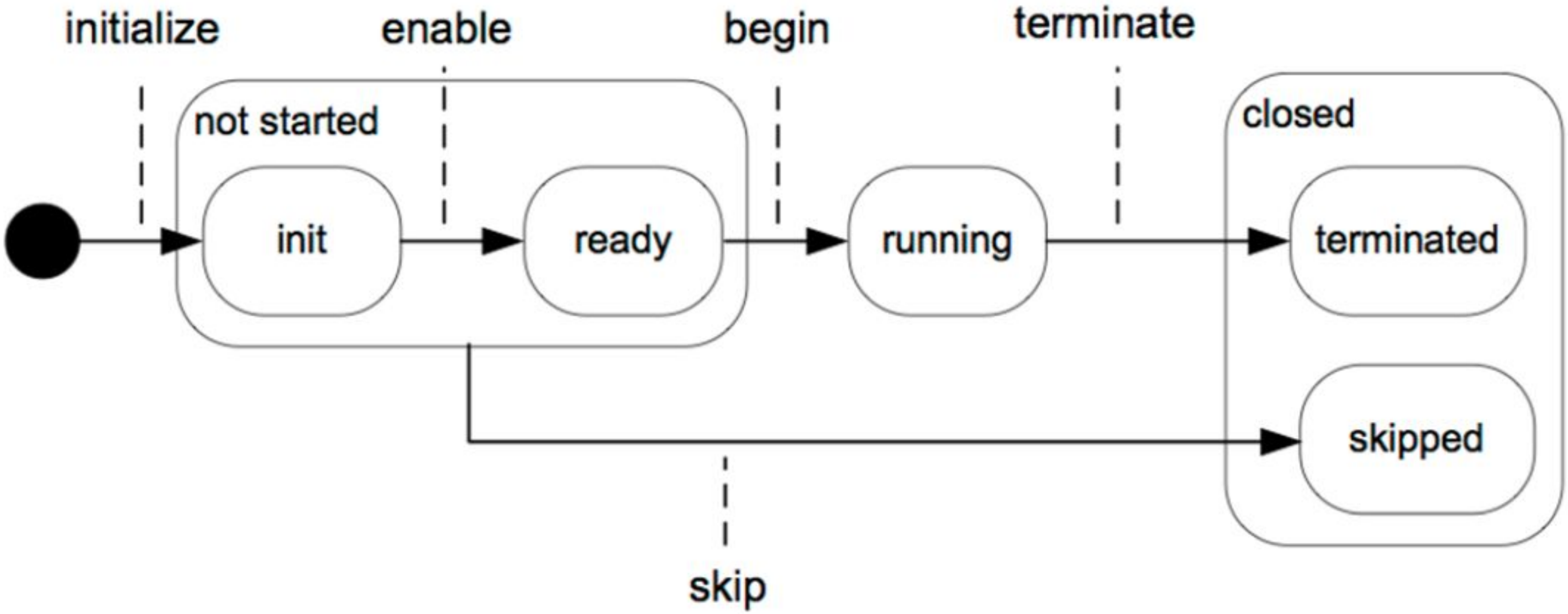
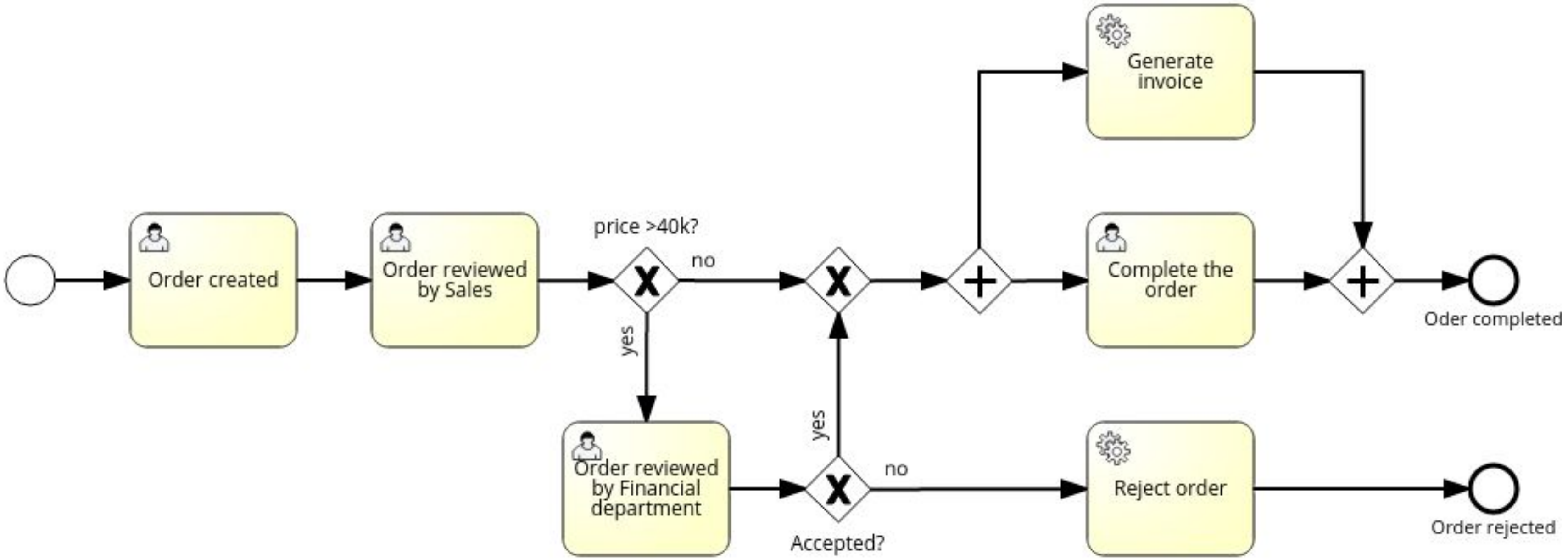


Fig. 3.9. State transition diagram for activity instances

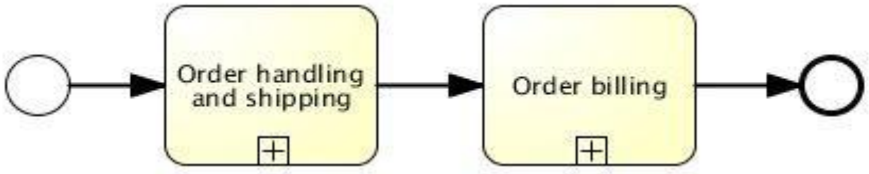
M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

# Level 2: timing precision example

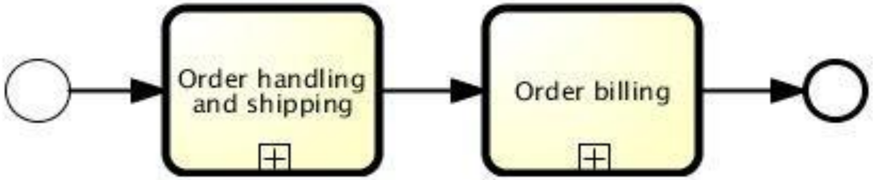


# Subprocess vs Call activity

- Subprocess
  - Expandable (nested) part of the process
  - Defined inside process
  - Nested for better readability



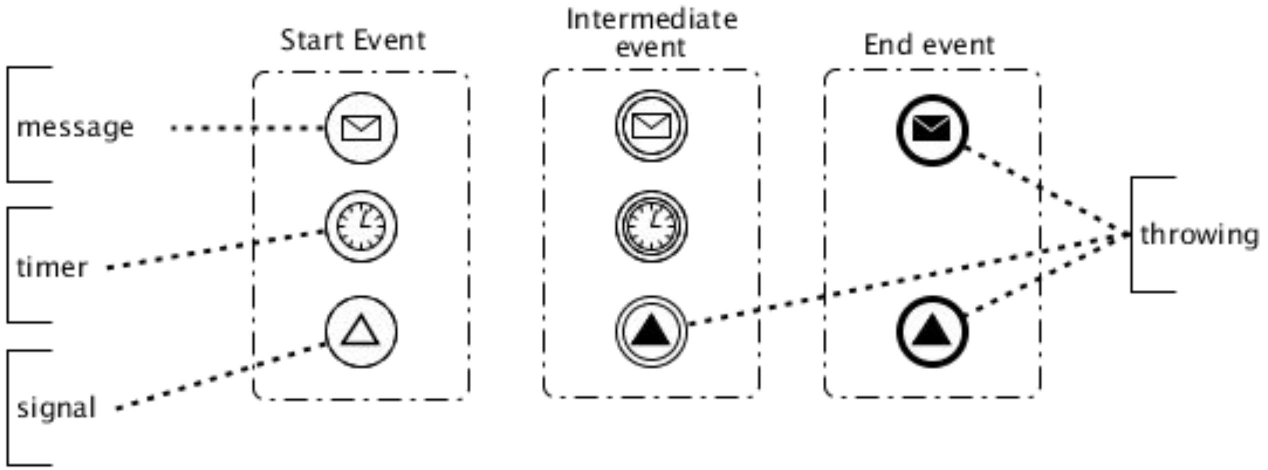
- Activity call
  - Call of global task or process
  - Defined as a separate process, then imported
  - Reusable in other processes

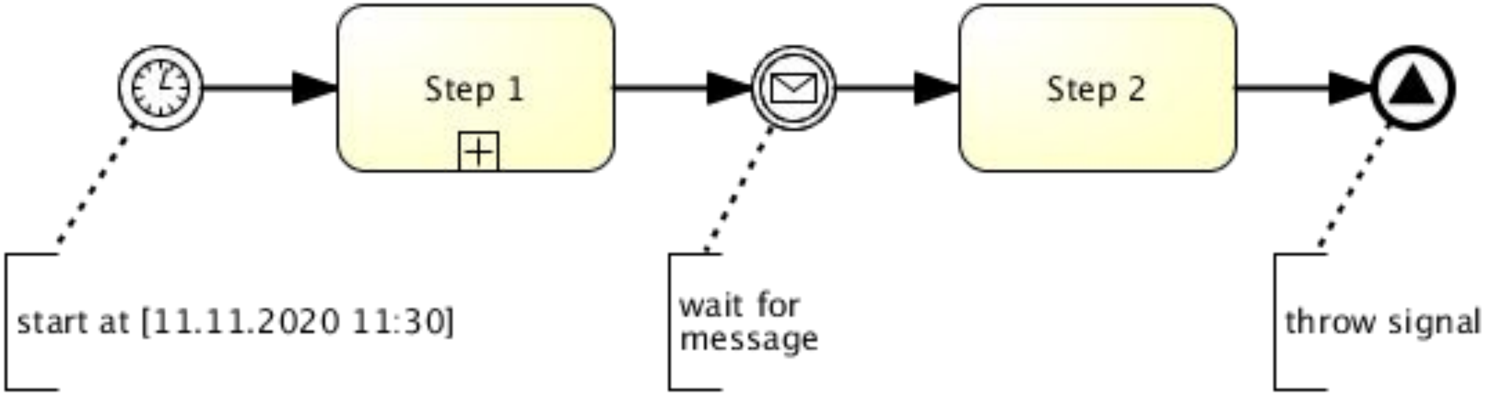


# Event types: Basic types

- Start events
  - Event initiate process/subprocess
  - One (or more in special cases)
  - Always catching
- Intermediate events
  - Occur during process
  - Can be throwing or catching
- End events
  - Occur at the end of process flow
  - Always throwing
  - End affect only one branch (except Terminate)

# Event types - Examples

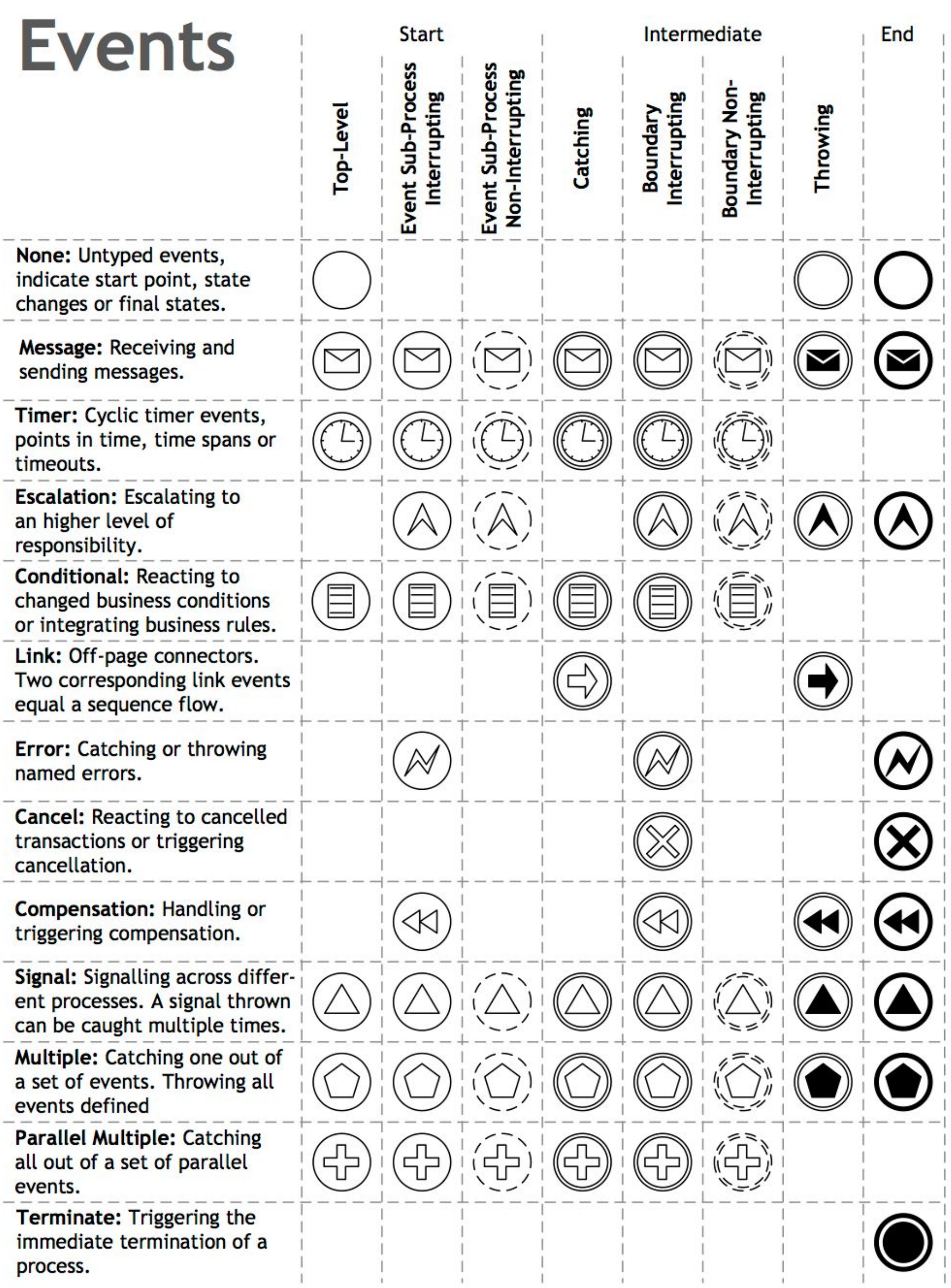




# Events

Downloaded from:

http://frapu.de/blog/index.php?m=07&y=09&d=01&entry=entry090701-211320

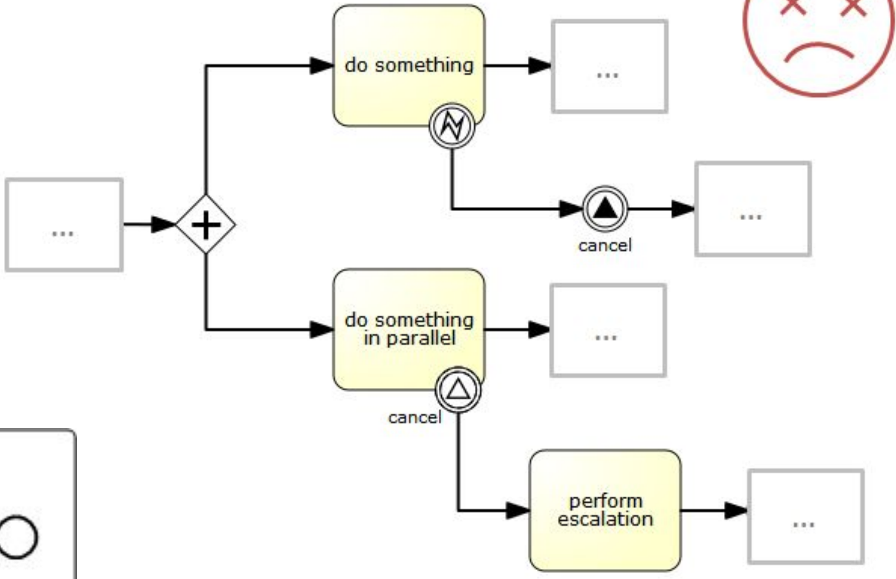


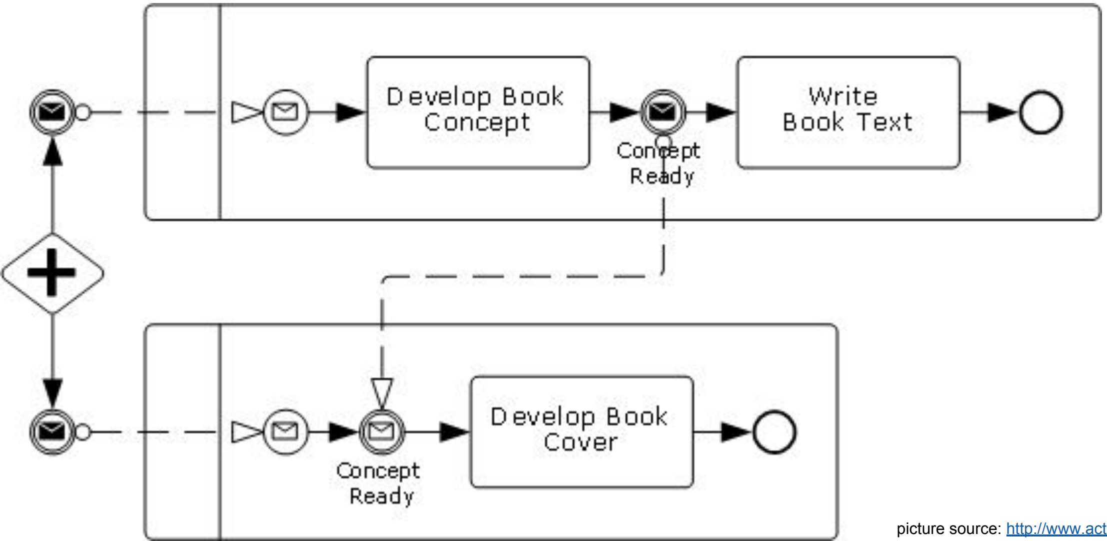
## Events

| | Start | | | Intermediate | | | | End |
|---|---|---|---|---|---|---|---|---|
| | Top-Level | Event Sub-Process Interrupting | Event Sub-Process Non-Interrupting | Catching | Boundary Interrupting | Boundary Non-Interrupting | Throwing | |
| **None:** Untyped events, indicate start point, state changes or final states. | ○ | | | | | | ○ | ○ |
| **Message:** Receiving and sending messages. | 🖂 | 🖂 | 🖂 | 🖂 | 🖂 | 🖂 | ✉ | ✉ |
| **Timer:** Cyclic timer events, points in time, time spans or timeouts. | ⏲ | ⏲ | ⏲ | ⏲ | ⏲ | ⏲ | | |
| **Escalation:** Escalating to an higher level of responsibility. | | Λ | Λ | | Λ | Λ | ⏶ | ⏶ |
| **Conditional:** Reacting to changed business conditions or integrating business rules. | ≣ | ≣ | ≣ | ≣ | ≣ | ≣ | | |
| **Link:** Off-page connectors. Two corresponding link events equal a sequence flow. | | | | ⇨ | | | ➡ | |
| **Error:** Catching or throwing named errors. | | ϟ | | | ϟ | | | ϟ |
| **Cancel:** Reacting to cancelled transactions or triggering cancellation. | | | | | ✕ | | | ✕ |
| **Compensation:** Handling or triggering compensation. | | ◁◁ | | | ◁◁ | | ◀◀ | ◀◀ |
| **Signal:** Signalling across different processes. A signal thrown can be caught multiple times. | △ | △ | △ | △ | △ | △ | ▲ | ▲ |
| **Multiple:** Catching one out of a set of events. Throwing all events defined | ⬠ | ⬠ | ⬠ | ⬠ | ⬠ | ⬠ | ⬟ | ⬟ |
| **Parallel Multiple:** Catching all out of a set of parallel events. | ✙ | ✙ | ✙ | ✙ | ✙ | ✙ | | |
| **Terminate:** Triggering the immediate termination of a process. | | | | | | | | ● |

# Event types:
# Catching vs. Throwing

- Throwing
  - Emits the event
  - Flow continues immediately
- Catching
  - Catch the event
  - Flow waits for the event

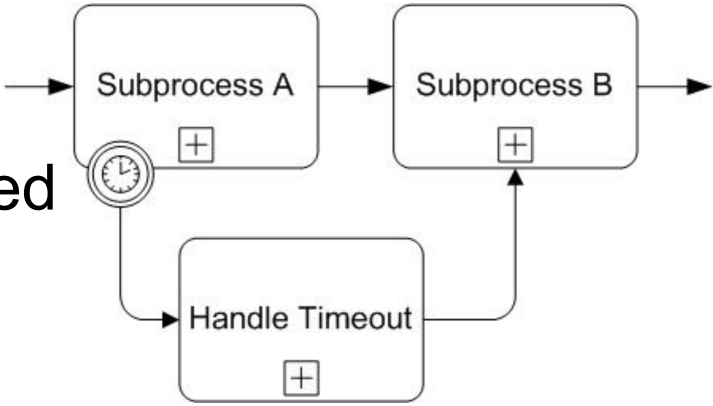




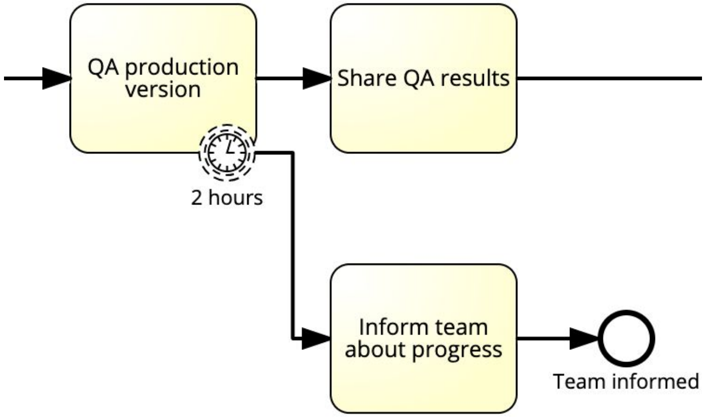
picture source: http://www.activiti.org/userguide/, http://mainthing.ru/wp-content/uploads/2010/11/message-e.png

# Event types:
# Interrupting vs non-interrupting

- Interrupting
  - Standard process flow is interrupted
  - Flow is directed through the event



- Non-interrupting
  - Standard flow continues normally
  - Parallel flow is directed through the event



picture source: http://www.processmodeling.info/posts/highlights-from-bpmn-2-0-non-interrupting-events/

# Event types:
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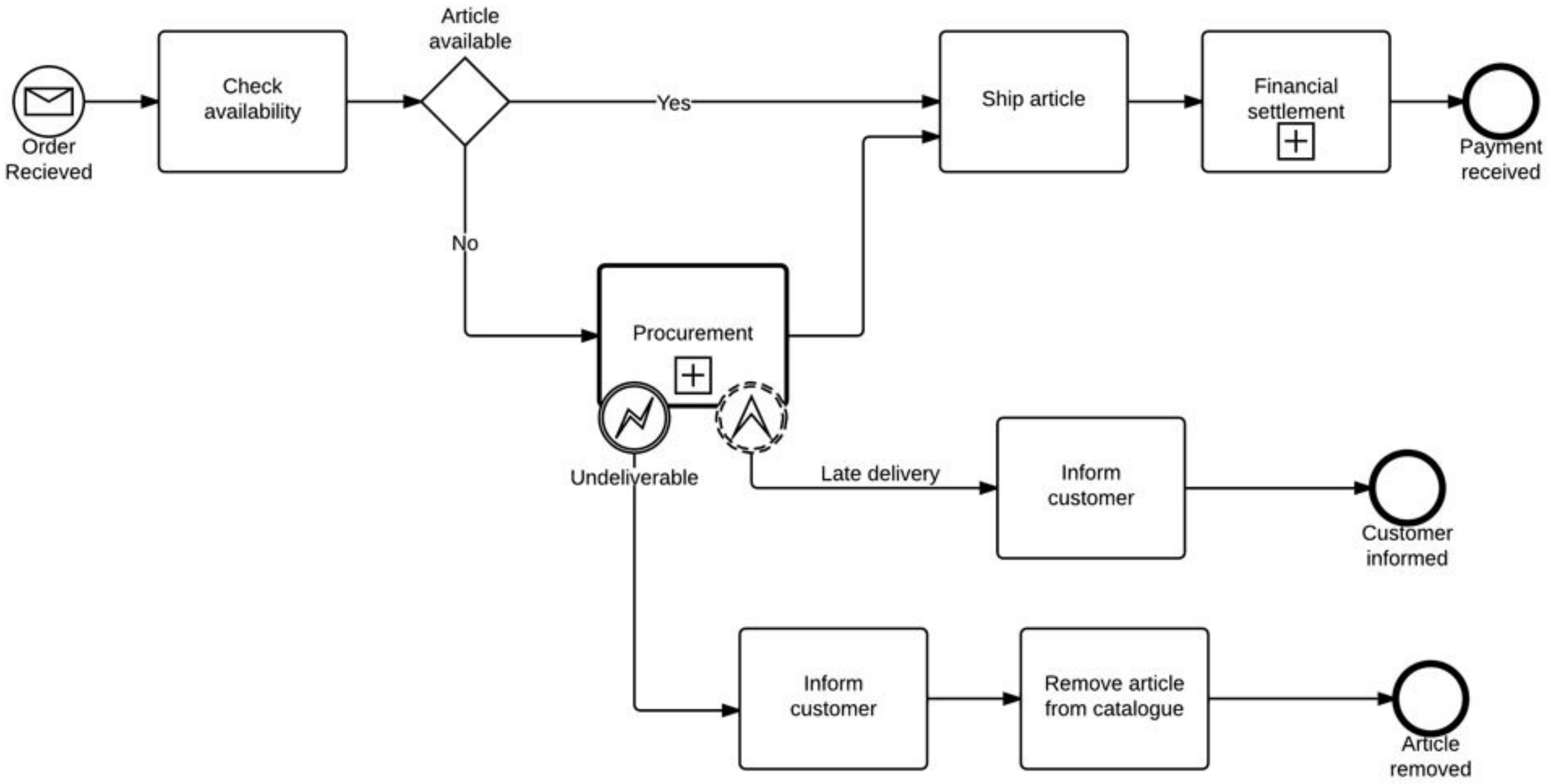
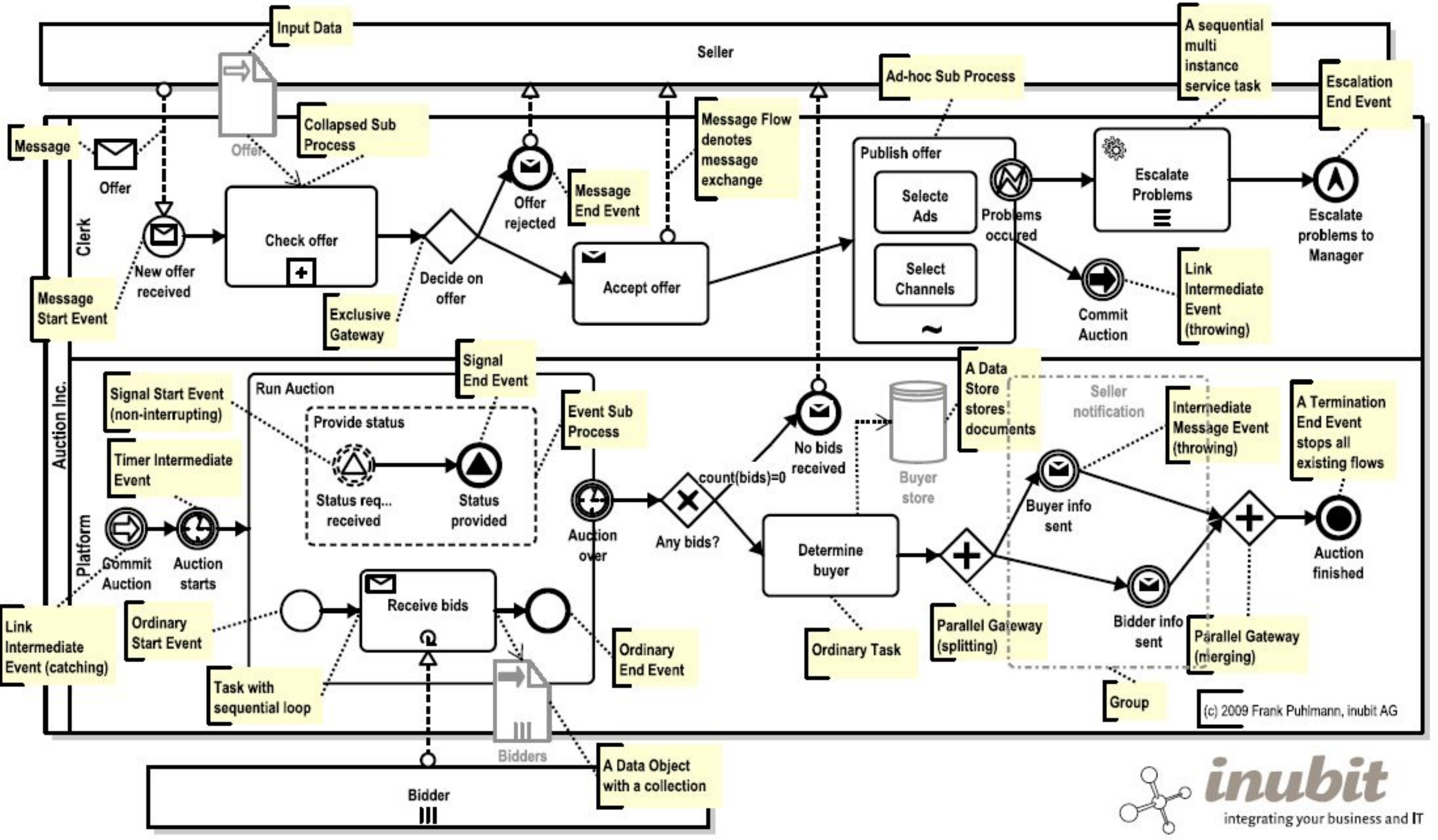


picture source: http://processpedia.com.au/community/wp-content/uploads/Order-Procurement-Process-Map-Example.png

# Break 10mins



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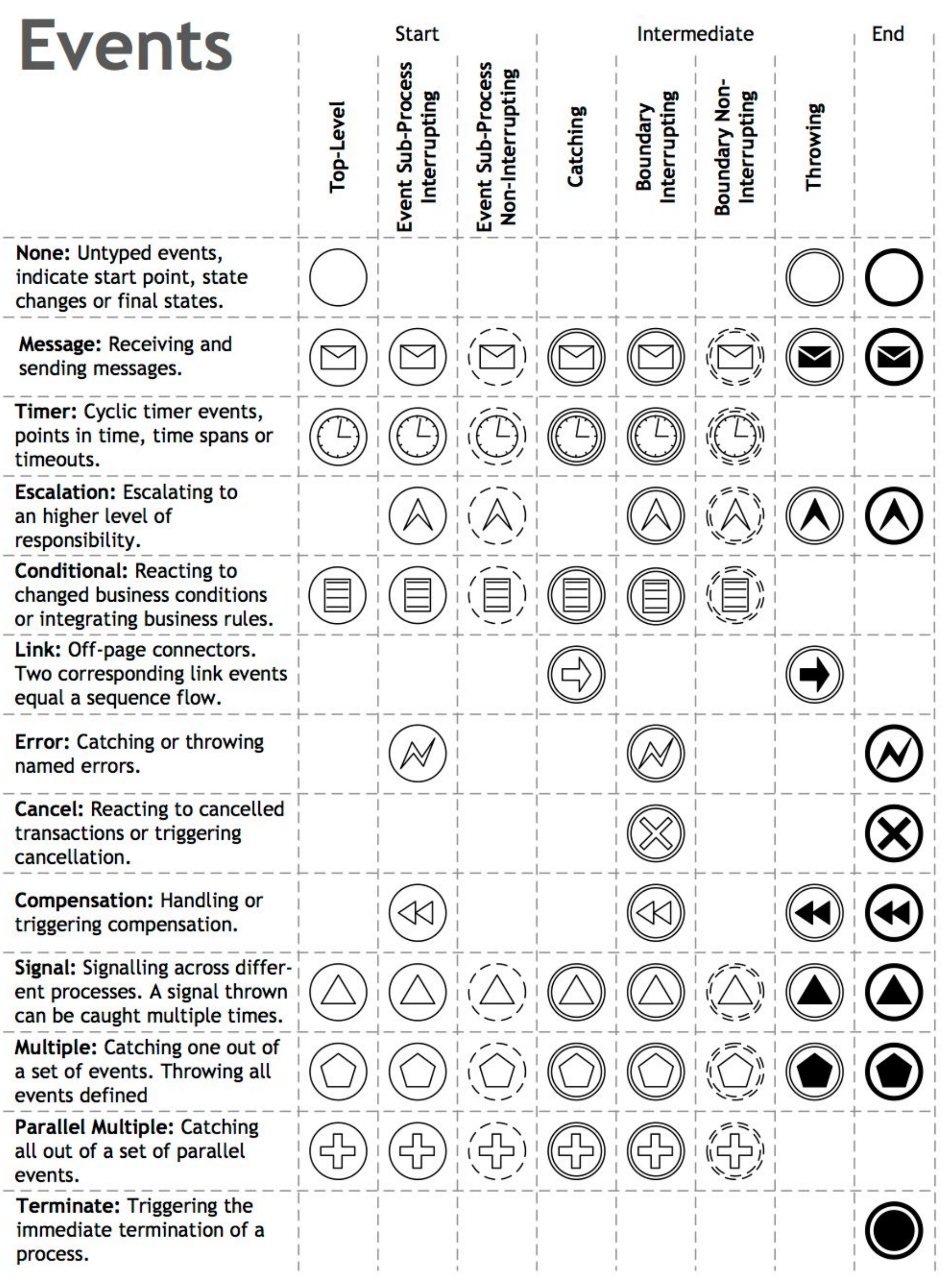

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| **Escalation:** Escalating to an higher level of responsibility. | | ⋀ | ⋀ | | ⋀ | ⋀ | ⋀ | ⋀ |
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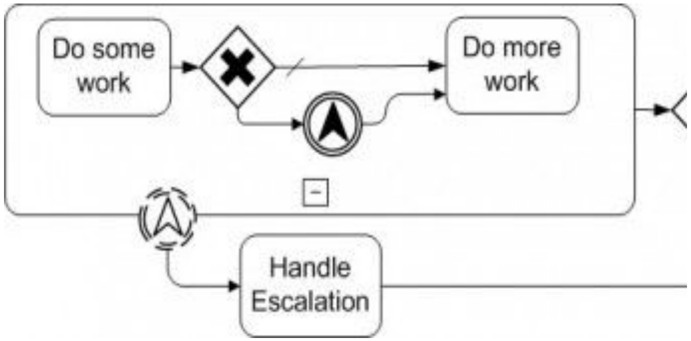
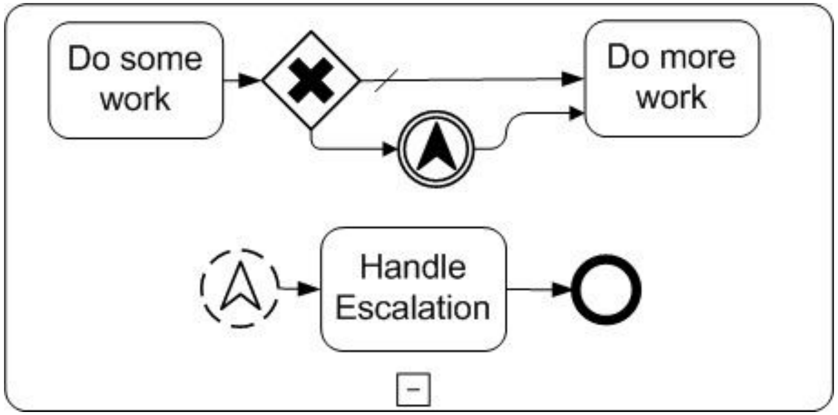
# Event types:
## Boundary vs. in-flow (event subprocess)





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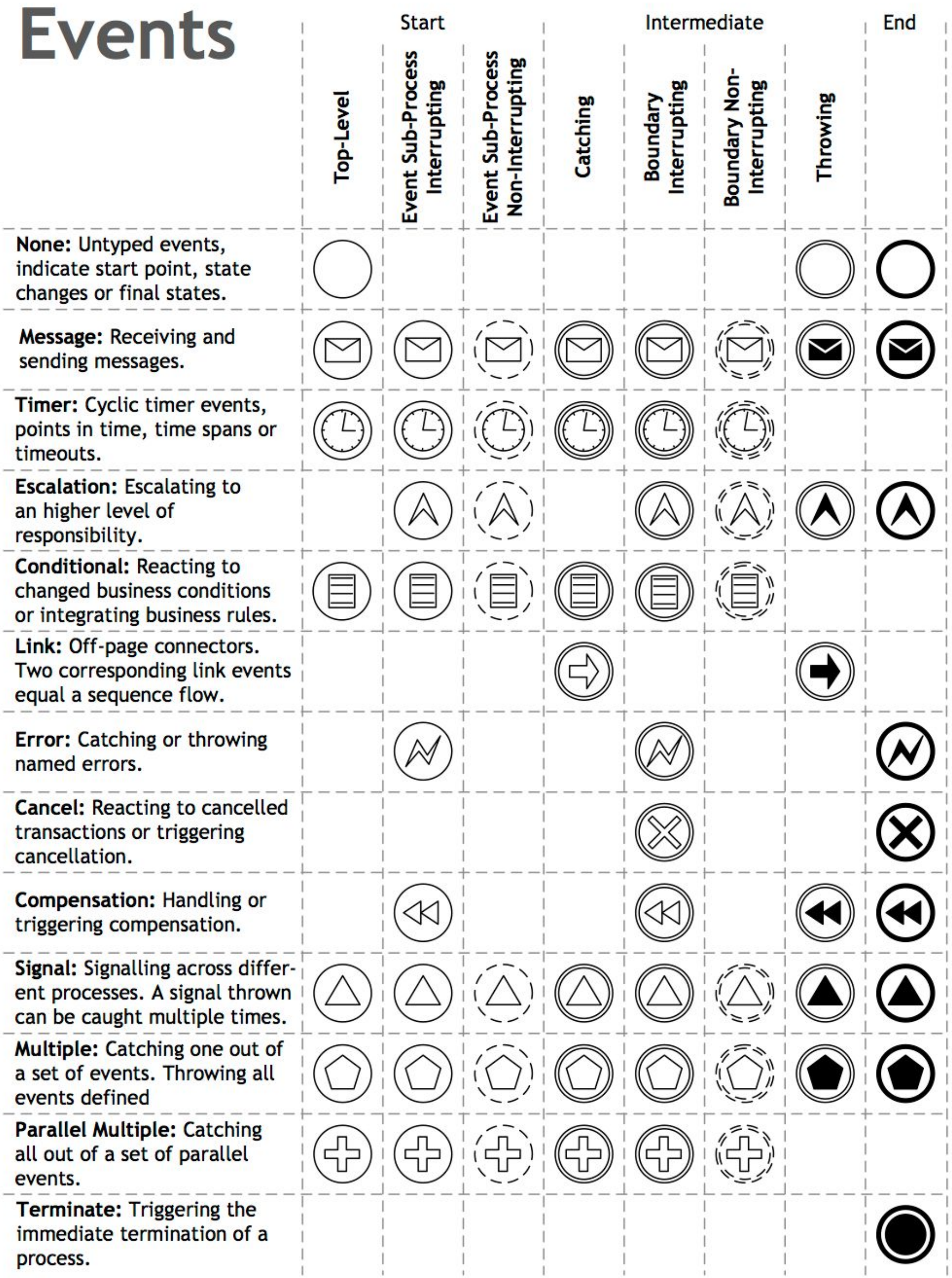

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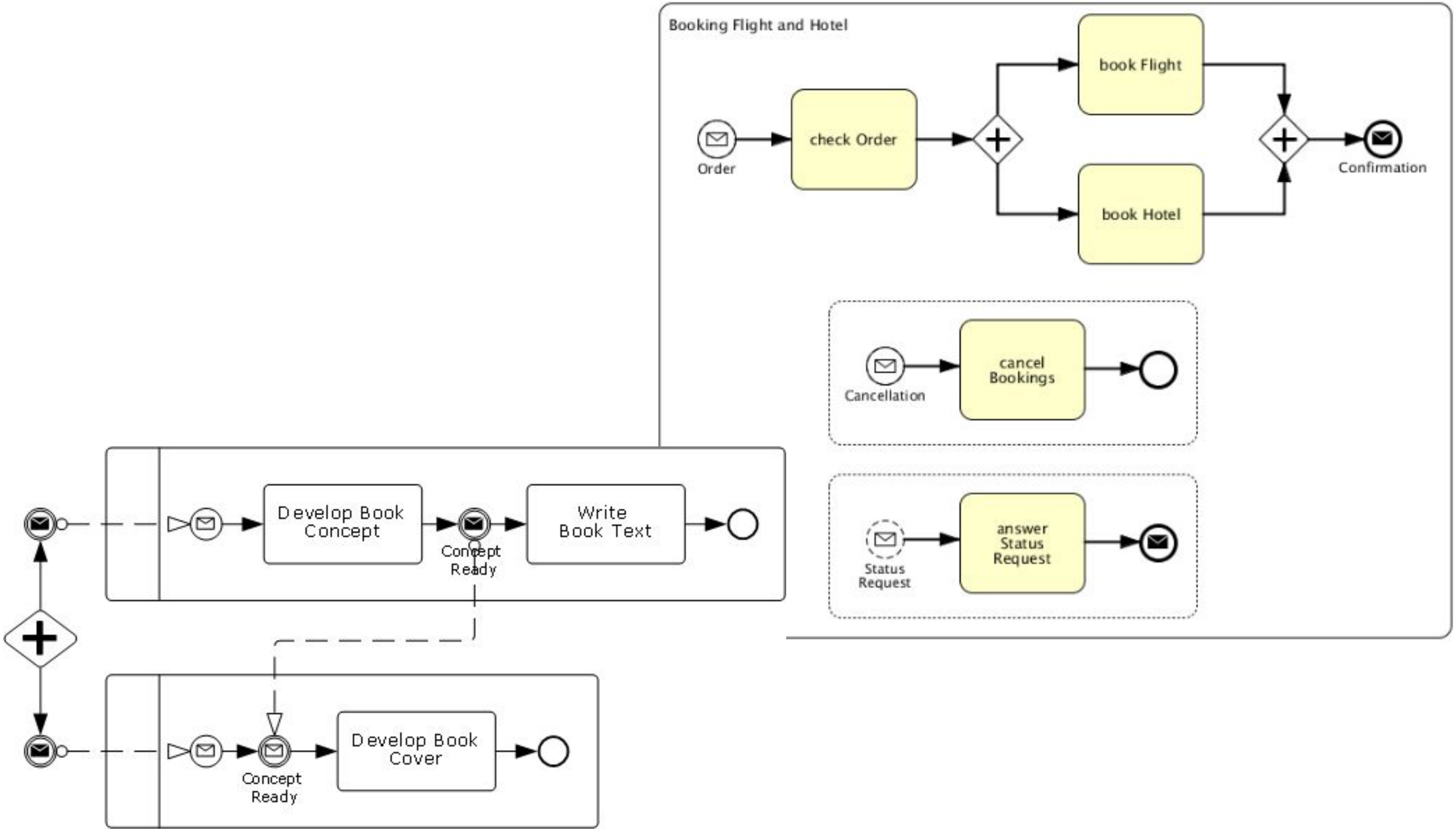
# Event semantics: Messages

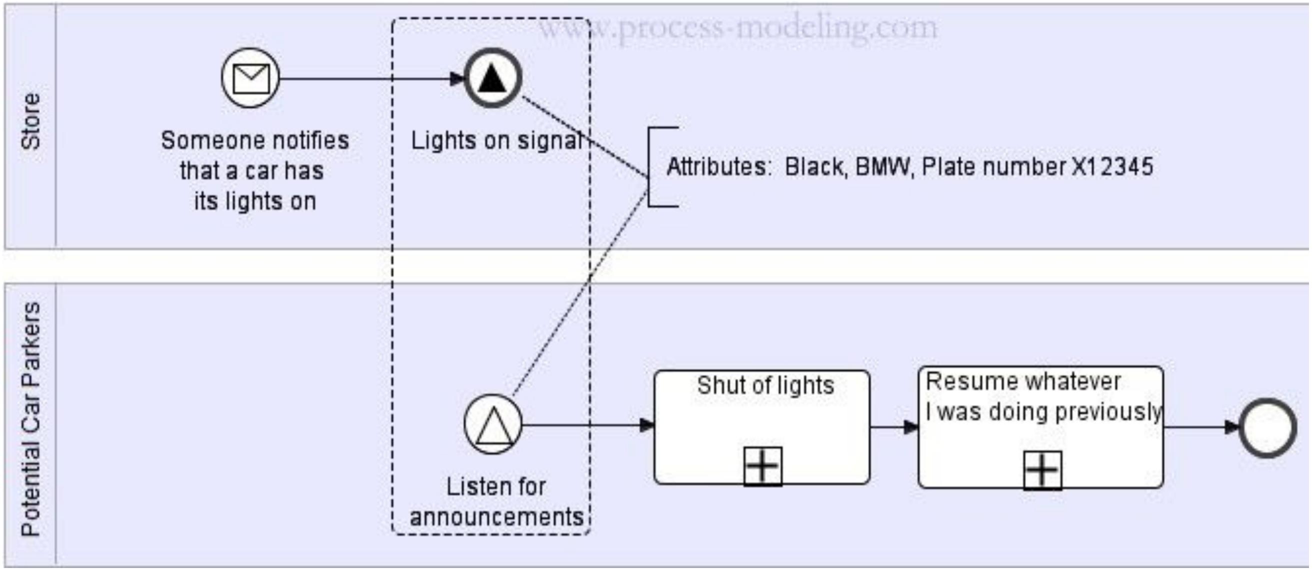
- Message represents a message send by external entity ~ Pool
  - Messaging is for interprocess communication
  - Inside the process use sequence flow instead
- Message does not have to be JMS, SOAP etc. but it can be fax, mail, SMS etc.
- A Message can be received and start process
- A message can occur as intermediate event
- A message can be sent at the end of process

# Event semantics: Message - examples



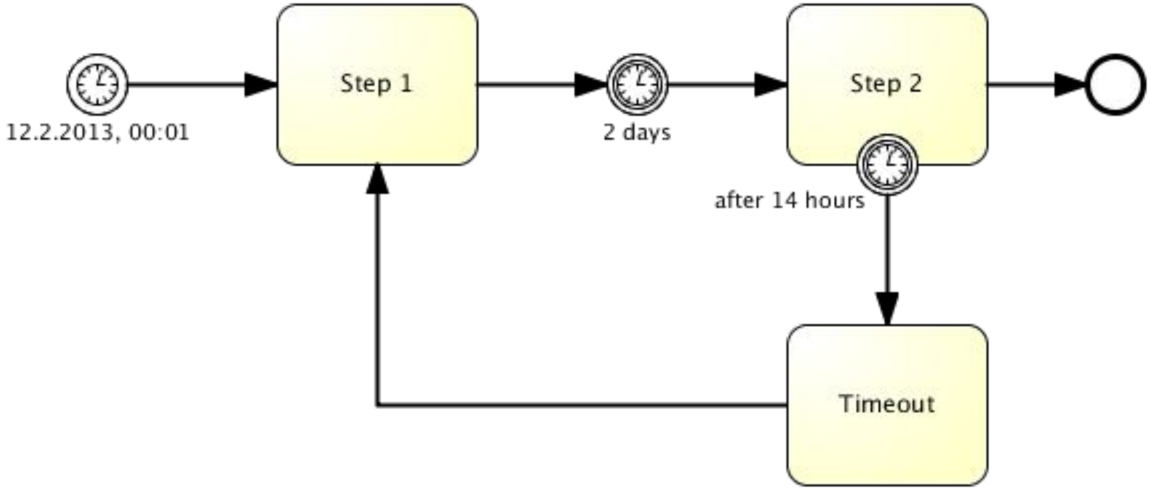
# Event semantics: Signals

- Signal is similar to message, except
  - **Is not** addressed to any particular consumer
  - Entity producing signal does not “care” who is listening
  - Many instances of the same process can consume it
  - Good for loosely coupled communication
  - Signals are used often inside one process, messages not

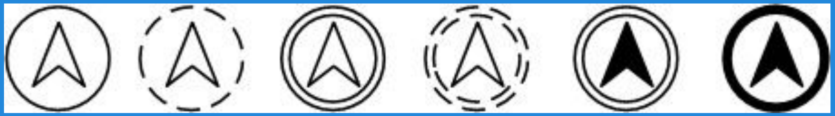

www.process-modeling.com
Store
Someone notifies that a car has its lights on
Lights on signal
Attributes: Black, BMW, Plate number X12345
Potential Car Parkers
Listen for announcements
Shut of lights
Resume whatever I was doing previously

# Event semantics: Timer

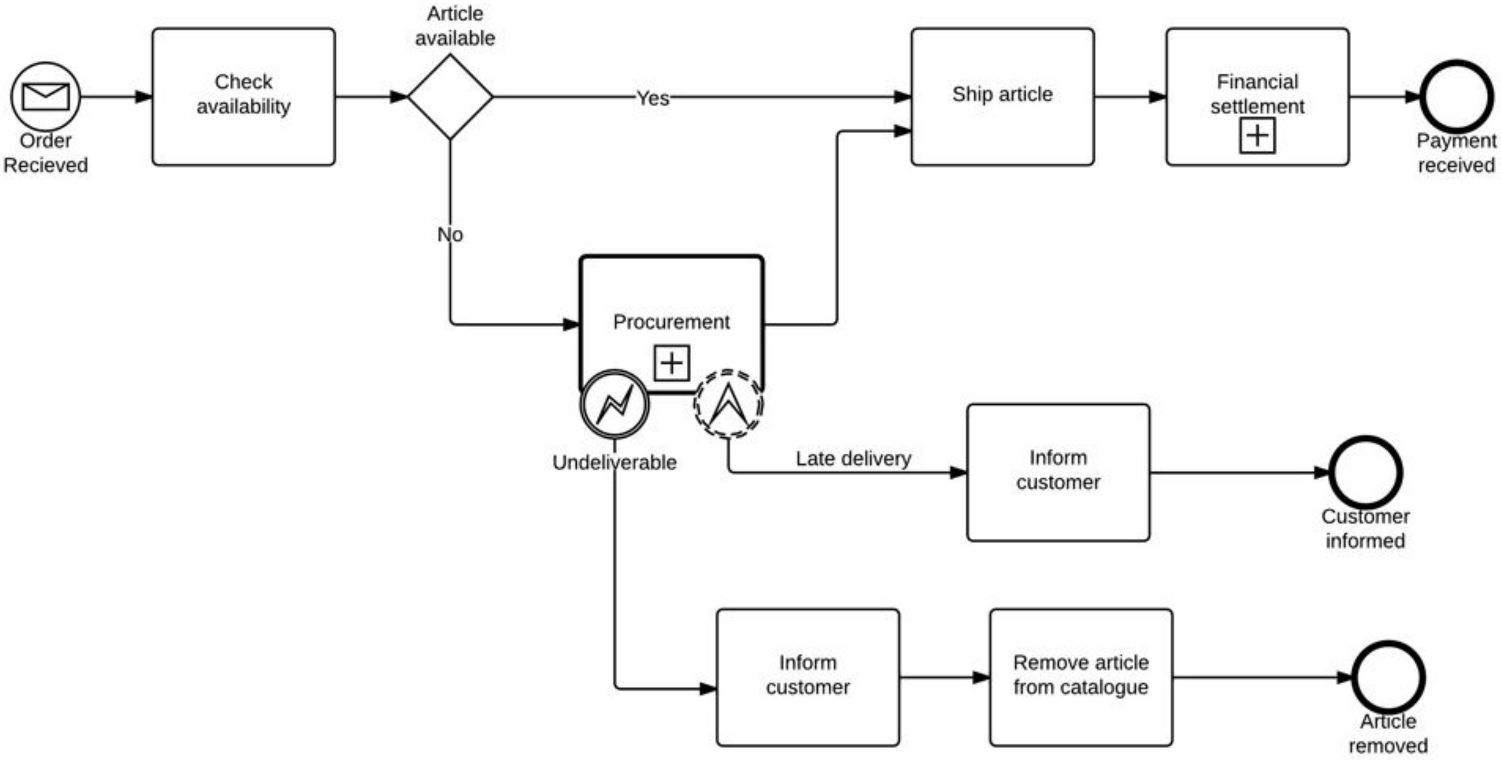
- Cyclic events
- Points in time
- Timeouts



# Event semantics: Escalations



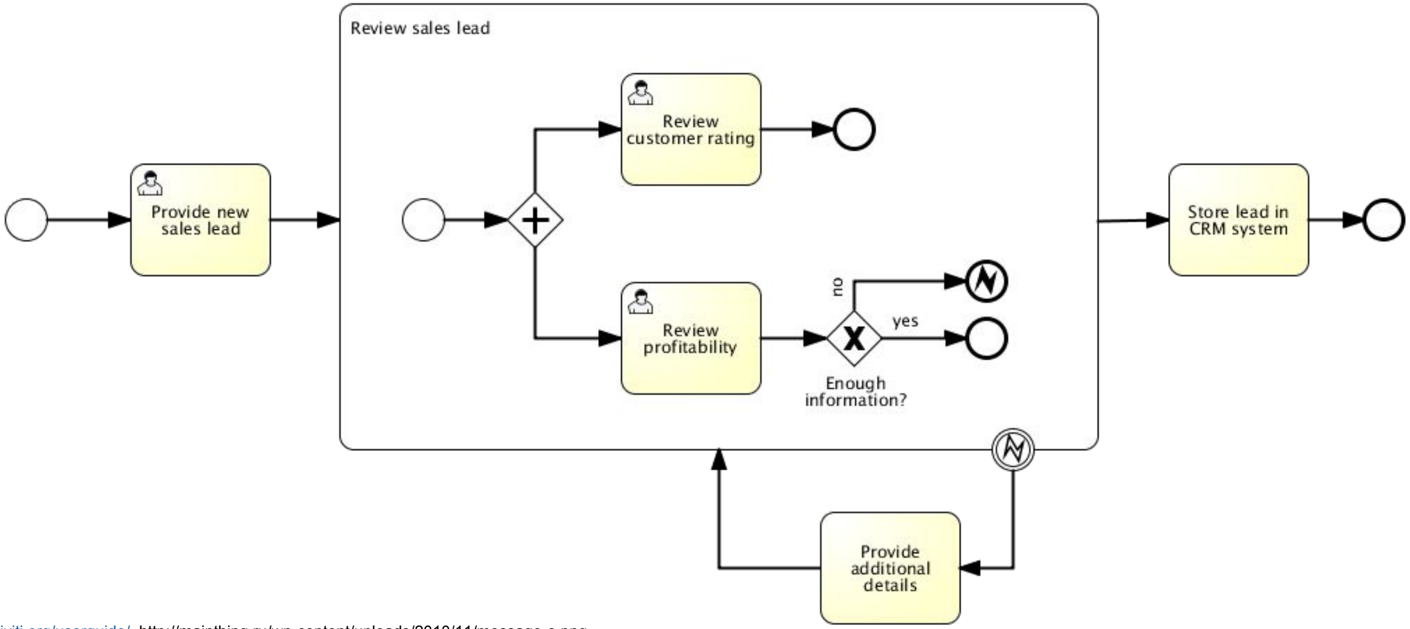
- Handling unusual but **expected** behaviour
  - Corrective actions (interrupting)
  - Additional steps to be done in parallel (non-interrupting)



picture source: http://processpedia.com.au/community/wp-content/uploads/Order-Procurement-Process-Map-Example.png

# Event semantics: Errors

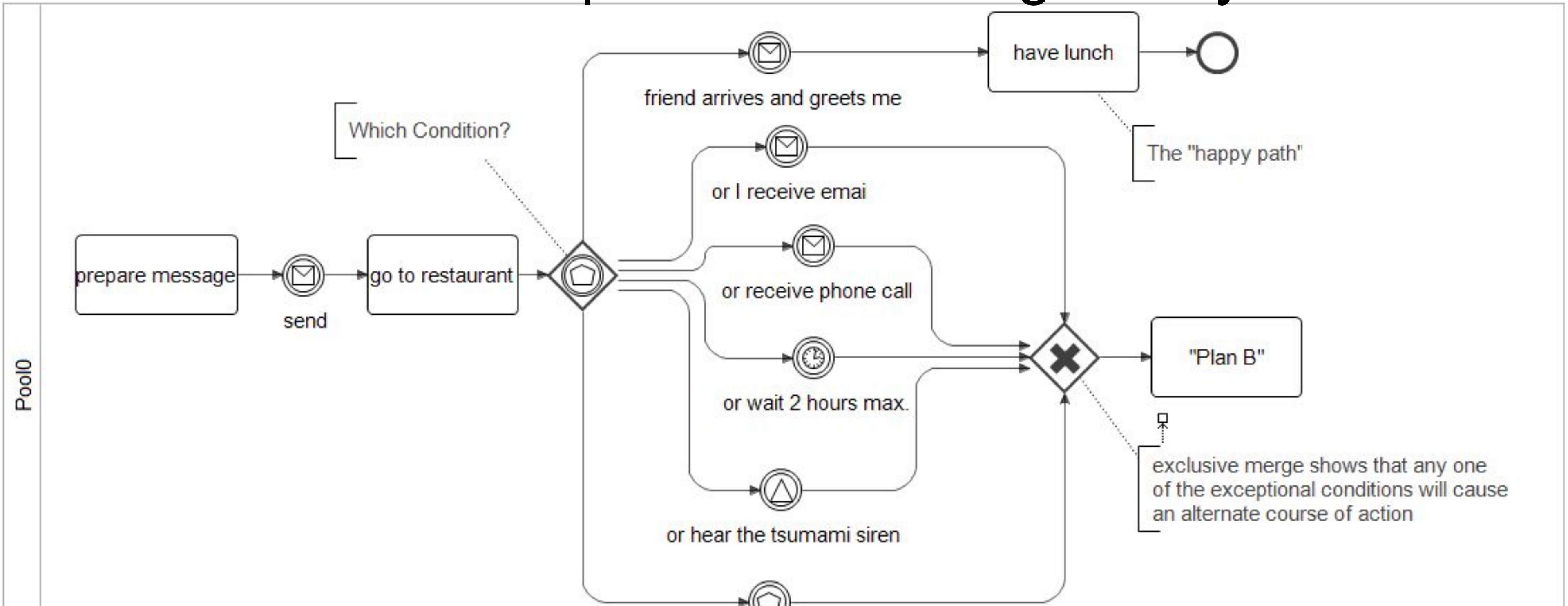
- Used for **serious** problem in process
- Throw - catch mechanism
  - Always interrupting
  - Always boundary event
- There should be some **error handling actions**



picture source: http://www.activiti.org/userguide/, http://mainthing.ru/wp-content/uploads/2010/11/message-e.png

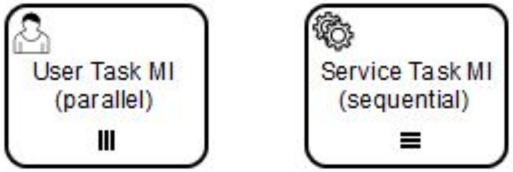
# Event-based gateway

- Event-based gateway
  - Branching based on event, only one triggered
  - Different semantics – branched according to event that is placed after the gateway

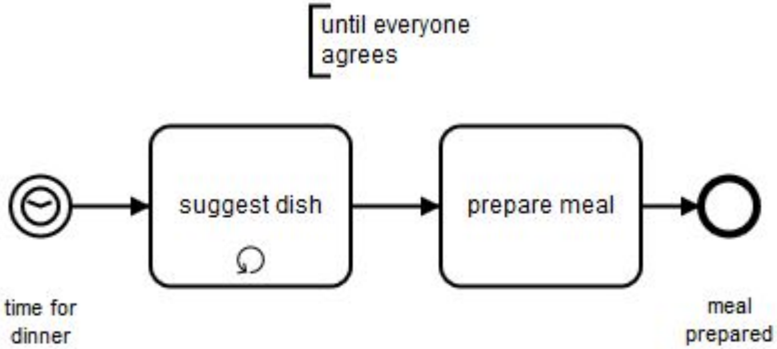

Pool0
prepare message
send
go to restaurant
Which Condition?
friend arrives and greets me
have lunch
The "happy path"
or I receive emai
or receive phone call
or wait 2 hours max.
or hear the tsumami siren
"Plan B"
exclusive merge shows that any one of the exceptional conditions will cause an alternate course of action

# Multi-instance and Loop activity

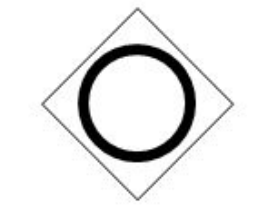
- Multi-instance
  - Shortcut for a number (dynamically defined) of the same activities that run in parallel or in series.



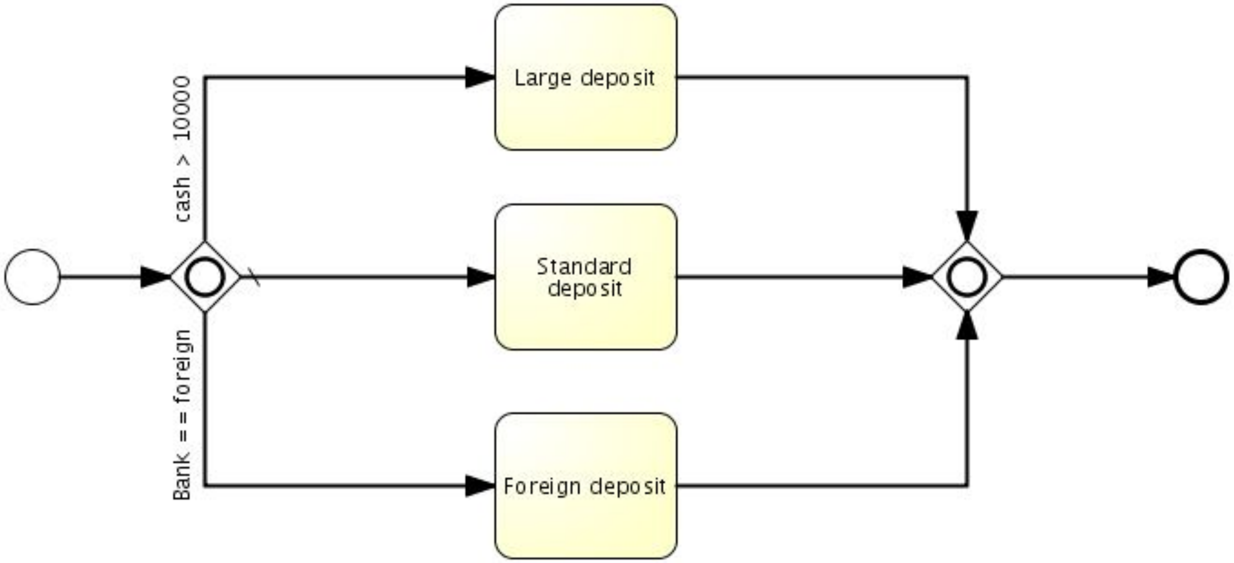
- Loop
  - Shortcut for a repeating one activity until a condition is met.



# Recap:
# Inclusive OR-gateway



- One or more branches can be performed
- Depends on conditions
- Branches performed in parallel
- Waiting for all **activated** branches

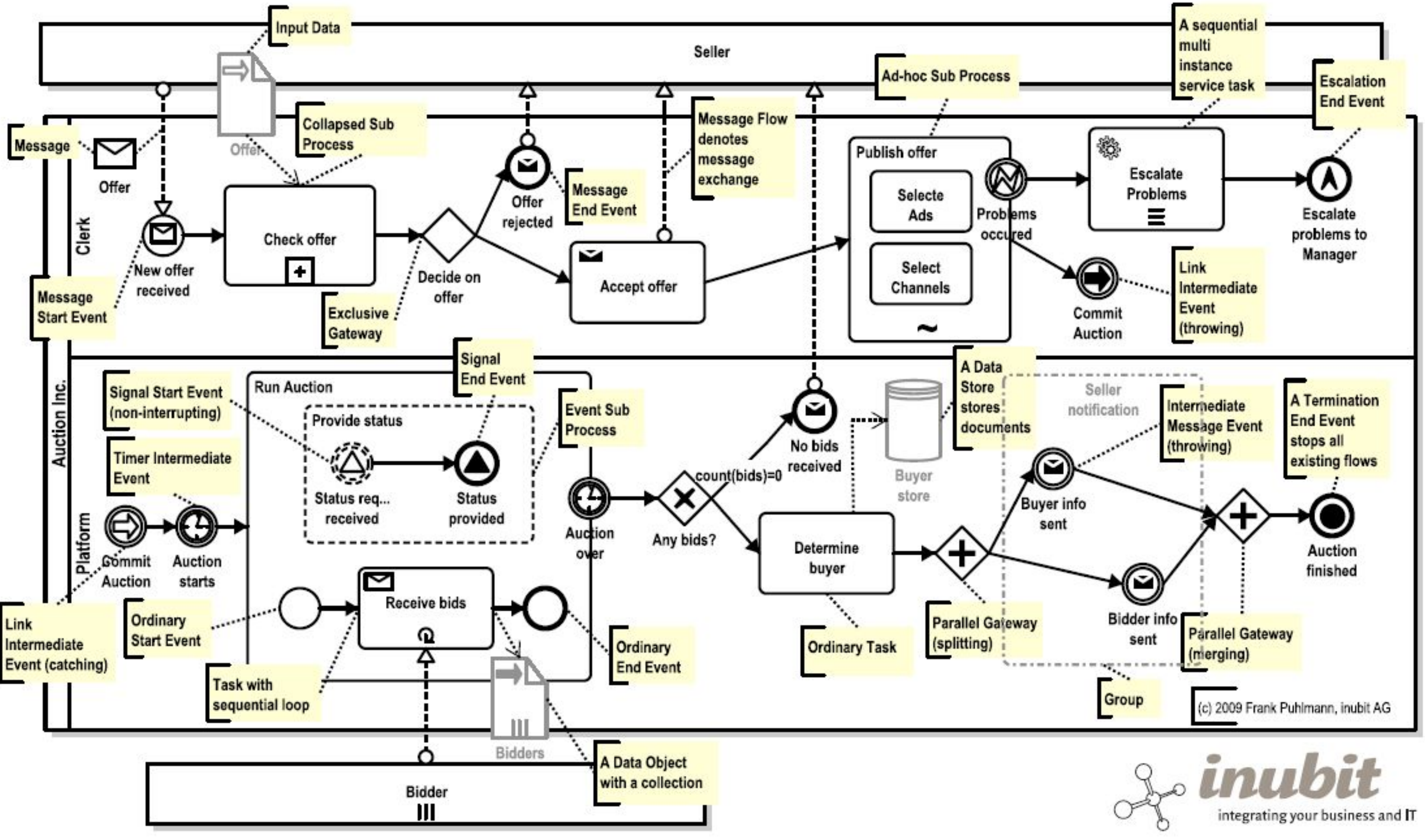


# What is in not covered here

- Transactional events
  - Compensations
  - Cancellations events
  - Rollbacks
- Other diagrams covered in BPMN 2.0 specs
  - Choreography diagrams
  - Conversation diagrams

# BPMN L2 summary

Downloaded from: http://frapu.de/blog/index.php?m=07&y=09&d=01&entry=entry090701-211320



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## Questions?

PV207 – Business Process Management

Spring 2019

Jiří Kolář, Lubomír Dočkal