

# Modeling and Execution Support for State-Centric Processes

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Eindhoven 26.6.2014

# Agenda

## 1. Presentation of the main ideas of the BPM14-paper:

*„From a family of state based PAIS to a configurable and parameterized business process architecture“*

**by Andreas Rulle and Juliane Siegeris**

## 2. Research Questions in the context of Variant-Management



# Modeling paradigms

## activity driven

Focus is on **activities** and there (predefined) **order** relation

→ Suitable to describe business processes, i.e set of activities that contribute towards a common business goal within a certain time.



## state driven

Focus is on **states** and **events** which entail changes of the state.

→ Suitable to describe the **life cycle** of (possible very long living) **objects**



# Application domain: Product Master Data Management



is concerned with the life-cycle of product data:

|   |   |   |  |   |   |
|---|---|---|--|---|---|
|   |   |   |  |   |   |
| <p><b>The Missing 8-Ball</b><br/>Every pool table needs one of these ... an extra 8-ball. The round sphere is coated with a thick layer of impervious tungsten poly-mesh material with a brilliant high-gloss sheen. And the elegant black exterior is offset with a numeric motif.<br/>Bernes Collectibles<br/>SKU00462 ..... \$195</p>                  | <p><b>Professional Disguise Kit</b><br/>If you want to maintain your anonymity, it's hard to get into the crowd with the expertly crafted kit of five. Optional alternative nose comes in different styles including Winston Churchill, Cesare de Bergamo, Walter Cronkite, and Cher.<br/>Bernes &amp; Pearl<br/>SKU00075 ..... \$195</p> | <p><b>Ping Pong Paddle</b><br/>Ping Pong is back! Latest Spinns show that more people would rather sit ping-pong than vote. Like the ping-pong ball, a paddle that's not just to ping. Thanks to the round of being "ping-pong" over and over again so the ball goes back and forth.<br/>Wilson Franks LTD<br/>SKU00004 ..... \$105</p>         | <p><b>Handy Wrench</b><br/>How many times in the last year have you really needed a wrench to tighten down that leaky kitchen faucet? Probably more times than you can count. That's a wrench when you need it. This high-quality forged steel adjustable wrench is just the thing.<br/>The Struble Company<br/>SKU00704 ..... \$195</p> | <p><b>Four Solar System</b><br/>Perfect for those rainy days when you're searching for something to do. Clear out the den and create your own solar system with these sturdy metal replicas of the four planets from the Sun. Other planets available with proof of purchase only.<br/>Wilson Franks LTD<br/>SKU00173 ..... \$795</p> | <p><b>Pro Soccer Ball</b><br/>You'll be the star of the team with this shiny new soccer ball. Designed to be used at maximum inflation pressure, the poly-urea ball offers balance and control in a perfect spherical shape. You need the ball to play with the rest.<br/>Bernes &amp; Pearl<br/>SKU00075 ..... \$245</p>                                       |
|   |   |   |  |   |   |
| <p><b>Old Time Alarm Clock</b><br/>Just like in the movies, the ultimate clock will wake you when no other clock can. Genuine brass bells ring and ring until you have no choice but to get up and get going. The bells will get the alarm ... but that's not all ... have a good breakfast instead.<br/>Bernes Collectibles<br/>SKU00007 ..... \$195</p> | <p><b>Money Sels</b><br/>In an age of online banking and internet phishing scams, it's nice to have a secure place to keep your hard-earned cash. This little piggy bank seems to get enough to get its amount as if there was a hole in its belly ... or at least another zipper.<br/>Bernes &amp; Pearl<br/>SKU00196 ..... \$295</p>    | <p><b>Bean Counter</b><br/>The Bean Counter's bean counter has ancient device provides a bit of dating information. It's unique mechanical design doesn't require recharging. Doubles as a calculator for mathematicians who measure as percentages.<br/>Bernes Collectibles<br/>SKU00180 ..... \$295</p>                                       | <p><b>Wireless Phone</b><br/>A breakthrough innovation, this wireless phone truly frees you from the tether of the land line. Drop in your phone or number and you're ready to go. You'll get the full effect of your 4-in-1, 10" that of Back Street News.<br/>Wilson Franks LTD<br/>SKU00080 ..... \$495</p>                           | <p><b>Tooth-Cleaning Trail Mix</b><br/>Did you know you can get the perfect smile? What you may not know is you can get it without your teeth! That's no joke. Just drop in these custom nuggets and you won't have to worry about your teeth again!<br/>Bernes &amp; Pearl<br/>SKU00009 ..... \$195</p>                              | <p><b>Food Processor</b><br/>That's yourself making too much of a good thing. Fix your problem with the perfect solution. Easy-to-use design takes the incredible accuracy of the precision scale. Place button on the left and the camera on the right.<br/>Wilson Franks LTD<br/>SKU00083 ..... \$295</p>   |
|   |   |   |  |   |   |
| <p><b>Wedding Couple Ornament</b><br/>This unique vase topper provides a special touch for those quiet evening dinners at home. And the non-toxic ceramic coating makes this ornament the perfect topper for your dinner party or anniversary dinner. With art you can only go around once!<br/>Wilson Franks LTD<br/>SKU00090 ..... \$495</p>            | <p><b>Adjustable Sand-Aid</b><br/>Finally a way to feel those peppy paper cut! Medical journal says pressure is the best medicine and that's what the Sand-Aid delivers. Great medical design helps the effectiveness of a logarithm when large spaced form matter meet.<br/>The Struble Company<br/>SKU00100 ..... \$105</p>             | <p><b>Bathrub Pigson</b><br/>Every family has traditions that are passed from generation to generation, as time goes by and the leader turns into the parent can't resist the charm of this rubber water float when it comes time baths their newborn? That's right ... babies and babies!<br/>Bernes Collectibles<br/>SKU00040 ..... \$295</p> | <p><b>Soft Leather Fedoras</b><br/>You'll be a commanding presence when you wear this authentic leather fedora. Handcrafted in Italy, designed to be durable even in the toughest weather. There's no way you won't be noticed and admired as you wear this beautiful hat to work!<br/>Wilson Franks LTD<br/>SKU00048 ..... \$795</p>    | <p><b>Giant Push Pin</b><br/>If you're a fan of old Land of the Giants reruns, this is the item for your handiwork! Get a head-to-toe durable plastic holder that's balanced and perfect for displaying yourself against a giant mouse or even mullin.<br/>Bernes Collectibles<br/>SKU00081 ..... \$295</p>                           | <p><b>Organic Boat Anchor</b><br/>Specially crafted from metallic drawings and spun, this durable steel weight is shaped to resemble a traditional anchor. How long you want to go fishing with the gear, set your wife loose taking the set into the shop for a repair and that you'll bring home dinner.<br/>The Struble Company<br/>SKU00081 ..... \$195</p> |

# Application domain: Product **Master Data Management**



is concerned with the life-cycle of product data:

A supplier might produce such catalogs

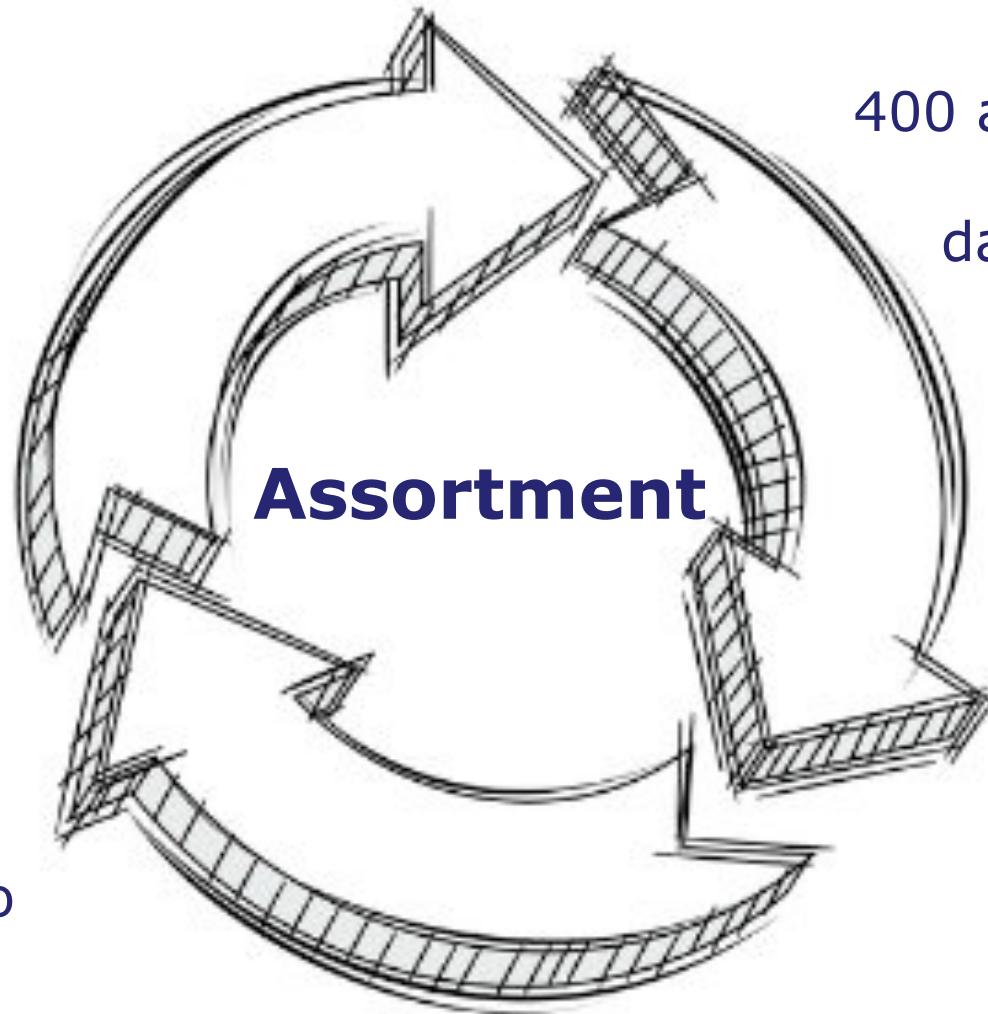


- for different groups of products,
- countries and
- in different languages.

the grouping of such product descriptions is denoted as an **assortment**.

# Application domain: Product **Master Data Management**

- In order to guarantee high quality of the product data



400 audits automatically  
test the products  
data / the media files

Human data  
editors manually  
check the quality  
of the product  
data.

Approved  
changes are  
taken over to  
the shared  
area

# Application domain: Product **Master Data Management**

Key characteristic:

→ An assortment in a MDS usually has **a long lifetime**.

→ Activities are triggered by external events / state change



# Scenario / Application domain: Product **Master Data Management**

## Key characteristic:

→ An assortment in a MDS usually has **a long lifetime**.

→ Activities are triggered by external events / state change



## Challenges:

- Model state centric-process with BPMN2.0
  - Use BPMS for execution support
- **but avoid long running transactions!**



# Challenge I: Model state centric-process with BPMN2.0



**Main alternatives for modeling state /event information in BPMN**

| ID | BPMN element used to depict state   | BPMN element used to model events                     | Literature                                       |
|----|-------------------------------------|---|--|
| A1 | Data objects with state information | -   | [13, Fig. 152], [17, p. 32]                      |
| A2 | Conditional event                   |   | BPMN 2.0 Spec. [14, p.251—254]                   |
| A3 | -                                   | Catching event, e.g. following an event based gateway | See pattern “deferred choice” [16, pp. 17–18]    |
| A4 | Edge-labels of XOR-gateway          | -   | BPMN 2.0 Spec. [14, p. 290]                      |
| A5 | Activities/Sub-processes            | Consecutive XOR gateways for different events         | [2, pp. 48–50, 85–98]                            |
| A6 | Activities/Sub-processes            | Attached interrupting events                          | [17, pp. 83–106, pp. 119–144], [14, pp. 254-257] |

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# Challenge I: Model state centric-process with BPMN2.0



Our Solution:

States

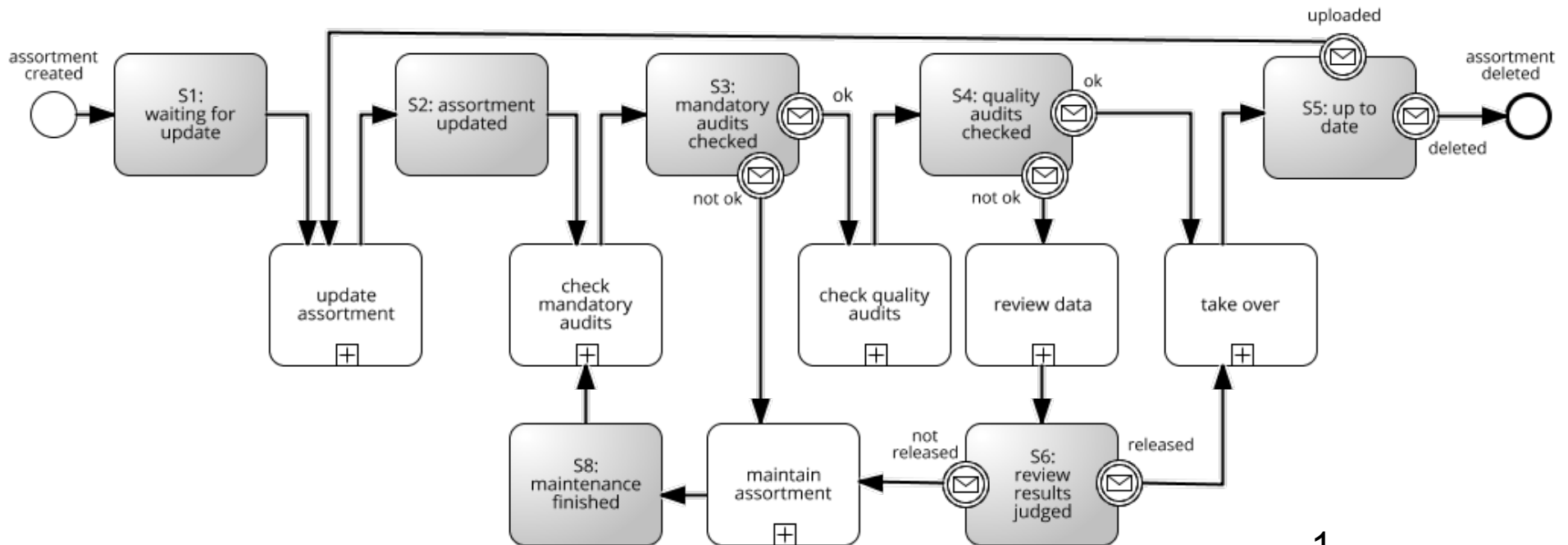
modeled with

BPMN-Activities

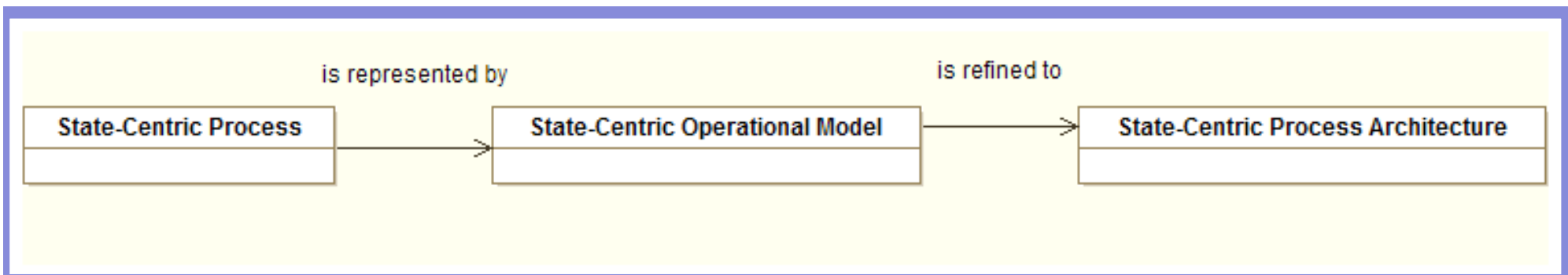
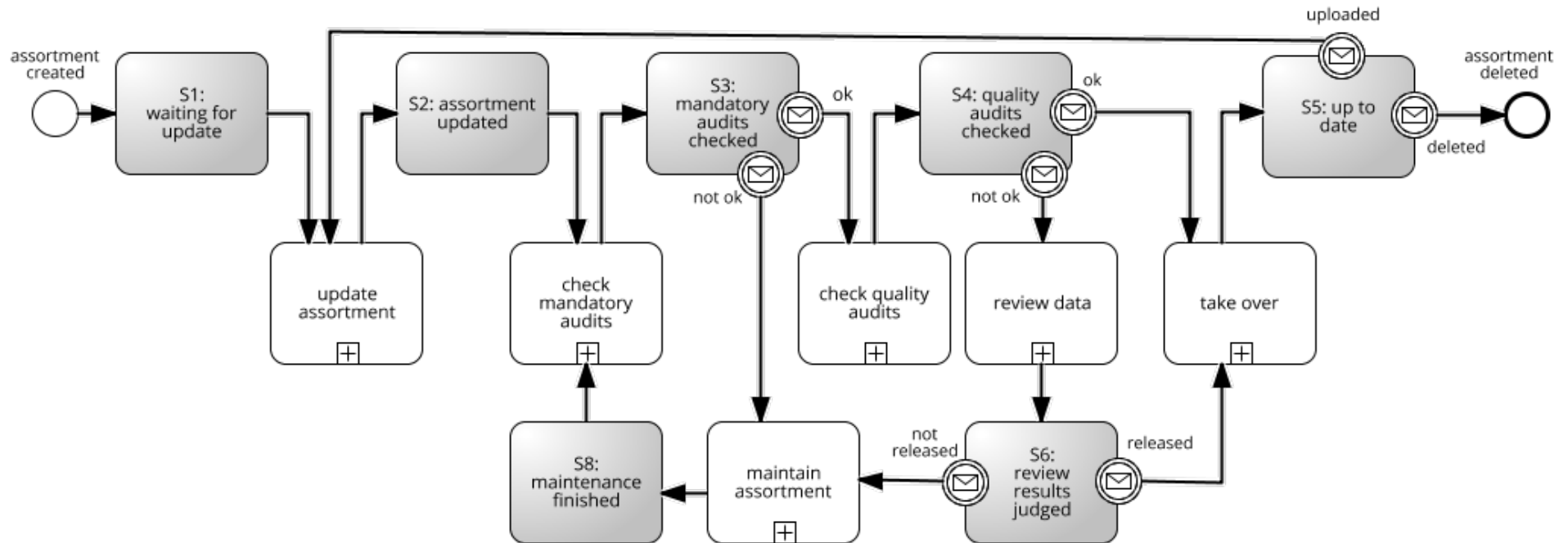
Events  
that entail state changes

modeled with

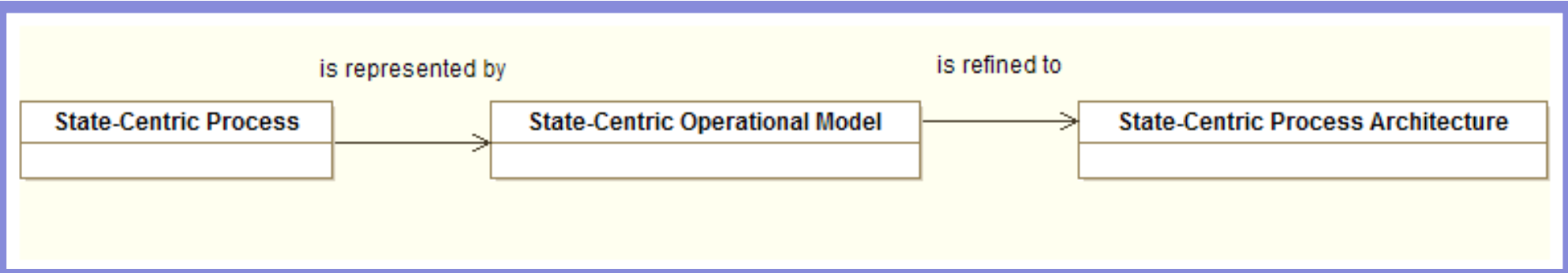
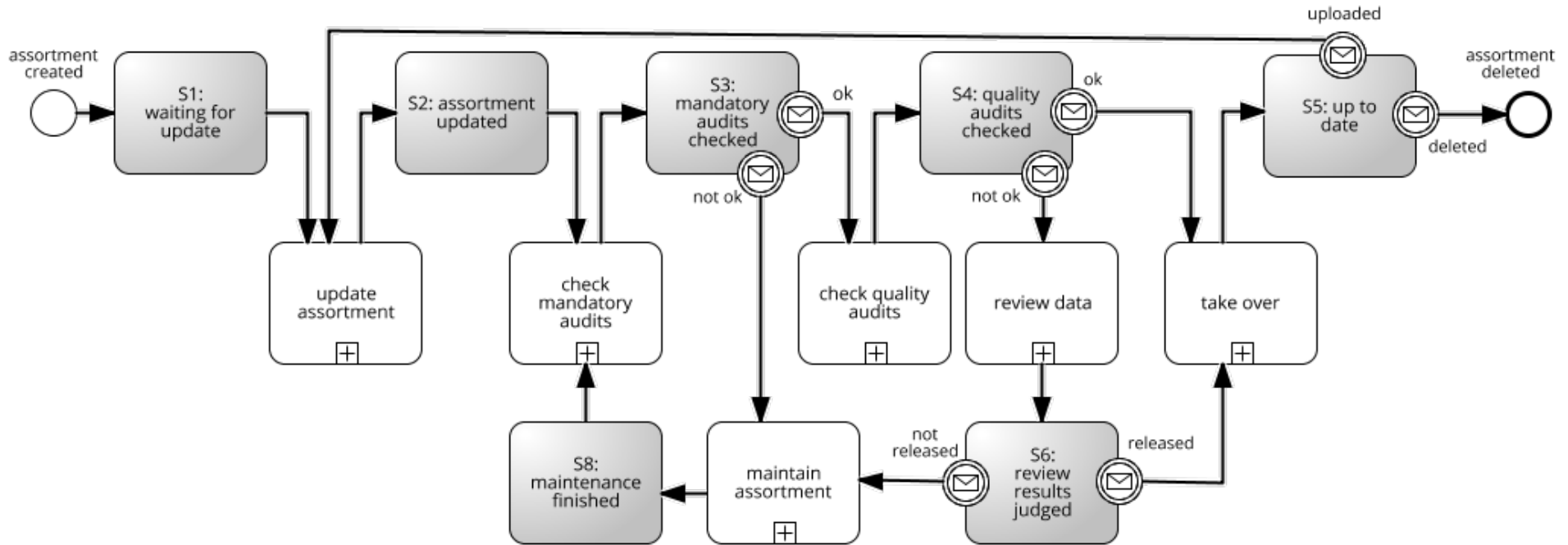
attached  
BPMN-Events



# State-Centric Operational Model (SCOM)



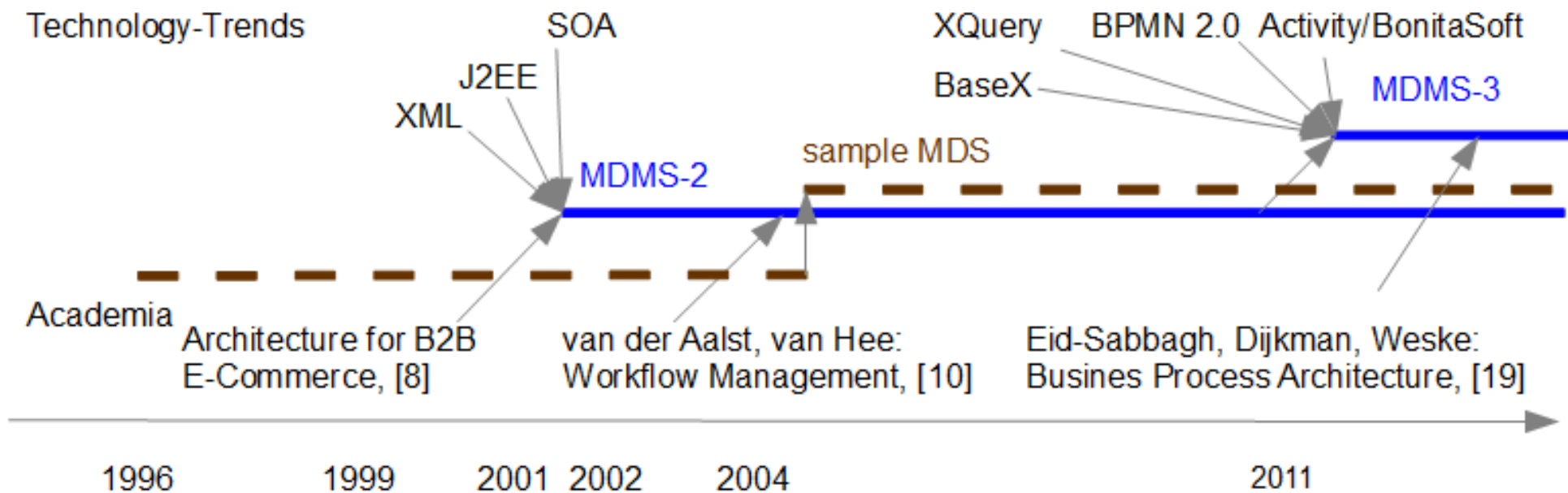
# Challenge II: Use BPMS for execution support → but avoid long running transactions!



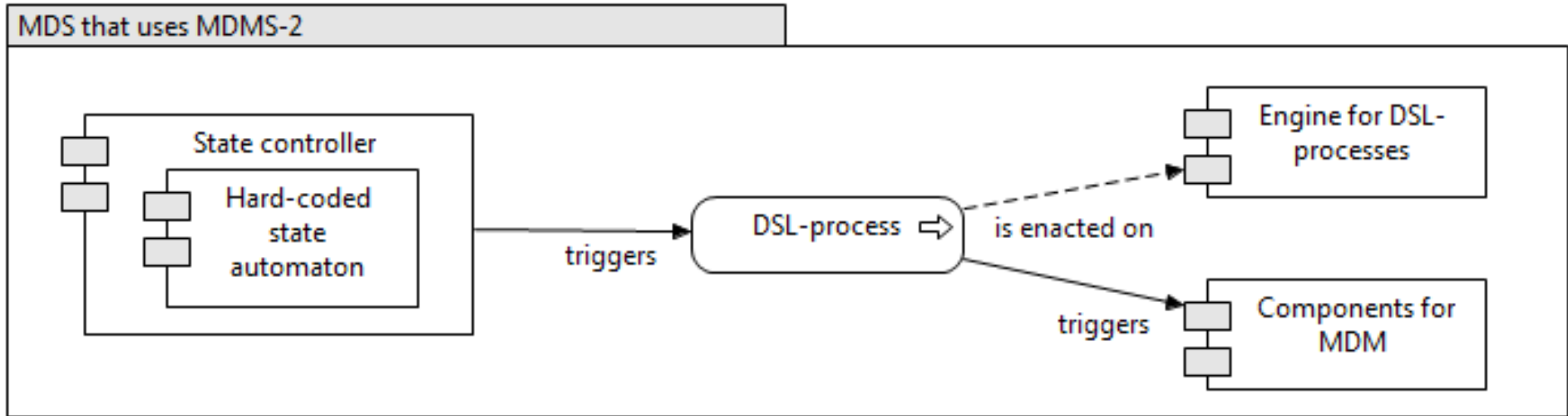
# Historical MDMS Process architectures



Evolution of the product family of MDMS:



# Process Architecture of MDMS2



Strength of the architecture:

- Interoperation of state controller and the DSL Processor as PAIS
- rollback to earlier states of the assortments

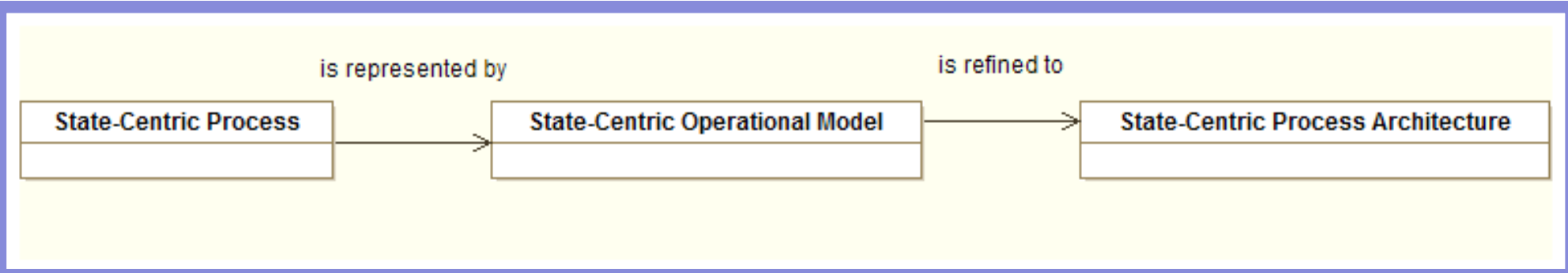
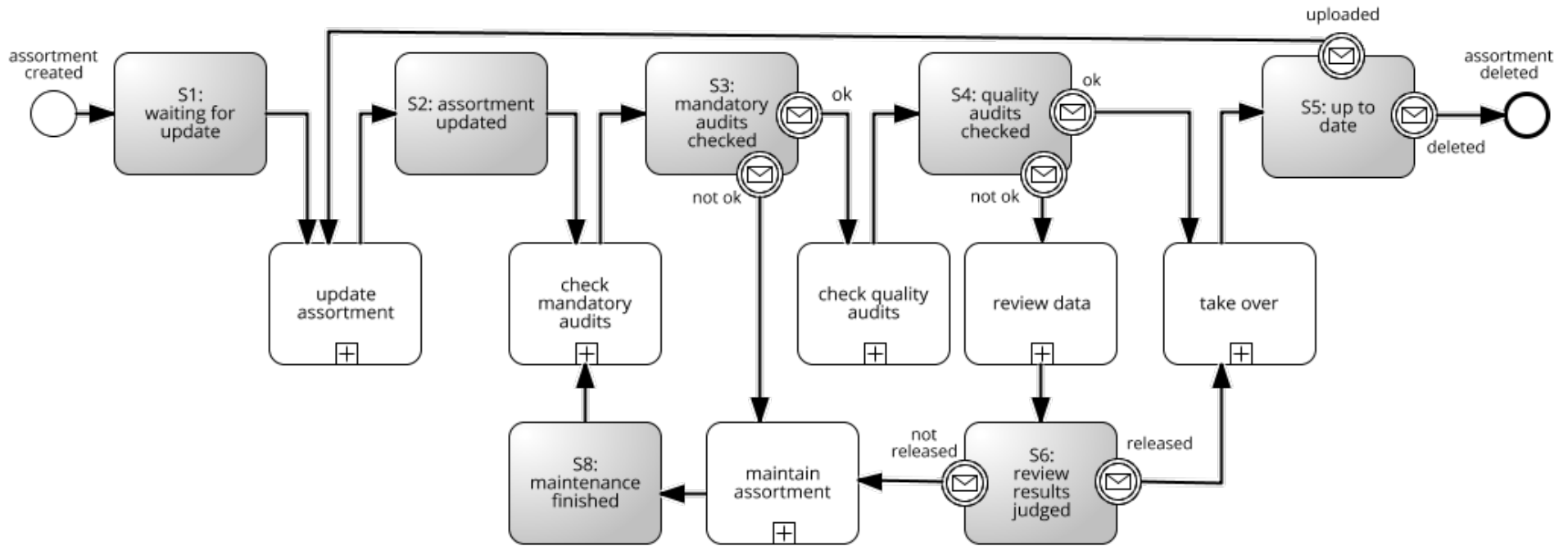


Weaknesses:

- Hard-coded state automaton
- hard-coded tasks that trigger the DSL-processes.
- Hard-coded auxiliary processes that prepare and post-process the process invocations

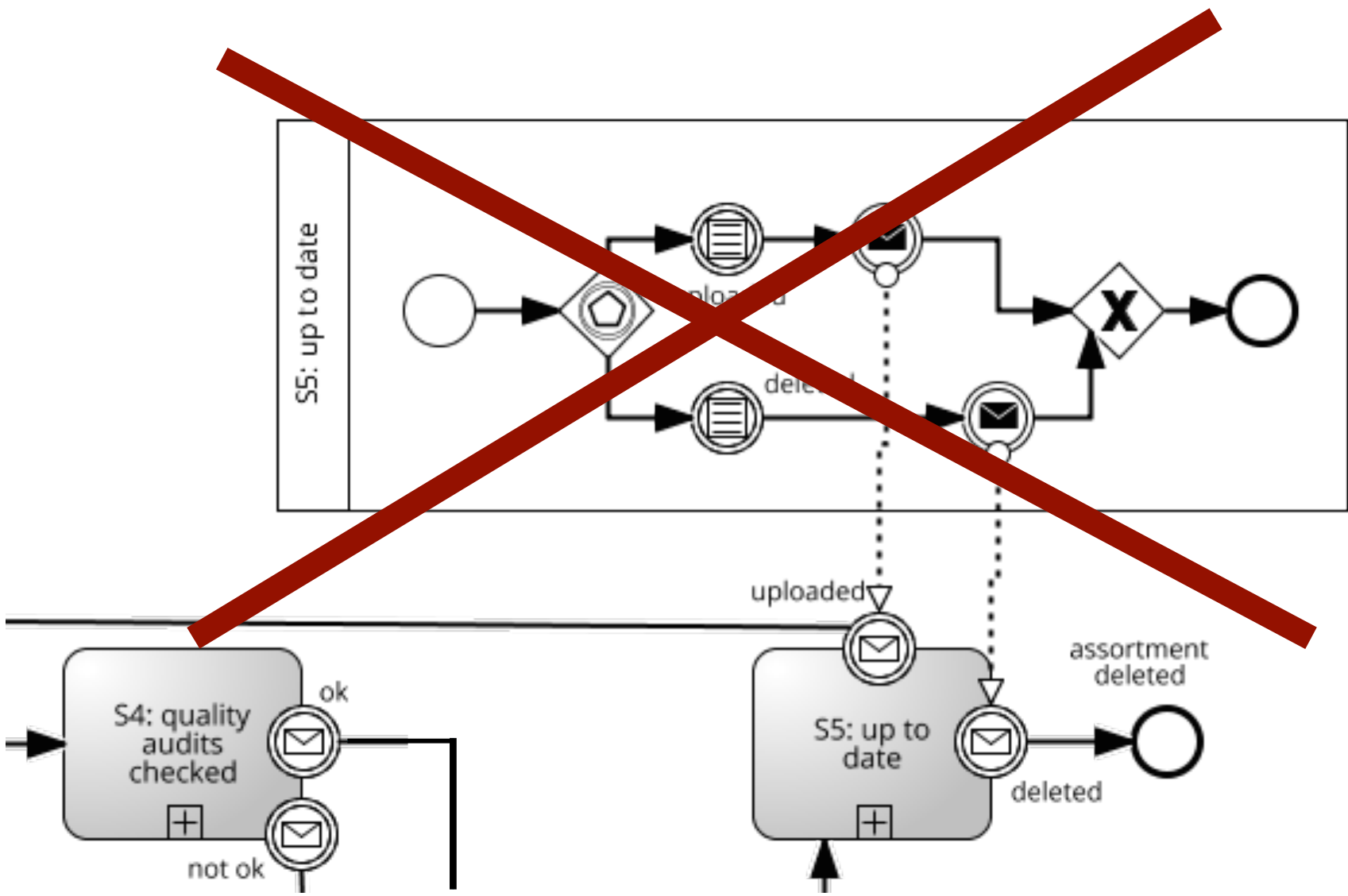


# State-Centric Operational Model (SCOM)

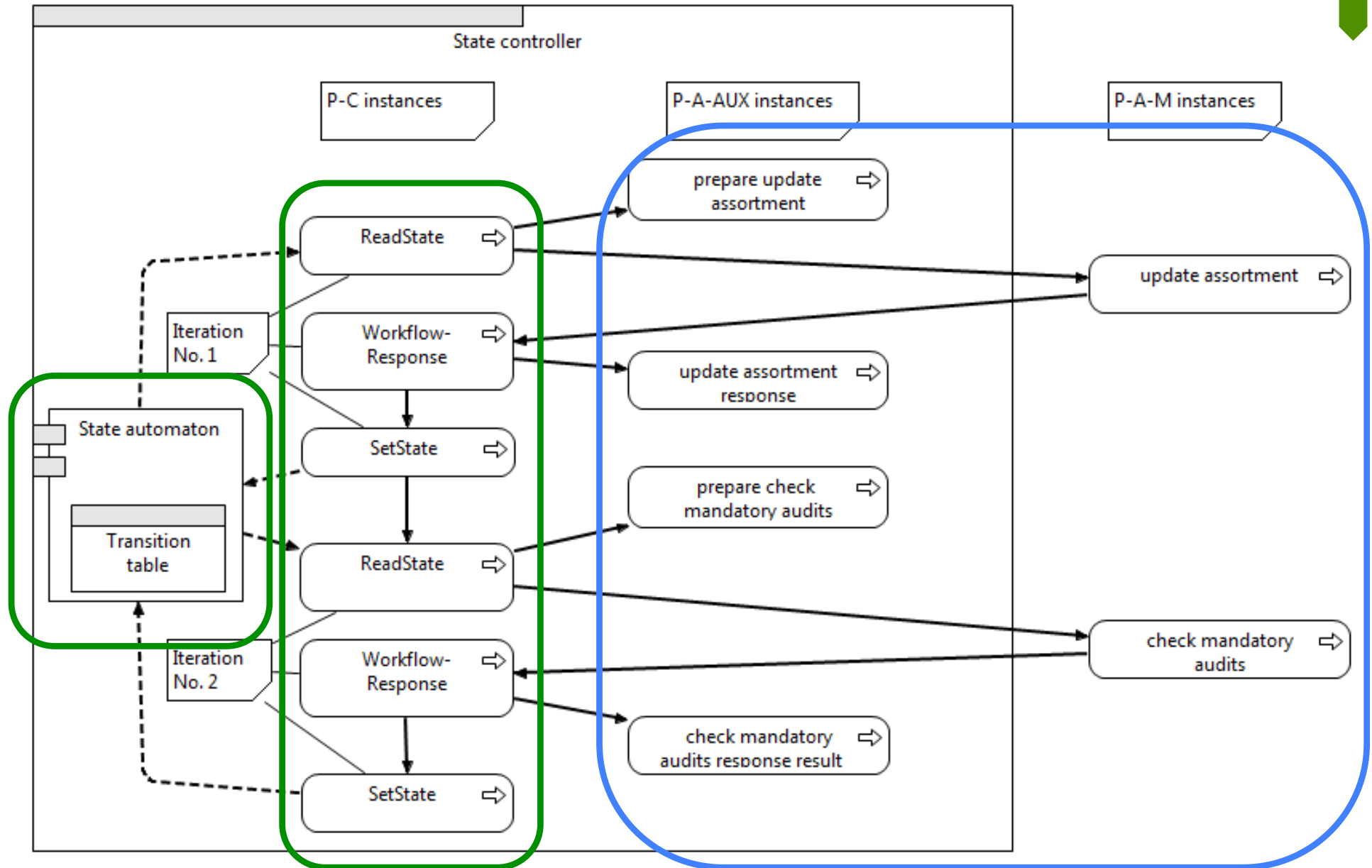




# Possible refinement of state representing activity

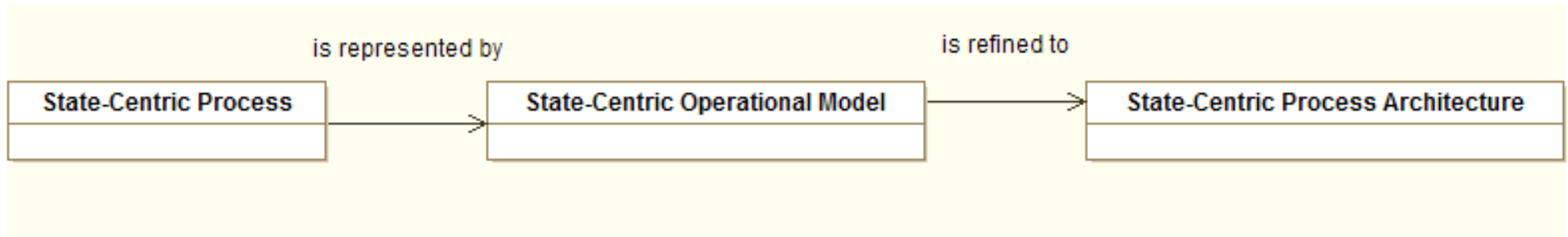


# Process Architecture of MDMS3 (detail)



# Benefits of the proposed architecture

- 1. Reuse:** The controller processes P-C are stable, in a way that the product family of different applications that are realized with MDMS-3 share the same set of control processes.
- 2. Runtime changes:** Modifications to the state automata influence the process execution at runtime. Changing the state automata other (or even new) application specific processes can be invoked.
- 3. Governing of long-living objects:** Instances of the application specific processes are invoked only if a state change has taken place and a state transition is possible. Long-living transactions are avoided.





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**We also:**

- Relate the approach to the 20 UseCases
- Give an idea how to proof the correctness of the derived architecture

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**We do not** (open research questions):

- proof the correctness of the derived architecture
- do **Process-Mining** for state-centric processes
- give further application domains for the use of state centric processes (SCPs)
- formalize SCPs, SCOM or the proposed state-centric business process architecture
- explore synergies from SCPs with respect to document-centric, data-centric, artifact-centric BPM

# Agenda

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## 2. Research Questions in the context of Variant-Management



## 2. Research Questions in the context of Variant-Management



Assume huge variety of different process instances.  
Aim is to have a (super-)model covering them all.

1. Optimize the model with respect to the number of different variants (instance graph)
2. Formulate criteria how to cut the supermodel, such that it is still manageable
3. Find out the relation between necessary measuring points within the process model and belonging variants in order to gain relevant events for process monitoring