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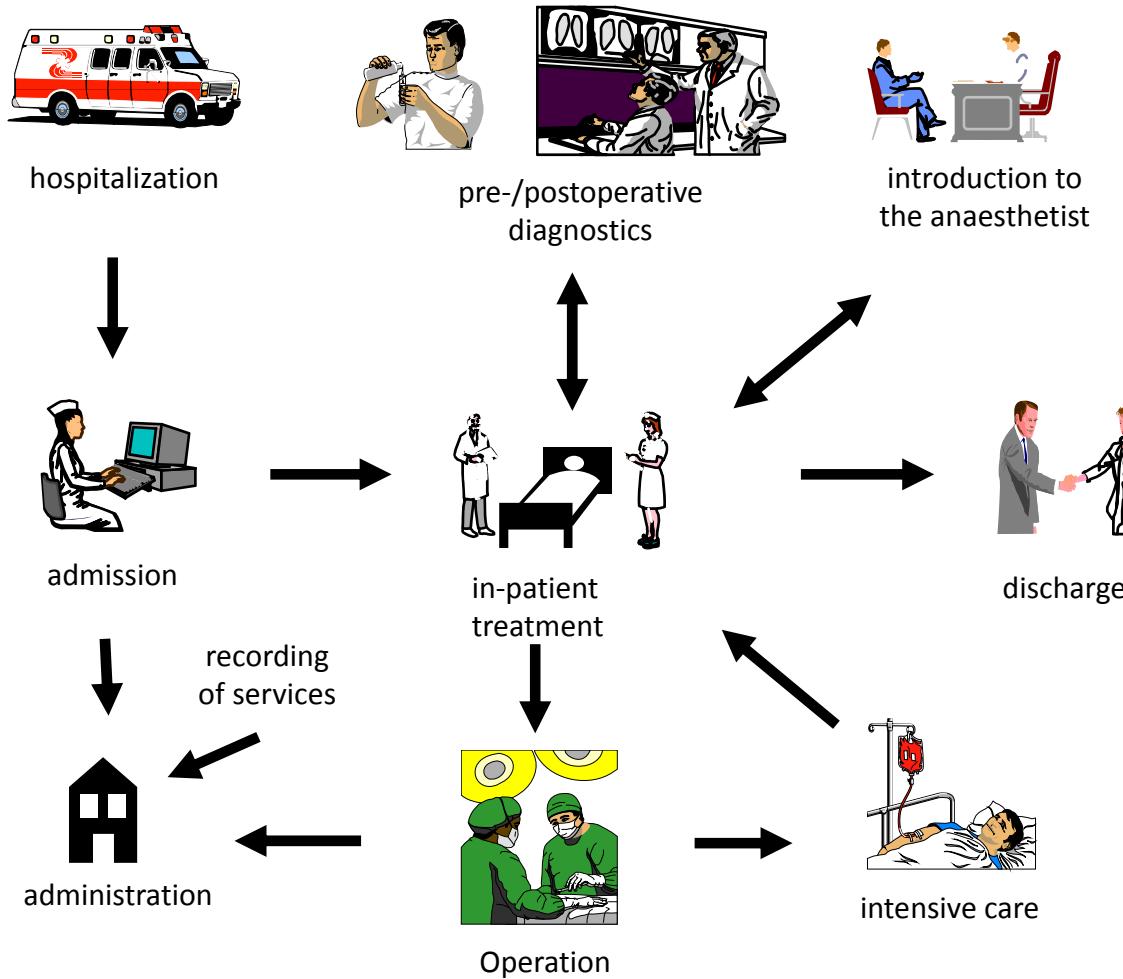
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DBIS Research in a Nutshell

Agenda

- **Motivation – Clinical Process Support**
- **Business Process Management**
- **Adaptive and Flexible Processes**
- **Mobile Process and Task Support**

Motivation – Clinical Process Support



Motivation – Clinical Process Support

Fundamental Goals:

- Continuity of care
- Patient-centered treatment
- Integrated care
- Process-awareness



provision of information and knowledge at the „point of care“

Urgent need for IT support:

- Frequent cause of medical errors ⇒ Missing information or knowledge
- Example: Medication errors
 - 29% due to missing patient-related information
 - 19% due to missing medical knowledge

Leape LL. A systems analysis approach to medical errors.
J Eval Clin Pract 3: 213-22, 1997

Motivation – Clinical Process Support

Fundamental Goals:

- Continuity of care
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- Integrated care
- Process-awareness



provision of information and knowledge at the „point of care“

There is a discrepancy between the potential and actual usage of IT!

Committee on Quality of Healthcare in America (IOM)
Crossing the Quality Chasm: A New Health System for the 21st Century. IOM, 2001

Motivation – Clinical Process Support

Levels of Process Support

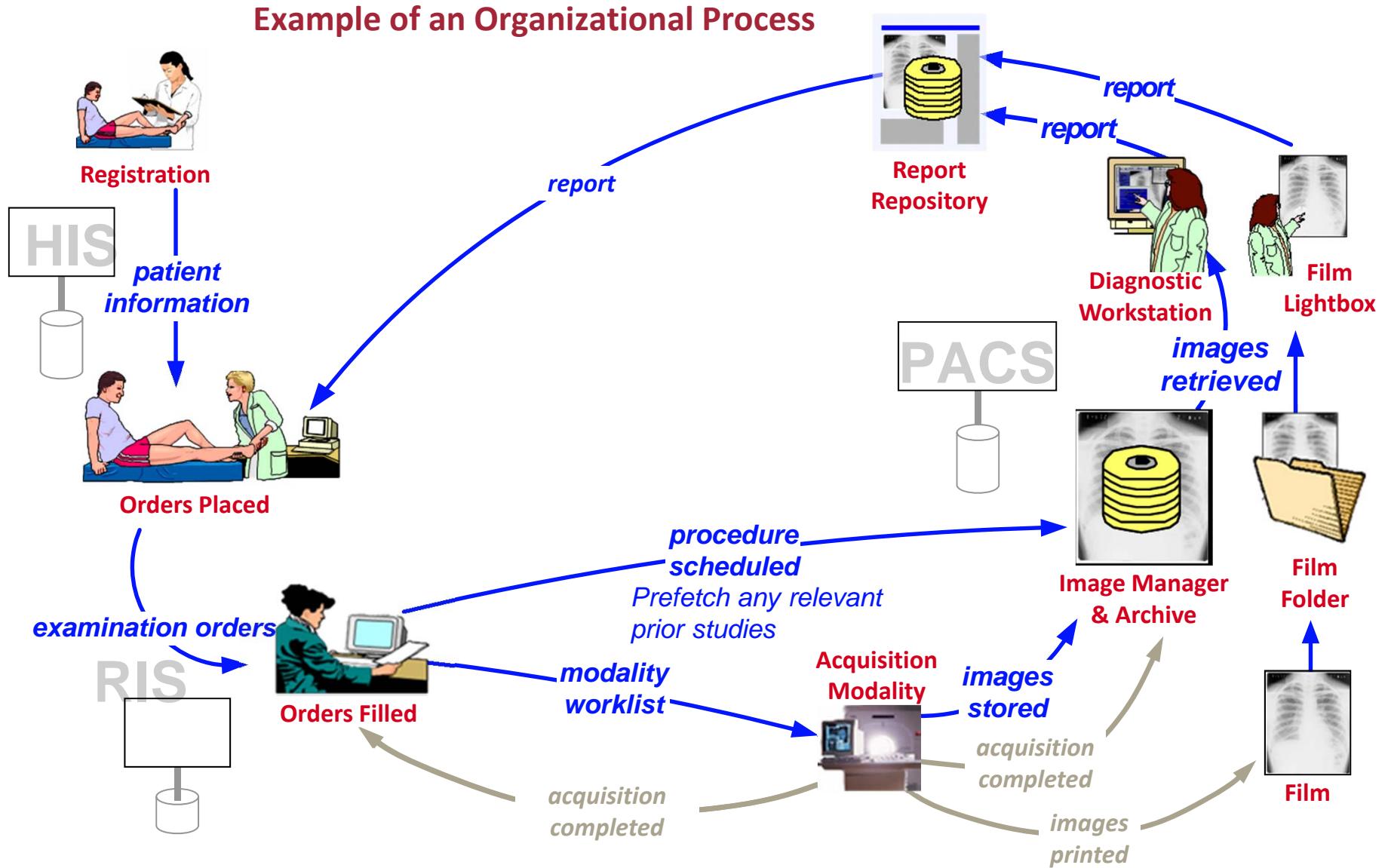
❑ Organizational processes

- Interdisciplinary cooperation among different people and organizational units
- Example: Order entry and result reporting

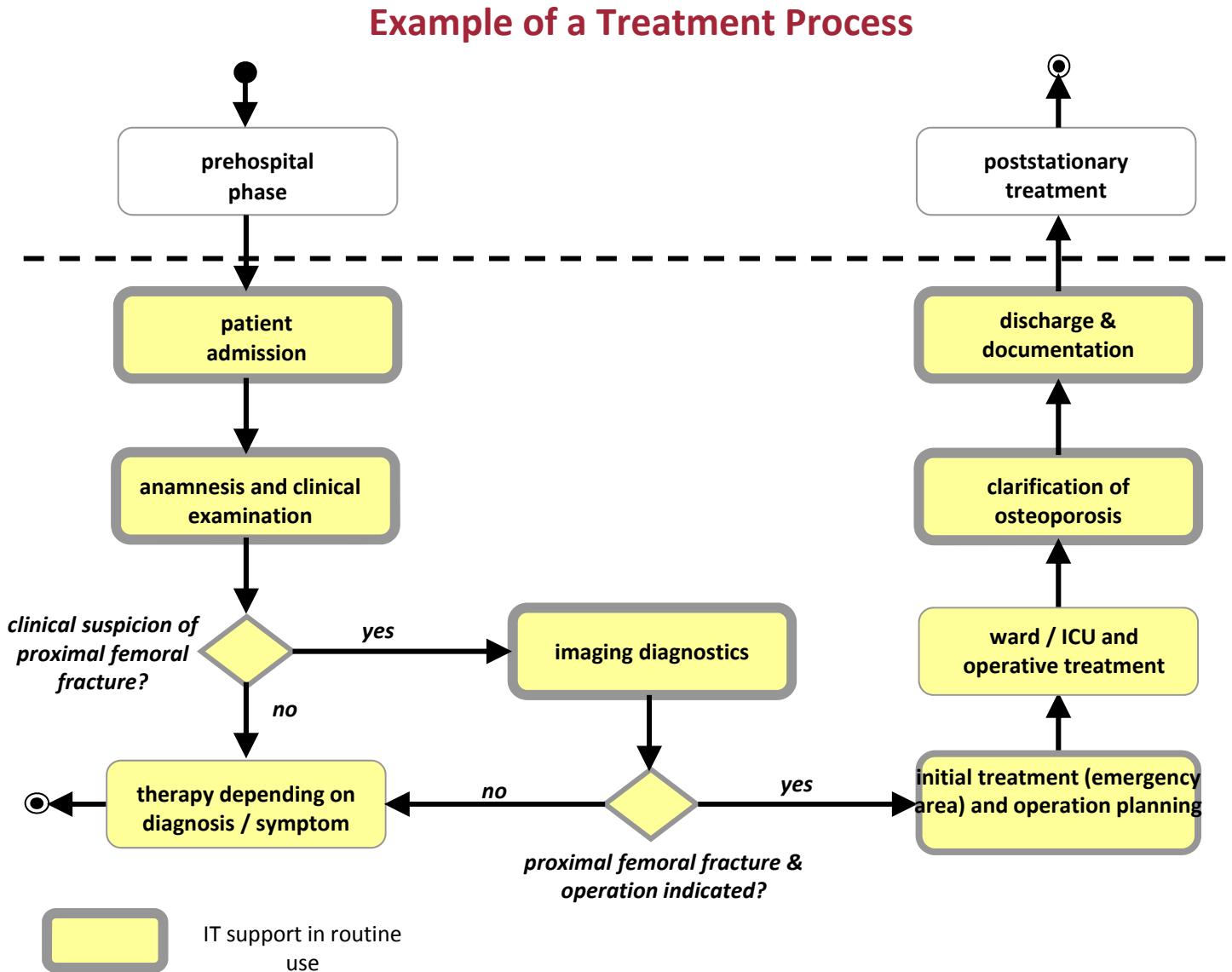
❑ Knowledge-intensive processes (i.e. patient treatment processes)

- Guided by available patient information
- Dependent on medical knowledge

Motivation – Clinical Process Support

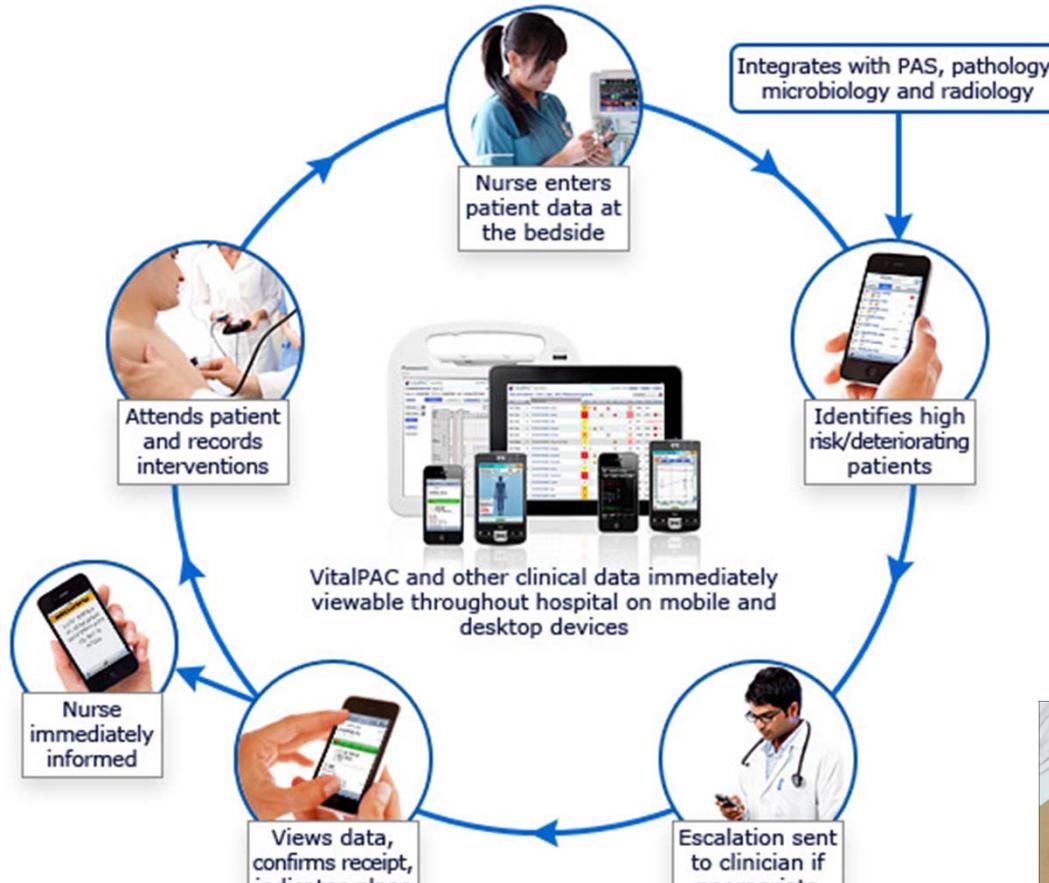


Motivation – Clinical Process Support



Motivation – Clinical Process Support

M-Health: Mobile Process and Task Support



Motivation – Clinical Process Support

Process-aware information systems will allow for real-time process diagnostics



👉 In the end it is the **(end-to-end) process** that matters

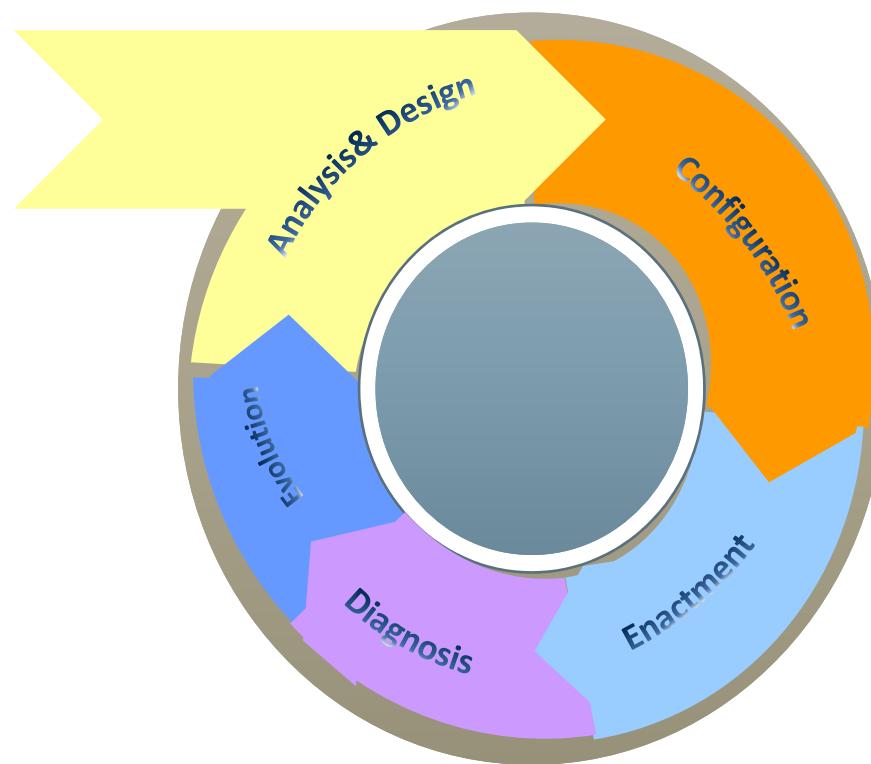
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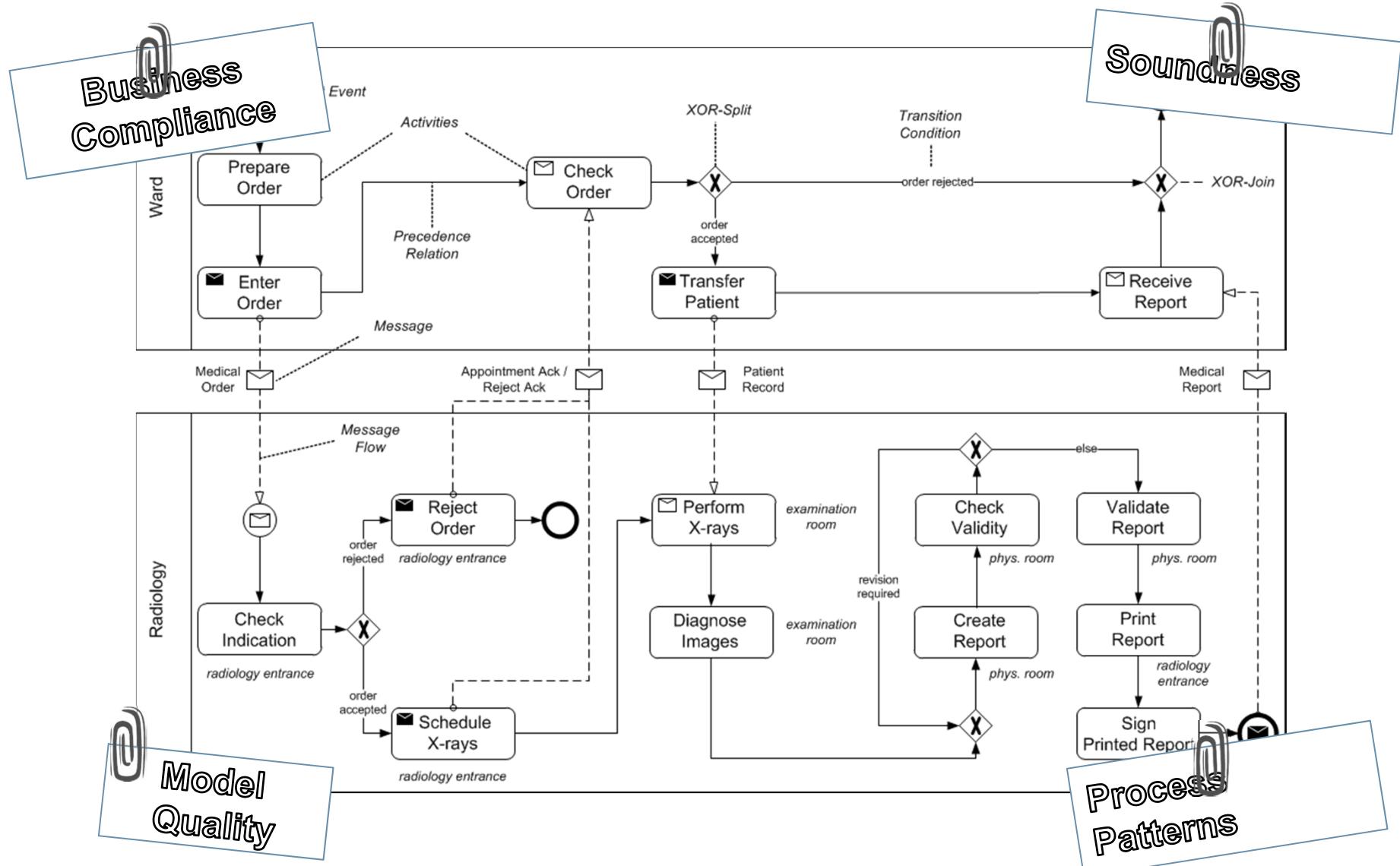
Business Process Management

Business Process Management (BPM) is a **discipline** involving any combination of **modeling, automation, execution, control, measurement, and optimization** of business activity flows, in support of enterprise goals, spanning IT systems, employees, customers and partners within and beyond the enterprise boundaries.

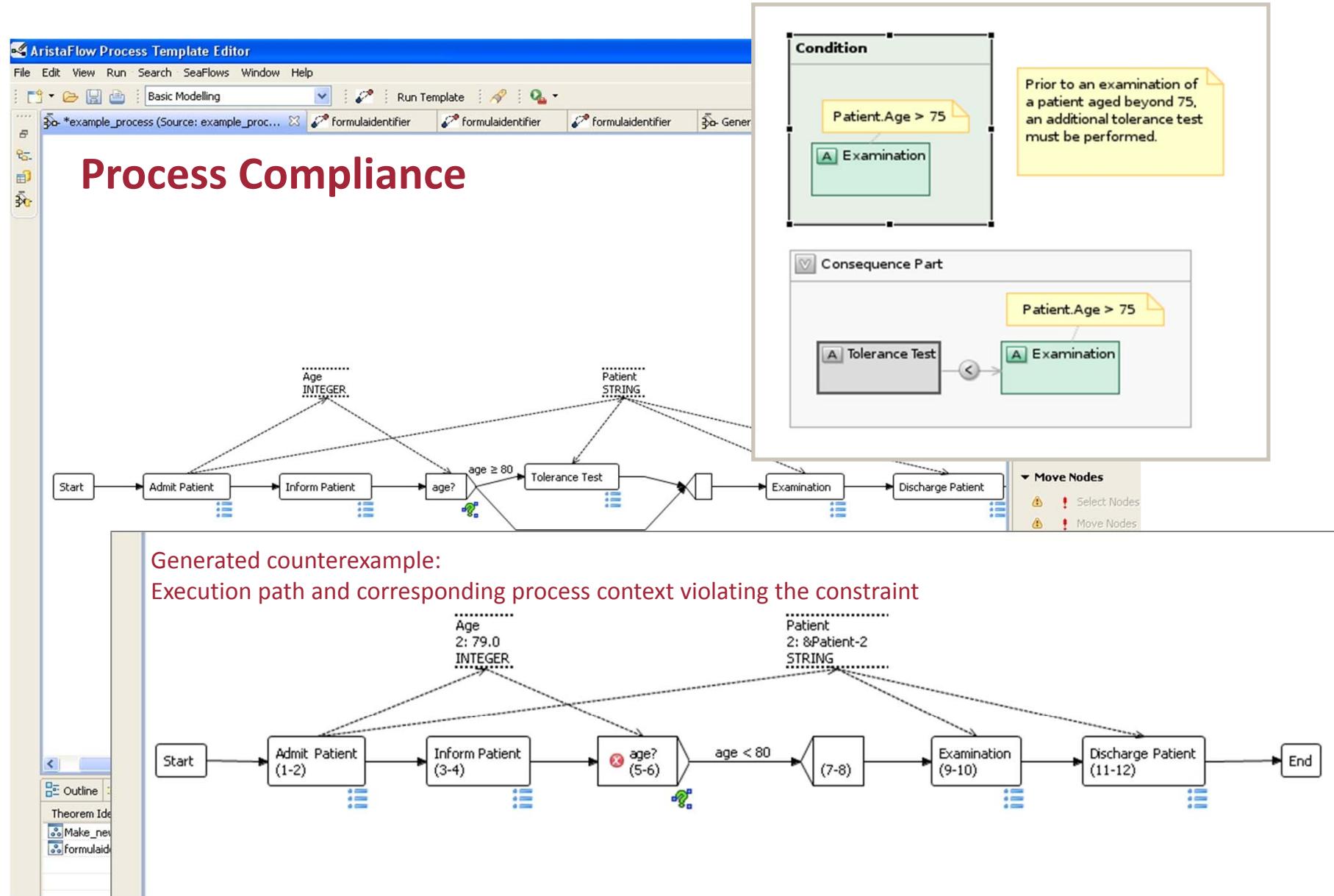
Business Process Management – The Process Lifecycle



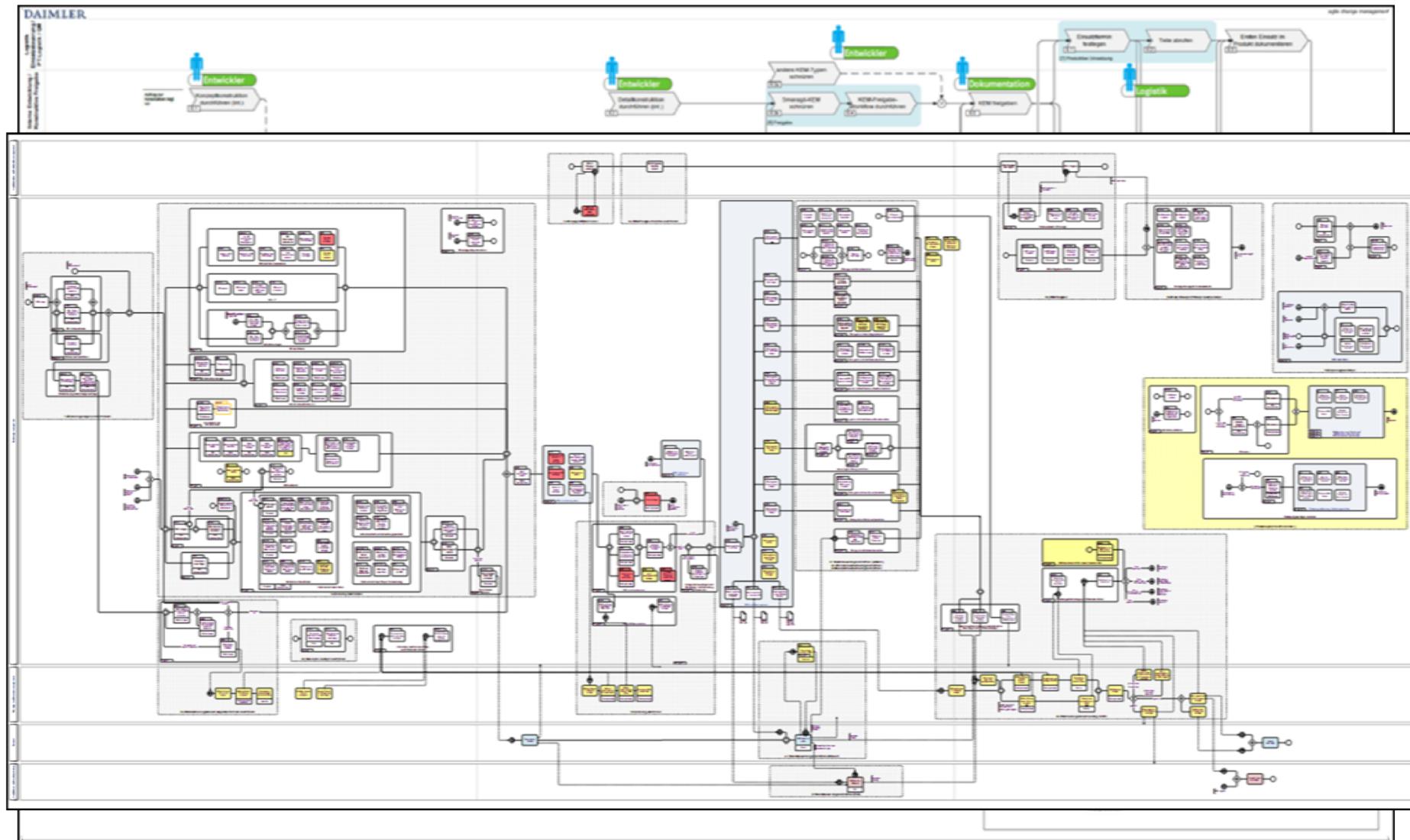
Business Process Management: The Role of Process Models



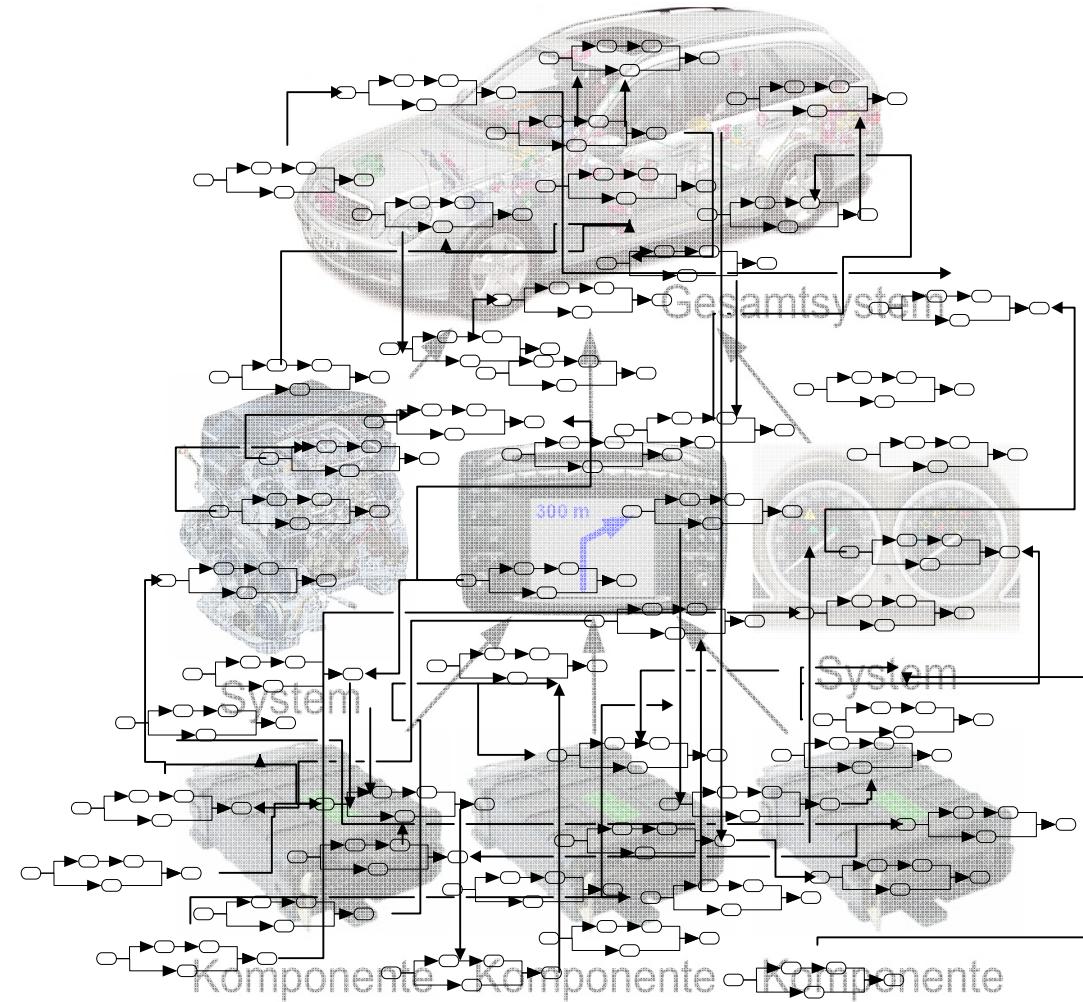
Business Process Management: The Role of Process Models



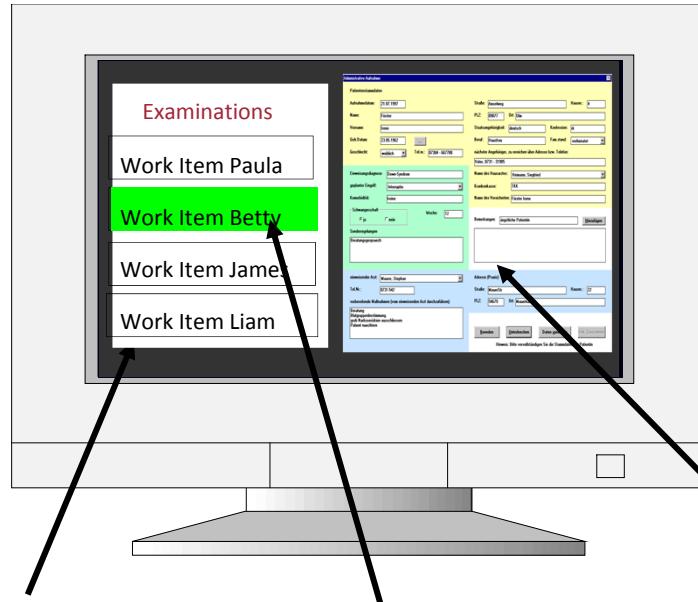
Business Process Management: The Role of Process Models



Business Process Management: The Role of Process Models



Business Process Management: Process-Aware Information Systems

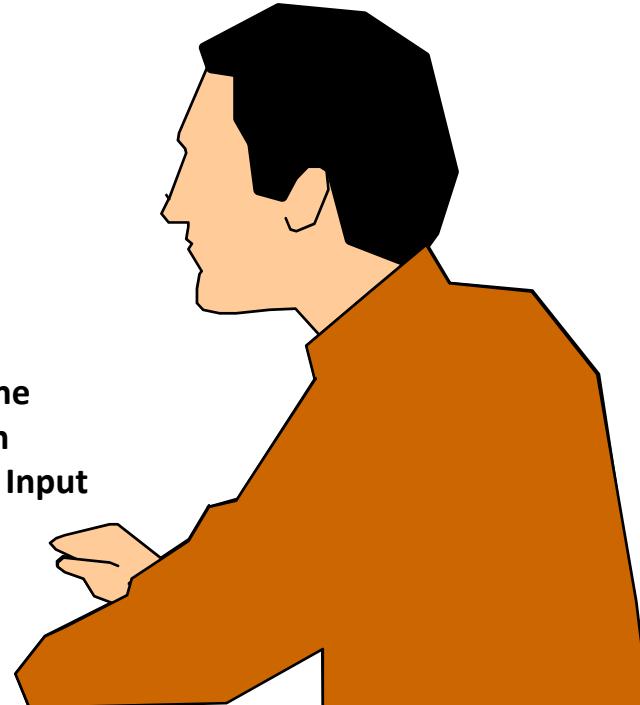


End User Perspective

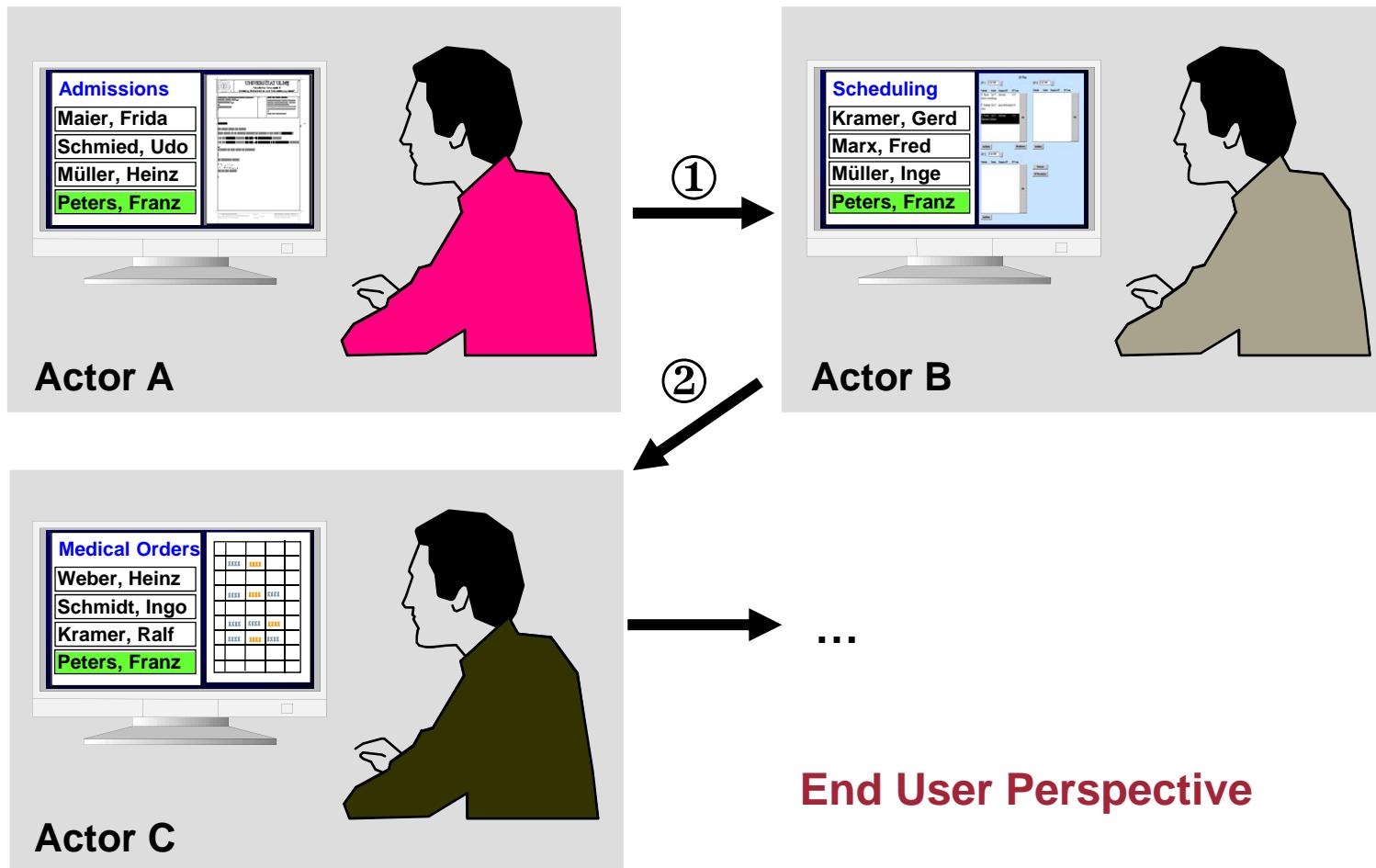
User
Worklists

Selection

Automatic Invocation of the
Corresponding Application
Program (incl. Provision of Input
Parameters)

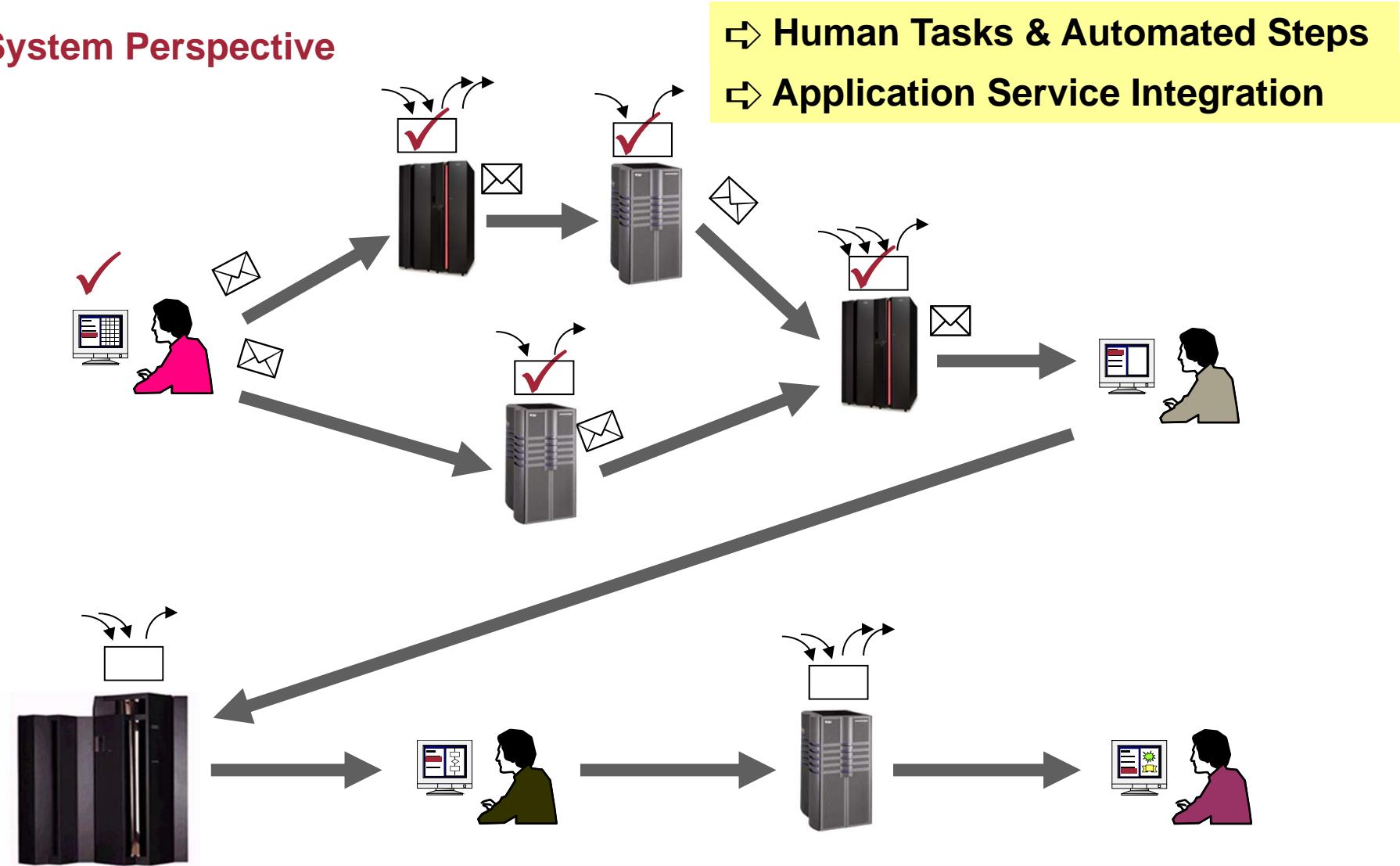


Business Process Management: Process-Aware Information Systems

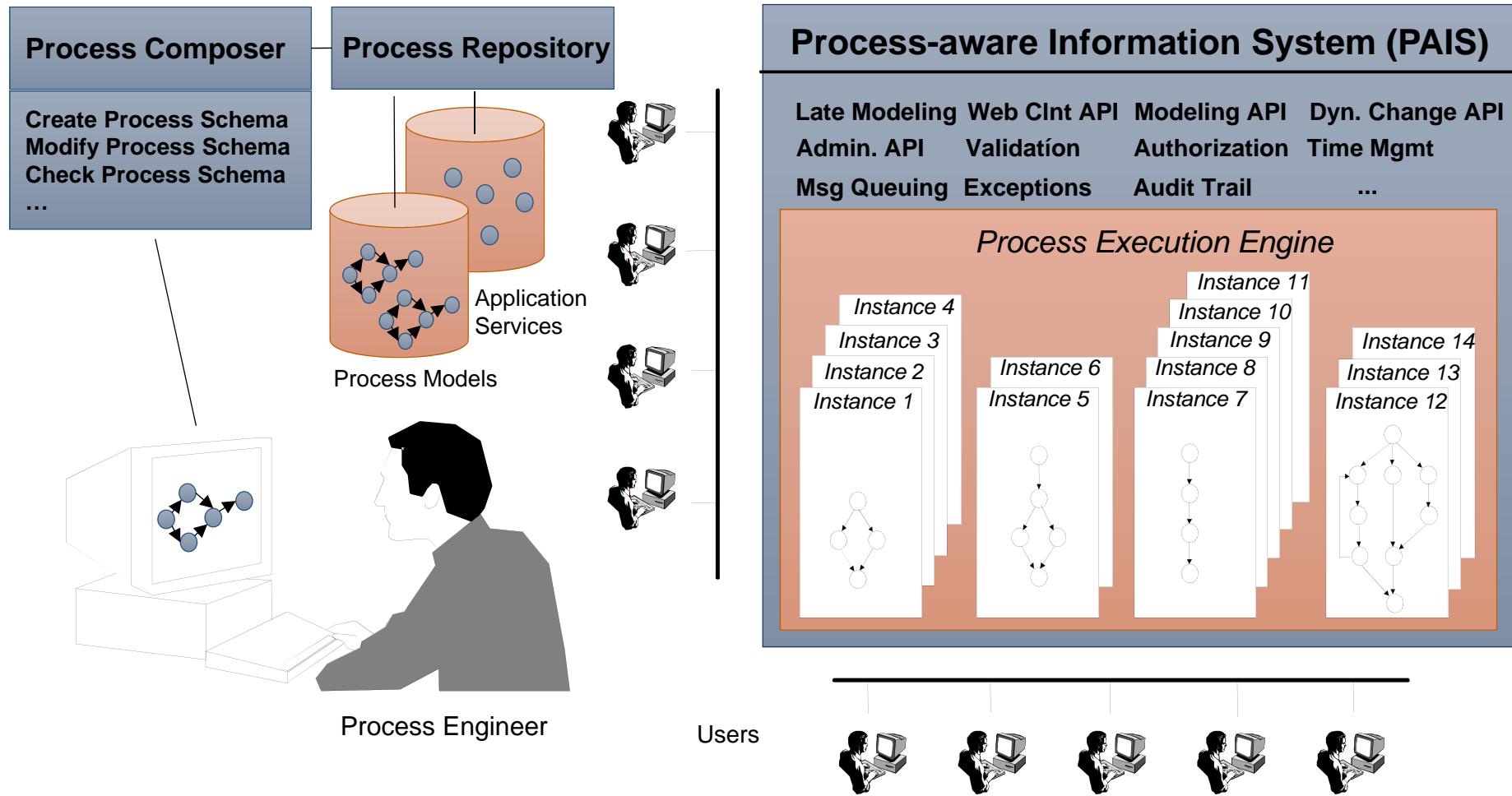


Business Process Management: Process-Aware Information Systems

System Perspective

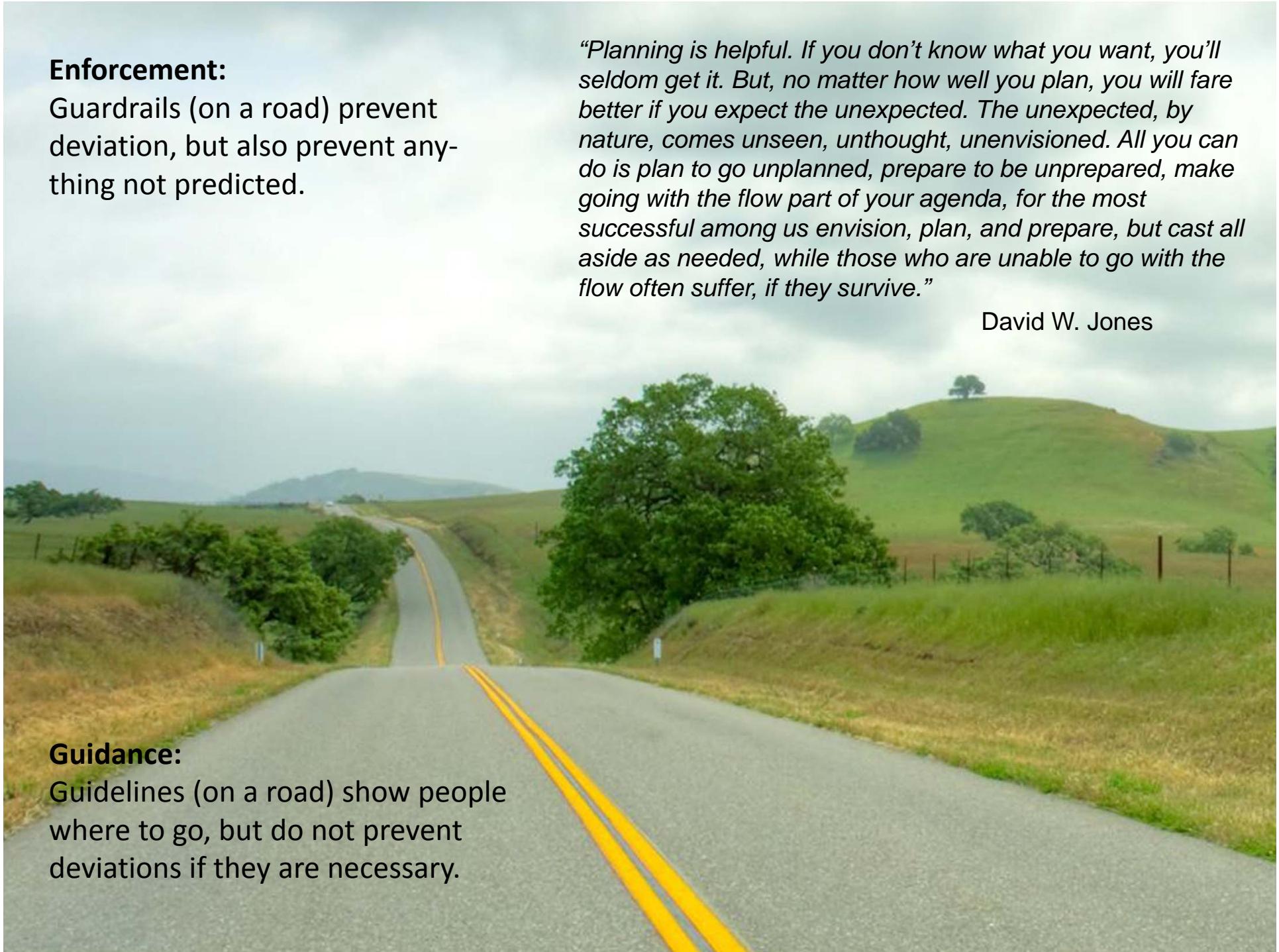


Business Process Management: Process-Aware Information Systems



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A photograph of a two-lane asphalt road curving through a rural landscape. The road is marked with a double yellow line. To the left, there's a grassy embankment with some low-lying shrubs. To the right, there are rolling green hills. A large, leafy tree stands prominently on the side of one of the hills. The sky is overcast with soft, grey clouds.

Enforcement:

Guardrails (on a road) prevent deviation, but also prevent anything not predicted.

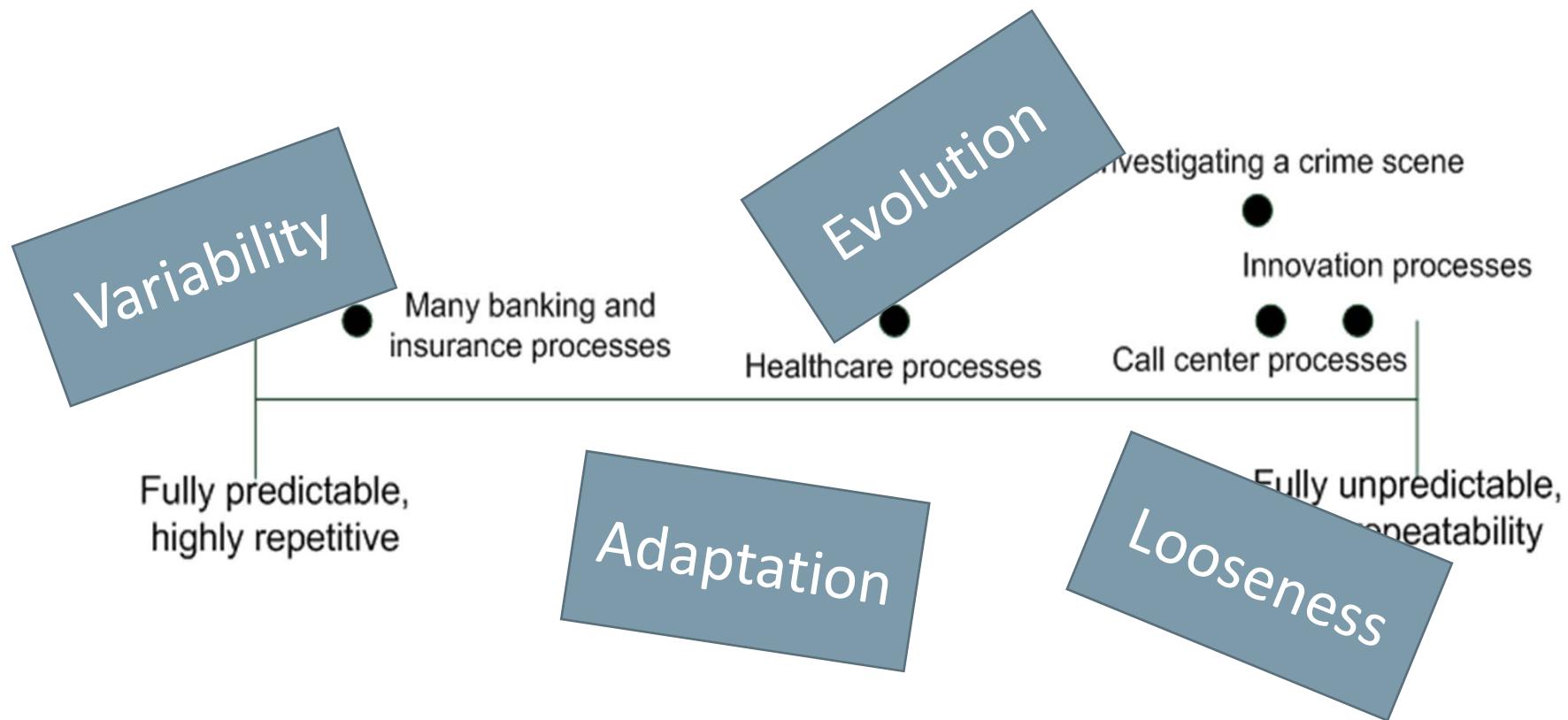
"Planning is helpful. If you don't know what you want, you'll seldom get it. But, no matter how well you plan, you will fare better if you expect the unexpected. The unexpected, by nature, comes unseen, unthought, unenvisioned. All you can do is plan to go unplanned, prepare to be unprepared, make going with the flow part of your agenda, for the most successful among us envision, plan, and prepare, but cast all aside as needed, while those who are unable to go with the flow often suffer, if they survive."

David W. Jones

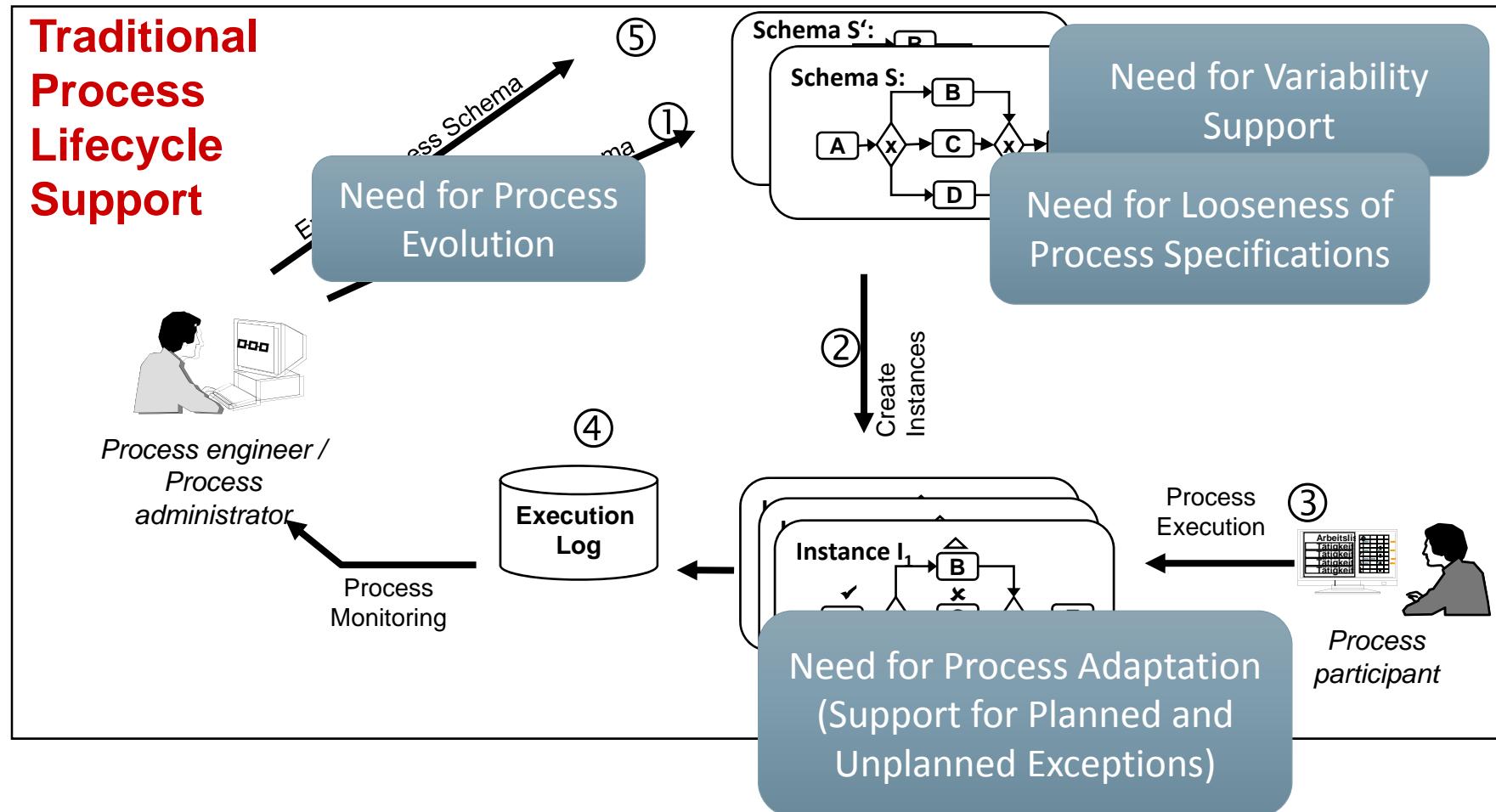
Guidance:

Guidelines (on a road) show people where to go, but do not prevent deviations if they are necessary.

Adaptive and Flexible Processes: Flexibility Needs



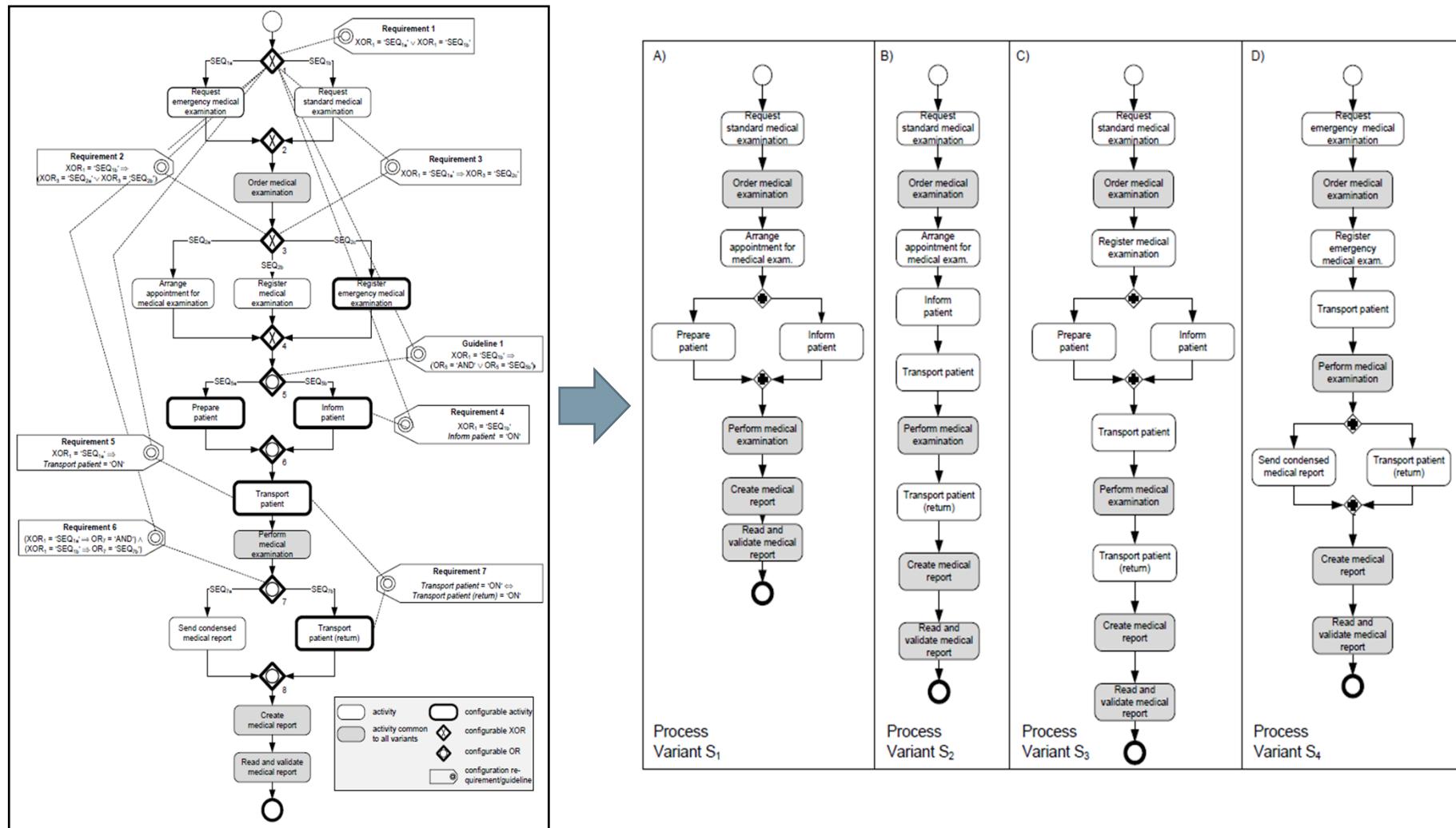
Adaptive and Flexible Processes: Flexibility Needs



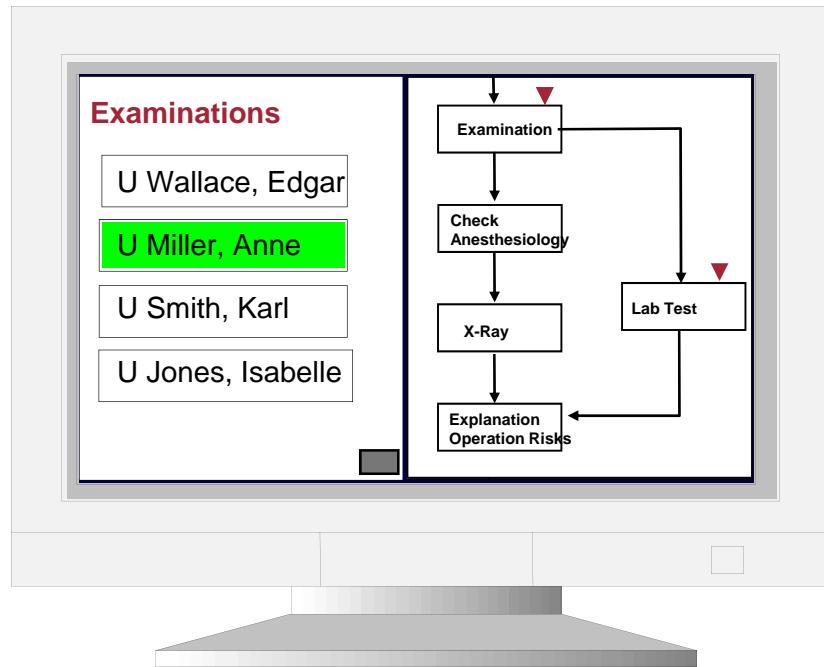
Adaptive and Flexible Processes: Flexibility Needs

Flexibility Need	Dimension	Technological Requirement
Variability		Configuration
Looseness		Loosely-specified processes
Adaptation	Planned Unplanned	Exception Handling Ad-hoc Changes
Evolution	Deferred Evolution Immediate Evolution Poor Internal Quality Organizational Learning	Versioning Process Instance Migration Refactoring Monitoring, Analysis and Mining

Adaptive and Flexible Processes: Addressing Variability by Configurable Process Models



Adaptive and Flexible Processes: Enabling Ad-hoc Changes

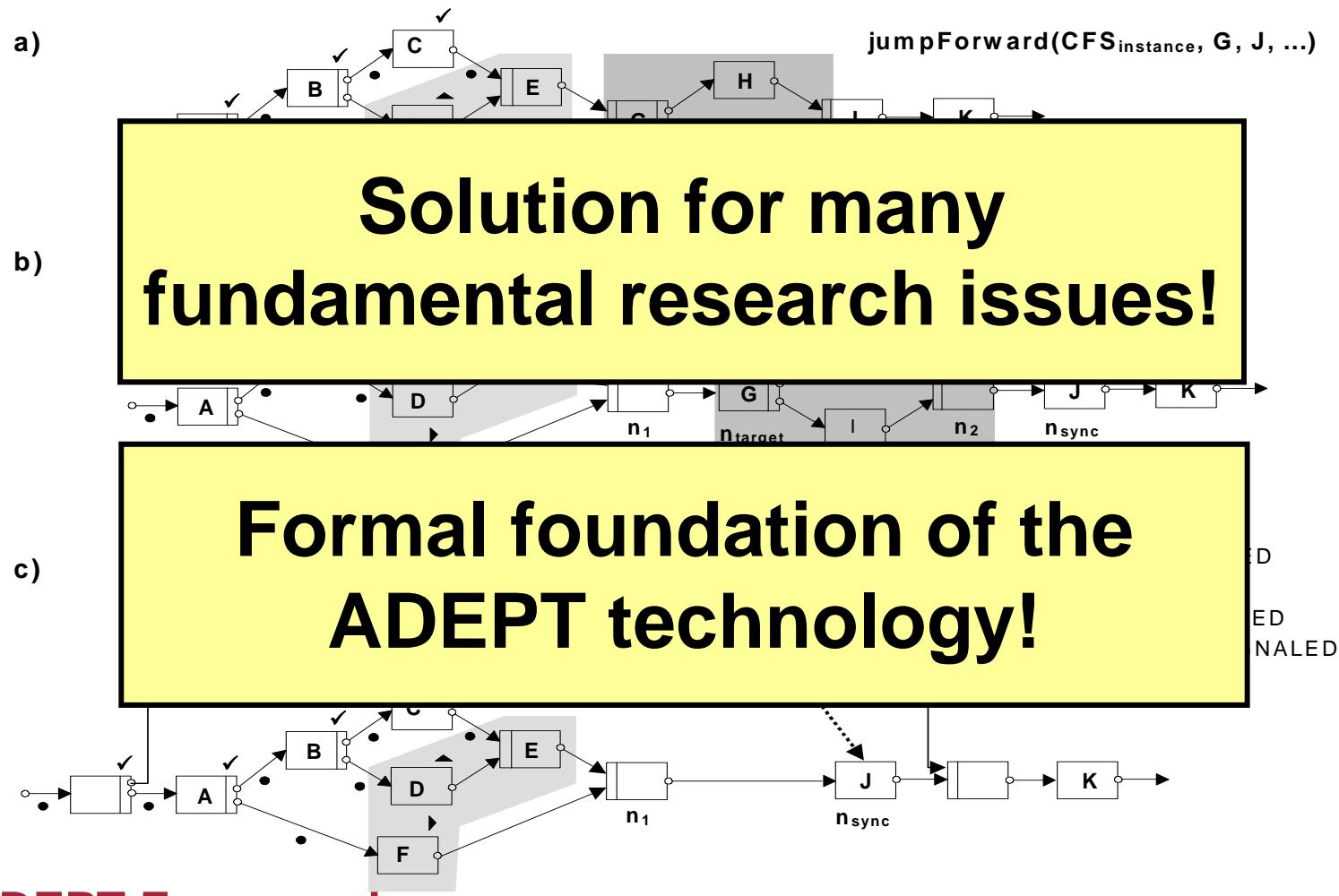


End User Perspective

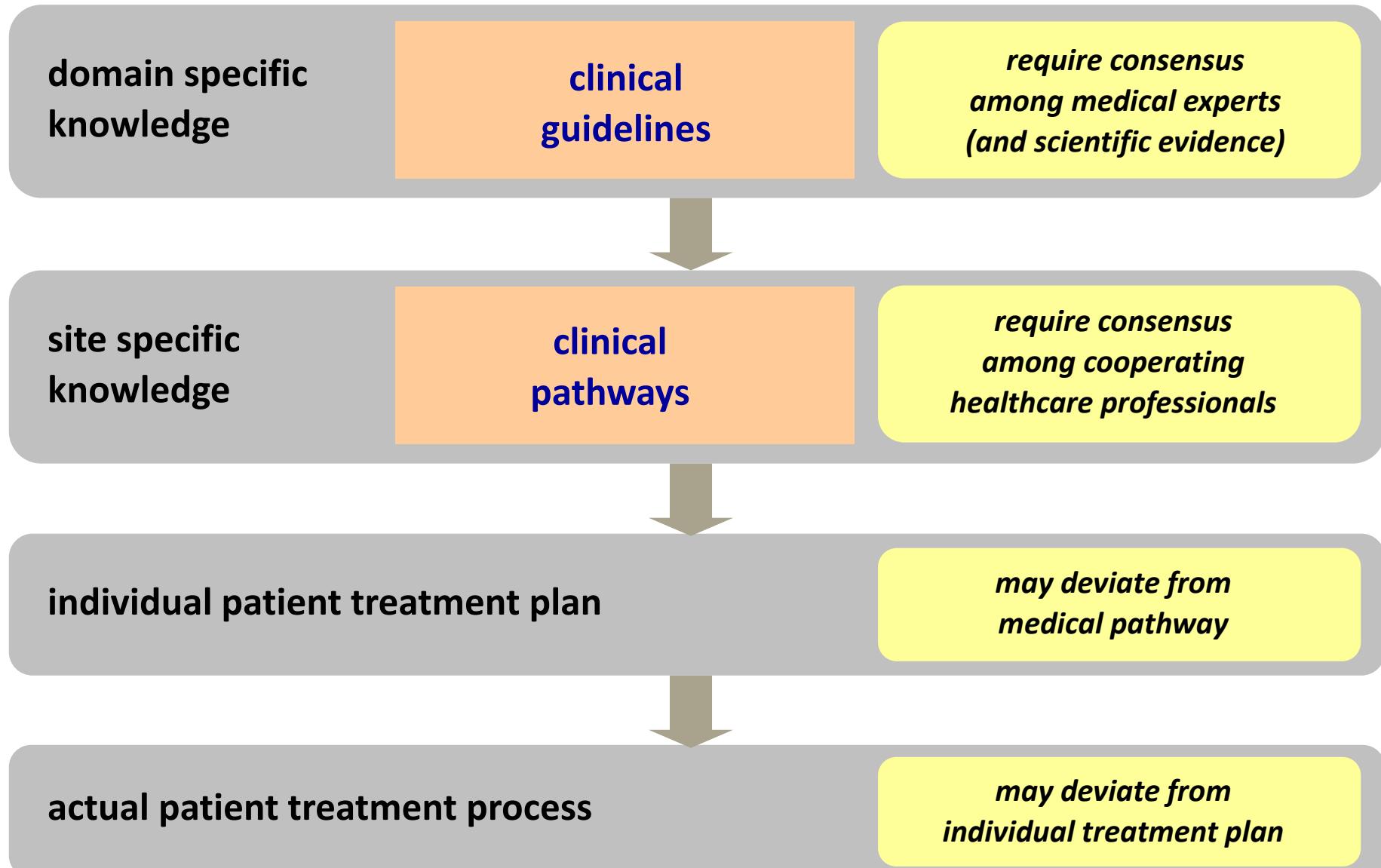


Adaptive and Flexible Processes: Enabling Adaptation through Ad-hoc Changes

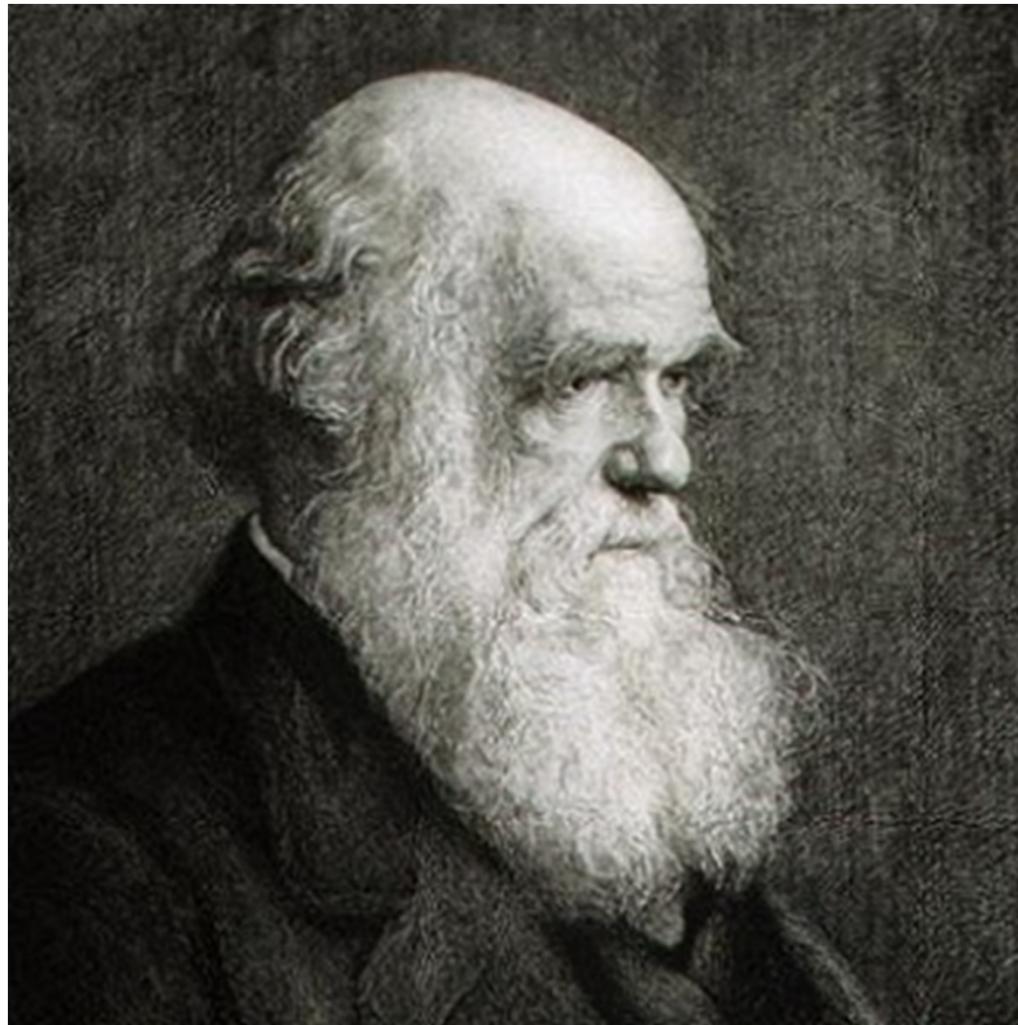
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Adaptive and Flexible Processes: A Scenario Requiring Adaptation at Different Levels



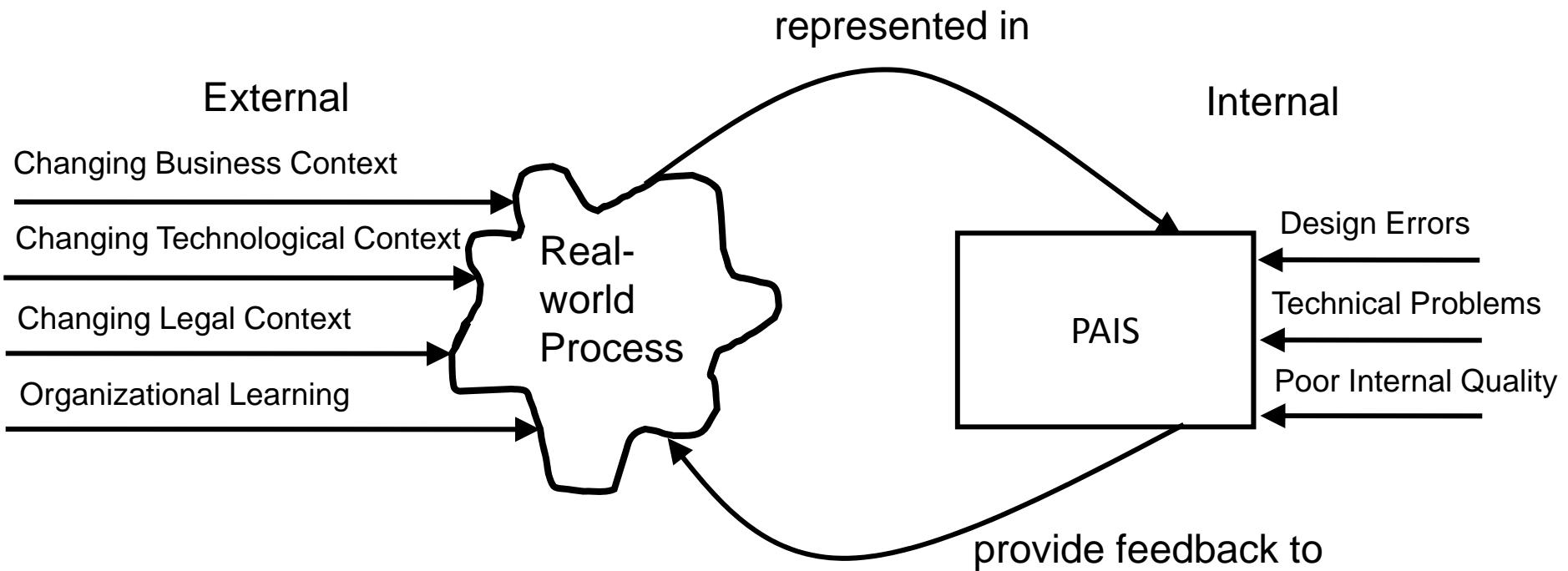
Adaptive and Flexible Processes: Evolution



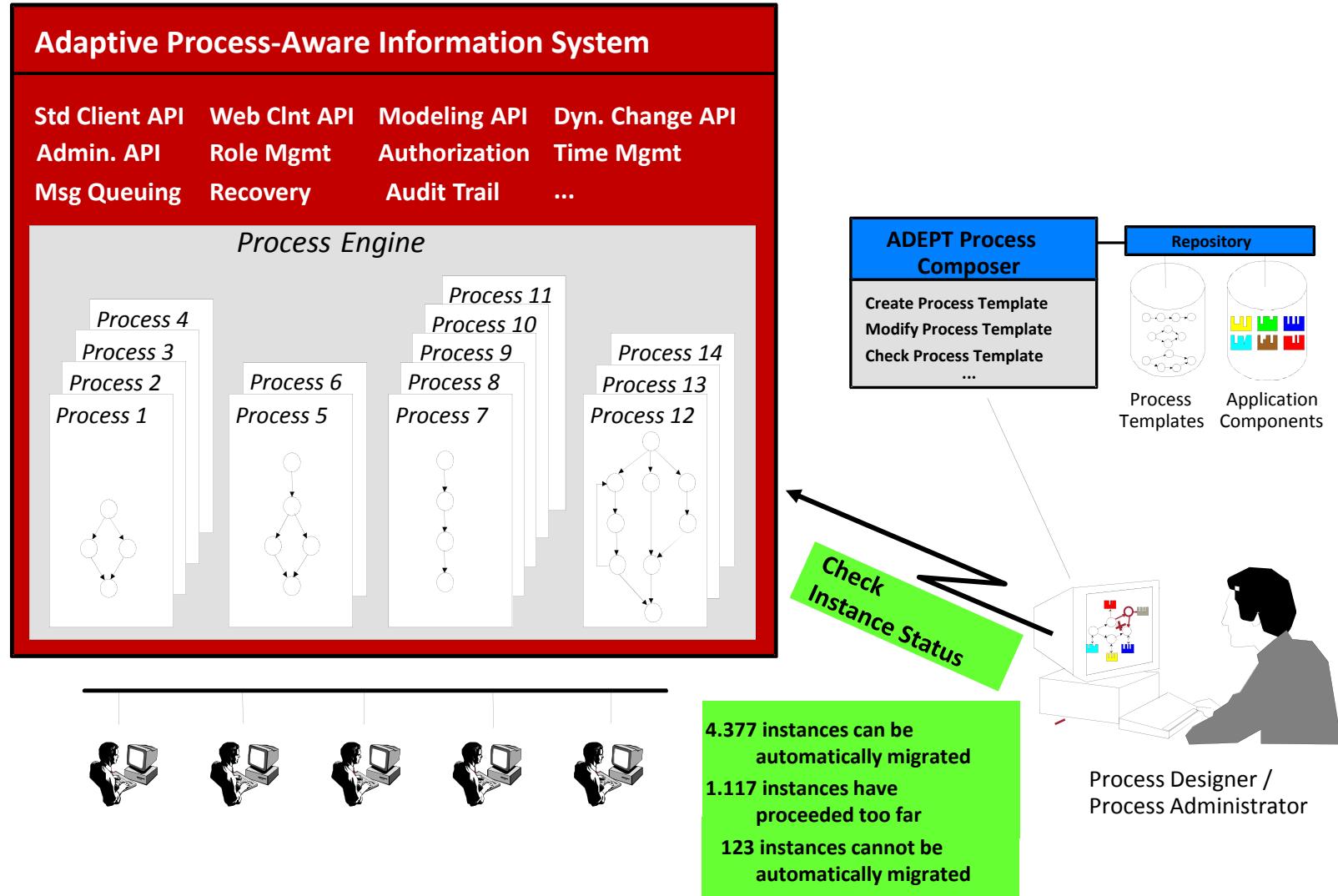
**"It is not the strongest
of the species that
survives, nor the most
intelligent that survives.
It is the one that is the
most adaptable to
change."**

Charles Darwin

Adaptive and Flexible Processes: Evolution



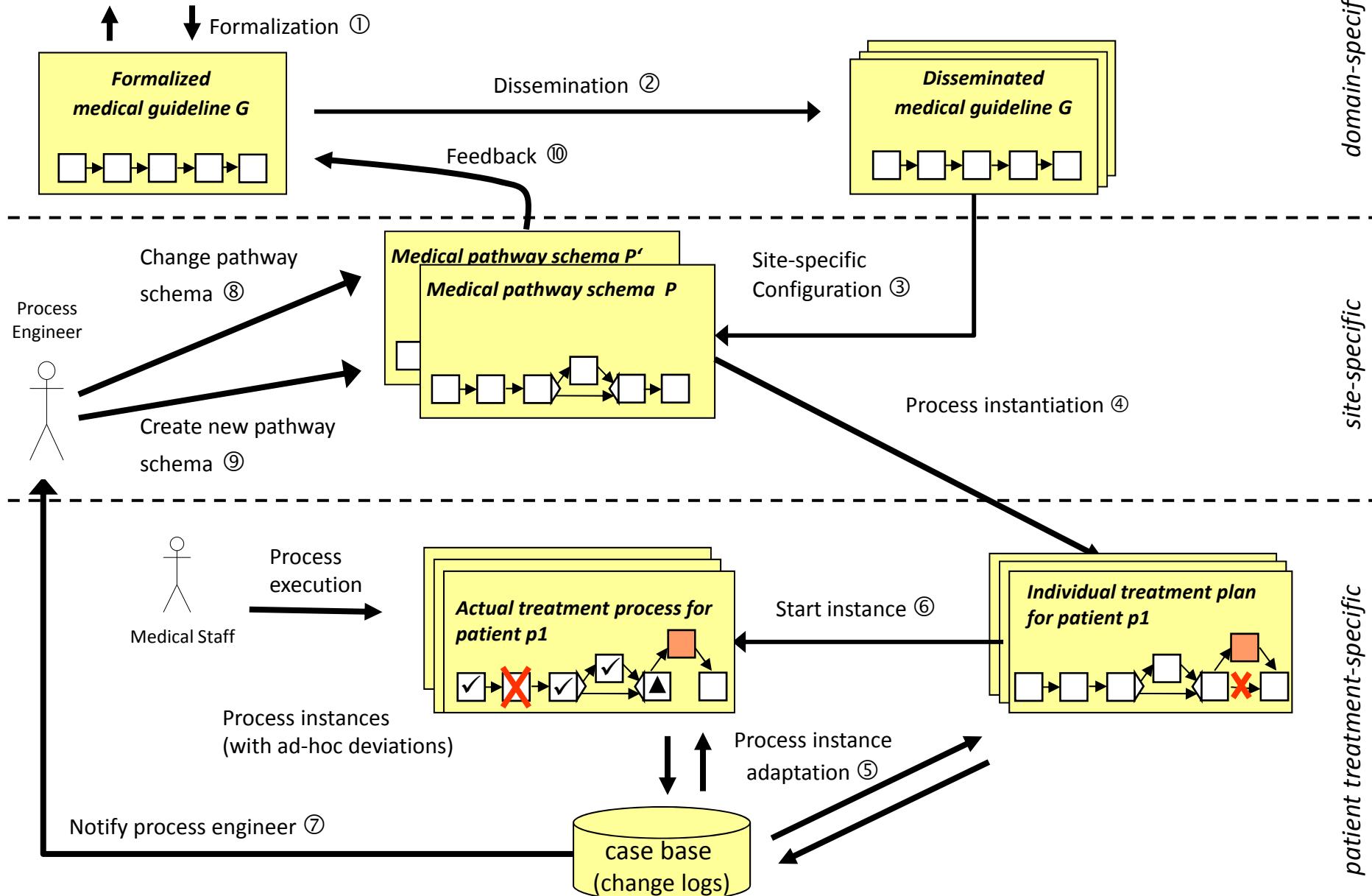
Adaptive and Flexible Processes: Evolution



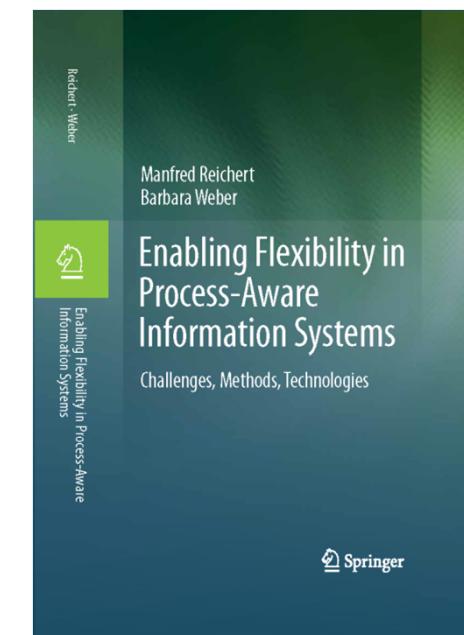
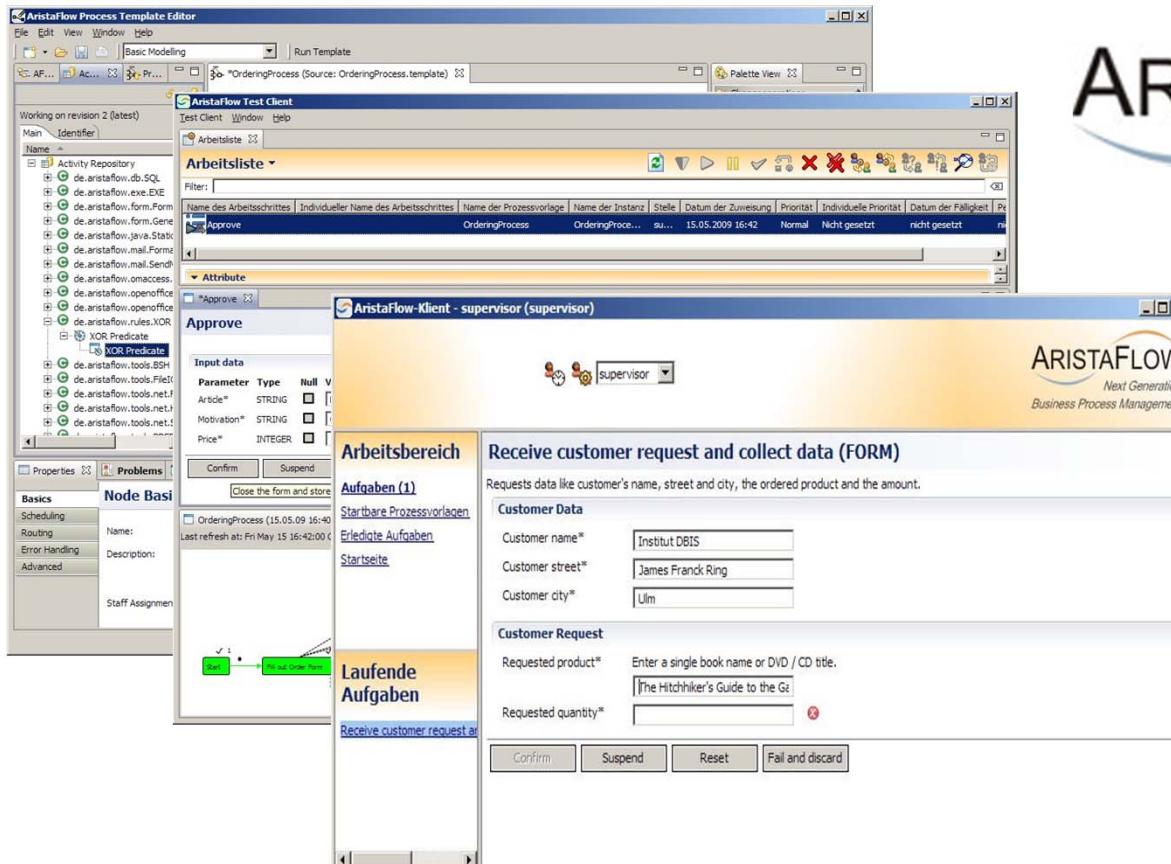


Medical Guideline (narrative)

Application Example



Adaptive and Flexible Processes: Research Transfer



www.aristaflow-forum.de

Reichert, M. et al. (2009) *Enabling Poka-Yoke Workflows with the AristaFlow BPM Suite*. In: CEUR Workshop Proceedings 489.

Adaptive and Flexible Processes: Research Transfer



Flexible Support of Clinical Pathways with AristaFlow

Partners:

Jan Neuhaus, Claudia Reuter
Fraunhoferinstitut Dortmund

The image displays three components of a clinical pathway management system:

- AristaFlow Monitoring:** A screenshot of a desktop application titled "AristaFlow Monitoring". It shows a process diagram with nodes like "Roentgenuntersuchung", "MRI BOOLEAN", and "CT BOOLEAN". Transitions between nodes are labeled with conditions such as "Ja" (Yes) or "Nein" (No). On the left, a tree view lists tasks like "Supervorfs", "Examination", and "Diagnose". Below the diagram is a table titled "Instance History" showing a log of events.
- Treatment Plan Editor:** A screenshot of a web-based application titled "Behandlungsplan bearbeiten". It shows a "Behandlungsplangraph" with nodes: "Anamnese und klinische Untersuchung", "Radiologische Untersuchung", "Prüfung der Befunde", and "Entscheidung über Therapie". Each node has a green checkmark indicating it is completed. The "Behandlungsplangraph" section includes the text "Variante auswählen und auf Behandlungsplan anwenden" and buttons for "Radiologische Untersuchung einfügen" and "Elektrophysiologische Untersuchung einfügen". At the bottom are "Übernehmen" and "Abbruch" buttons.
- Mobile Application:** An iPhone displaying the same treatment plan interface as the web app, showing the "Behandlungsplan Rückenleiden" and the four steps of the plan.

Adaptive and Flexible Processes: Research Transfer

Process-aware, Cooperative Emergency Management for Water Infrastructures
Partner: TU Darmstadt



ARISTAFLOW Process Template Editor

The screenshot shows the ARISTAFLOW Process Template Editor interface. It displays a process diagram titled "So bestellen und aufrufen (Source: Bestellprozess.template)". The diagram consists of various nodes like "Maßnahmenort", "anlegen oder nicht?", "Bestellung eingeben", and "Vorhandene Maßnahmen holen". The "Properties" and "Template Manager View" panes are visible at the bottom.

ARISTAFLOW Client - Einsatzplanung

This screenshot shows the ARISTAFLOW Client interface for "Einsatzplanung". It features a map view with several red dots labeled 'D' indicating emergency locations. A legend defines symbols for different types of resources. Below the map is a table titled "VERFÜGBARE RESSOURGEN" listing available resources such as "Lastwagen (Ladekapazität: 12t)", "Kleinlaster (Ladekapazität: 7t)", and "Schwerverteiler (Ladekapazität: 22t)".

A. Wagenknecht; U. Rüppel: Improving Resource Management In Flood Response With Process Models and Web GIS. In: 16th TIEMS Conf., 2009

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2005



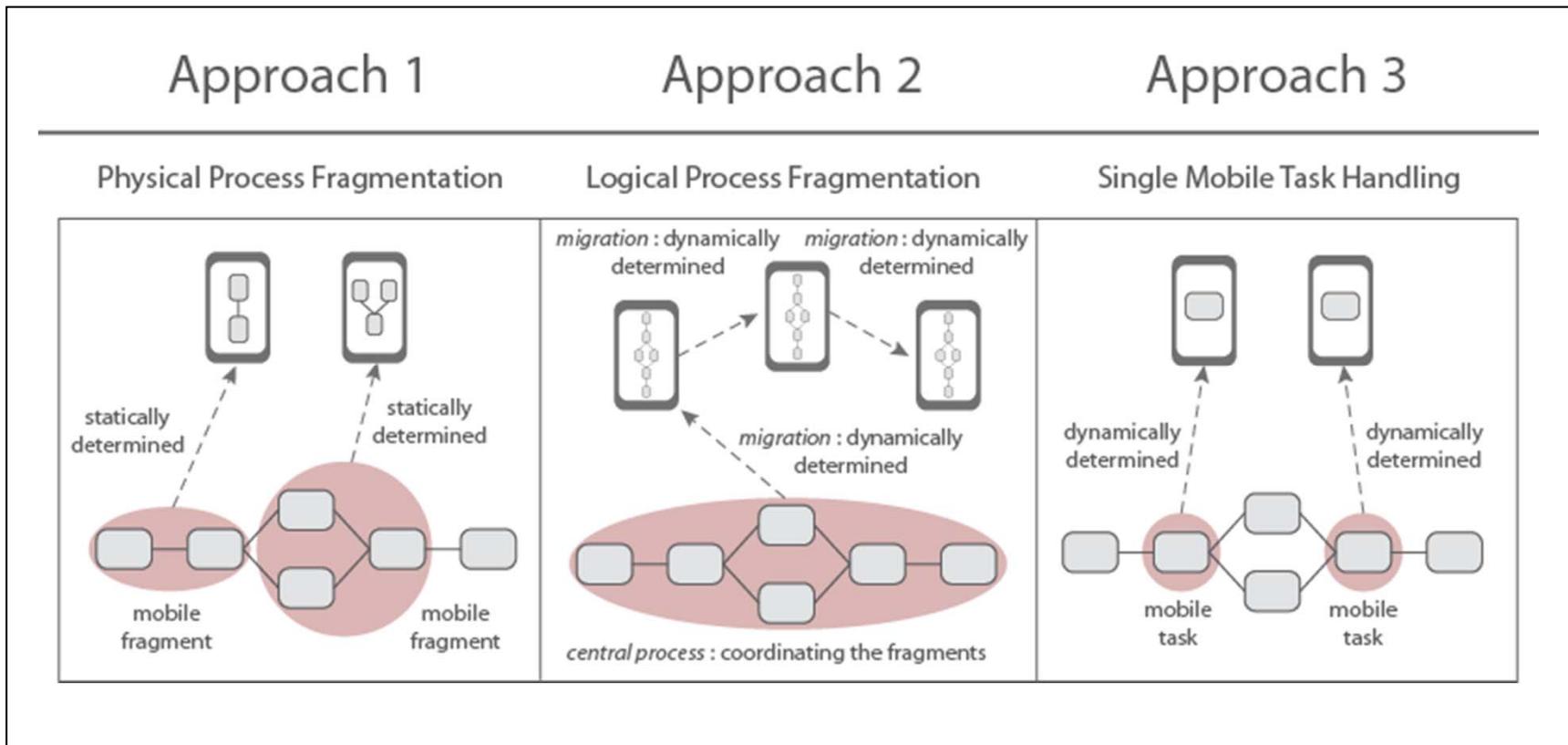
2013



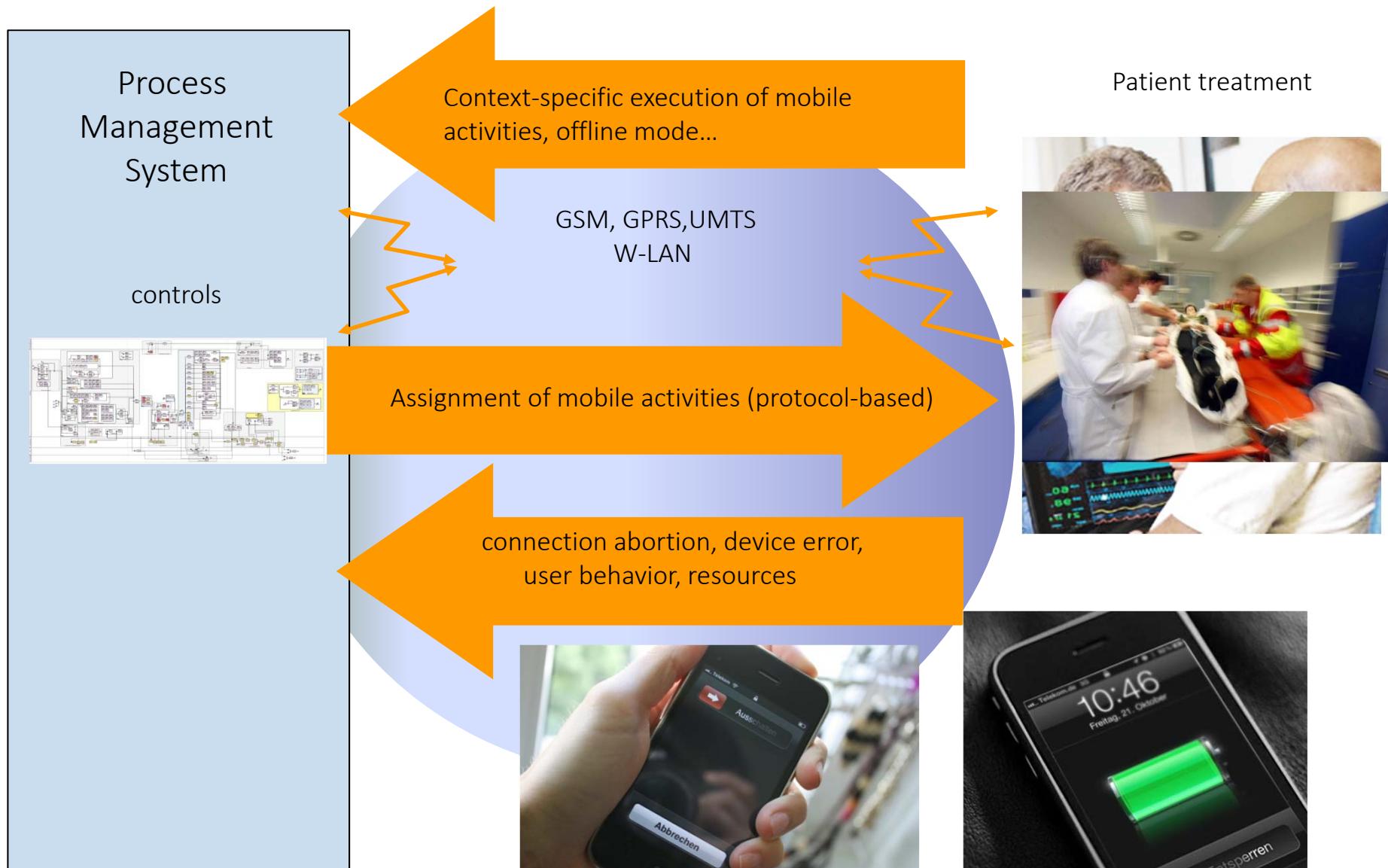
DBIS Experiences with Mobile Applications

	Healthcare	Psychology	Logistics	Tourism	Automotive	Aviation
Mobile Process and Task Execution	Orange	Green				
Location-Based Augmented Reality			Orange	Orange	Red	Red
Mobile Data Collection	Green	Green		Red		
Mobile Crowd Sensing	Orange	Orange	Red			
Mobile Application Engineering		Red		Orange	Red	
Mobile Navigation			Orange	Green	Red	Red

MARPLE – Mobile Process and Task Execution (1)

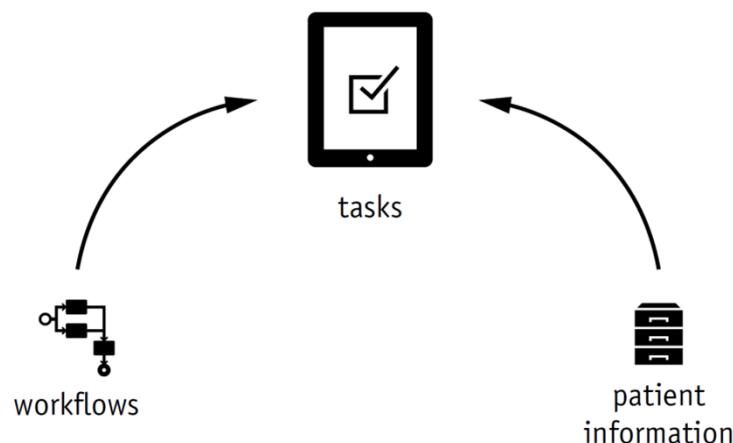


MARPLE – Mobile Process and Task Execution (2)

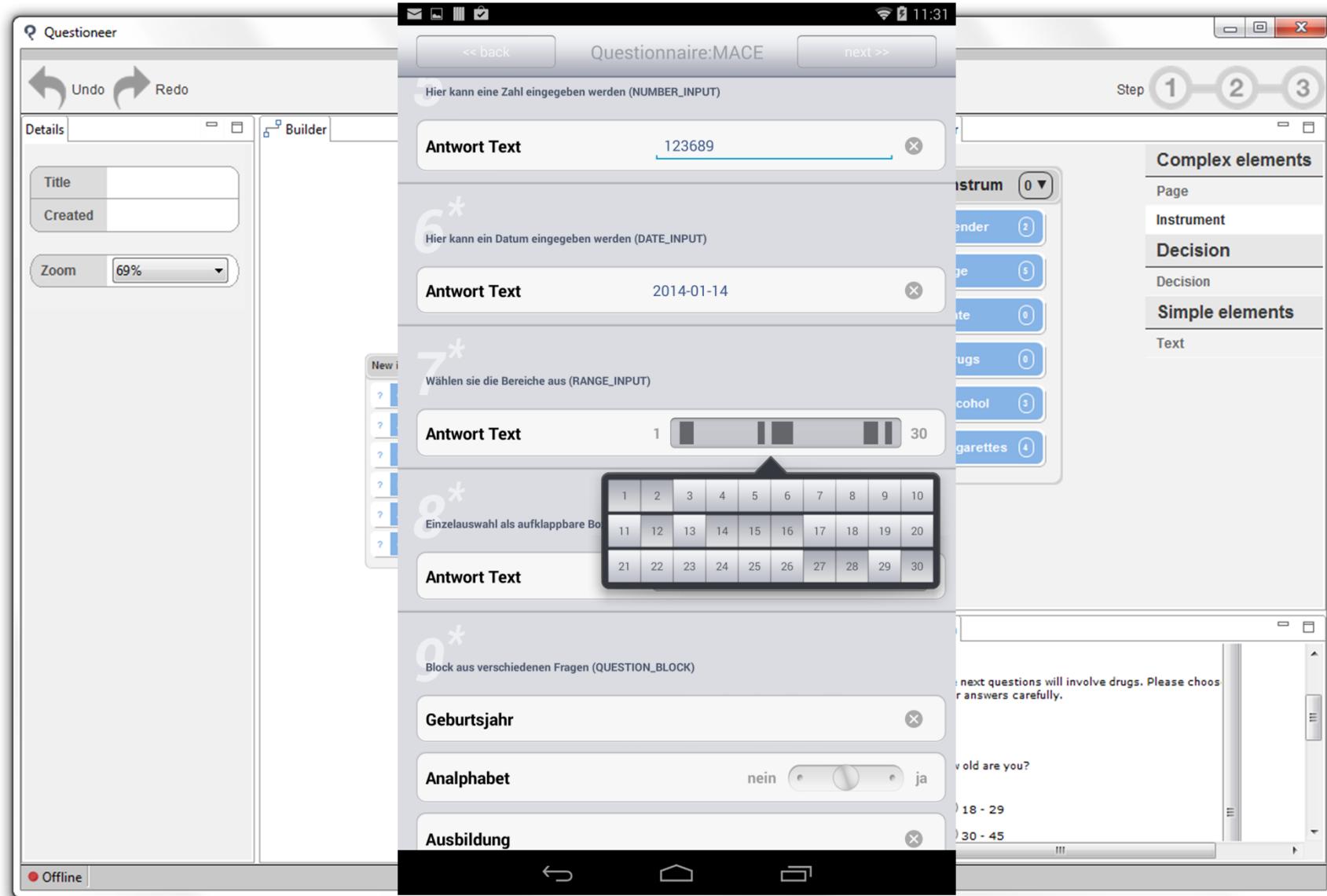


MEDo – Mobile Task Definition and Execution in Ward Rounds

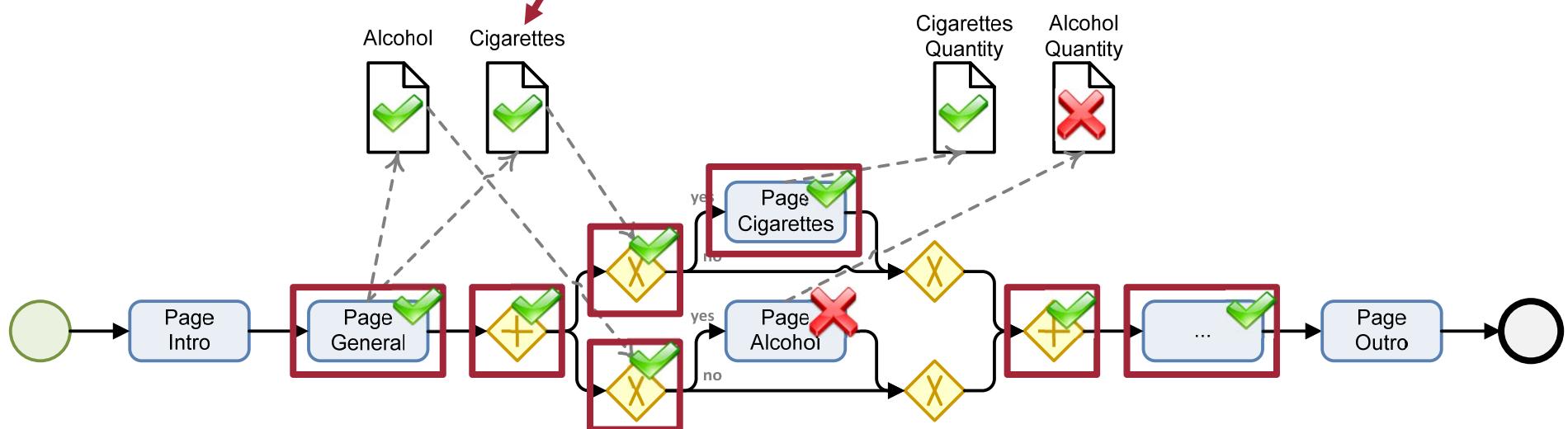
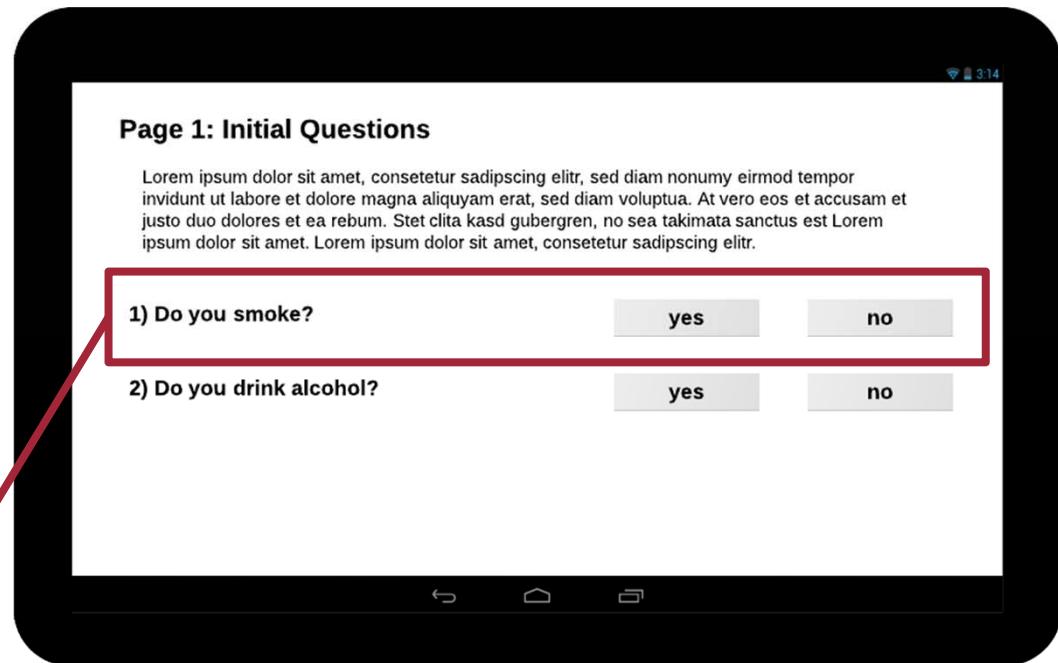
- Support ward rounds using smart mobile devices
 - document „on the fly“ while examine patients
 - start processes based on sensor data
 - mobile „task management“ for each user
 - connect hospital informations system for additional patient data



QuestionSys – End-User Development of Mobile Questionnaires



QuestionSys – Process-Driven Mobile Data Collection



Blood Sugar Diary – Mobile Sensing

- Enable patients to fully track their blood sugar level after measurement
 - customizable wizard to guide user through the measurement process
 - connects with external sensors (via bluetooth) to collect data
 - extensible framework to integrate other sensors
 - enrich data collected with meta information
 - diagrams and pdf export functionality

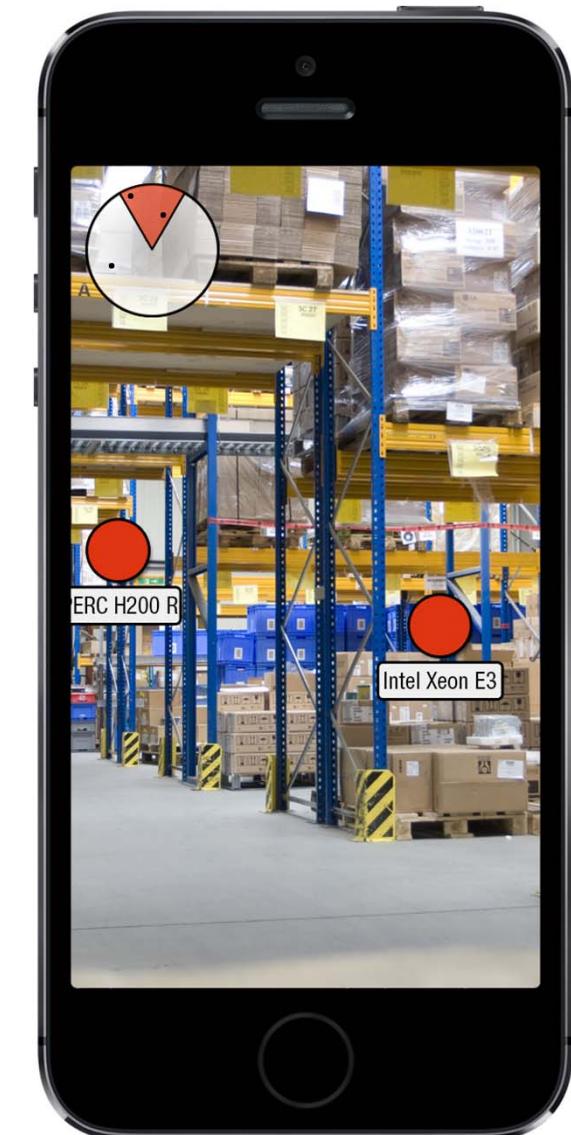
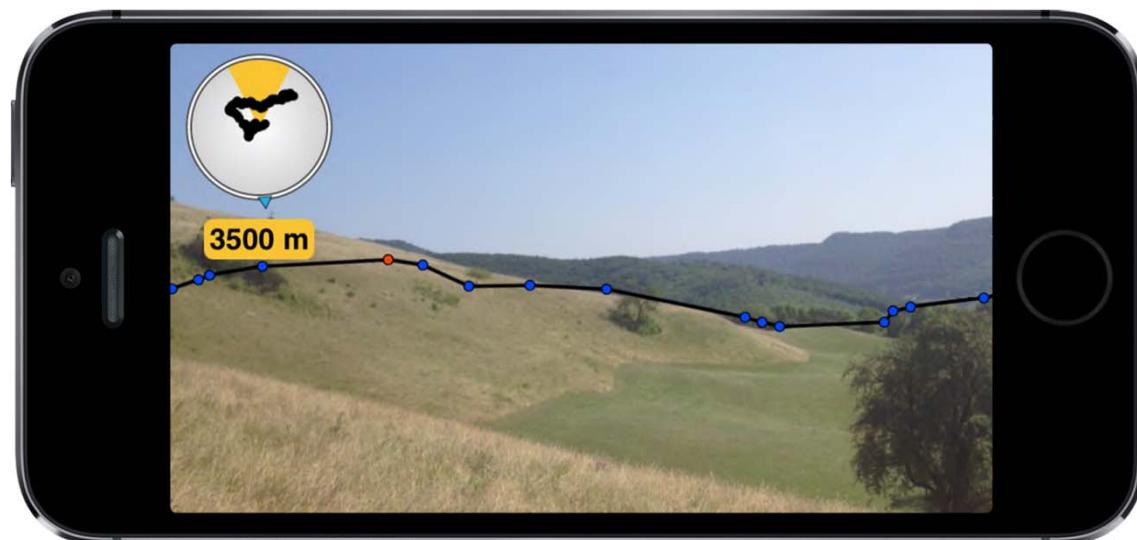


TrackYourTinnitus – Mobile Crowd Sensing

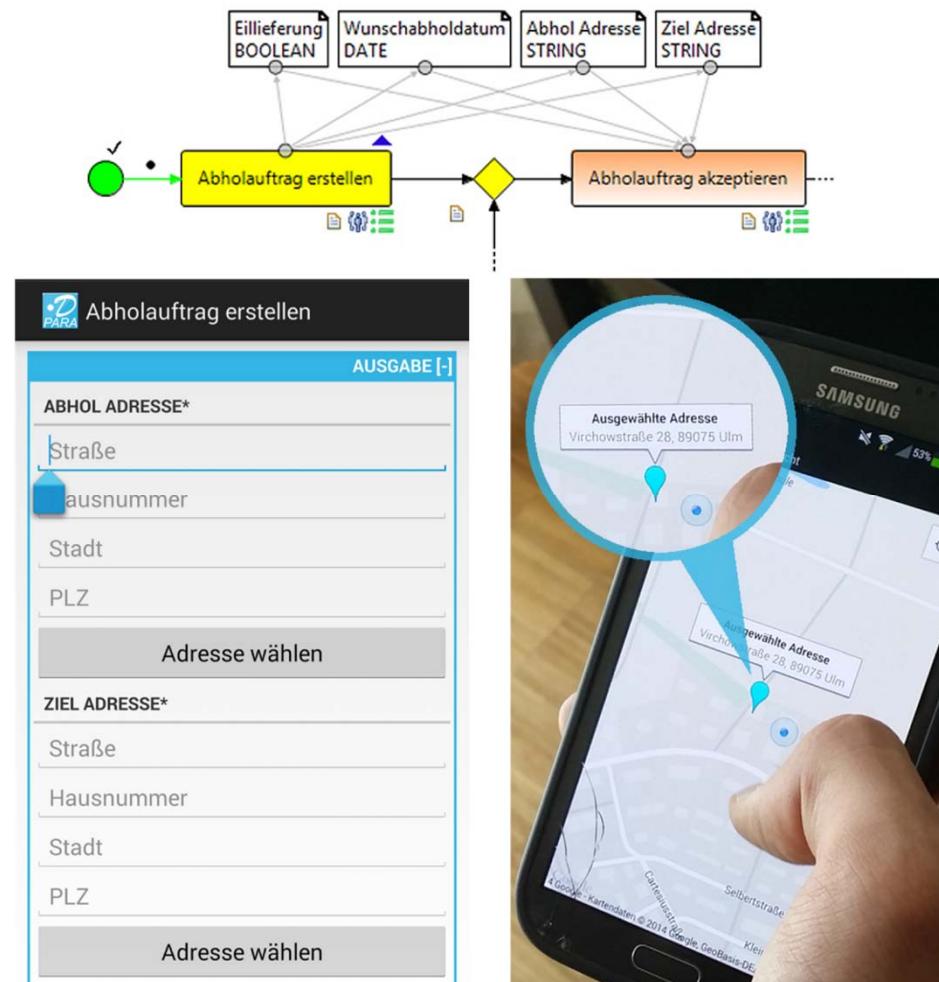


AREA – Location-Based Augmented Reality

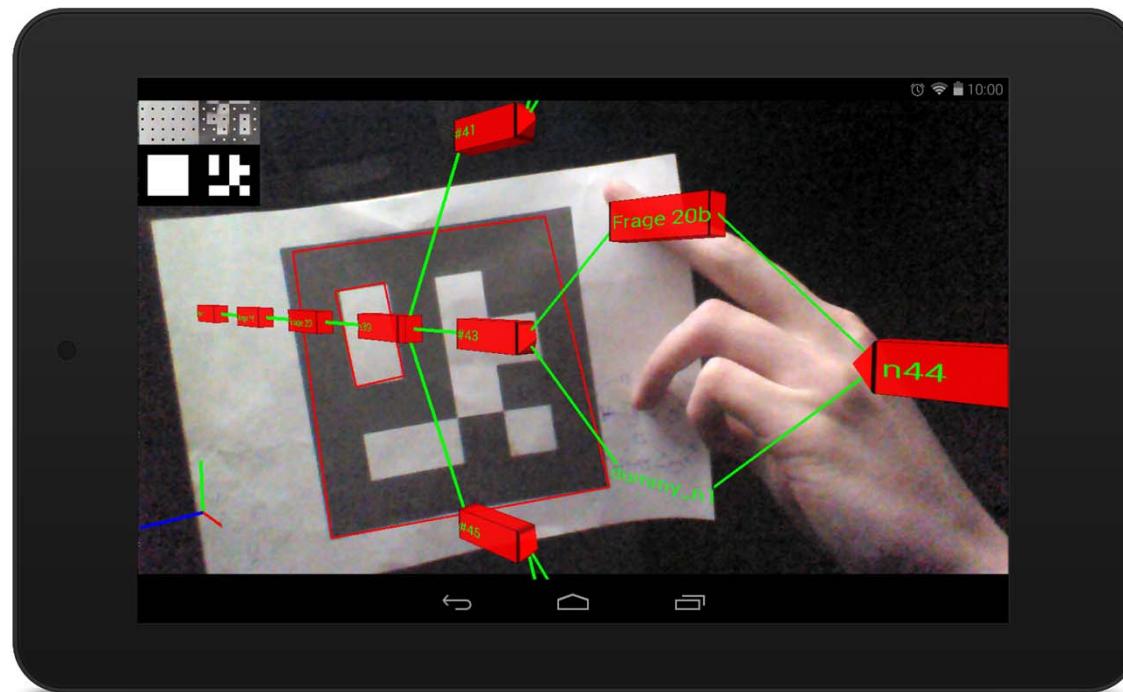
- Augmented Reality to enrich the camera view of Smartphone with different information, e.g.,
 - Points of interest (POI) ↗ Tourism Apps
 - Trails ↗ Tourism Apps (e.g. guiding hikers)
 - Goods in a warehouse ↗ Logistics



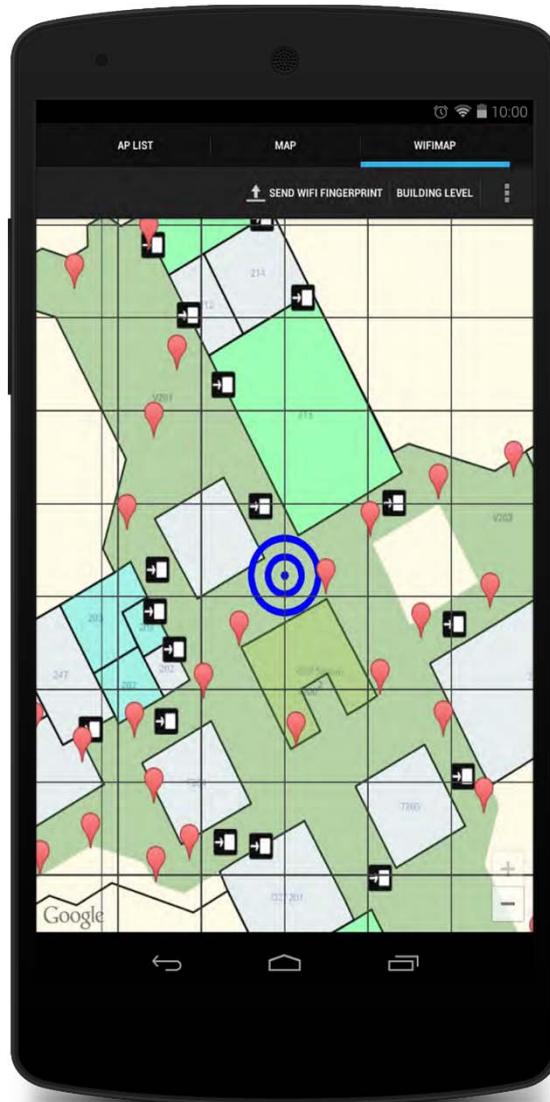
AREA – Process-Driven Asset Tracking



AR 3D – Augmented Reality Enabled Process Model Configuration



Inhouse Navigation

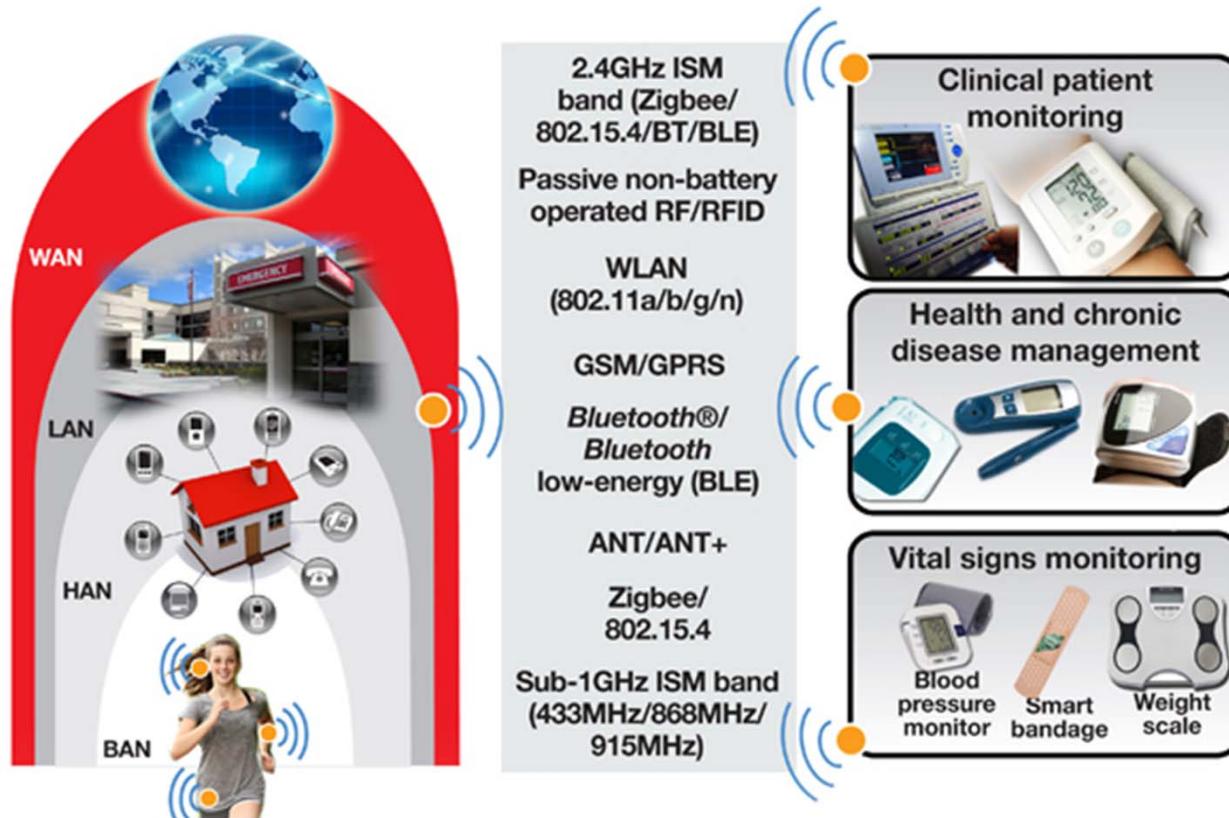


Mobile Access to ERP Systems

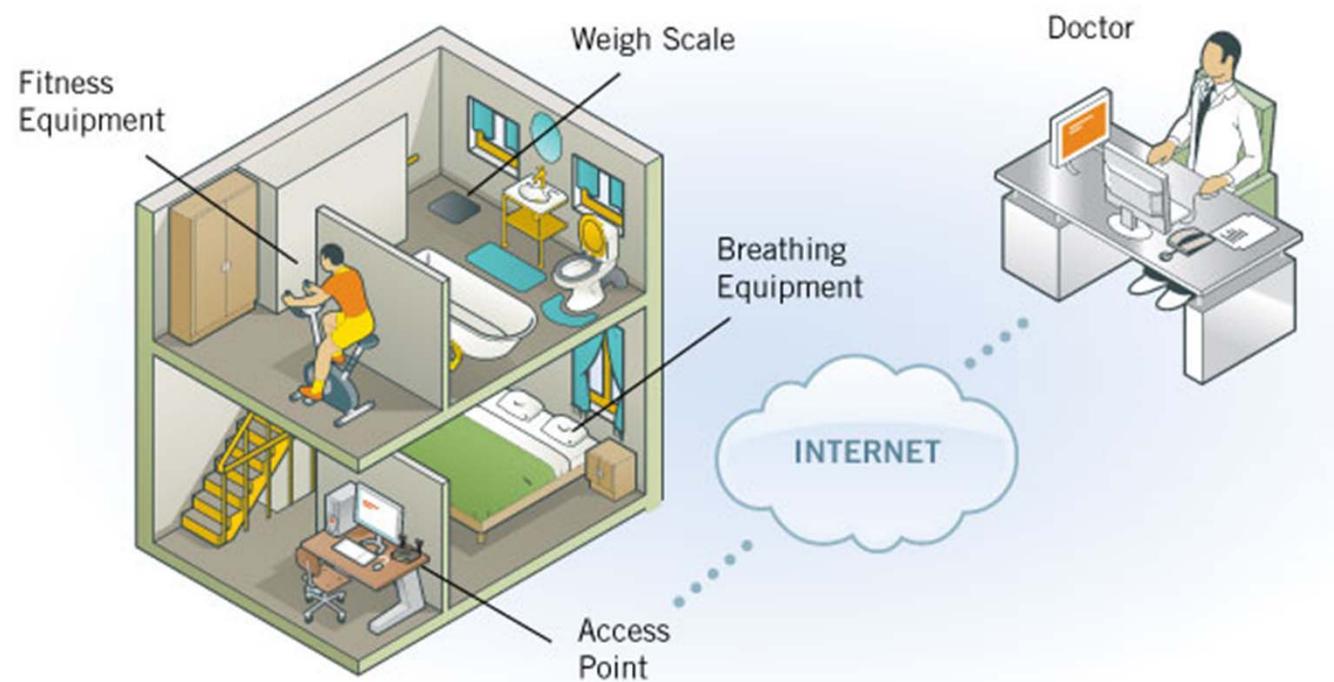
- Example: SAP Mobile Infrastructure



Connected Health Opportunities



Connected Health Opportunities



**Thank you for your kind
attention – Questions?**



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