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DATA-CENTRIC BUSINESS PROCESS MODELING

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Learning Goals

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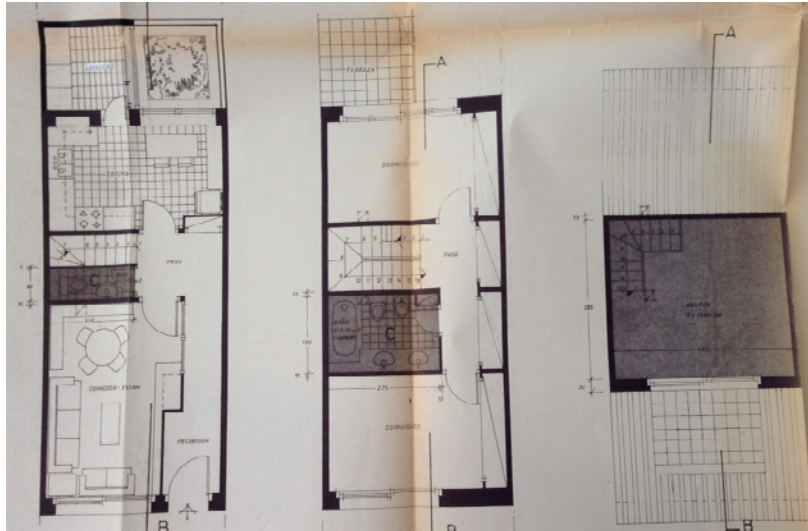
1. Know what a data-centric business process model is
2. Understand the advantages of data-centric BPM vs process-centric BPM
3. Model a data-centric BPM using UML (OCL)

- Data-centric Business Process Models
 - Perspectives on BPM
 - BALSÀ Framework
- Data-centric BPM in UML
- Potential of Data-centric BPM

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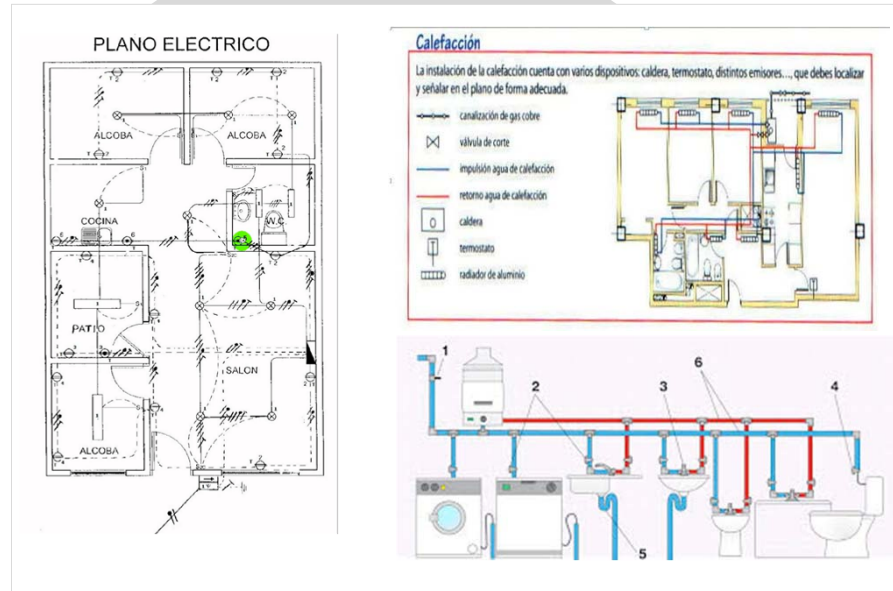


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- No plans...
 - And one water pipe broke!
 - Turned out to be one of the heating pipes
 - I had no clue where the pipes were



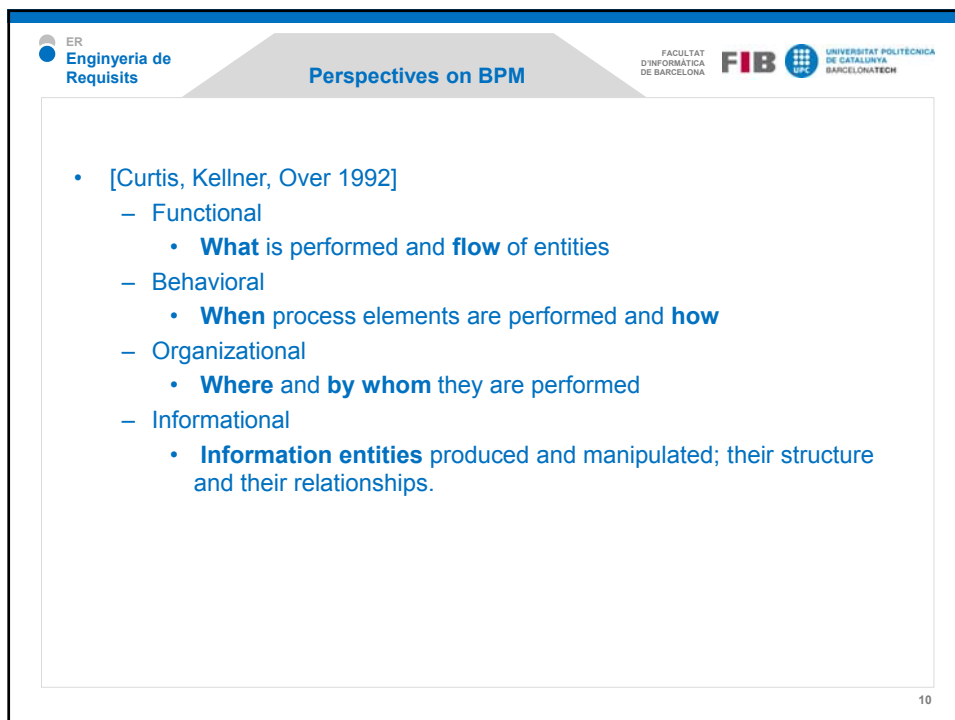
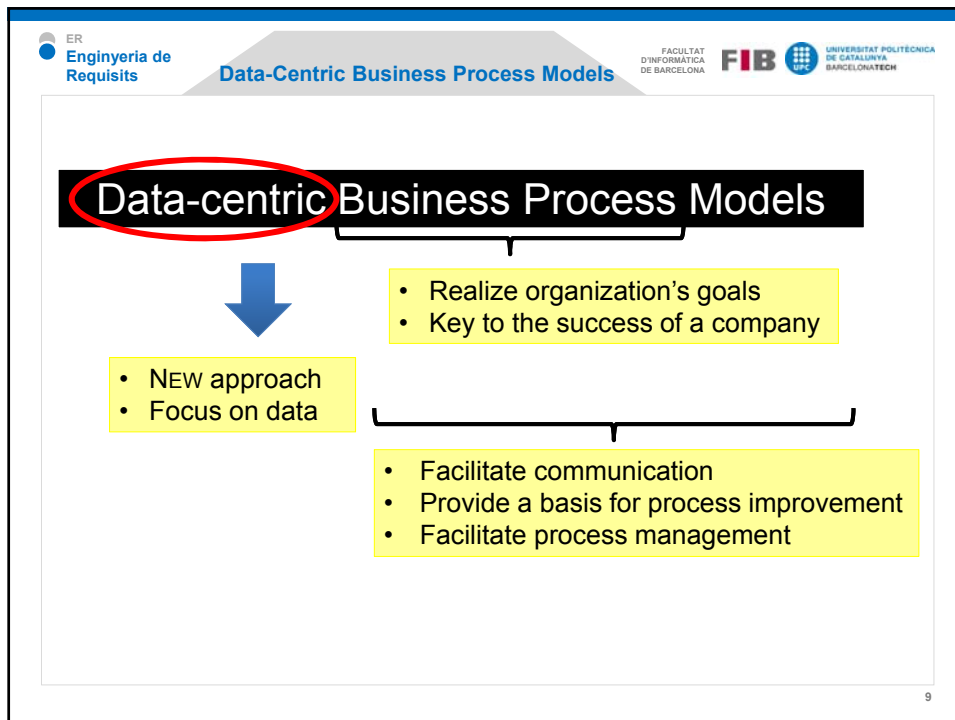
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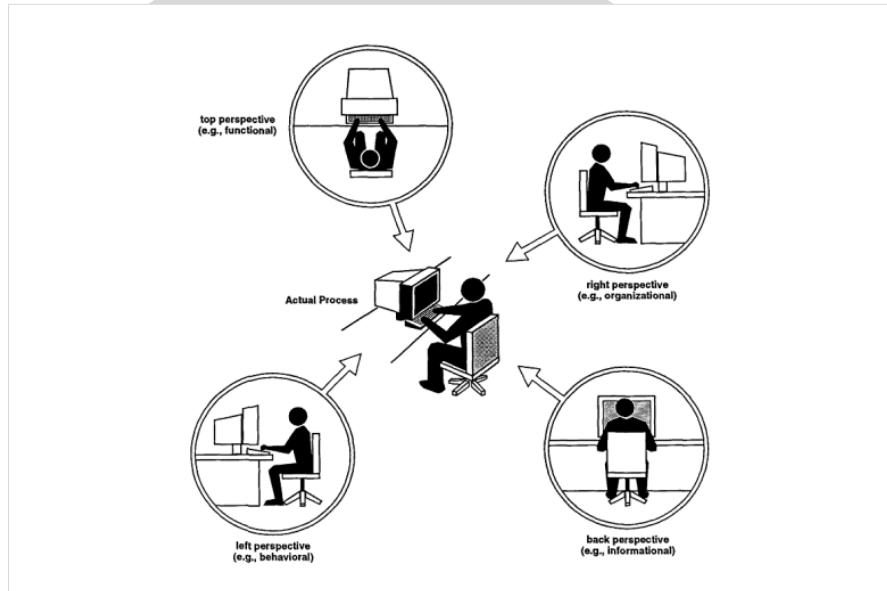


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- **Data-centric Business Process Models**
 - Perspectives on BPM
 - BALSA Framework
- Data-centric BPM in UML
- Potential of Data-centric BPM

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Process-centric BPM

- Focus on the sequencing of activities



- Behavioral perspective

Data-centric BPM

- Focus on the data and details of tasks



- Closer to functional, behavioral, informational perspectives

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Outline

- **Data-centric Business Process Models**
 - Perspectives on BPM
 - **BALSA Framework**
- Data-centric BPM in UML
- Potential of Data-centric BPM

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The BALSA framework

What is exactly a data-centric BPM?

↓



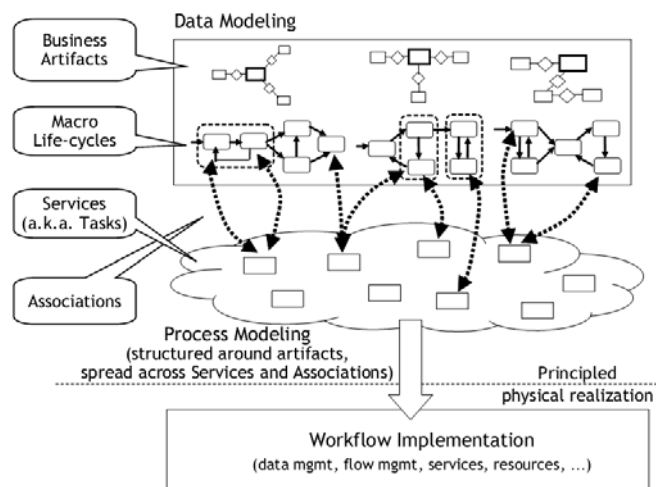
- BALSA Framework
 - Defined by [Hull 2008]
 - 4 dimensions that should be present in data-centric BPM

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- **Business Artifacts:** Relevant data for businesses
 - Attributes
 - Identifier – they can be distinguished
 - Relationships to other artifacts
- **Lifecycles:** Relevant stages in the evolution of an artifact
- **Services:** Create, update, delete business artifacts
- **Associations:** Establish restrictions over the execution of services

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- [Hull 2008]

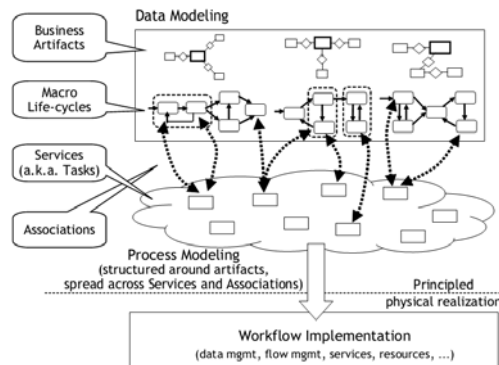


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Process-centric



Data-centric



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- Process-centric BPMN diagram:



- What is the *precise* meaning of the tasks (services)?

We need data!!!

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The BALSA framework

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Many different alternatives
to represent BALSA

- We will use UML/OCL

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Outline

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- Data-centric Business Process Models
 - Perspectives on BPM
 - BALSA Framework
- ***Data-centric BPM in UML***
- Potential of Data-centric BPM

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Our proposal

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BALSA Framework	UML / OCL
<ul style="list-style-type: none"> • Business Artifacts <ul style="list-style-type: none"> – Relevant data for businesses 	Class Diagram
<ul style="list-style-type: none"> • Lifecycles <ul style="list-style-type: none"> – Of the business artifacts 	State Machine Diagram
<ul style="list-style-type: none"> • Services <ul style="list-style-type: none"> – Meaningful unit of work – Create, update, delete artifacts 	OCL Operation Contracts
<ul style="list-style-type: none"> • Associations <ul style="list-style-type: none"> – Links between services 	Activity Diagrams

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Our proposal

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- Why a notation based on UML/OCL?
 - UML
 - Graphic representation of specification of systems
 - Representation of dynamic and static aspects
 - Widely used & flexible
 - It has a precise semantics
 - ISO/IEC Standard (ISO/IEC 19505)
 - Complemented by OCL
 - Declarative language, with a precise semantics
 - ISO/IEC Standard (ISO/IEC 19507)

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- **City bicycle rental system**

- Alternative form of public transportation
- Several bicycle stations placed around the city
- Users take bicycles from stations and drop them off at other stations



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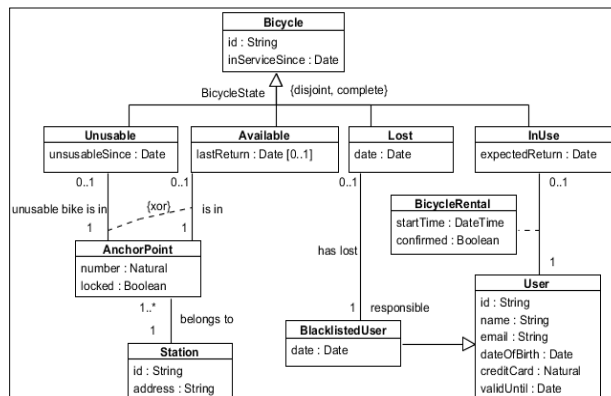
- **We assume:**

- We wish to track bicycles and their evolution
 - Who is using them
 - Where they are, if they are not in use
- Simple system
 - No history of bicycle rentals (e.g. given a bicycle, we know its state and who is currently using it, but we don't know who has used it previously)

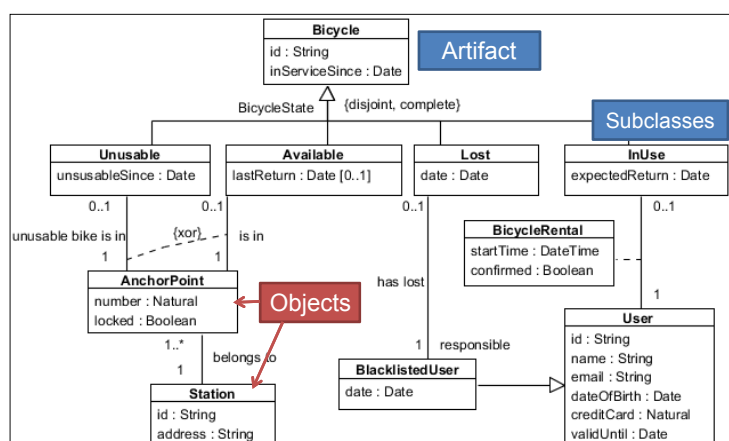


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- Identity
 - OCL constraints
- Attributes
- Relationships

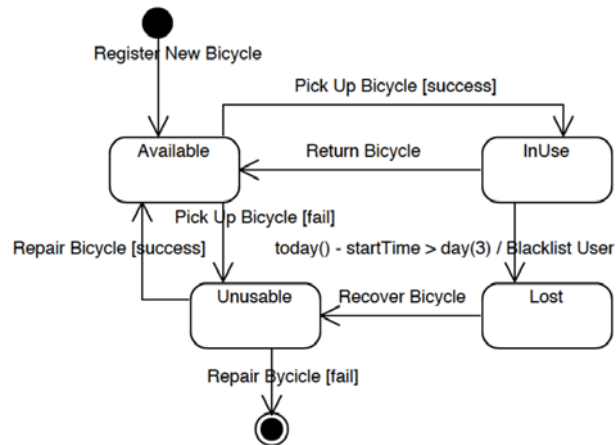


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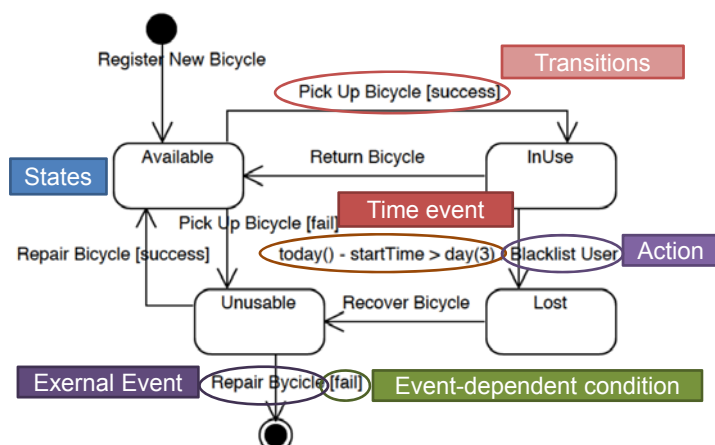


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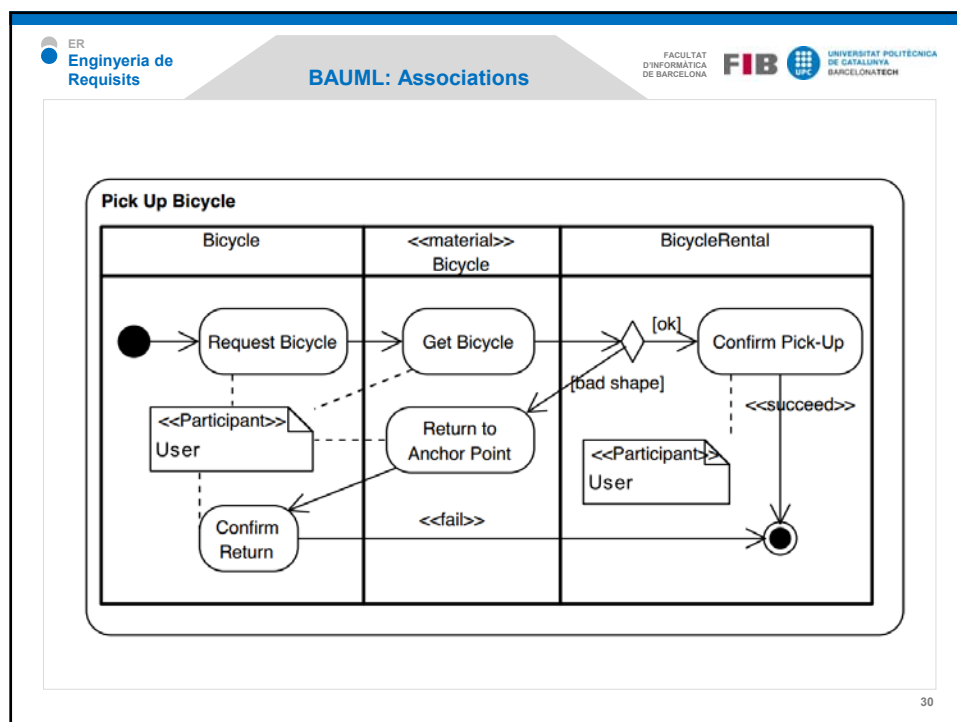
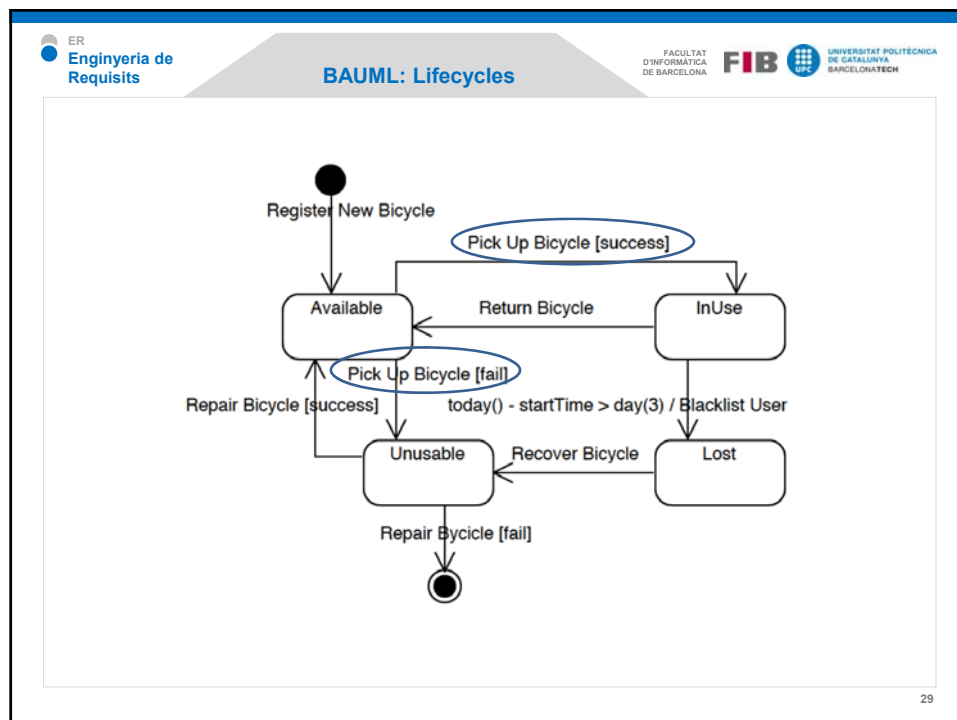
Lifecycle for the business artifact *Bicycle*

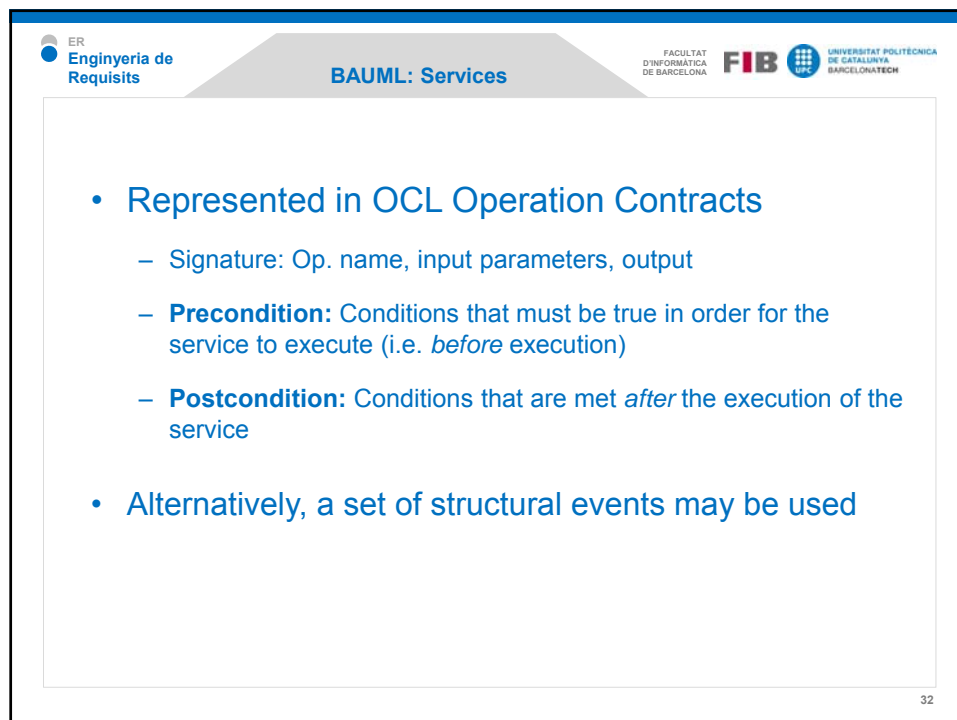
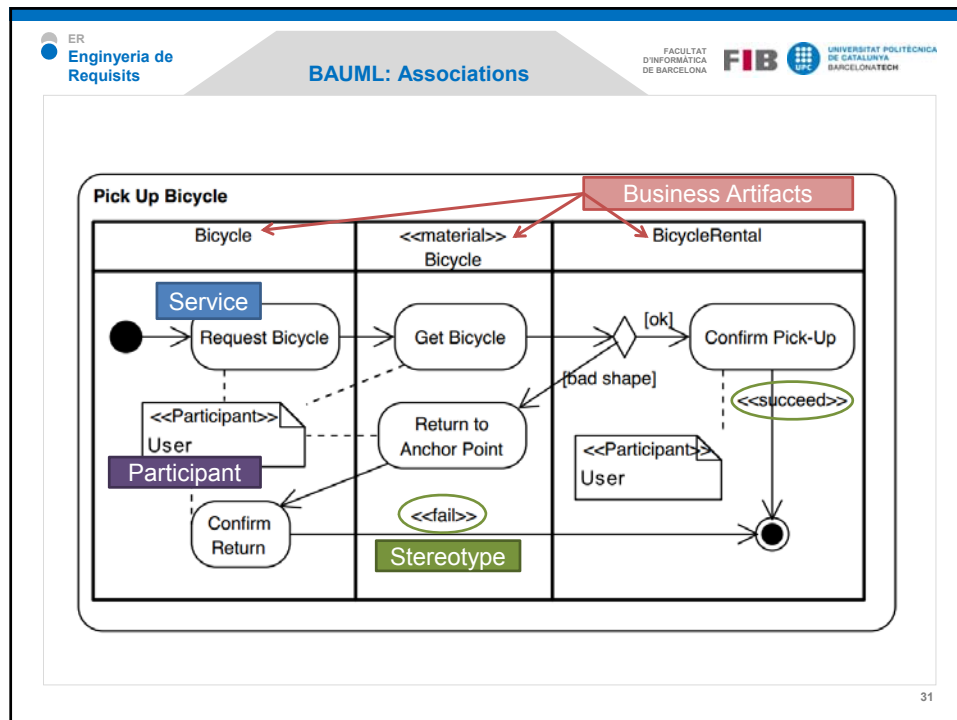


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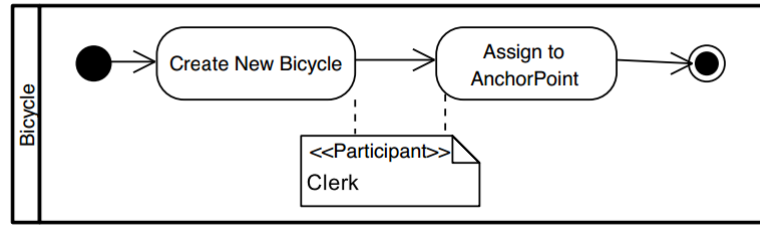


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Register New Bicycle



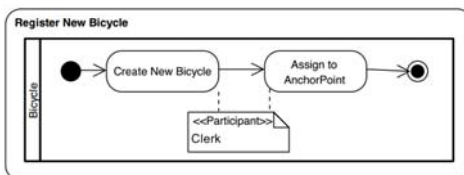
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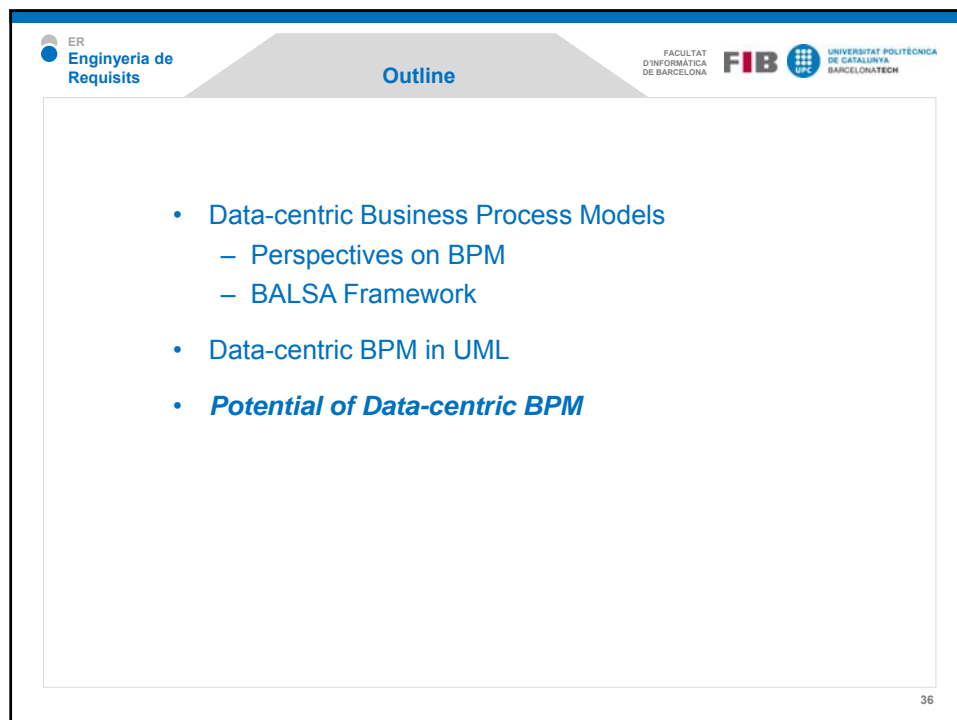
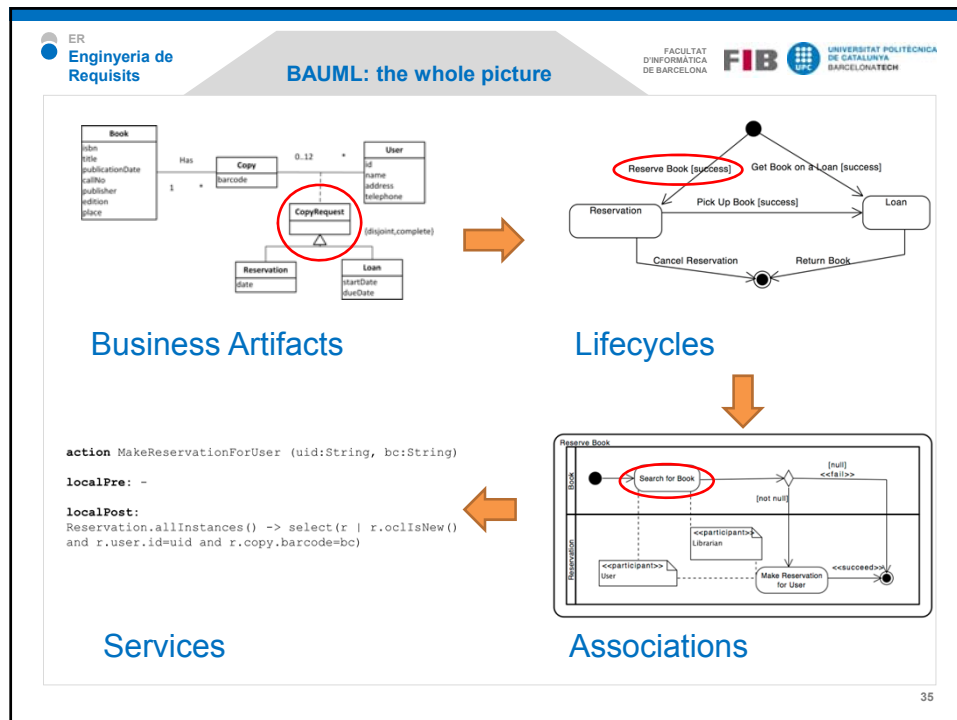
operation CreateNewBicycle (bId: String): Bicycle
localPre: -
localPost: Bicycle.allInstances()->exists(b | b.oclIsNew() and b.id=bId
and b.oclIsTypeOf(Available) and b.inServiceSince = today() and result=b)
    
```

```

operation AssignToAnchorPoint (b: Bicycle , apNumber:
Integer , stationId: String)
localPre: -
localPost:
b.oclAsType(Available).anchorPoint =
AnchorPoint().allInstances()->select(ap | ap.number=apNumber and
ap.station.id=stationId)
    
```



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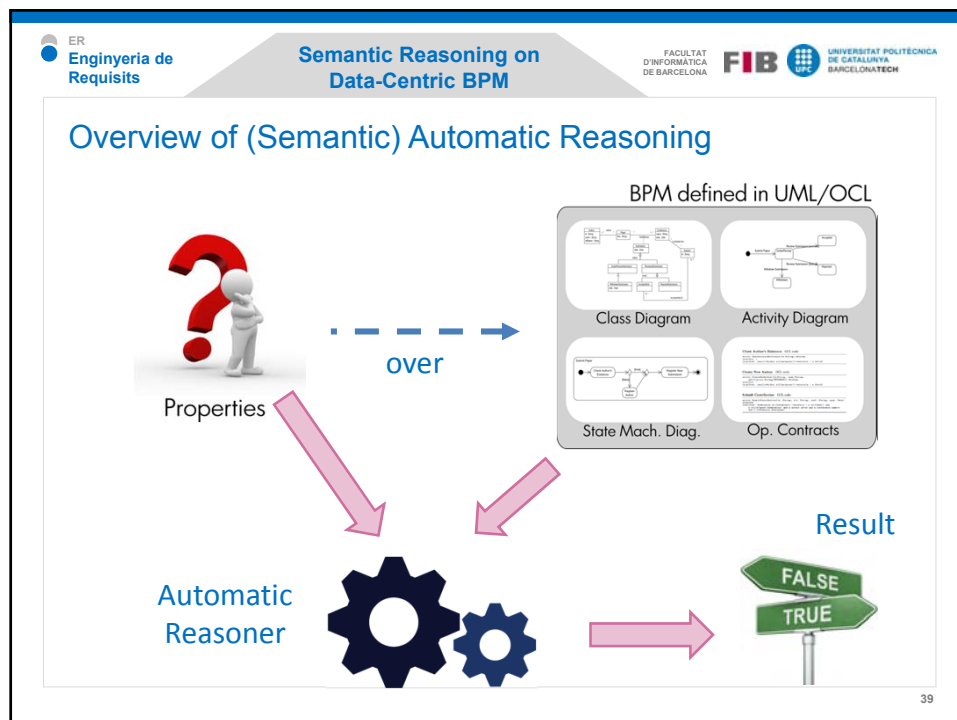


- **What can we do with these models?**
 - *Detect errors before the process is deployed*
 - Automatic reasoning
 - *Detect deviations once the process is running*
 - Process conformance techniques

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- **Automatic reasoning:**
 - *Syntactic correctness*
 - This can be done on process-centric BPMs
 - *Semantic correctness*
 - Thanks to the data!
 - Verification: Is the *model right*?
 - Validation: Is it the *right model*?

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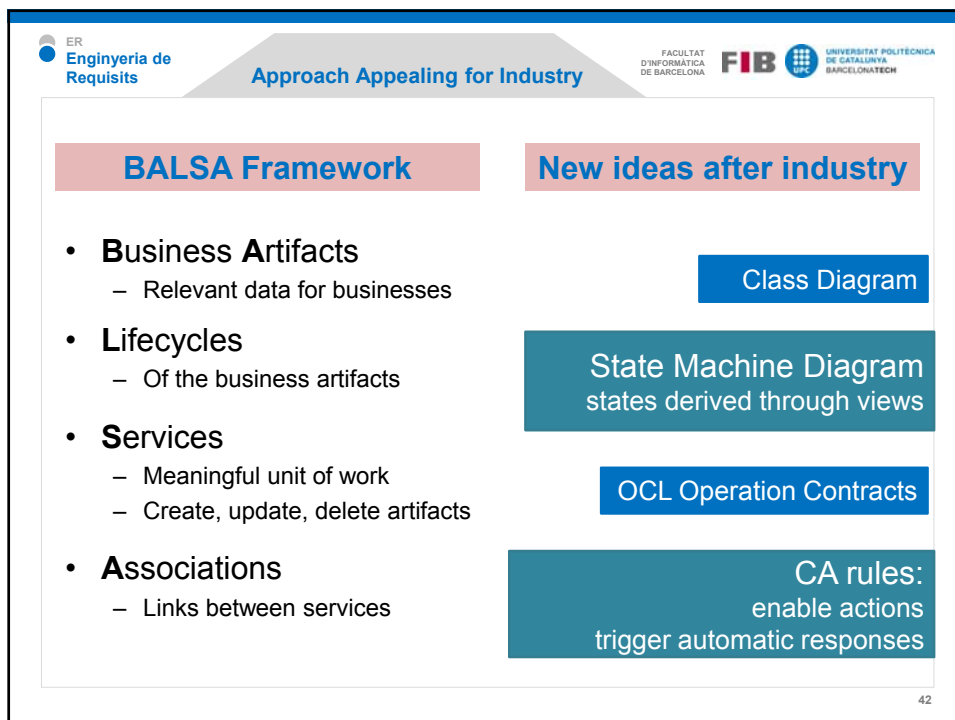
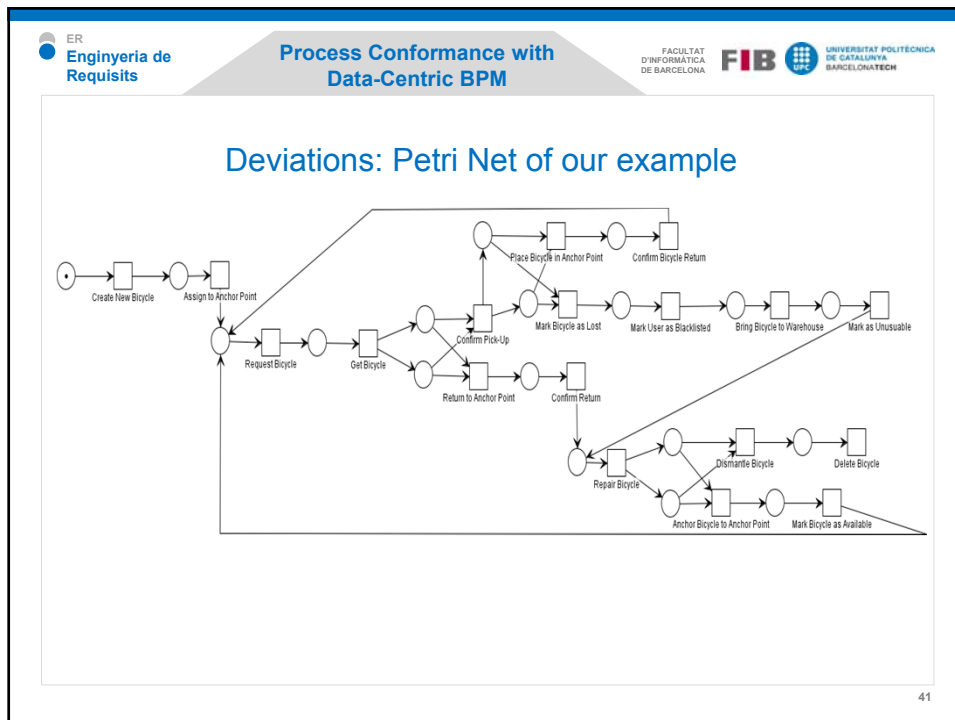
Process Conformance with Data-Centric BPM

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We can apply process conformance techniques that consider data to detect deviations at run-time

- **What do we achieve?**
 - Given a log ("reality"), check how far the real behaviour of the proces is from the one defined by the model
- **How do we do it?**
 - Translate our BPM-UML model into a Petri Net
 - Reuse existing tools to perform conformance checks

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Bibliography

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Thank you for your attention !!!

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