

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

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Abstract. This workshop focuses on the topics of connecting Internet of Services and Things as event sources of a global “smart dust” with the management of business processes and the Future and Emerging Technologies as addressed by the European FET-F 2020 and Beyond Initiative. Such FET challenges are not longer limited to business processes, but focus on new ideas in order to connect processes on the basis of CEP with disciplines of Cell Biology, Epigenetics, Brain Research, Robotics, Emergency Management, SocioGeonomics, Bio- and Quantum Computing – summarized under the concept of U-CEP. This workshop extends edBPM as actually "commodity" from the perspective of the scientific State of the Art, although there are no real adopters so far and we are far from standards. This workshop extends edBPM as ed(B)PM (not all processes must be “business” processes) to U-CEP (new application domains, new services from the "Universe"). In continuation with the edBPM workshops at the 1st ServiceWave 2008 in Madrid and the 2nd ServiceWave 2009 in Stockholm, this 3rd workshop is a thematical enhancement considering the grand challenges defined by Future Internet Initiative and FET-F. The workshop positions U-CEP as an appropriate umbrella for new medium-term Future Internet- and long-term FET-F technologies, products and ideas.

The Idea and Background – From edBPM to U-CEP

This workshop focuses on the topics of connecting Internet of Services and Things with the management of business processes and the Future and Emerging Technologies as addressed by the ISTAG Recommendations of the European FET-F 2020 and Beyond Initiative [1]. Such FET challenges are not longer limited to business processes, but focus on new ideas in order to connect processes on the basis of CEP with disciplines of Cell Biology, Epigenetics, Brain Research, Robotics, Emergency Management, SocioGeonomics, Bio- and Quantum Computing – summarized under the concept of U-CEP [2].

In continuation with the edBPM workshops at the 1st ServiceWave 2008 in Madrid and the 2nd ServiceWave 2009 in Stockholm, this 3rd workshop is a thematical enhancement considering the grand challenges defined by FET-F. FET-F initiative is looking for radically new ideas, products and outcomes and U-CEP is a contribution

in order to bring together the relevant Future and Emerging Technologies under one umbrella.

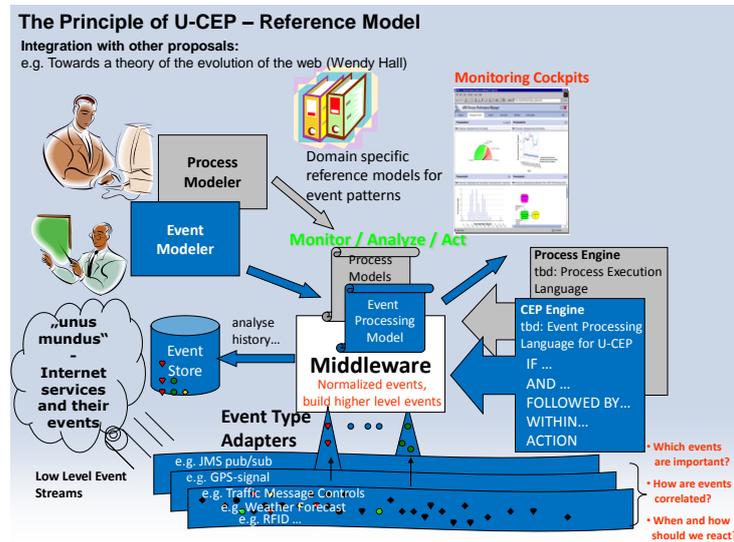


Fig. 1. The reference model of U-CEP consists of two ICT platforms which run in parallel [3]. The processes are modeled by process modelers with special skills in an application domain. The models are executed by a process engine. The other, corresponding platform monitors and processes Complex Events from different event types which are modeled as event patterns by event modelers with special skills in event modeling.

The term «Event-Driven Business Process Management» (edBPM) was coined after the 1st CEP Symposium in Hawthorne/NY March 2006 with its first BPM/CEP panel. edBPM is nowadays an enhancement of BPM by new concepts of Service Oriented Architecture, Event Driven Architecture, Software as a Service, Business Activity Monitoring and Complex Event Processing. In this context BPM means a software platform which provides companies the ability to model, manage, and optimize these processes for significant gain. As an independent system, Complex Event Processing (CEP) is a parallel running platform that analyses and processes events. The BPM- and the CEP-platform correspond via events which are produced by the BPM-workflow engine and by the – if so distributed - IT services which are associated with the business process steps. Also events coming from different event sources in different forms can trigger a business process or influence the execution of the process or a service, which can result in another event. Even more, the correlation of these events in a particular context can be treated as a complex, business level event, relevant for the execution of other business processes or services. A business process – arbitrarily fine or coarse grained – can be seen as a service again and can be "choreographed" with other business processes or services, even between different enterprises and organisations.

This way, processes will be able to change their control flow dynamically and very flexibly according to enterprise internal or external internet services. For this aim a process execution standard like BPEL (OASIS) has to be enhanced by integrating not only simple single, process external events but also complex events. The workshop will discuss a reference model for edBPM and use cases for different domains like telco, banking, insurance, automotive, logistics, retail, entertainment etc. (see fig. 2).

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

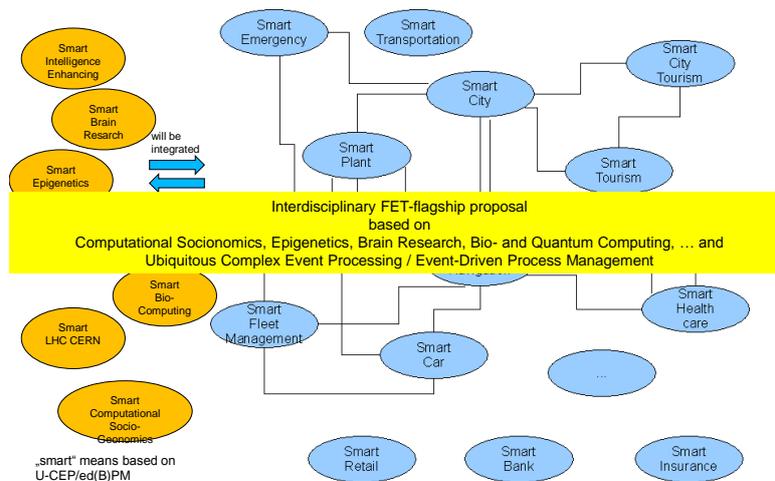


Fig. 2. The different domains of edBPM like telco, banking, insurance, automotive, logistics, retail, entertainment etc. are enhanced by new domains like Brain Research, Bio Computing, or Epigenetics, Human Enhancements and Artificial Global Intelligence, Robotics, Cyborgs and Socio Economical applications.

First experiences in setting up edBPM-applications have shown that the potential adopters have major problems to adequately define and implement the underlying complex event patterns. Engineering of such applications remains a laborious trial and error process with slow development and change cycles. Therefore the availability of domain specific reference models for event patterns is an urgent need businesses do have nowadays. Adopters and decision makers need a clear understanding of the alternative event patterns and their applicability to solve certain edBPM problems. They should be able to choose the event pattern which is most suitable for fulfilling the properties and objectives of the intended application in a particular domain. The workshop will also discuss how to find and model appropriate event patterns.

Internet of Service will change the way how the business processes will be performed, by having them in the form of services on the Internet. Consequently, this opens many challenges, but the most important is managing the interaction between services in such an open environment. Indeed, in such a networked services supply chain every service produces many events that might be relevant for other services. It

is clear that all these influences, due to their ad-hoc nature, cannot be defined in advance explicitly. Real-world reactivity requires a kind of publish-subscribe mechanism, that enables pushing relevant events to interesting parties. It means that the actual data flow (and not predefined workflows) will determine the reactive nature of a Future Internet system.

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

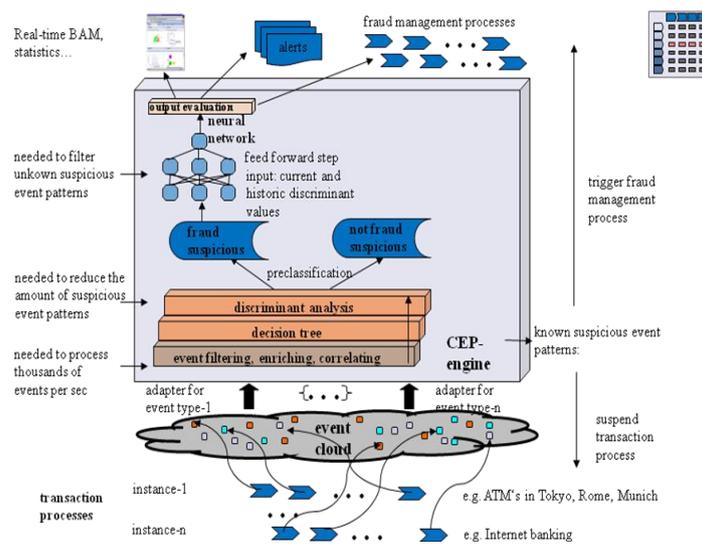


Fig. 3. A reference model for U-CEP as a combination of deterministically programmed event patterns and non-deterministic, unknown or suspicious event patterns [4]. Therefore a U-CEP approach must be enhanced by Artificial Intelligence components.

The last part of the workshop deals with the Grand Challenges of what is summarized under the concept of “Ubiquitous Complex Event Processing” and where the concept of Internet of Services is enhanced according to the FET-F Initiative. Hardly anybody would have forecast 10 years ago that the business world would look as it does today. How will the industrial world look in 10 years time? Which products and technologies will we use to produce goods, to do business, to learn, to live and to communicate? To better explore the potential that these technologies can offer, European Commission (Vice-Presidents Antonio Tajani, Neelie Kroes and Commissioner Maire Geoghegan-Quinn) have launched a high-level expert group on key enabling technologies. Key enabling technologies, such as U-CEP in connection with nanotechnology, micro- and nanoelectronics including semiconductors, Bio- and Quantum Computing, biotechnology and photonics, but also brain research, cell biology, epigenetics, robot companions for citizens, cyborgs, exocortex etc. will provide services in a much broader sense. For the modeling and management of such

new event types and patterns as so called “smart dust” we also need new modeling and execution platforms. In this workshop we start a first dialogue between experts and visionary potential adopters.

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
- http://ftp.cordis.europa.eu/pub/ftp7/ict/docs/fet-proactive/press-17_en.pdf

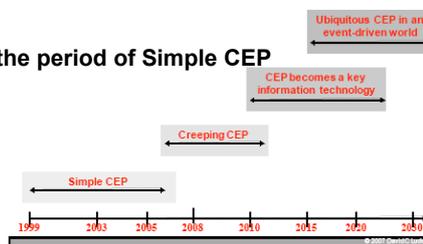


Figure 1: The four stages in the evolution of CEP applications.

Fig. 4. The forecast of Ubiquitous CEP for the next decades by David Luckham is combined in this workshop with the challenges of the European Future Internet- and the FET-F Initiatives.

References

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