Workshop

From Event-Driven Business Process Management to Ubiquitous Complex Event Processing

ServiceWave/FIA , Ghent, 13 Dec 2010

Rainer von Ammon

Some retrospections of the past:

Event-Driven Business Process Management

2nd edBPM Workshop
2nd ServiceWave
November 23-27, 2009
Stockholm

Workshop Agenda of 2009

- Introduction edBPM:
  What it means, Basic concepts, Reference Model, Reference Architecture, Taxonomy, Dissemination and Teaching (CITT)
  (45 min)
- Hands-on: Implementing a use case live (Starview, jCOM1/Valial)
  (60 min)
- Grand Challenges of the EASSy-project (IBM/FZI/NSN)
  (15 min)
- SmartHealthcare Maccabi (Maccabi/FZI/NSN)
  (15 min)
- SmartCity/SmartTransportation Genova/Shanghai (Thales/TXT)
  (15 min)
- SmartPlant/SmartSCM Siemens (Siemens Brasov)
  (15 min)
- SmartEmergencyManagement Cologne (SAP)
  (15 min)
- Q&A

Agenda – Introduction edBPM 2009

- The forecast of edBPM for the next decades
- edBPM – a combination of two disciplines: Business Process Management (BPM) and Complex Event Processing (CEP)
- A reference model for edBPM – how its components work together
- edBPM-enhancements of the NEXOF-Reference Architecture
- edBPM-enhancements of modeling and execution standards
- Instrumenting of Business Processes and Services - the „Event Tornado“
- Domain-specific standards for Notification Event Architectures (NEAx)
- Standardising Event Processing Languages?
- Domain-specific reference models for use cases and event patterns
- Taxonomy of Event-driven Adaptivity of Service-based Systems
- Dissemination and teaching edBPM

Some impressions of our edBPM workshop 2009

http://www.citt-online.com/index.php?id=veranstaltungen&id3=stockholm2009&id4=more

Download of the whole presentation

http://www.citt-online.com/downloads/EDBPM-workshop09.ppt

European FET-Flagship initiative:

Pilot Project

"Ubiquitous Complex Event Processing“

interdisciplinary with computational socio-geonomics, neuroscience, epigenetics, brain research, epidemic research, weather/global catastrophe emergency management etc.

Infoday FET-FLAGSHIP INITIATIVE, Brussels, 30 Sept 2010

Rainer von Ammon / Rüdiger Klein / Miriam Leis / Behrooz Mobasheri / Themis Palpanas / Bernhard Seeger et al.

Proposed consortium partners – will be restricted to 15

Industry:

- Deutsche Telekom AG, Bonn, Germany, Shahrok Mosheni, Behrooz Mobasheri
- Continental Automotive GmbH, Vahrenwalder Str. 9, D-30165 Hannover, Jürgen Broda
- Siemens Corporate Technology CEE, Munich/Brasov, Septimiu Nechifor
- IBM HRL, Israel, Opher Etzion
- Software AG, Darmstadt, Germany, Harald Schöning/Walter Waterfeld
- Telecom Italia, Manzalini Antonio
- France Telecom
- OFFIS, Oldenburg, Germany, Jorge Marx-Gomez

SME

- CITT GmbH, Regensburg, Germany, Rainer von Ammon (SME)
- Biomathics, Plamen Simeonov, Berlin, Germany (SME)

RTO/University

- Fraunhofer IAIS, Bonn, Germany, Rüdiger Klein
- University Marburg, Germany, Bernhard Seeger
- FZI, Karlsruhe, Germany, Rudi Studer
- TNO, The Netherlands, Miriam Leis
- University of Trento, Italy, Themis Palpanas
- Telefonica Spain, Oscar Jesus Diez
- University of Reading, UK, Atta Badii

International partnership, e.g. with:

- Event Processing-Technical Society (EPTS)
- University of Stanford, David Luckham
- Caltech Pasadena, Mani Chandy
- University of Toronto, Hans-Arno Jacobsen
- www.ieee-smartgridworld.org

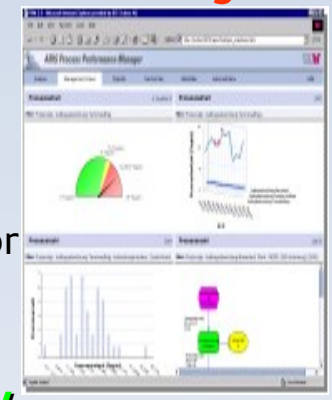
The Principle of U-CEP – Reference Model

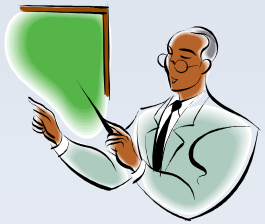
Integration with other proposals:
e.g. Towards a theory of the evolution of the web (Wendy Hall)

Process Modeler

Domain specific reference models for event patterns

Monitoring Cockpits





Event Modeler

Monitor / Analyze / Act

Process Models

Event Processing Model

Process Engine
tbd: Process Execution Language

CEP Engine
tbd: Event Processing Language for U-CEP

IF ...
AND ...
FOLLOWED BY...
WITHIN...
ACTION

„unus mundus"– Internet services and their events

Event Store

analyse history...

Middleware
Normalized events, build higher level events

Event Type Adapters

e.g. JMS pub/sub
e.g. GPS-signal
e.g. Traffic Message Controls
e.g. Weather Forecast
e.g. RFID ...

Low Level Event Streams

- Which events are important?
- How are event correlated?
- When and how should we

Categorizing of ED-BPM use cases

First sketch of a taxonomy of Event-driven adaptivity

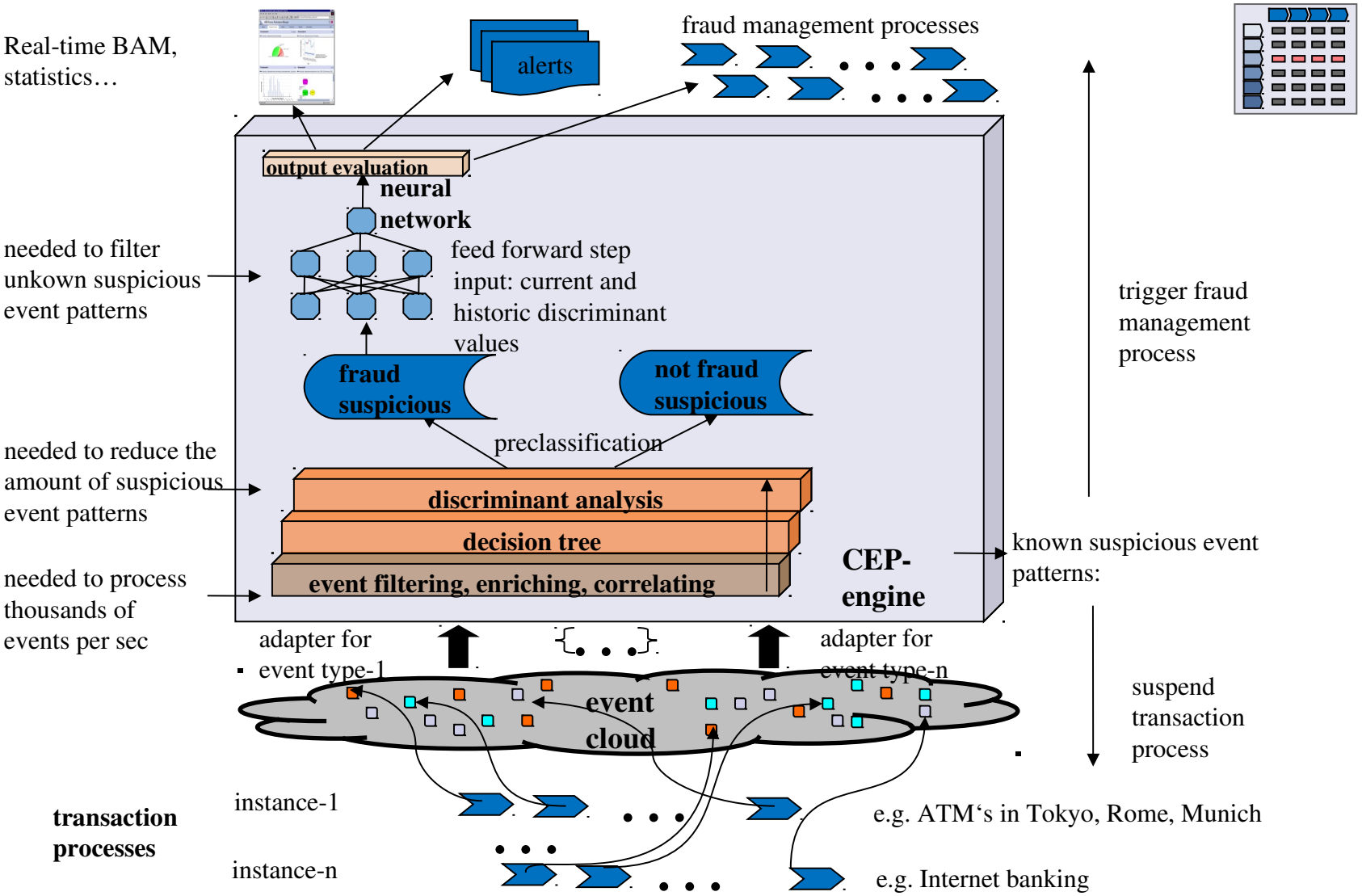
Process type	Process instance	Action type
{list of domain specific processes}	{new, running, all}	{instantiate, stop, continue, terminate, change, new define}

Example: Use Case „Fraud-Management" in the Banking-Domain

According to the reference model of edBPM-based Fraud-Management, we describe a simple example of the process "Withdraw" in connection with a potential event pattern of fraud and related processes in order to exemplify the edBPM principle:

1. An instance of a transaction process is started in the case of withdrawing at a certain ATM.
2. A lot of process instances of the same type are instantiated in a more or less short/certain timeframe at different ATM's.
3. Each process step generates an event, if so of different event types (JMS publish/subscribe, special ATM-banking event type according to the banking standard "<…> "
4. The global event cloud is analyzed in real-time by the CEP-system and optionally by some "intelligent" components like discriminant analysis and neural networks. A suspicious event pattern is detected because the login-data respectively the card is used more than once and at different locations in a timeframe whereas a service is called in order to check the probability that the same customer could use the same card at the different locations.
5. …< see Mona+ 09 paper >

A Reference Model of ED-BPM-based Fraud Management – non-deterministic approach



The Pain Point: The Event Cloud, the IT-Blindness and the „Event Tornado"

Often even additional events are needed for BAM and a better Business Insight

Today's existing event cloud and the IT-blindness

startedService_7
startedService_6
startedService_4
exitService_4
startedService_5
exitService_5
exitService_6
startedService_8
exitService_8
exitService_7
startedService_1
exitService_1
startedService_2
exitService_2

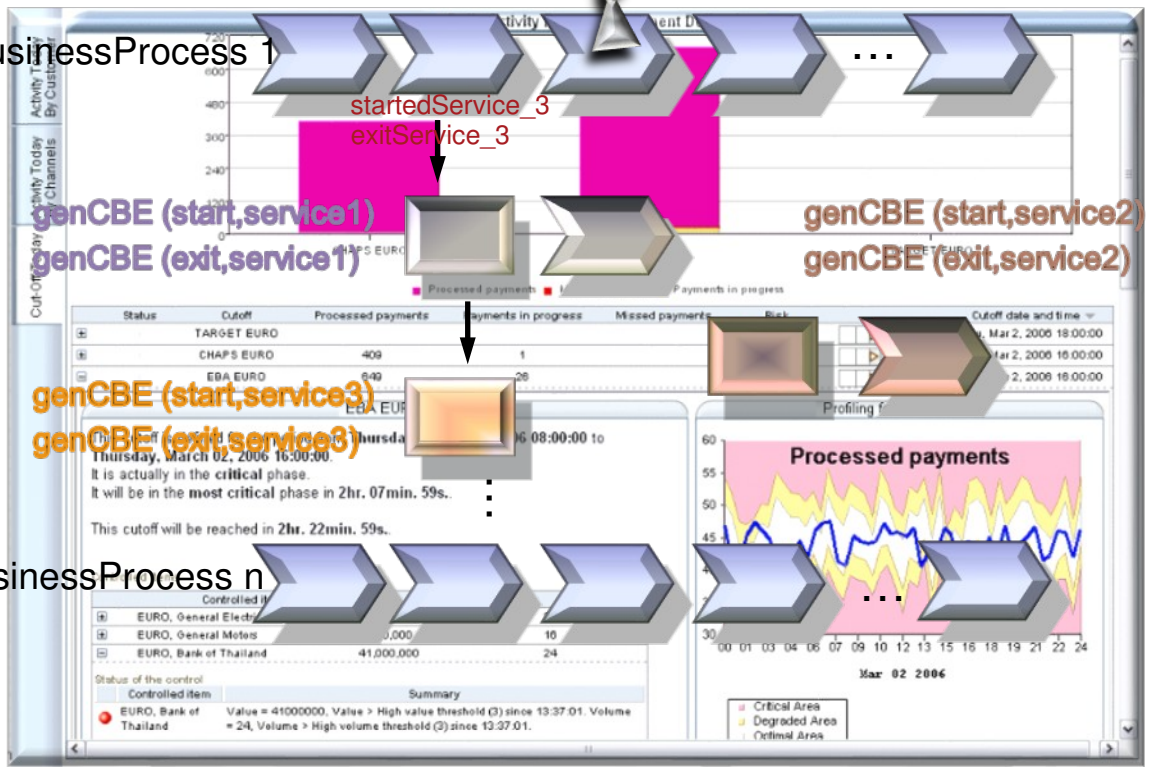
Low level events without semantics

BusinessProcess 1

startedService_3
exitService_3

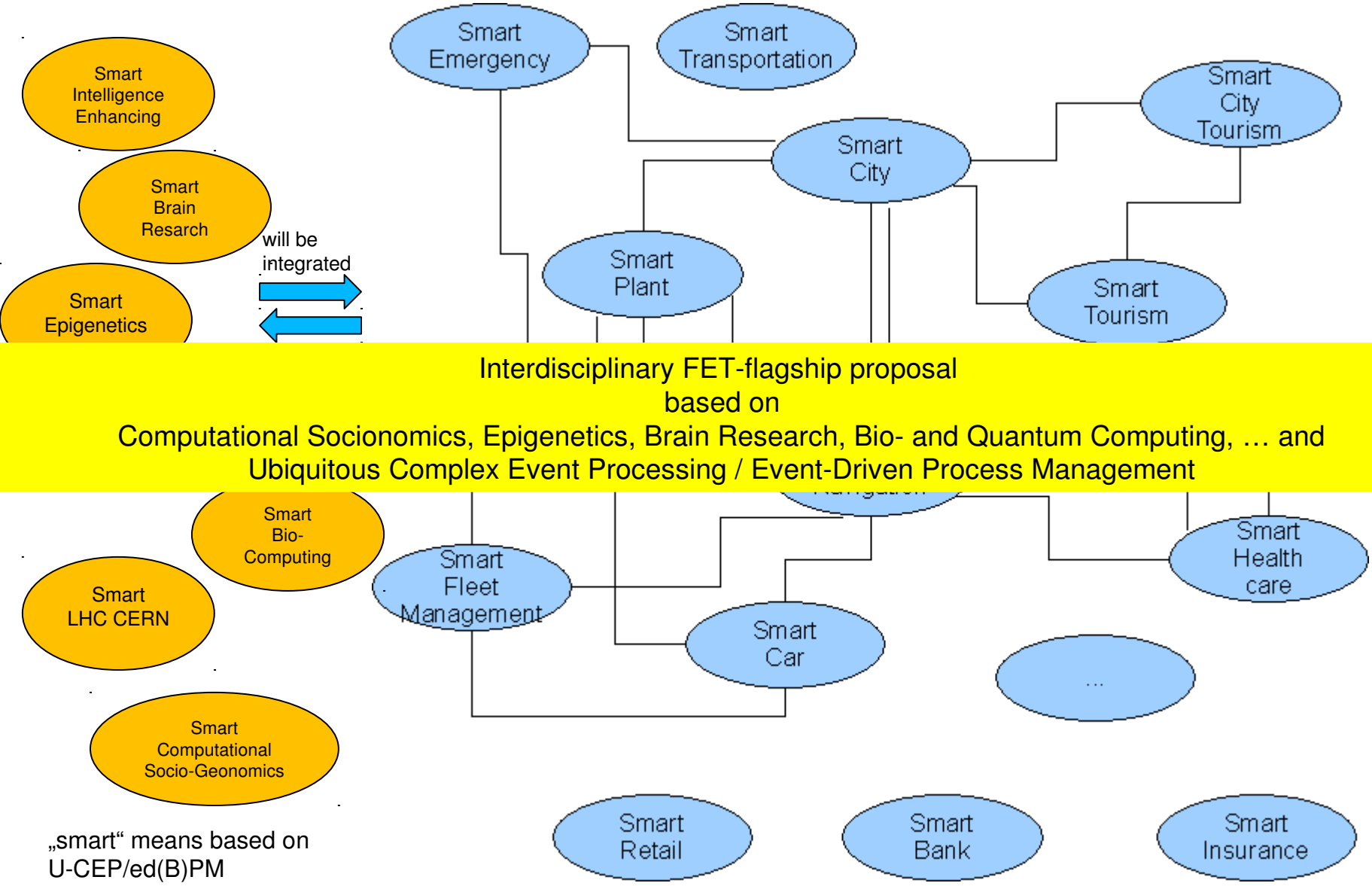
genCBE (start,service1)
genCBE (exit,service1)
genCBE (start,service2)
genCBE (exit,service2)
genCBE (start,service3)
genCBE (exit,service3)

BusinessProcess n



Visualization of the processed/correlated events via Business Activity Monitoring

Ubiquitous CEP - Current domains and their interdependencies:
What we are already going to start and what we will do until 2020 and Beyond



„smart“ means based on
U-CEP/ed(B)PM

The forecast of Ubiquitous CEP for the next decades

The forecast of Prof. David Luckham…

- … until 2020 and beyond
- … we are only at the end of the period of Simple CEP

European Challenges and Flagships 2020 and Beyond – Topics from the ISTAG, to be launched by 2013:

- Understanding life through future ICT
- Anticipation by simulation – Managing complex systems with future ICT
- Future Information Processing Technologies
- The Team Player: Future Problem Solving Technologies
- Robot Companions for Citizen

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/press-17_en.pdf

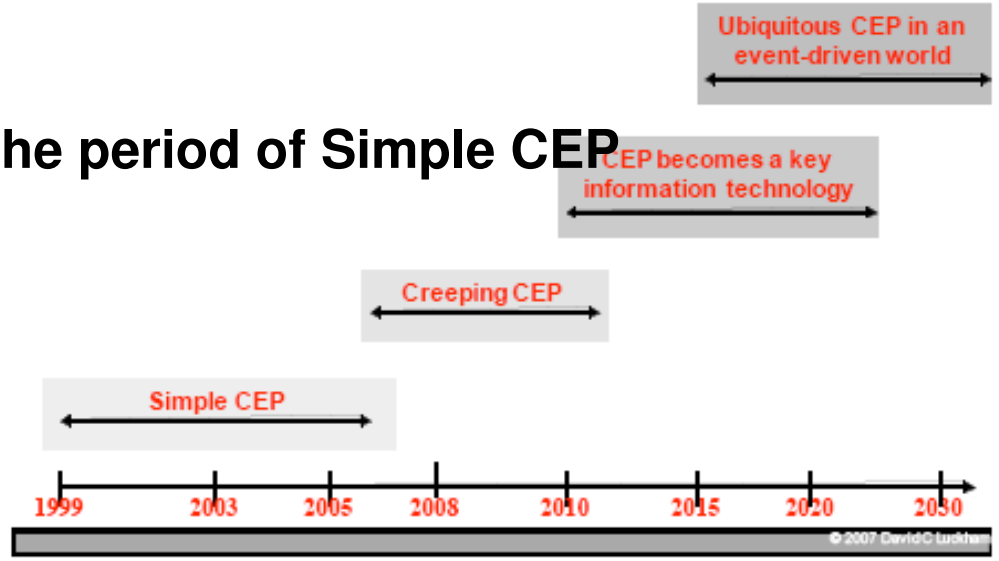


Figure 1: The four stages in the evolution of CEP applications.

Themes of the Pilot Project in more detail

Event-Driven BPM: Integrating Internet of Services

- Integrating Complex Events in BPM
- Deterministically managing of a “concert” of collaborating business processes based on complex events
- Non-deterministically managing of collaborating business processes
- Needed enhancements of modeling standards like BPMN
- Enhancements of execution standards like BPEL
- Enhancements of the NEXOF-Reference Architecture based on edBPM

Ubiquitous CEP: Concepts for the integration of a new kind of Services

- New modeling and design approaches
- Unified Modeling Language and enhanced notations/diagrams for modeling complex dynamics
- New Agent Based Modeling approaches (e.g. for smart devices)
- New application domains like Epigenetics, Cell Biology, Brain Research, etc.
- U-CEP based robot companions for citizens, Cyborgs → better AGI?
- Weather/global catastrophe emergency management
- New Human Enhancement Technologies (HET) and U-CEP related product ideas like Smart Navigation Systems, Intelligent Cars, U-CEP based SmartPhones, Exocortex products…
- Computational Socio-Geonomics and Social Simulation, e.g. in the case of 10 billion human agents
- From energy to matter – Higgs Boson, Higgs field, quantum physics
- Super-Computing, Bio-Computing, Quantum-Computing
- Challenges for Event Processing Languages (EPL) from the perspective of Bio-Computing and Quantum-Computing

Milestones of this Preparatory Action

- Organisation of International Workshops about U-CEP in order to evangelize the idea and to bring together the high potential interdisciplinary experts with the potential adopters (ServiceWaves/Future Internet Conferences, U-CEP Dagstuhl seminar…)

- Organisation of a Course of Study U-CEP, curriculum and concept for Live-long Learning, new eLearning concept

- Set up of first Proof of Concepts according to where edBPM/U-CEP will start from (Conti use case Change Management, Unicredit use case Risk Management according to an edBPM enhanced NEXOF-Reference Architecture ...), in order to convince potential future adopters from different domains

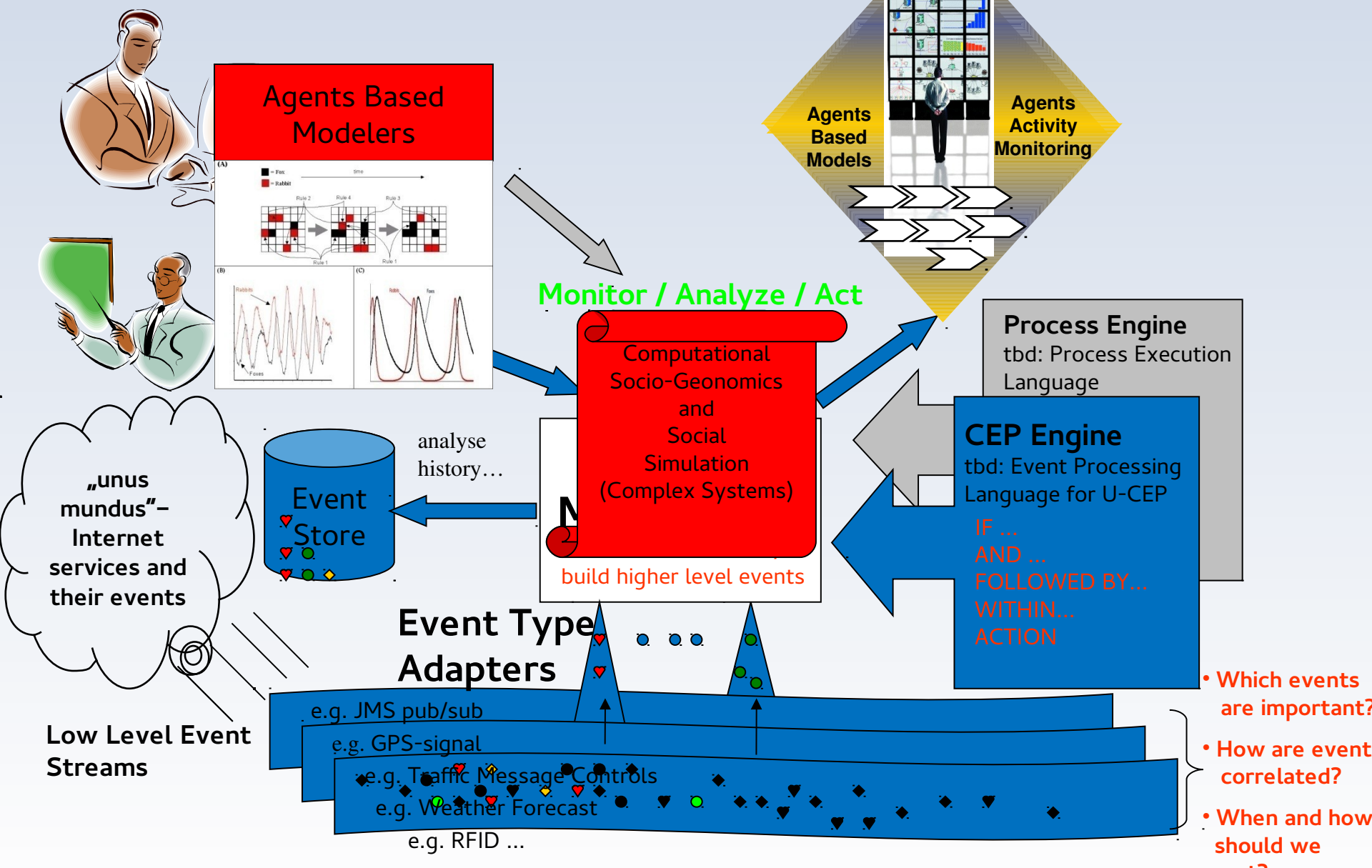
- Defining explicit interdisciplinary U-CEP ideas and radically new long-term products

Additional slides about some interdiscipilnary ideas of the U-CEP flagship sketch
Submitted to the January/June 2010 FET-F-workshops,
if needed

Computational Socio-Geonomics / Social Simulation / e.g. 10 Billion Agents

"Emergences" of the Computational Socio-Geonomics discipline correspond to "Complex Events" of the U-CEP discipline

Integration with other proposals:
e.g. Live-Ecology, S-Gaia, Futurich, Socionome Metalogger



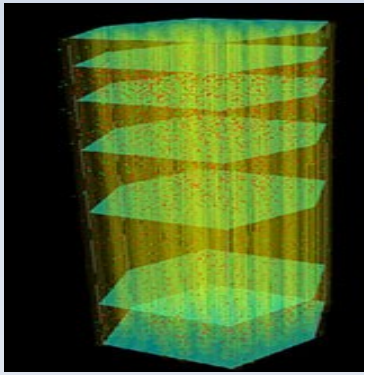
Enhancing human intelligence and cognitive or physical abilities

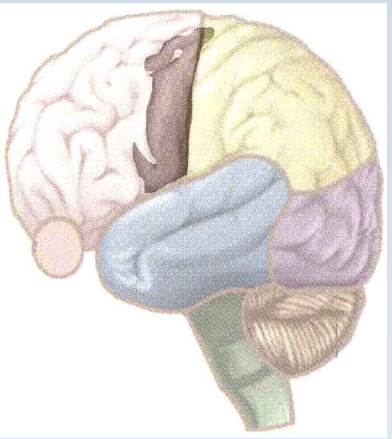
connect humans to more events of the universe (resp. Internet services)

Integration with other proposals:

e.g. - Ray Kurzweil: Singularity is Near / Henry Markram Blue **Brain** /
- Bruce H. Lipton: Epigenetics – Intelligent **cells** /
- Karlheinz Meier: Design, construction and Operation of a Neuromorphic Computation facility
- Plamen Simeonov Integral **Biomathics**,
- Francois Képès, Marc Schoenauer : Using Evolution to compute
- Kevin Warwick: Brain Computer Interface - **Cyborg**

NeuroColumn





Modeler

Event Modeler

Monitor / Analyze / Act

Intracellular effectors = Event Processing Agents

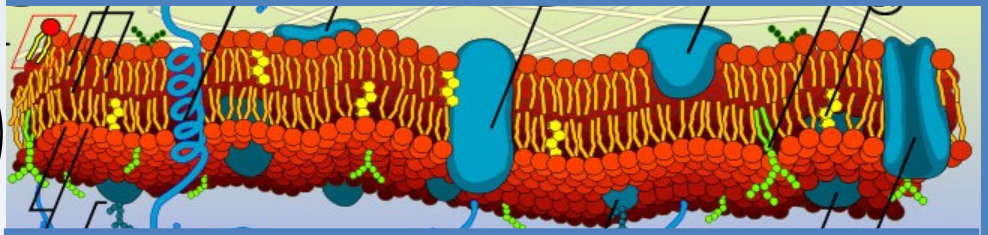
Intracellular effectors = Event Processing Agents

Intracellular effectors = Event Processing Agents

Protein machinery

Protein machinery

...



Extracellular receptors = event adapters

„unus mundus"– Internet services and their events

Adapters

e.g. JMS pub/sub

e.g. GPS-signal

e.g. Traffic Message Controls

e.g. Weather Forecast

e.g. RFID ...

Low Level Event Streams

...ich events are important?

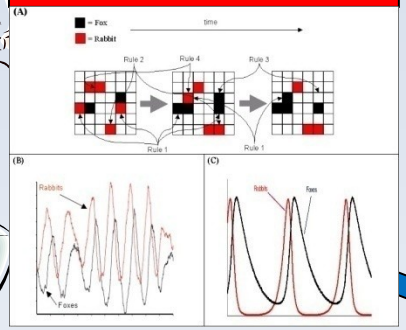
- **How are event correlated?**
- **When and how should we**

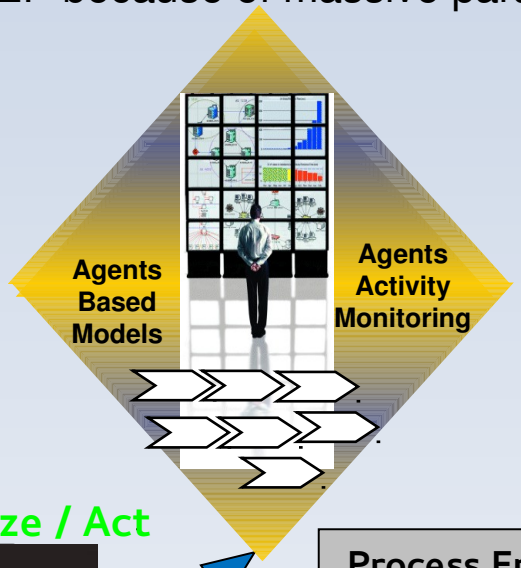
DNA-based Biocomputers / Quantum Computing

the obviously appropriate computer technology for U-CEP because of massive parallel processing

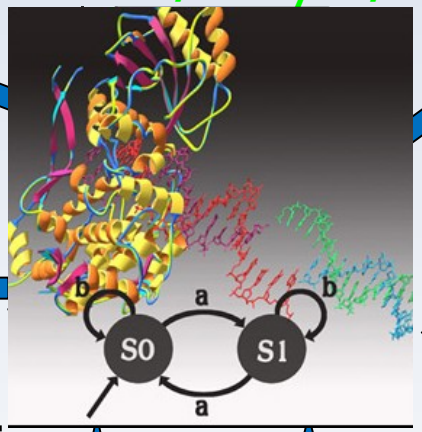
Integration with other proposals:
e.g. Peter Zoller ICT beyond limits

Agents Based Modelers





Monitor / Analyze / Act



Process Engine
tbd: Process Execution Language

CEP Engine
tbd: Event Processing Language for U-CEP

IF ...
AND ...
FOLLOWED BY...
WITHIN...
ACTION

analyse history…

Event Store

„unus mundus"– Internet services and their events

Low Level Event Streams

Event Type Adapters

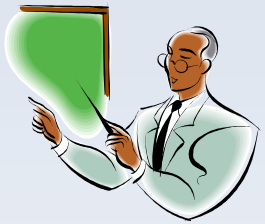
e.g. JMS pub/sub
e.g. GPS-signal
e.g. Traffic Message Controls
e.g. Weather Forecast
e.g. RFID ...

- Which events are important?
- How are event correlated?
- When and how should we

Robot Companions for Citizen – driven by Event Processing

Integration with other proposals:
e.g. Paolo Dario Robot companions for citizens

Process Modeler



Event Modeler

Process Engine
tbd: Process Execution Language

CEP Engine
tbd: Event Processing Language for U-CEP

IF ...
AND ...
FOLLOWED BY...
WITHIN...
ACTION

analyse history…

Event Store

„unus mundus"– Internet services and their events

Low Level Event Streams

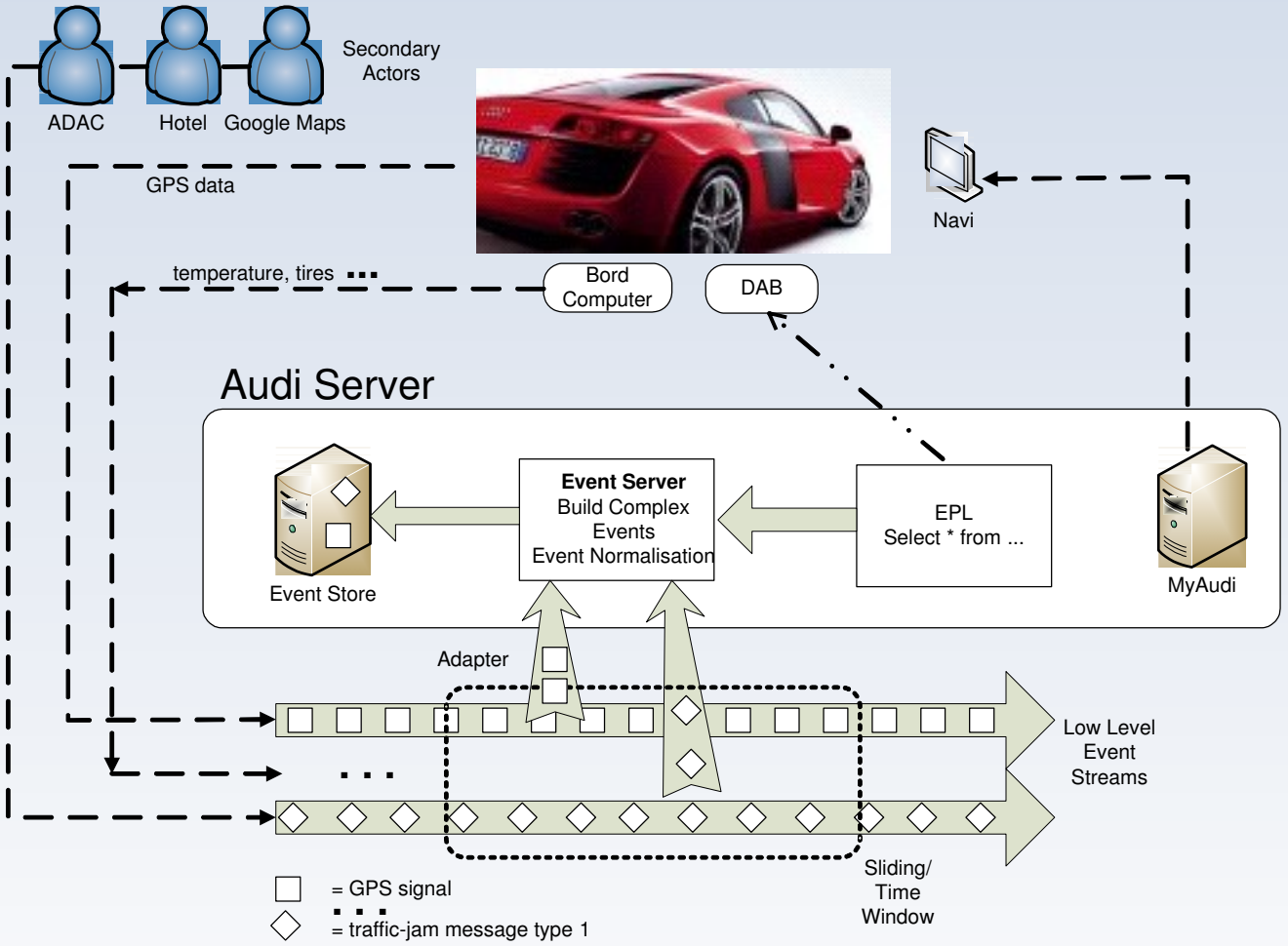
Event Type Adapters

e.g. JMS pub/sub
e.g. GPS-signal
e.g. Traffic Message Controls
e.g. Weather Forecast
e.g. RFID ...

- Which events are important?
- How are event correlated?
- When and how should we

Ideas for SmartNavigation – based on edBPM/U-CEP, study started 2008

Audi/VW also presented Shelley TT – driverless car e.g. JavaOne Sept 2010

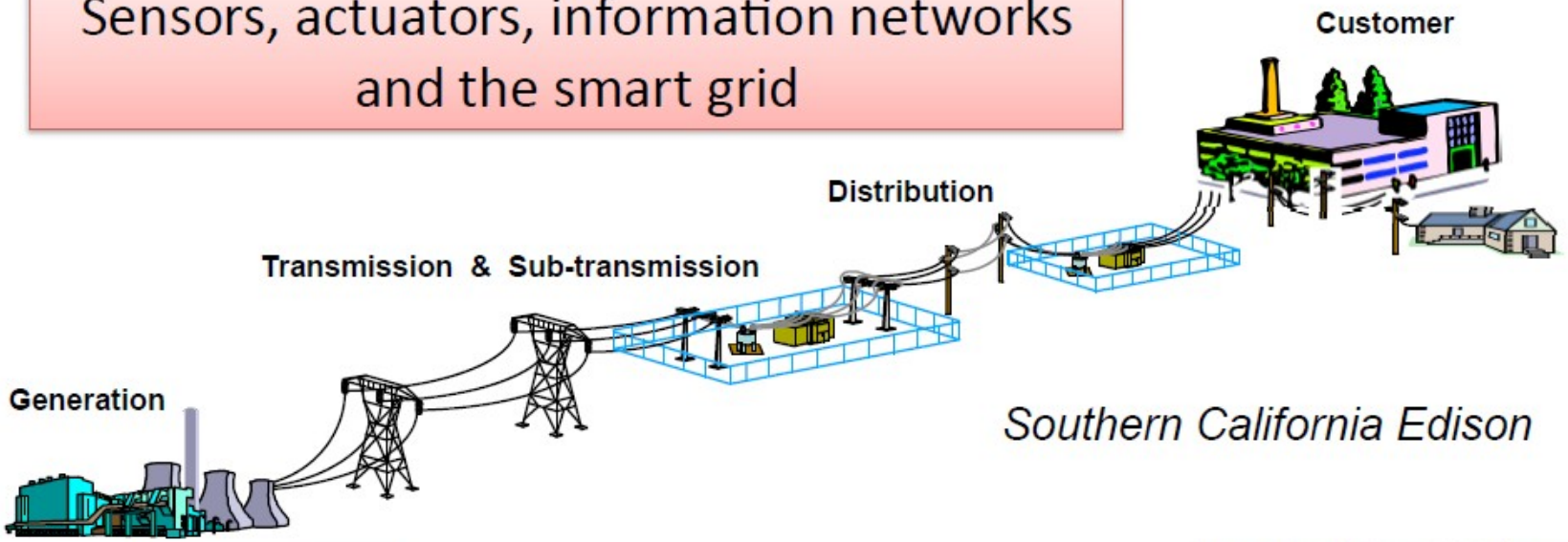


Ideas for SmartEnergyGrids – based on edBPM/U-CEP

NSF keynote Mani Chandy/Caltech Pasadena 2010

Technology fulfilling needs: energy

Sensors, actuators, information networks and the smart grid



Southern California Edison

Managing dynamic renewable energy portfolio integrated with nuclear and fossil fuel generation; energy storage; dynamic demand; and time-sensitive pricing

Some slides about previous
related edBPM curricula to be enhanced for U-CEP

Dissemination and Teaching ED-BPM

The business modeler and the event modeler – different qualifications not in personal union

A proposal for a curriculum of a new international Master course of study "Event-Driven Business Process Management"

1. **Description: Curriculum together with required credits and examinations**

Certificate: Master of Science

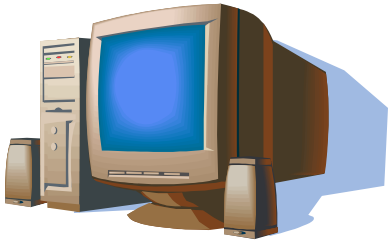
Programme Duration: Four Semesters (120 credits/cr)

Mastercourse-EDBPM-v02.doc

The business modeler and the event modeler – different qualifications not in personal union

Concept:

The course consists of the fields of study Business Process Management, Complex Event Processing, Business Activity Montoring included Business Intelligence and Data Warehousing, Computer Networks, Messaging as well as several application disciplines like Algorithmic Trading, Supply Chain Management in the retail domain, fraud detection in the banking and insurance domain etc. All courses are completed with course-related tests and Credits (cr) according to European Credit Transfer System (ECTS) are awarded. All courses are given in English and are designed as distance learning/eLearning courses.



? course will be based on a new Technology-Enhanced-Learning approach, developed in the project "CloudBox-edBPM"

Some slides about previous related edBPM workshops

Dissemination and Previous Preparatory Work

Examples of last contributions to conferences (+ additional events from 2009 and 2010)

edBPM/DoReMoPat
FP7-ICT Proposers' Day 2009, January 22, Budapest
ropa.eu/information_society/events/cf/stream-items.cfm?id=20

edBPM exhibition **SSOKU 2009**
on Software Services and SOKU technologies, Brussels, January 13 – 14, 2009

edBPM-Workshop
ServiceWave 2008, Madrid, December 10 – 13, 2008

9th edBPM Expert Meeting
Regensburg, Germany, December 7 – 8, 2009

Rainer v. Ammon, Andreas Hehmann
Mainz, Germany, October 7 - 9, 2008
http://www.bpm-event.com/
"Event-Driven Business Process Management Taking the Example of Hamburger Sparkasse"
EDBPM-Haspa.ppt

Rainer v. Ammon, Christoph Emmersberger, Florian Springer, Christian Wolff
Vienna, September 28 - 30, 2008
FIS 2008 / 1st International Workshop on Complex Event Processing for Future Int
"Event-Driven Business Process Management and its Practical Applicatio
FIS08_AmmonSpringer.pps

Rainer v. Ammon
New York/Stamford, September 17 - 19, 20
4th EPTS symposium
"Proposal for a new Master course of study
Event-Driven Business Process Managemen
EDBPM-mastercourse.ppt

Adrian Paschke, Rainer v. Ammon
Irsee Monastery, Bavaria, Germany, July 9 - 1
Focus Group for EuroPLoP 2008
Domain-specific Complex Event and Rule Patt
http://hillside.net/europlop/
Agenda for the focus group...