Business Processes Modelling

MPB (6 cfu, 295AA)

Roberto Bruni
http://www.di.unipi.it/~bruni

02 - Examples
Insurance claim example

Sect.1.3 of Workflow Management: Models, Methods, and Systems
An example:
insurance claim
An example: insurance claim

1. recording the receipt of the claim
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
An example: insurance claim

1. **recording** the receipt of the claim
2. establishing the **type** of the claim
3. checking covering of client's **policy**
4. checking the **premium** (payments up to date?)
5. **rejection**, if 3 or 4 has negative result
6. producing a **rejection letter**
7. roughly **estimate** the amount to be paid, if 3 & 4 have positive results
An example:
insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
An example:
insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action 12
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
An example:

insurance claim

1. **recording** the receipt of the claim
2. establishing the **type** of the claim
3. checking covering of client's **policy**
4. checking the **premium** (payments up to date?)
5. **rejection**, if 3 or 4 has negative result
6. producing a **rejection letter**
7. roughly **estimate** the amount to be paid, if 3 & 4 have positive results
8. appointment of an **assessor**, if needed
9. **revision** of the amount offered to the client
10. recording client's **reaction**
11. **assessment** of objection: decision to revise 9 or take legal action
12. **legal proceedings**
13. **payment** of claim
An example: insurance claim

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client’s policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client’s reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Tasks

1. recording the receipt of the claim
2. establishing the type of the claim
3. checking the covering of the client’s policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client’s reaction
11. assessment of objection: decision to revise 9 or take legal action
12. legal proceedings
13. payment of claim
14. filing and closure of claim
1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action 12
12. legal proceedings
13. payment of claim
14. filing and closure of claim
1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action 12
12. legal proceedings
13. payment of claim
14. filing and closure of claim
1. recording the receipt of the claim
2. establishing the type of the claim
3. checking covering of client's policy
4. checking the premium (payments up to date?)
5. rejection, if 3 or 4 has negative result
6. producing a rejection letter
7. roughly estimate the amount to be paid, if 3 & 4 have positive results
8. appointment of an assessor, if needed
9. revision of the amount offered to the client
10. recording client's reaction
11. assessment of objection: decision to revise 9 or take legal action 12
12. legal proceedings
13. payment of claim
14. filing and closure of claim
Order / links

1-recording
2-type
3-policy
4-premium
5-rejection?
6-rejection letter
7-estimate
8-assessor
9-revision
10-reaction
11-assessment
12-legal proc.
13-payment
14-filing
Order / links

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Order / links

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Order / links

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Order / links

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Order / links

- 1-recording
- 2-type
- 3-policy
- 4-premium
- 5-rejection?
- 6-rejection letter
- 7-estimate
- 8-assessor
- 9-revision
- 10-reaction
- 11-assessment
- 12-legal proc.
- 13-payment
- 14-filing
Order / links

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Some link patterns
Sequence

1-recording

2-type
Parallel

2-type

3-policy

4-premium

5-rejection?
Another selection
Iteration

9-revision

10-reaction

11-assessment

12-legal proc.
Both tasks 3 and 4 are always executed.

Both tasks 6 and 7 are possibly executed but not both.
Disambiguation

2-type

3-policy  4-premium

5-rejection?

6-rejection letter

7-estimate

parallel split

choice split
Ambiguity!

Both tasks 3 and 4 must be completed before task 5.

Task 6 and 13 are possibly executed but not both.
Disambiguation

3-policy \rightarrow 4-premium

\[ + \]

5-rejection?

6-rejection letter

\[ \times \]

13-payment

14-f

parallel split / join

choice split / join
Orchestration

Business process models are performed in a single organization by definition.

Thus, the **ordering of activities** can be controlled by a **business process management system** as a **centralized** software component run by the organization.

This kind of control is called **orchestration**.
Orchestration

Orchestration is about describing and executing a single viewpoint model.

The analogy is with the conductor who centrally controls the musicians in an orchestra.
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Executing the model

1-recording
  ↓
2-rejection
  ↓
3-policy  4-premium
  ↓
5-rejection?
  ↓
6-rejection letter

7-estimate
  ↓
8-assessor
  ↓
9-revision
  ↓
10-reaction
  ↓
11-assessment
  ↓
12-legal proc.
  ↓
13-payment
  ↓
14-filing
Executing the model

1-recording

2-type

3-policy 4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-evaluate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Executing the model
Executing the model

1-executing
2-type
3-policy
4-premium
5-rejection?
6-rejection letter
7-estimate
8-assessor
9-revision
10-reaction
11-assessment
12-legal proc.
13-payment
14-filing
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-p

14-filing
Executing the model

1-recording

2-type

3-policy

4-premium

5-rejection?

6-rejection letter

7-estimate

8-assessor

9-revision

10-reaction

11-assessment

12-legal proc.

13-payment

14-filing
A process instance

1-recording → 2-type

3-policy, 4-premium

5-rejection?

6-rejection letter → 7-estimate → 8-assessor → 9-revision → 10-reaction → 11-assessment

12-legal proc, → 13-payment → 14-filing

14-filing
Workflow management coalition (WfMC)

Founded in the ‘90s by vendors, users, academia: fix standard for Wf representation and execution

http://www.wfmc.org
Workflow

**Definition:** A workflow is the automation of a business process, in whole or in part, during which documents, information, or tasks are passed from one participant to another for action, according to a set of procedural rules.
Workflow management system

**Definition:** A *workflow management system* is a software system that defines, creates, and manages Wfs execution, running on one or more workflow engines, able to interpret the workflow definition, able to interact with workflow participants, and able to invoke the use of IT tools and applications.
Kinds of workflow

**Definition:** a *system workflow* consists of activities that are implemented by software systems without any user involvement.

**Definition:** Workflows in which humans are actively involved and interact with information systems are called *human interaction workflows.*
Example: Human interaction workflow
Human interaction workflows

Goal:
support automation by driving the human activities according to the process model

Benefits:
reduce idle periods
avoid redundant work
improve human/machine work integration
Roles

Roles are groups of employees that qualify for being responsible of certain activities.

Increased flexibility: different persons can cover the same role at different time in different cases
Human collaboration

When task performed by humans are involved in the workflow, it is not sufficient to equip workers with adequate software:

their collaboration must be supported

shared data repositories and work handover can speed-up office procedure considerably
Some limitations

Problems with knowledge workers:

User acceptance issues

Machine burdening of workers

Little room for creativity and flexibility
Exercise

Travel agency orchestration:
define a series of task for
booking a flight, a hotel and optionally a car, with
the possibility
to change dates,
to cancel the booking,
to confirm the booking.
Then, draw a process diagram relating the tasks.
Buyer & Reseller example
Example: Reseller

We move to BPMN-like syntax
Example: Reseller

A **pool** is a rectangle that encloses a business process

(it can be divided in **lanes** to distribute tasks to different actors)

We move to BPMN-like syntax
A reseller can use the business process model above to configure the business process management system accordingly.

All instances will be executed as specified (after receiving the order, send and ship activities are concurrently executed).
Different processes are possible, but... do they all make sense?
Different processes are possible, but... do they all make sense?
Example: Buyers

Different processes are possible, but... do they all make sense?
Buyer & Reseller

Separately developed processes need to communicate!
Cross-organization interaction

Each business process is enacted by one organization

Business processes can interact with each other

Interacting activities of business processes must be related together
Interacting processes can exchange information (electronic messages, physically transported objects)
Interacting processes

Interacting processes can exchange information (electronic messages, physically transported objects)
Interacting processes

Message flow is represented by dotted arcs

We move to BPMN-like syntax
Interacting processes

Message flow is represented by dotted arcs

We move to BPMN-like syntax
Interacting processes

Message flow is represented by dotted arcs

We move to BPMN-like syntax
Interacting processes

Message flow is represented by dotted arcs

We move to BPMN-like syntax
Choreography

The interactions of a set of business processes are specified in a process choreography.

Difference w.r.t. orchestration:
the absence of a central agent that controls the activities in the business processes involved.

For the interaction to be realized correctly, the interacting business processes better be aware and agree upon the choreography in advance.
Choreography

Choreography is about describing a global model (multi-point view)

The analogy is with the dancers who behave autonomously, but follow their parts in the choreography
Choreography diagrams allow for multiple concrete implementations, with different software support.

**Old-fashioned order:** a buyer browses a paper catalogue of a reseller, then fills a postcard and sends it by snail mail and pay by bank transfer.

**e-commerce:** a buyer browses an online web catalogue, fills a virtual basket and an electronic form (billing information) and presses the submit button. The goods themselves may be intangible (e-books, music, video, software)
Interaction issues

As said, interacting business processes must be aware and agree upon the choreography.

In such cases, the realization of business processes by participants can change without affecting the overall behaviour.

On the other hand, if the change is not done correctly, then some problems may arise.
Question time

Work fine together!
Question time

Still working fine?
Question time

Still working fine?
Exercises

In previous slides, we have seen many variants of business processes for resellers (two) and buyers (four).

Build a “compatibility” matrix with two rows and four columns and mark all the combinations for which some problems may arise during the interaction because activities are not implemented in the expected order.

You are also free to consider other process diagrams, by adding the corresponding rows / columns to the matrix.
<table>
<thead>
<tr>
<th></th>
<th>B₁</th>
<th>B₂</th>
<th>B₃</th>
<th>B₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>R₁</td>
<td>ok</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R₂</td>
<td>ok</td>
<td></td>
<td></td>
<td>no</td>
</tr>
</tbody>
</table>
Coffee break choreography:
Draw the process diagram for a vending machine that accepts a coin, then gives the possibility
(1) to get a coffee or
(2) to insert another coin and get either a cappuccino or a tea.

Draw the process diagrams for a compatible butler robot and a "problematic" butler robot.