



Business Process Management Systems and Challenges in their Adoption

presented by **Barbara Weber**

BPMuy, Montevideo, Uruguay, September 29, 2016

Business Processes Matter



Growth of Investments in BPMS

Gartner Says Spending on Business Process Management Suites to Reach \$2.7 Billion in 2015 as Organizations Digitalize Processes



4.4% growth in 2015

Worldwide IT Spendings

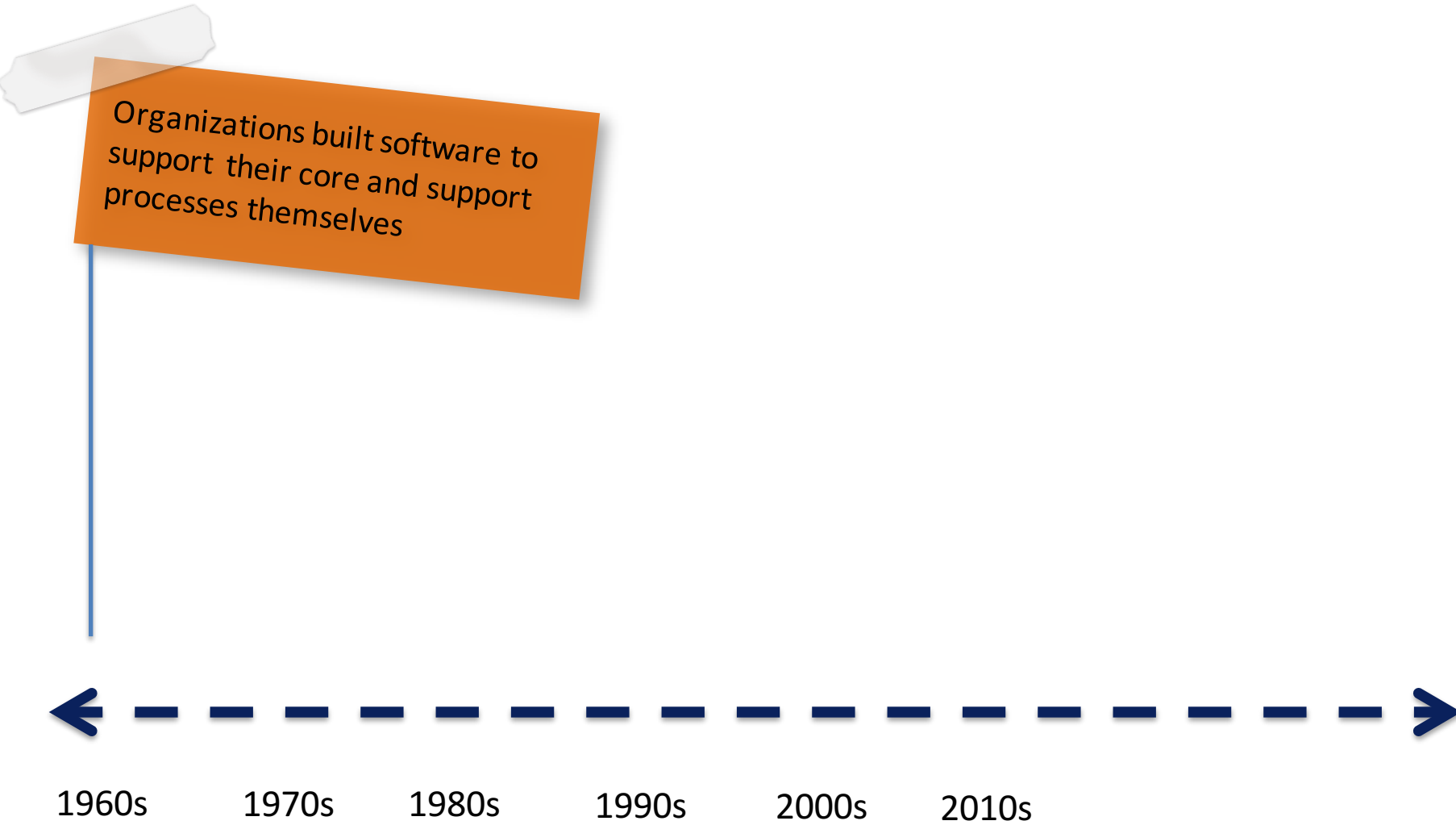
Worldwide IT Spending Forecast (Billions of U.S. Dollars)

	2014 Spending	2014 Growth (%)	2015 Spending	2015 Growth (%)
Devices	696	3.8	732	5.1
Data Center Systems	141	0.8	143	1.8
Enterprise Software	317	5.8	335	5.5
IT Services	956	2.7	981	2.5
Telecom Services	1,626	-0.1	1,638	0.7
Overall IT	3,737	1.9	3,828	2.4

Source: Gartner (January 2015)

BPMS account for a relatively small portion of spendings on enterprise software

Evolution of Enterprise Applications



Organizations built software to support their core and support processes themselves

1960s

1970s

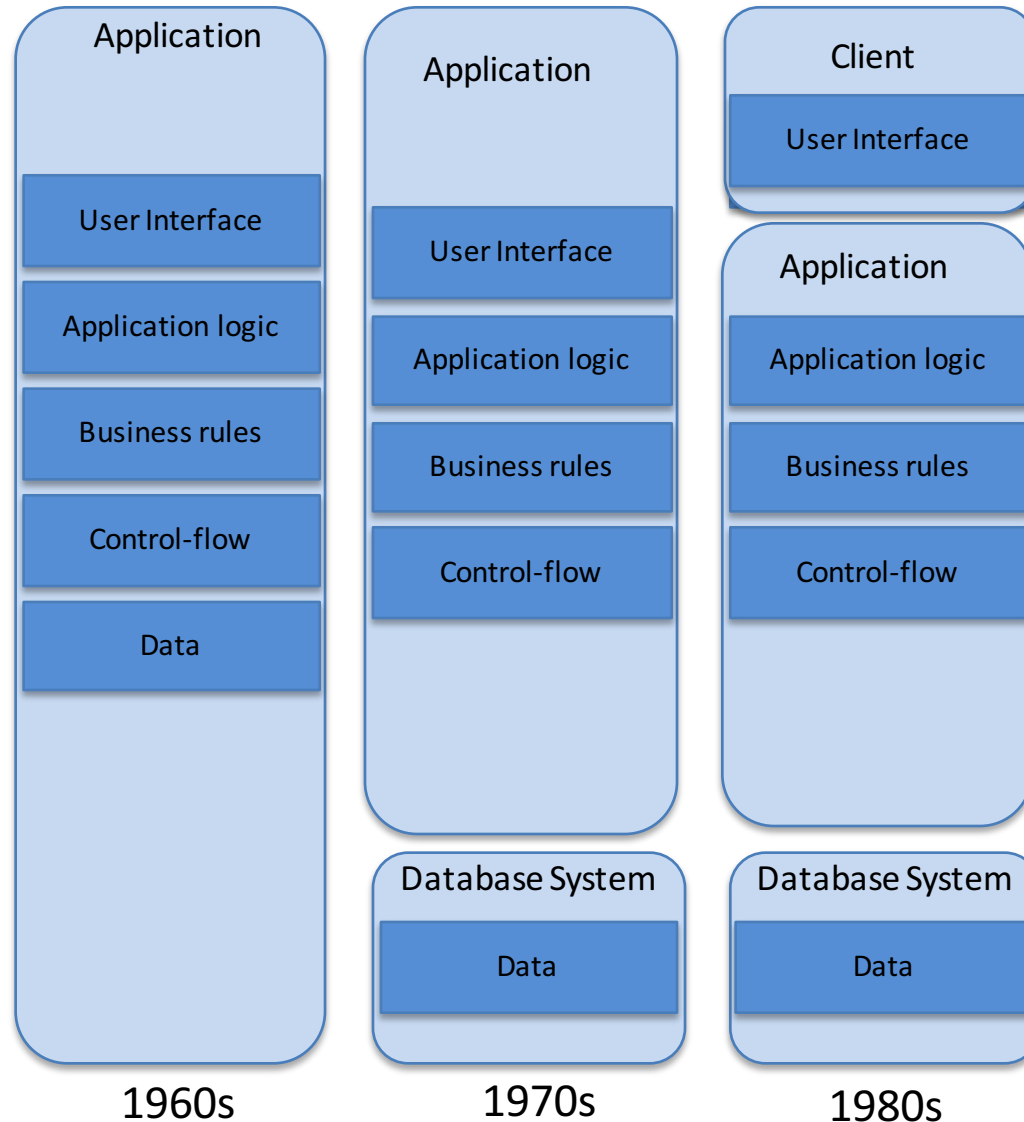
1980s

1990s

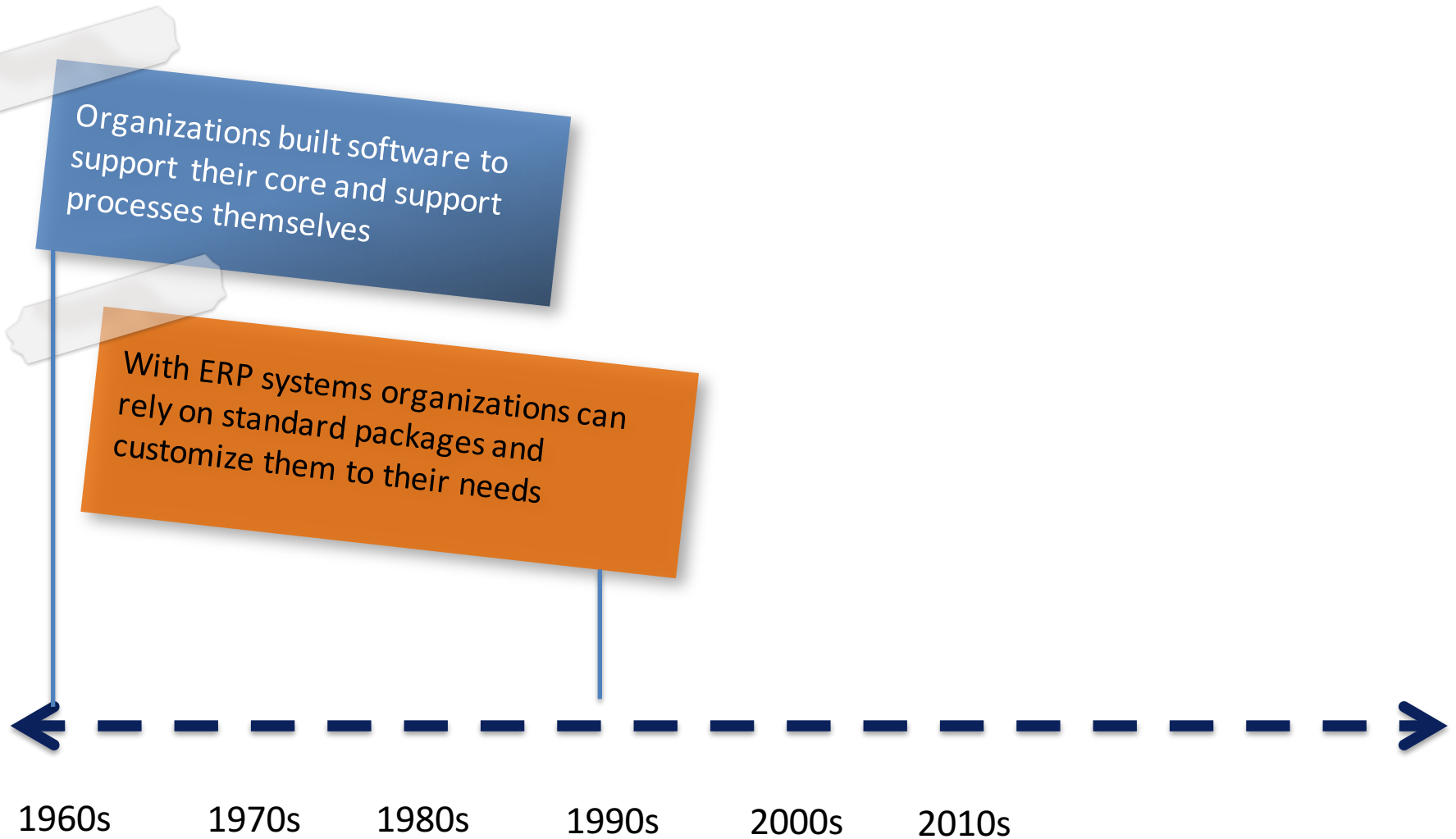
2000s

2010s

Evolution of Enterprise Applications



Evolution of Enterprise Applications



Evolution of Enterprise Applications

WFMS appear on the market

Organizations built software to support their core and support processes themselves

With ERP systems organizations can rely on standard packages and customize them to their needs

1960s

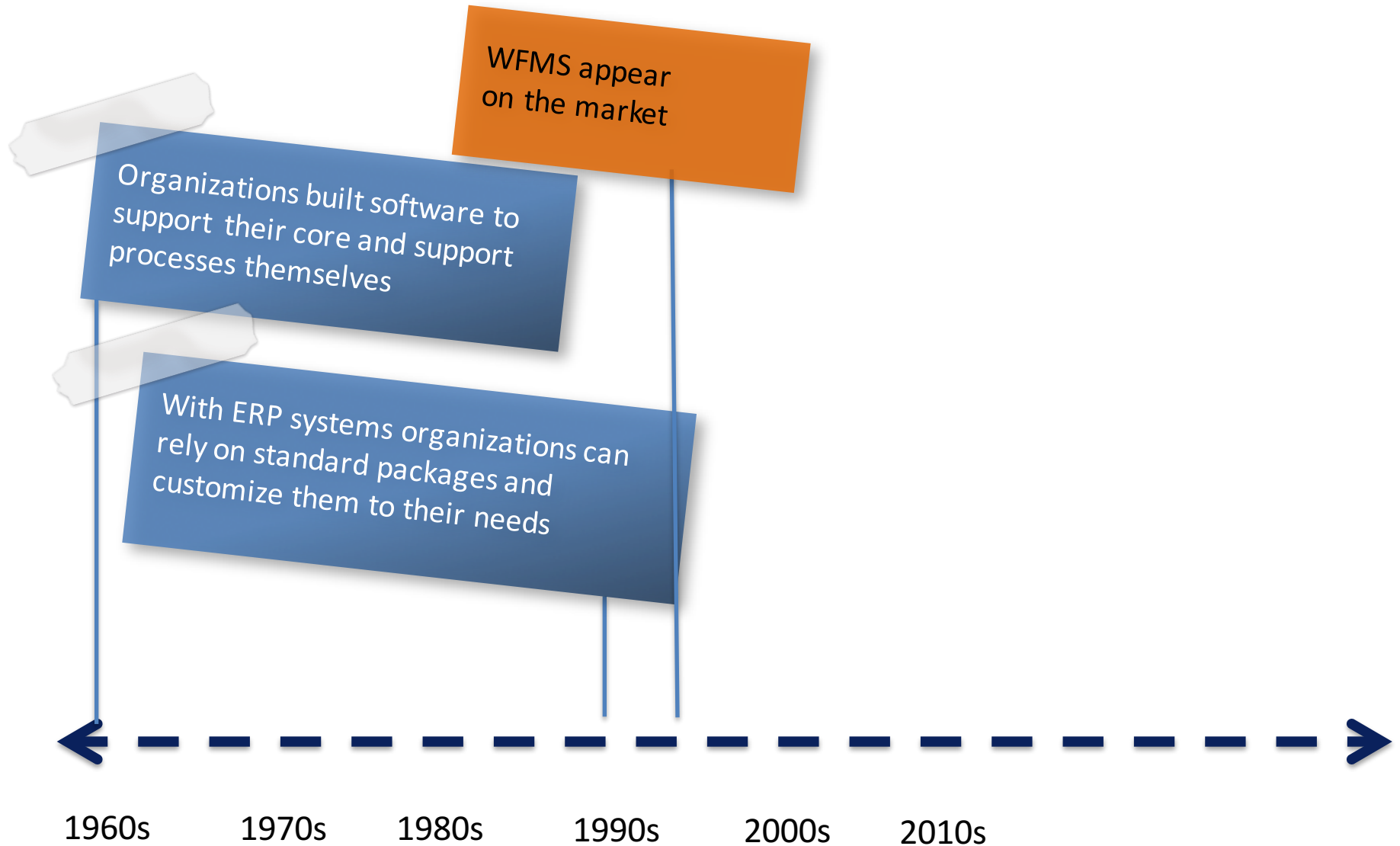
1970s

1980s

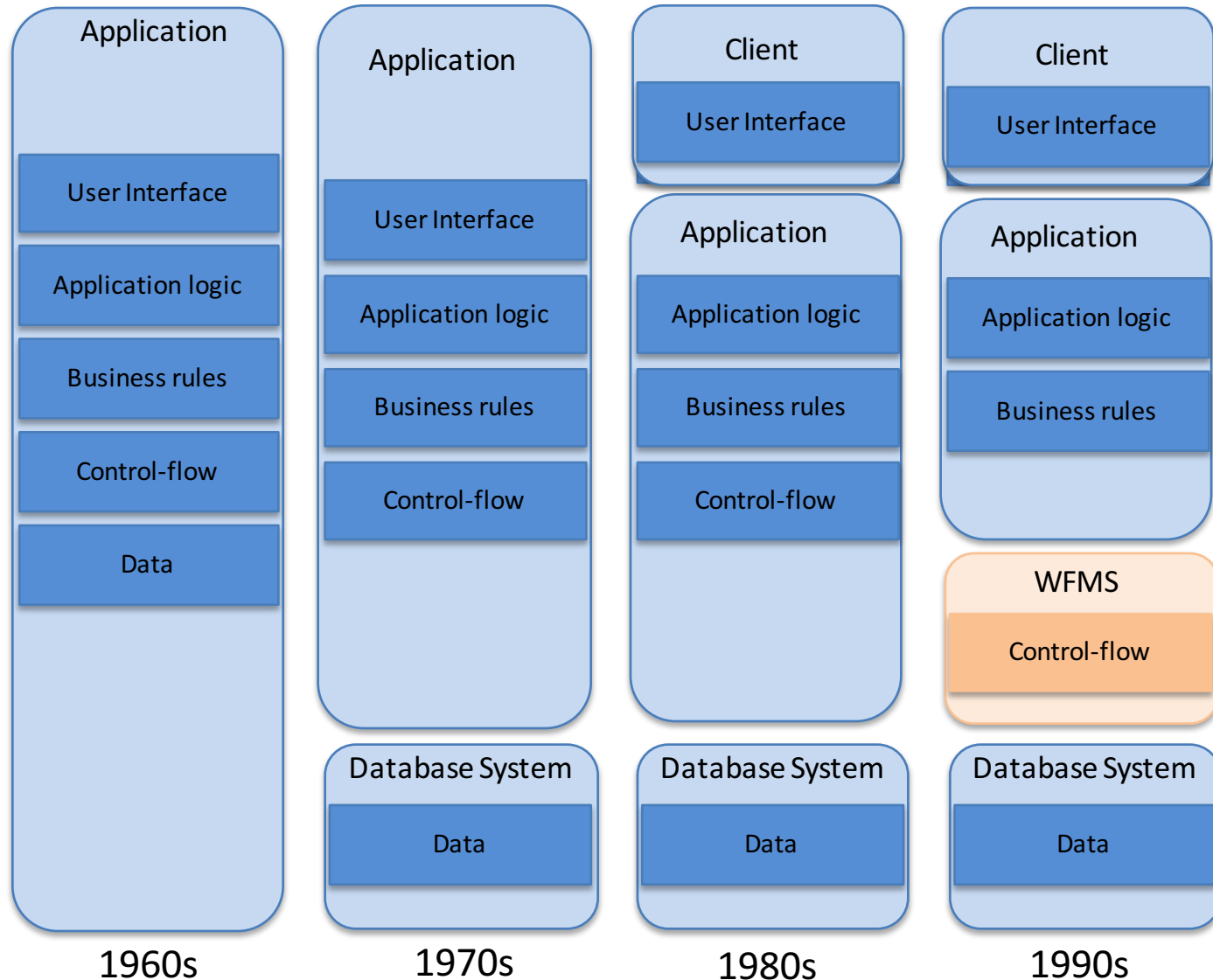
1990s

2000s

2010s

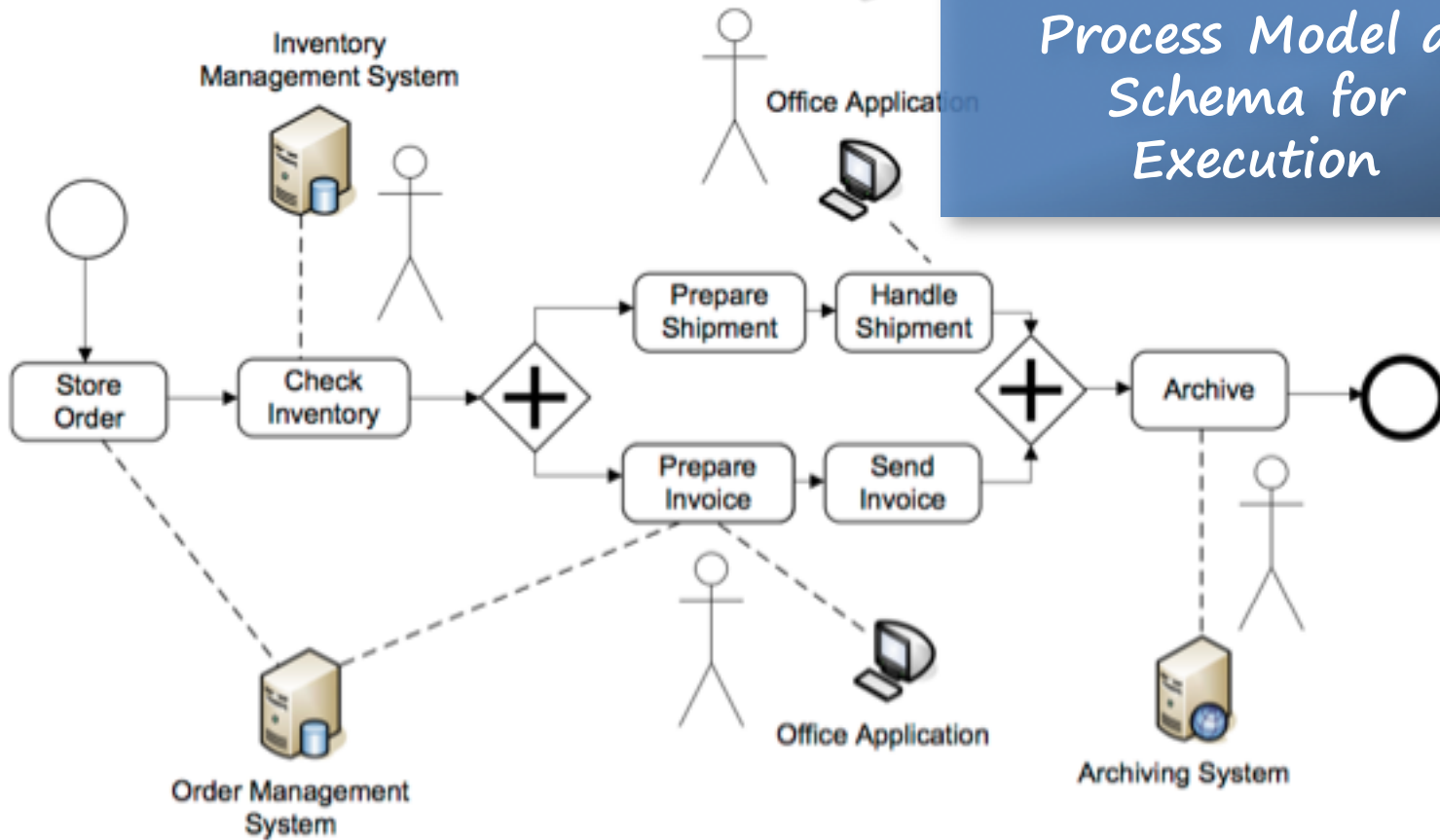


Evolution of Enterprise Software



Pre-defined Process Model

Process Model as Schema for Execution

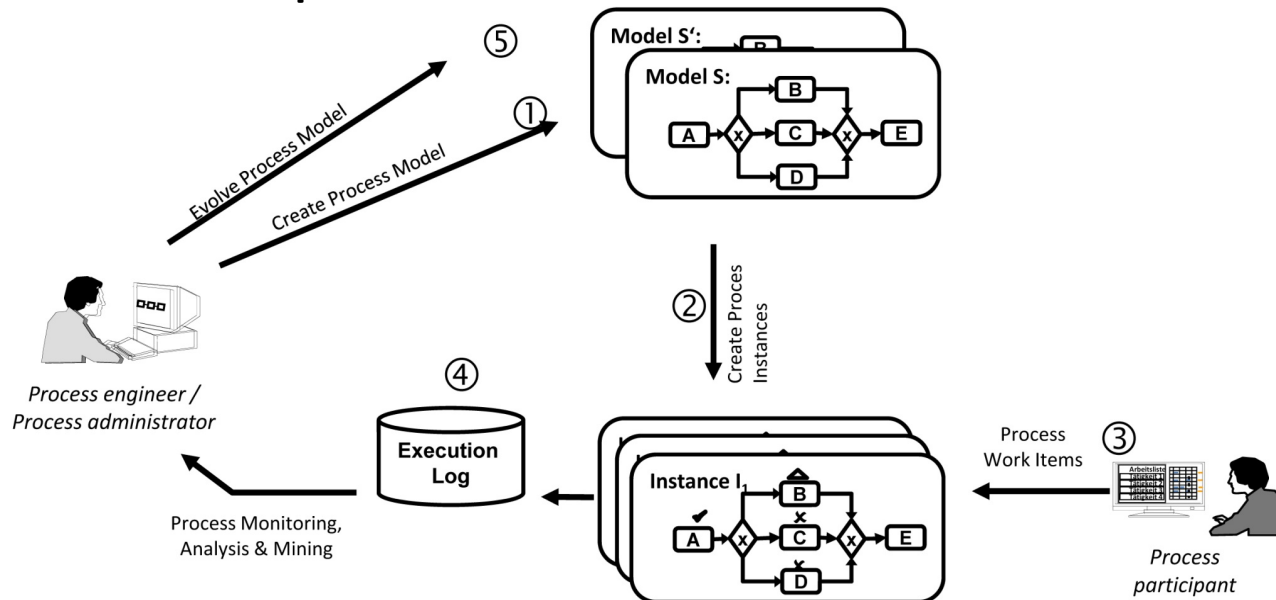


Workflow Management System (WFMS)

Software package to support the

- definition,
- management and
- execution

of business processes

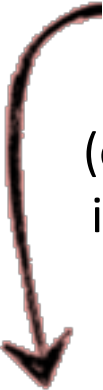


From Monolithic to Service-based Architectures

Evolution in the technology space

Monolithic architecture

(one piece of software in a single deployable unit)



From Monolithic to Service-based Architectures

Evolution in the technology space



*Hard to adapt to
changing requirements*

Difficult to reuse



From Monolithic to Service-based Architectures

Evolution in the technology space

Monolithic architecture

(one piece of software in a single deployable unit)



The Middle Way

(components in single deployable unit)

From Monolithic to Service-based Architectures

Evolution in the technology space

Better reuse

Substitutable



Evolution of Enterprise Applications

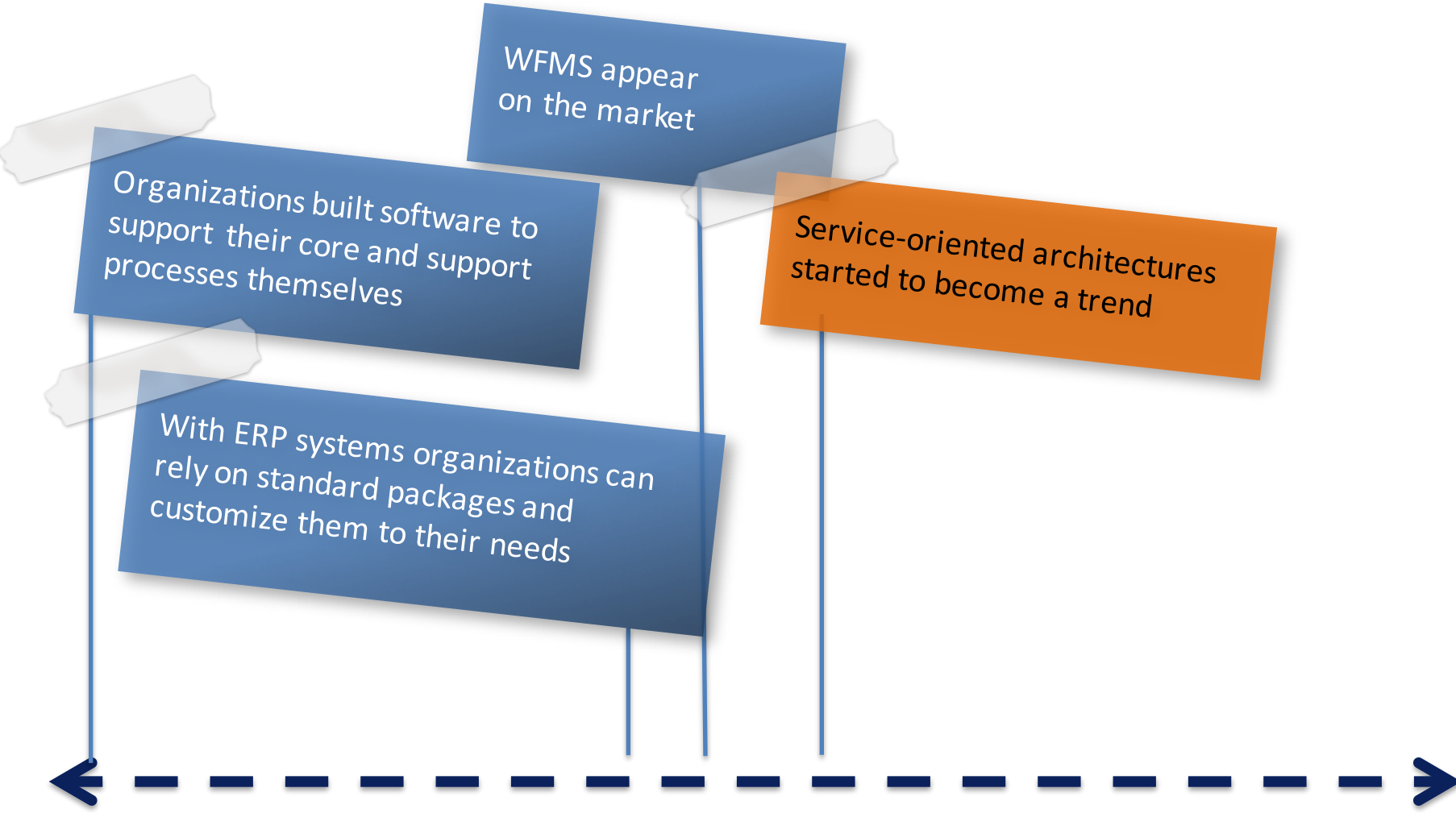
WFMS appear on the market

Organizations built software to support their core and support processes themselves

Service-oriented architectures started to become a trend

With ERP systems organizations can rely on standard packages and customize them to their needs

1960s 1970s 1980s 1990s 2000s 2010s



From Monolithic to Service-based Architectures

Evolution in the technology space

Monolithic architecture

(one piece of software in a single deployable unit)

Service-based architecture

(SOA, micro services, etc. deployed separately)



The Middle Way

(components in single deployable unit)

From Monolithic to Service-based Architectures

Evolution in the technology space

Replaceable

Upgradable

Scalable

*Heterogeneous
technology stack*



Assembling Services for Realizing Business Process Support

Orchestration vs. Choreography



Programming in the large

Assembling Services for Realizing Business Process Support

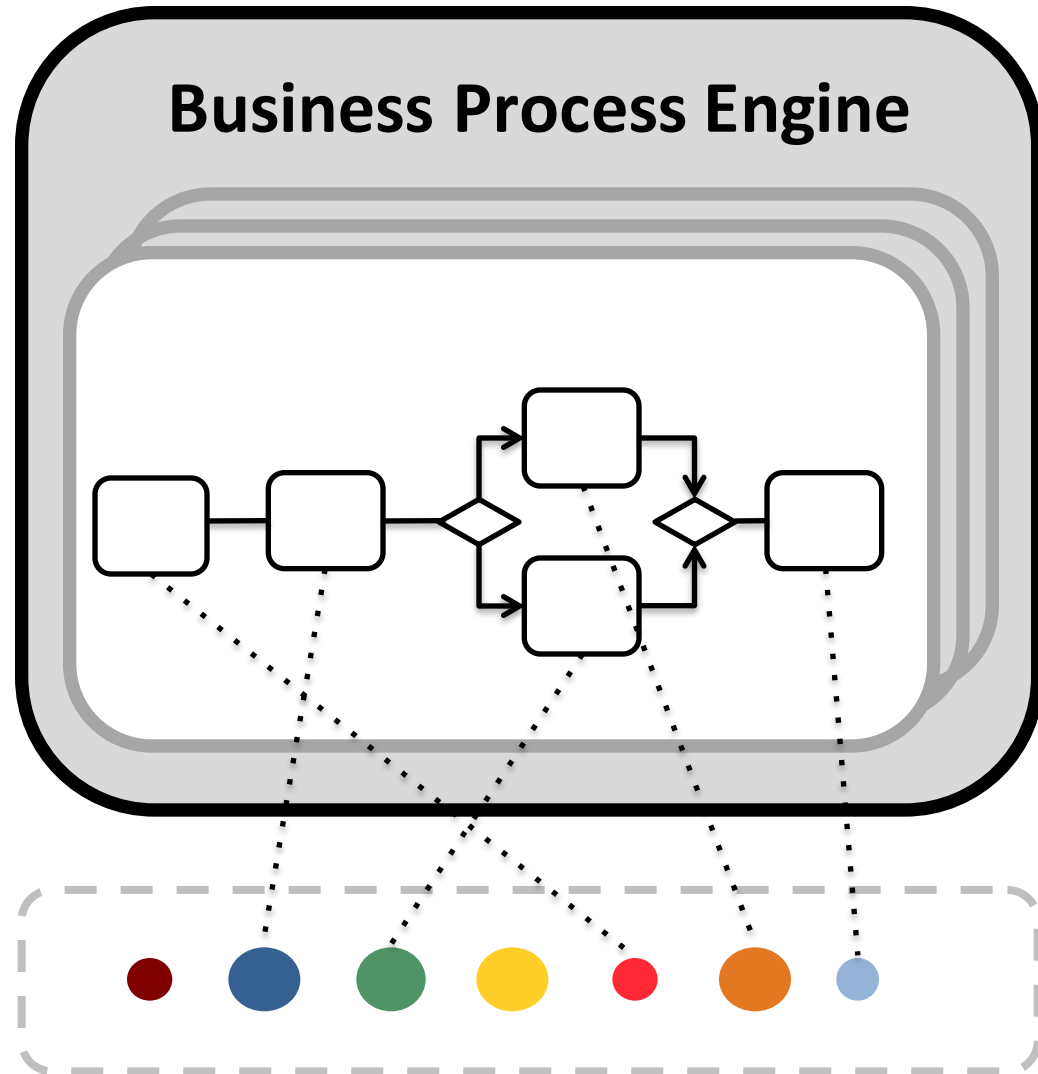
Code-based Orchestration



```
<h2 class="title">Send money from any bank account</h2>
<h3 class="subtitle">Transfer funds across the globe with simple, low cost remittance</h3>
<ul class="equal">
  <li>Transfer funds to any bank account</li>
  <li>Send bank transfers to more than 200 countries</li>
  <li>Get started with a quick, simple test</li>
</ul>
<a href="MassPaymentServices.aspx" class="read-more">Read More</a>
<div class="clearfix"></div>
<div class="buttons">
  <div class="button"><a href="http://www.westernunion.com/money">
    <div id="generalDemo" class="demo-button">
      Watch<br>
      Demo
    </div>
  </div>
<div class="demoContainer" id="generalDemo">
  <iframe width="853" height="481" src="" frameborder="1" allowfullscreen></iframe>
</div>
</div>
</div>
<div class="receive">
  <div class="inner half-sw">
    <h2 class="title">Receive</h2>
    <h3 class="subtitle">Global solution to receive funds. Local options to spend on</h3>
    <ul class="equal">
      <li>Receive funds from any bank account</li>
      <li>Withdraw funds to your local bank account</li>
      <li>Spend funds with a prepaid card</li>
    </ul>
    <a href="ReceiveWithdraw.aspx" class="read-more">Read More</a>
  </div>
  <div class="clearfix"></div>
  <div class="buttons">
    <div class="button"><a href="http://www.westernunion.com/money">
      Watch & Withdraw</a>
    </div>
    <div id="useDemo" class="demo-button">
      Watch<br>
      Demo
    </div>
  </div>
</div>
</div>
```

Assembling Services for Realizing Business Process Support

BPM Technologies for Orchestration



Assembling Services for Realizing Business Process Support

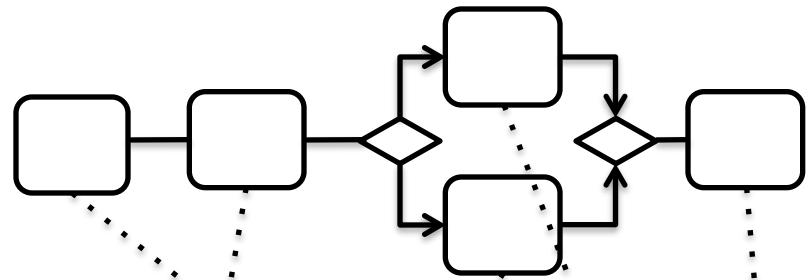
BPM Technologies for Orchestration

Model execution driven by Business Process Engine

Composition based on formal process models

Loosely coupled services

Business Process Engine



Evolution of Enterprise Applications

WFMS appear on the market

Organizations built software to support their core and support processes themselves

Service-oriented architectures started to become a trend

With ERP systems organizations can rely on standard packages and customize them to their needs

BPMS appear on the market

1960s

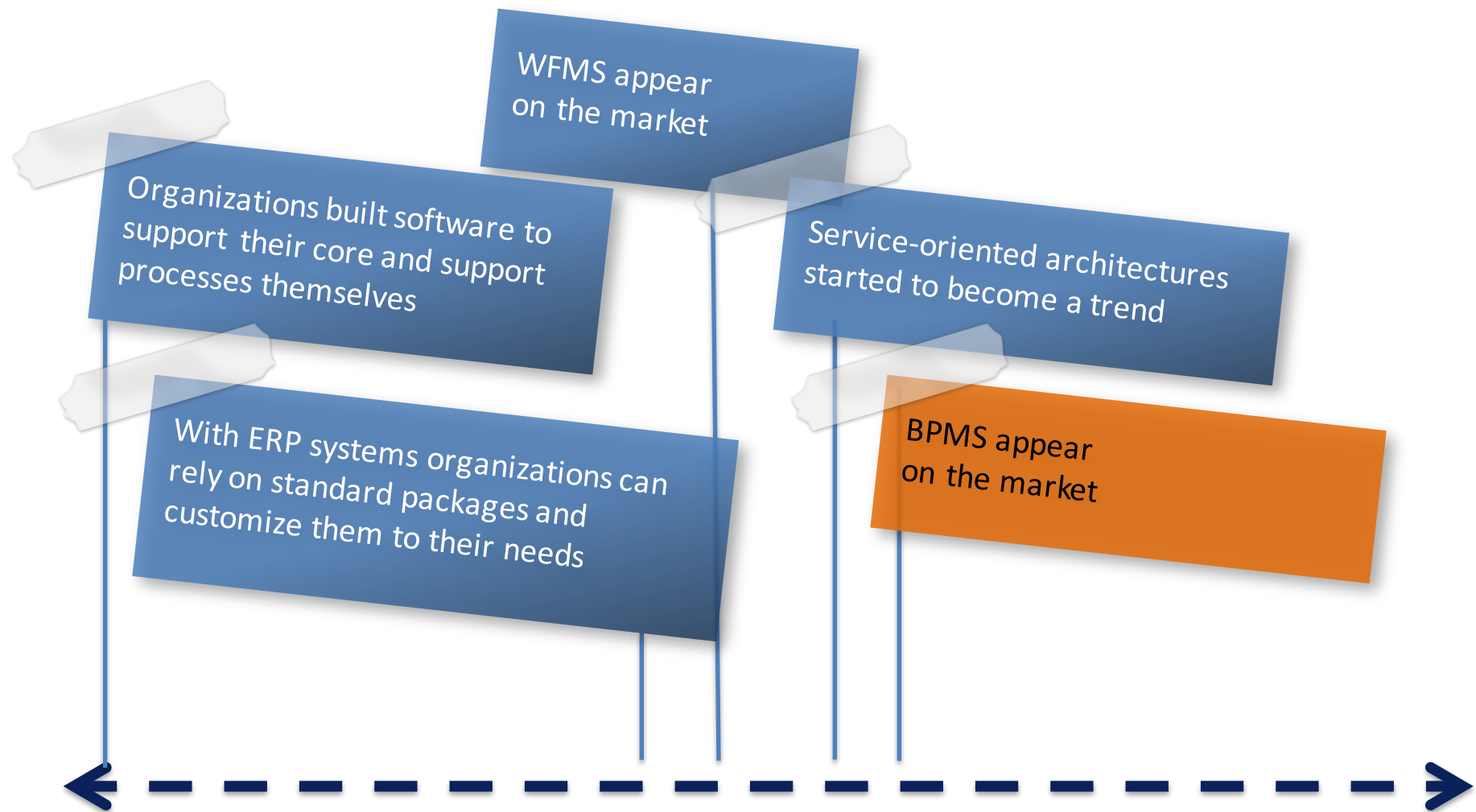
1970s

1980s

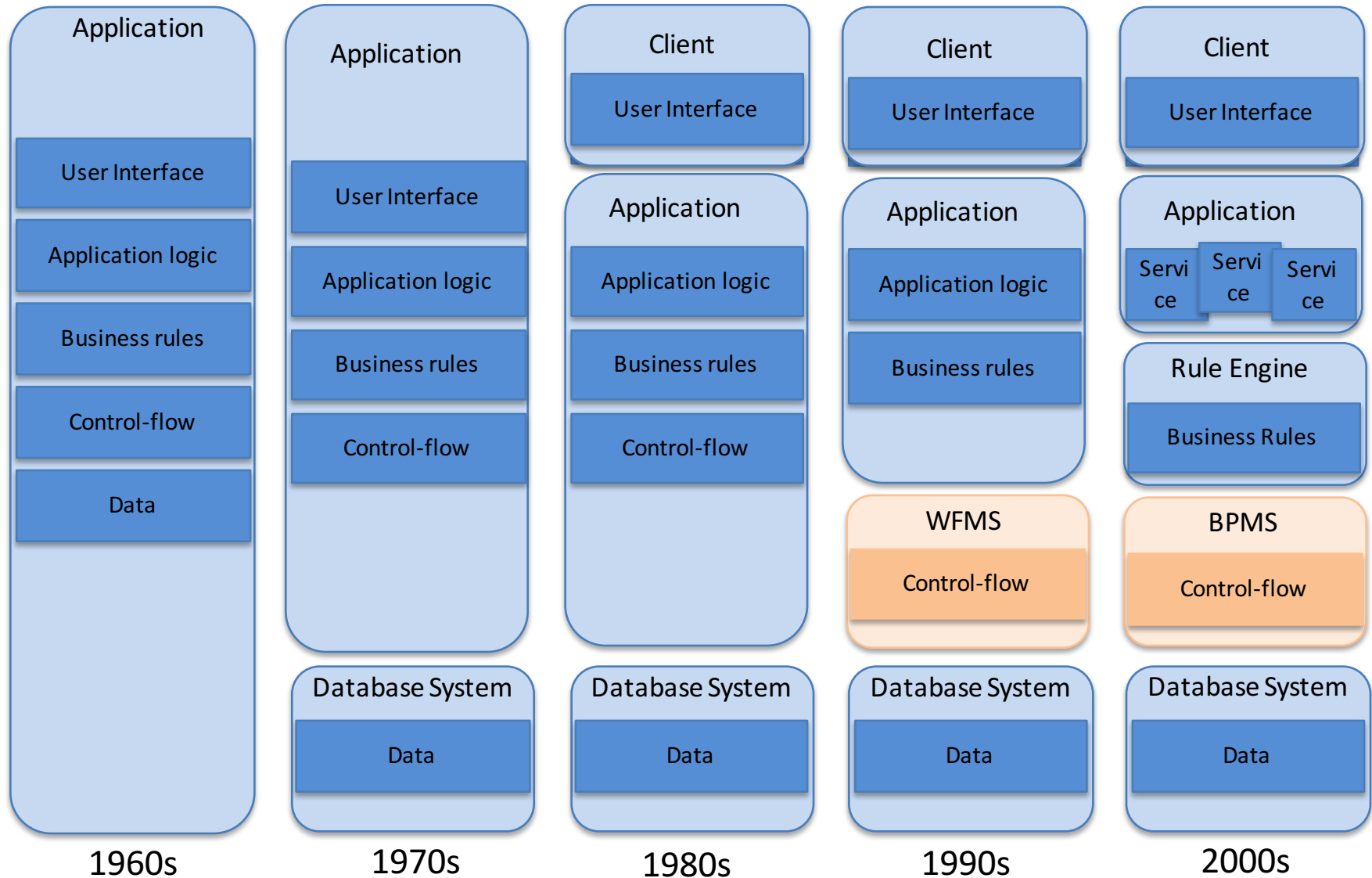
1990s

2000s

2010s

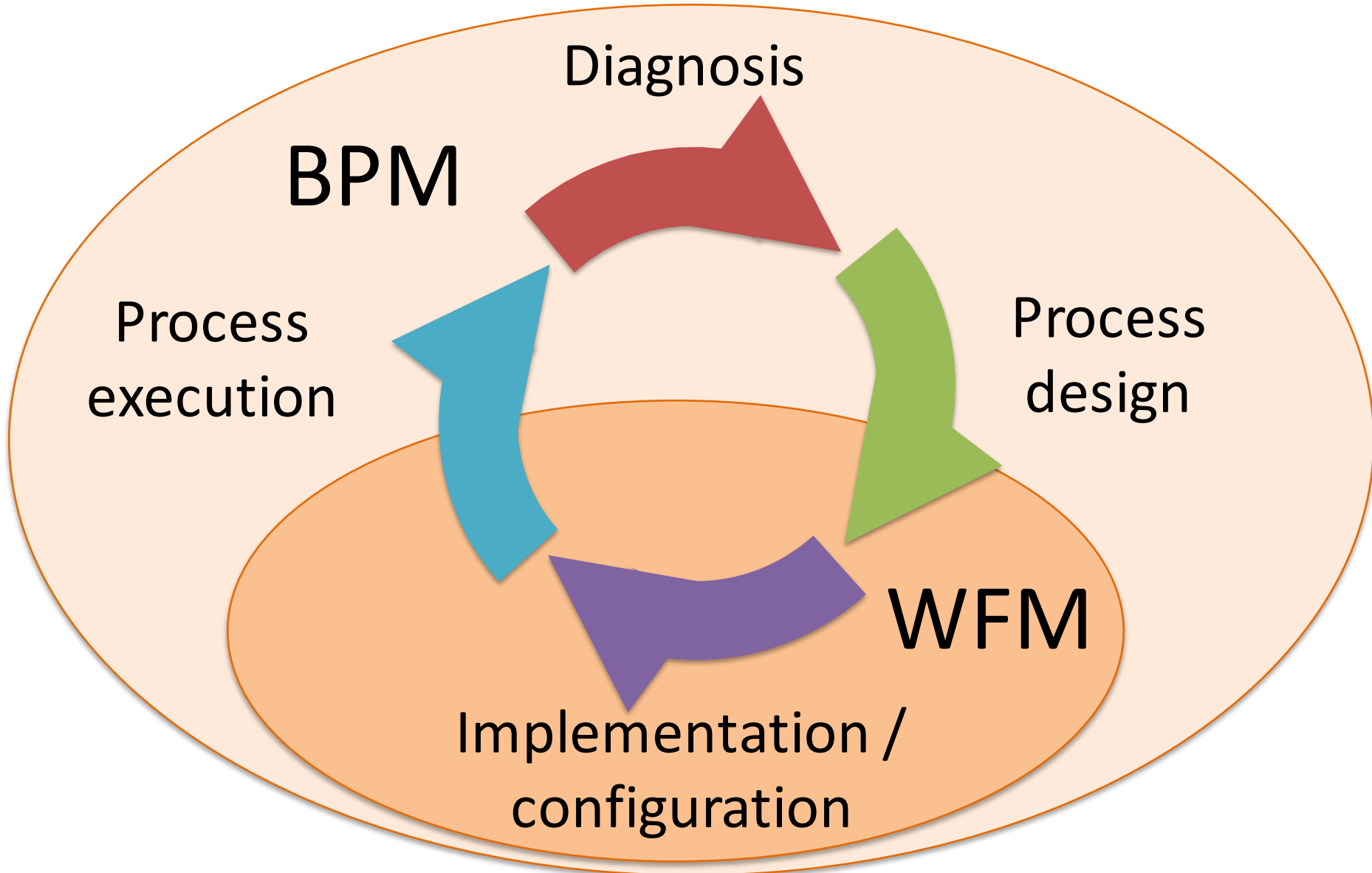


Evolution of Enterprise Software



Evolution of Enterprise Software

From WFM to BPM



Evolution of Enterprise Applications

WFMS appear on the market

2008: BPMN Standard by OMG first released

Organizations built software to support their core and support processes themselves

Service-oriented architectures started to become a trend

With ERP systems organizations can rely on standard packages and customize them to their needs

BPMS appear on the market

1960s

1970s

1980s

1990s

2000s

2010s



Why have BPMS still not fully taken off?



Challenge:

BPM support rarely developed on the green field

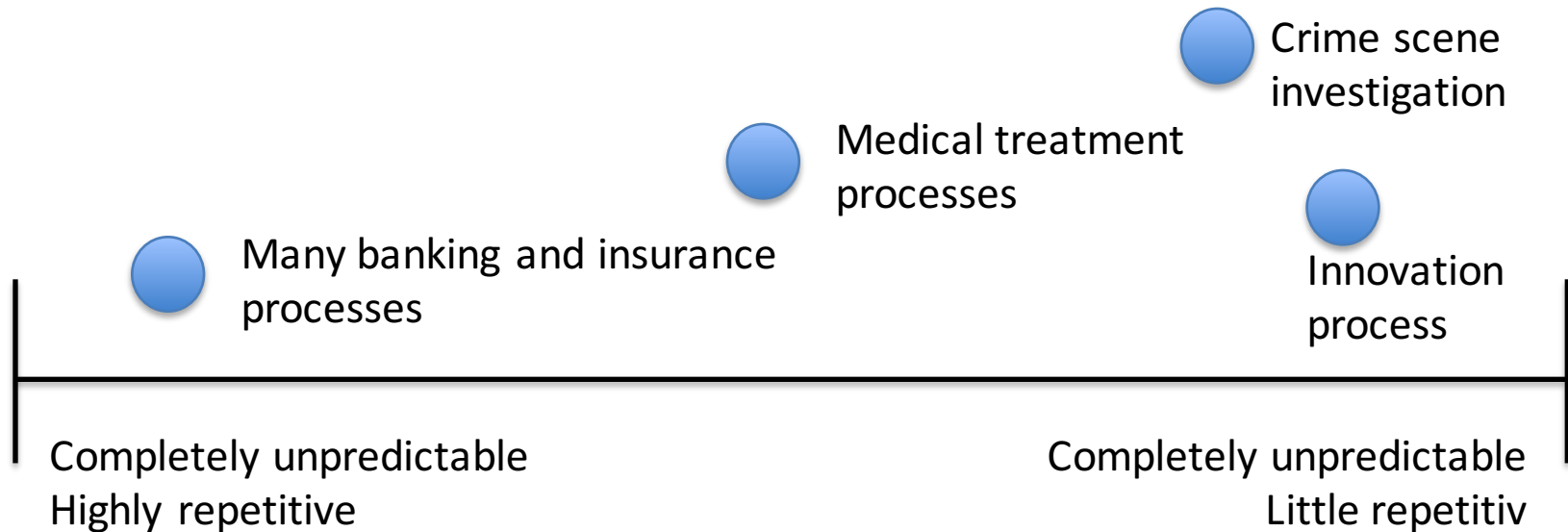
- Organizations

- have made huge IT investments since the 1960s, which are today legacy applications
- and not fully transitioned to service-oriented architectures

- To avoid the creation of new silos BPMS need to be able to integrate into the existing IT landscape

The process spectrum

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



The process spectrum

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



Completely unpredictable
Highly repetitive

Completely unpredictable
Little repetitive

Technology Support for BP

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



*Business
Process
Management
Suites (BPMS)*

Completely unpredictable
Highly repetitive

Completely unpredictable
Little repetitive

Challenge: Flexibility

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



Completely unpredictable
Highly repetitive

Variability

Adaptation

Evolution

Completely unpredictable
Little repetitive

Adaption

- Ability to adapt process and its structure to temporary events
 - Special cases, exceptions

Example: Road blockage



Adaption in BPMS

- Planned adaptations typically addressed via exception handling
- Approaches for unplanned exceptions in academic research known since years
- Unplanned exceptions in many commercial BPMS not sufficiently supported
 - Exceptions: Adaptive BPMS like AristaFlow or camunda

Adaptation of Running Instances

The screenshot displays the Camunda BPMN editor interface for a process titled "Invoice Receipt". The process flow includes tasks: "Assign Approver Group", "Review Invoice", "Approve Invoice", "Prepare Bank Transfer", and "Archive Invoice". Decision diamonds are used for "Review successful?" and "Invoice approved?". Annotations 1-6 point to specific UI elements: 1 (Start Before/Start After/Cancel menu), 2 (Modify icon), 3 (Indicator badge), 4 (Instances badge), and 5 (Change order), 6 (Remove instruction).

1. Modification tab
2. Operations Menu
3. Indicator badge
4. Instances badge
5. Change order
6. Remove instruction

Modify

Start before	Approve Invoice
Add variable +	
Start before	Prepare Bank Transfer
Add variable +	

Example:
camunda

Evolution

- Ability to change the implemented process when the real-world process changes

Example: New road



Evolution

- Typical Driver

External Driver

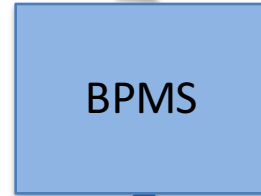
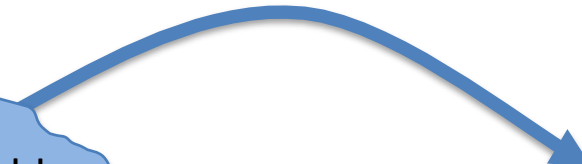
Organizational learning



Changes of
- business
- technological
- legal
circumstances



represented in



Internal Driver

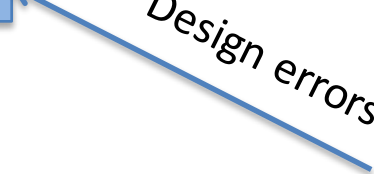
Poor model
quality



Technical problems



Design errors



provides feedback



Evolution

- Immediateness of evolution
 - deferred
 - Running instances not affected
 - immediate
 - Running instances affected
 - Requires migration of instances

Evolution in BPMS

- Deferred evolution of business process typically supported
- Approaches for immediate evolution in academic research known since years
- Immediate Evolution in commercial BPMS not sufficiently supported
 - Exception: Adaptive BPMS like AristaFlow or camunda

Immediate Evolution

Dashboard » Processes » Migration

1. Define Mapping

2. Select Instances

3. Confirm

*Example:
camunda*

Source:

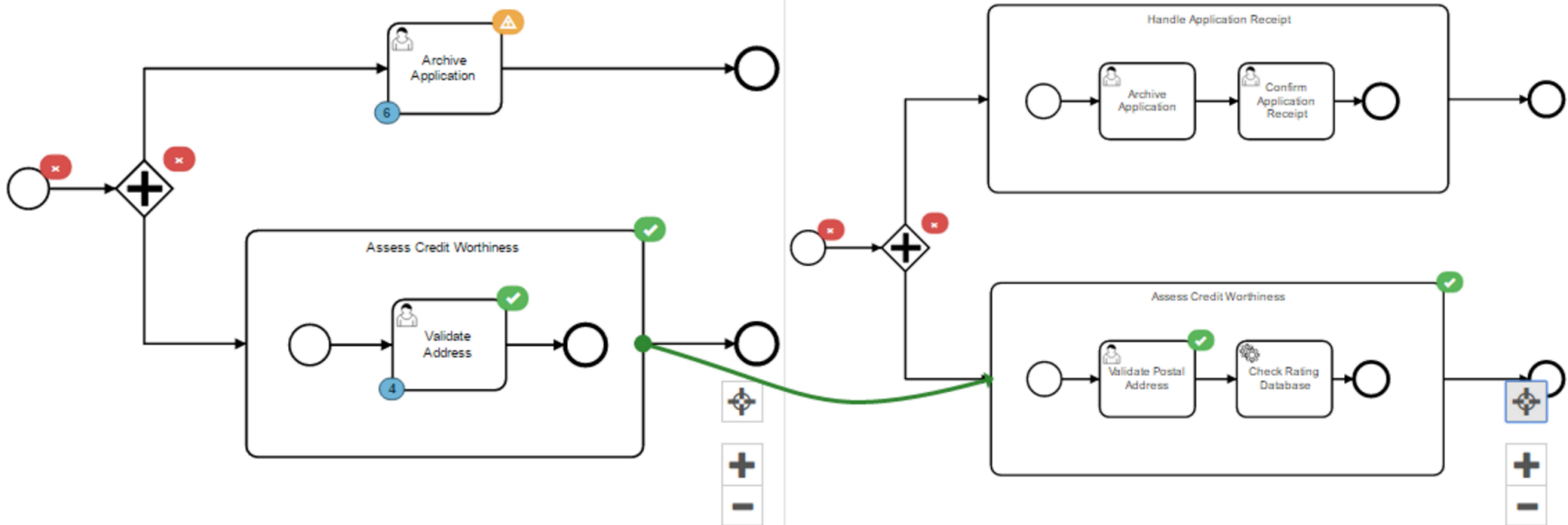
Example Process

1

Target:

Example Process

2



Variability

- Variability requires that processes, depending on the context, are treated differently
- Example: hiking path versus highway



Copyright © Steffen Ramsaier, Flickr



Copyright © Moyan Brenn – Flickr.com

Variability

- Context factors known

Example:

Transportation
Method



- Selection of variants is context-dependent



Copyright © Steffen Ramsaier, Flickr



Copyright © Moyan Brenn – Flickr.com

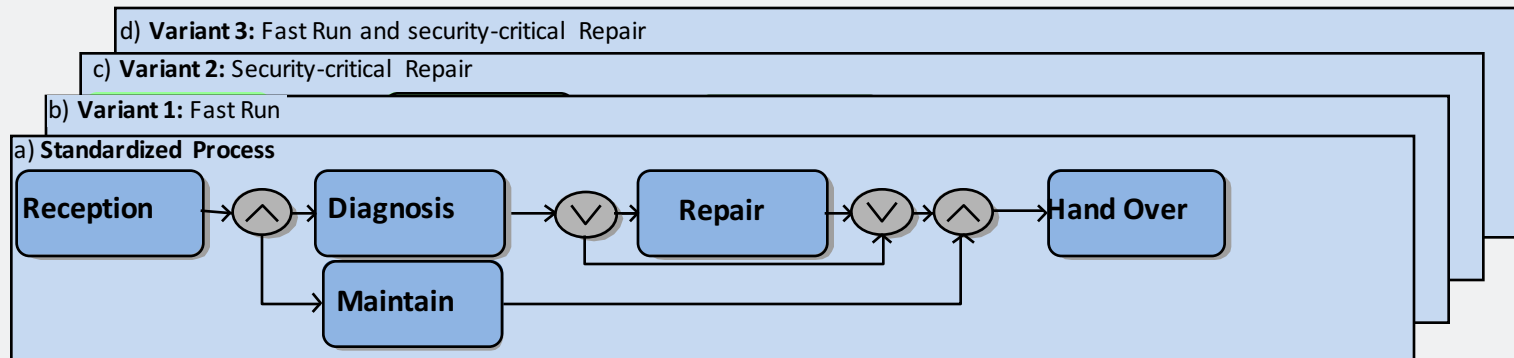
Variability

- Typical Driver
 - Product and Service Variability
 - Country-specific (legal) regulations
 - Different customer groups
 - Seasonal differences

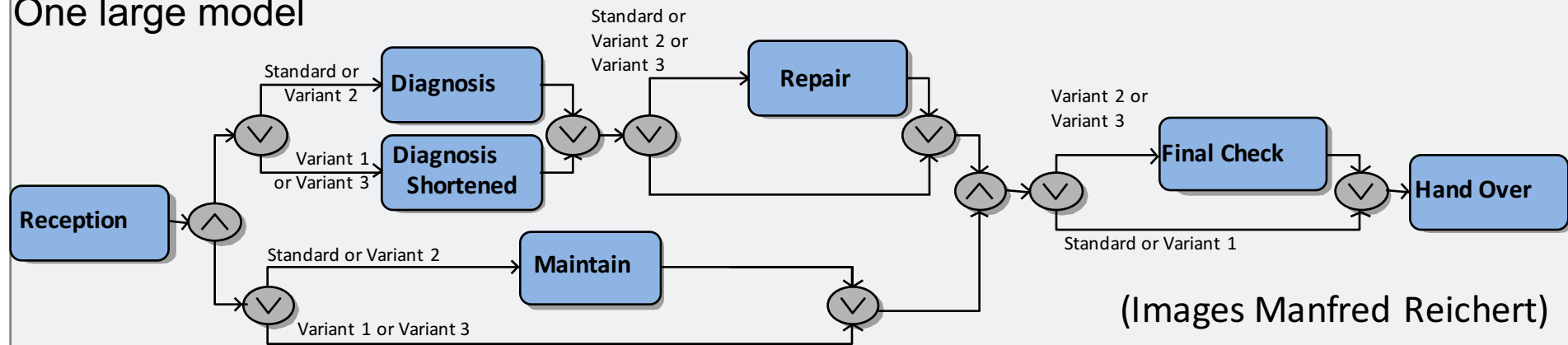
Variability in BPMS

- Not explicitly supported in commercial BPMS

One model per variant



One large model



- Very recent research topic

The process spectrum

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



Completely unpredictable
Highly repetitive



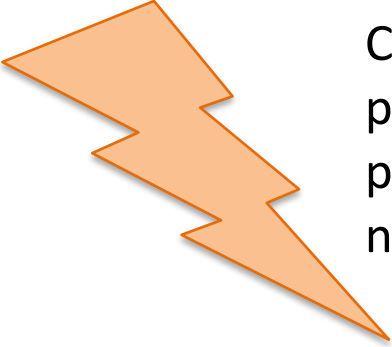
Completely unpredictable
Little repetitive

Technology Support for BP

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



*Business
Process
Management
Suites (BPMS)*



Completely
predefined
process model
not suitable

Completely unpredictable
Highly repetitive

Completely unpredictable
Little repetitive

The process spectrum

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



Completely unpredictable
Highly repetitive



Specific
property:
Emergence

Completely unpredictable
Little repetitive

Technology Support for BP

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive



*Business
Process
Management
Suites (BPMS)*

*Case
Handling*

Completely unpredictable
Highly repetitive

Completely unpredictable
Little repetitiv

Challenge Flexibility

Variability

Adoption

Evolution

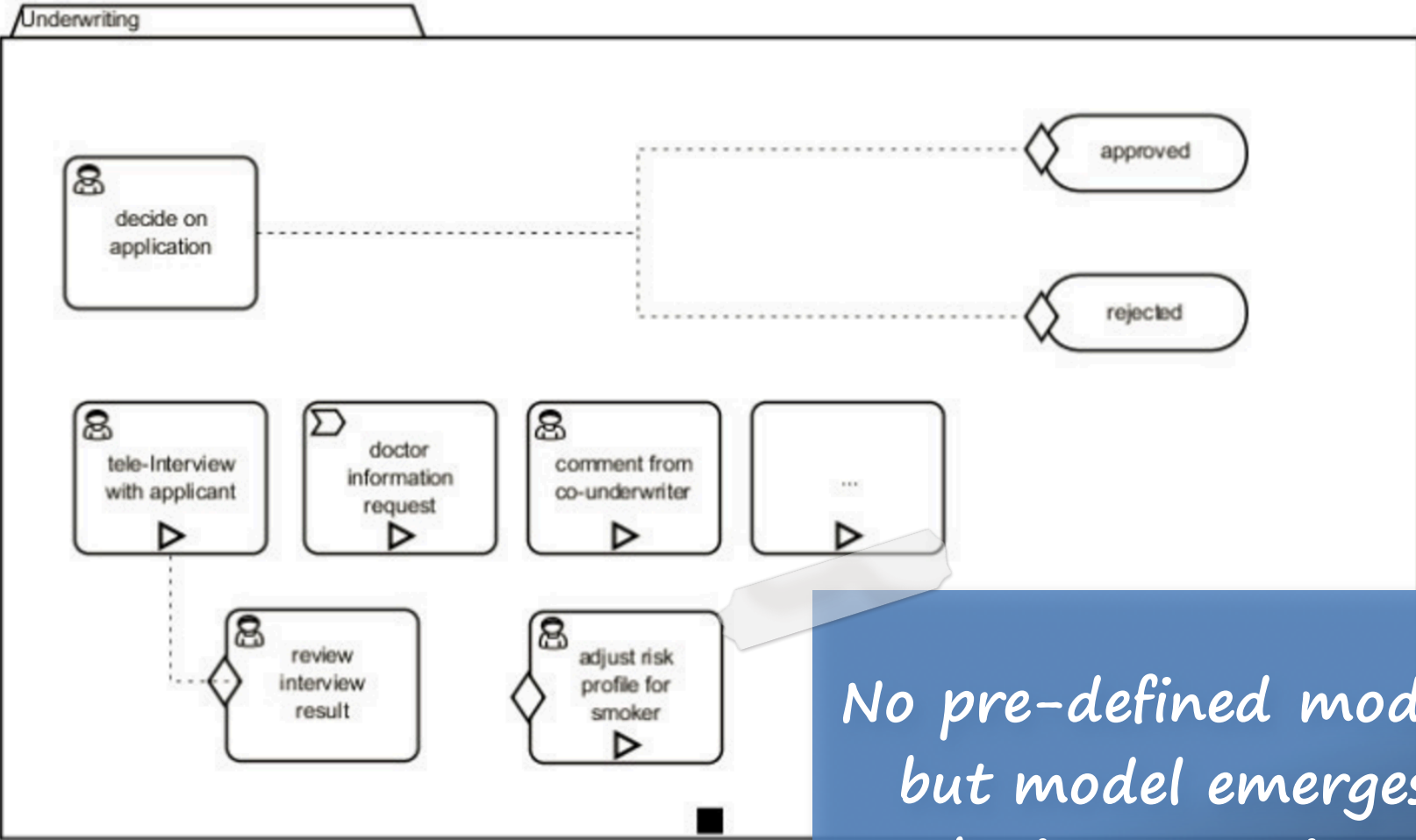
Looseness



Highly predictable
Highly repetitiv

Highly unpredictable
Little repetitive

Looseness



*No pre-defined model,
but model emerges
during run-time*

Evolution of Enterprise Applications

WFMS appear on the market

2008: BPMN Standard by OMG first released

Organizations built software to support their core and support processes themselves

Service-oriented architectures started to become a trend

With ERP systems organizations can rely on standard packages and customize them to their needs

BPMS appear on the market

2014: CMMN Standard by OMG



1960s

1970s

1980s

1990s

2000s

2010s

The Need for Hybrid Approaches

- The process spectrum reaches from
 - completely predictable and highly repetitive
 - to completely unpredictable and little repetitive
- Processes many times occurring are clearly positioned on one side of the spectrum
 - Parts that are predictable and repetitive and
 - Other parts that are unpredictable and little repetitive
- The process portfolio of an organization typically comprises processes at both sides of the spectrum

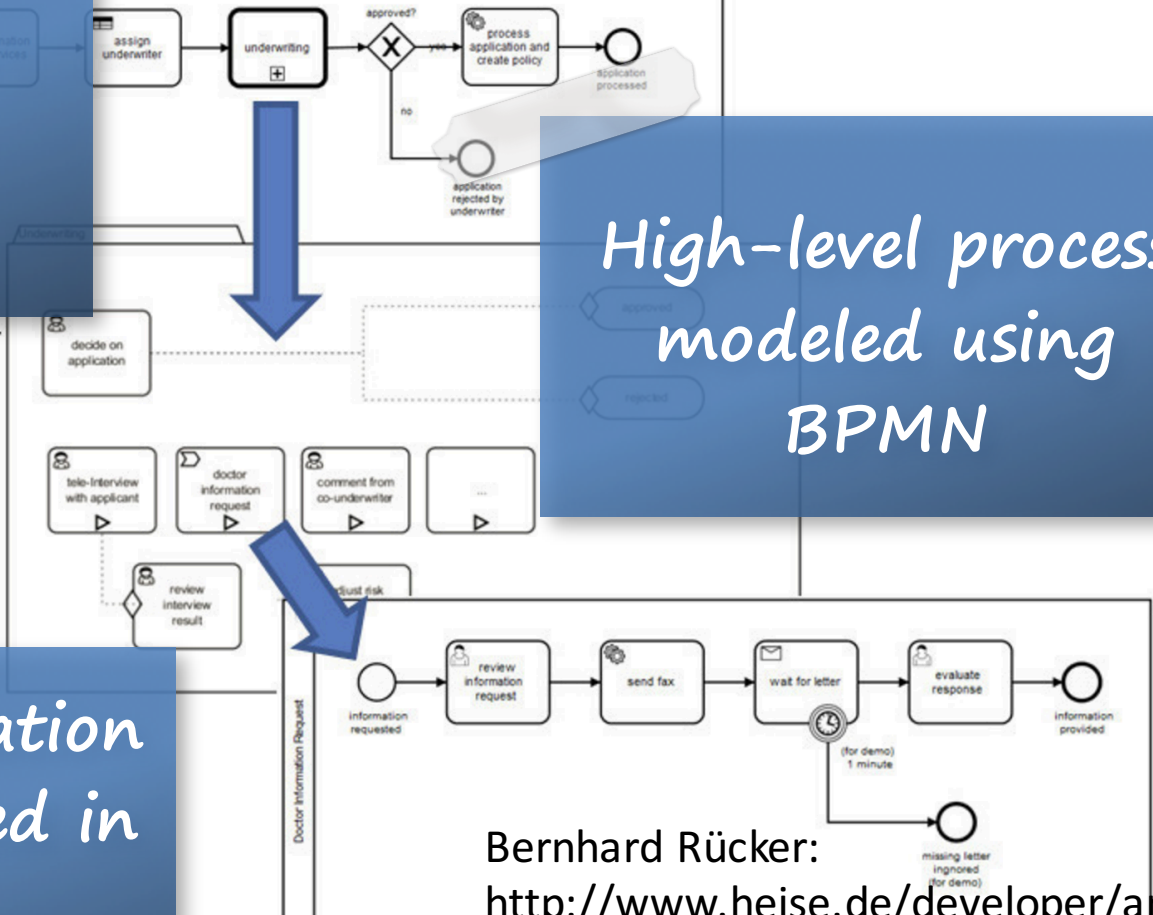
Need for hybrid approaches

Vendors Start Picking Up This Need

Decision Phase
modeled using
CMMN

High-level process
modeled using
BPMN

Doctor information
request modeled in
BPMN



Bernhard Rücker:
<http://www.heise.de/developer/artikel/Case-Management-und-CMMN-fuer-Entwickler-2569883.html>

Evolution of Enterprise Applications

WFMS appear on the market

2008: BPMN Standard by OMG first released

Organizations built software to support their core and support processes themselves

Service-oriented architectures started to become a trend

With ERP systems organizations can rely on standard packages and customize them to their needs

BPMS appear on the market

2014: CMMN Standard by OMG

2015: DMM Standard by OMG

1960s

1970s

1980s

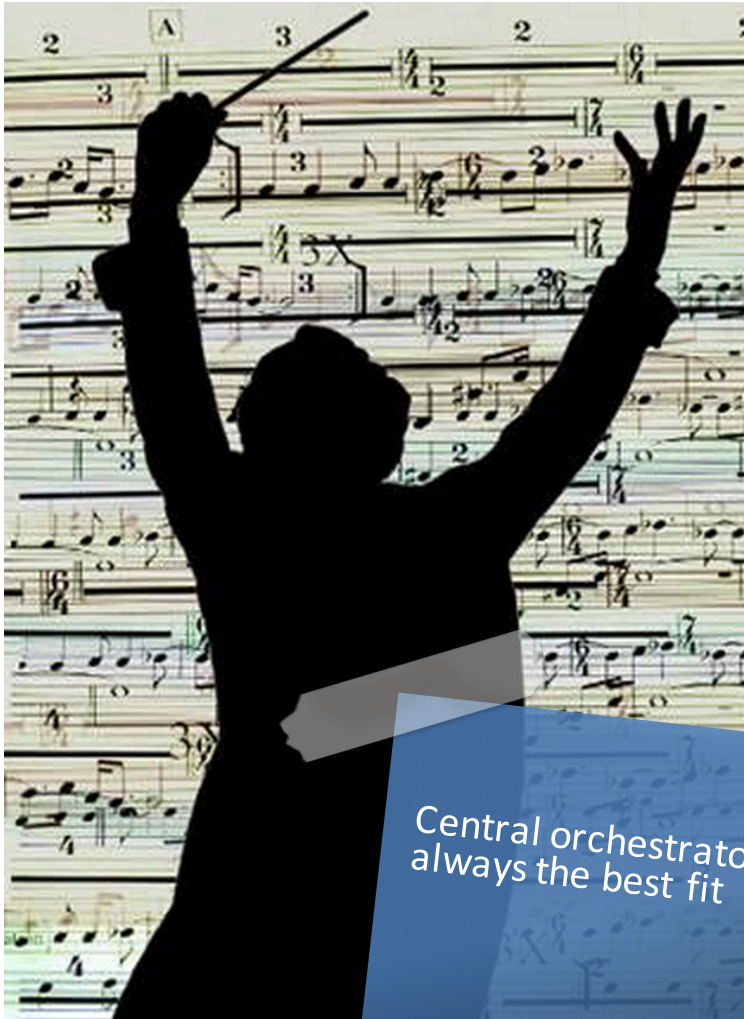
1990s

2000s

2010s



Model of a Central Orchestrator not Always Fits



Central orchestrator not
always the best fit



- B2B scenarios
- Highly dynamic and goal-seeking processes
- Very high number of components

Challenge: New Technological Trends

Internet of Things

Industry 4.0

Big Data

Cognitive Computing

Social

Mobile

New Generation of intelligent BPMS



Source: Gartner (August 2016)

Summary

- Business processes matter
- BPMS offer promising perspectives for the assembly of services, but are up to now still a niche solution
- Several open challenges that need to be addressed for BPMS to take off

THANKS FOR YOUR ATTENTION!

Email: bweb@dtu.dk

Website: <http://bpm.q-e.at>

