

Responsive Future Internet

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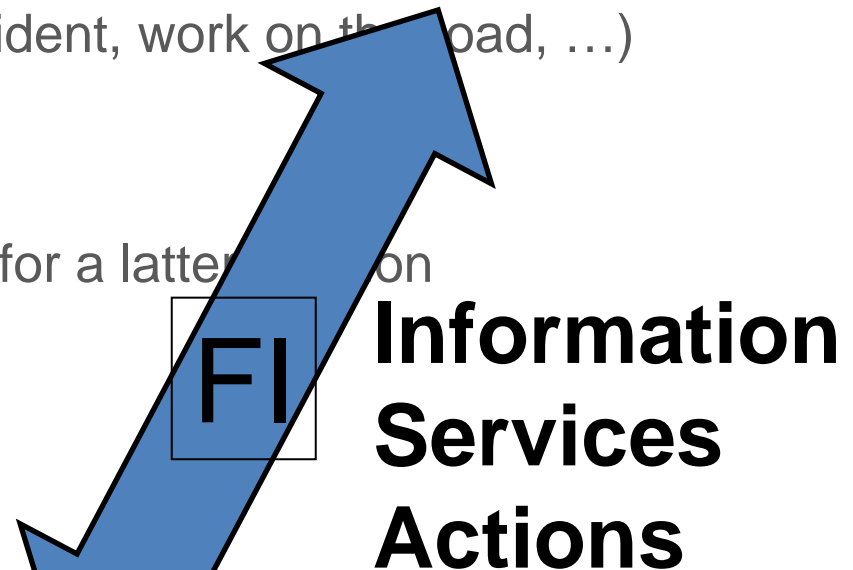
Responsive Future Internet: Motivating example



- Starting at 6am to Brussels (by car)
- Several “obstructions” (a car accident, work on the road, ...)
- ⇒ I will be arriving too late!
- ⇒ I should inform someone
- ⇒ It would be nice to move my slot for a latter meeting on

However

- I am driving the car
- I am not familiar with the agenda
- I don't know who is in charge of the meeting
- I don't know at what time I will be arriving
- ...



Responsive Future Internet: Requirements



- Starting at 6am to Brussels (by car)
- Several “obstructions” (a car accident, work on the road, ...)
- ⇒ I will be arriving too late!
- ⇒ I should inform someone
- ⇒ It would be nice to move my slot for a latter session

However

- I am driving the car **Decoupled architecture (EDA)**
- I am not familiar with the agenda **Real-time data/event processing**
- I don't know who is in charge of the meeting
- I don't know at what time I will be arriving
- ... **Dynamics / ad-hoc-ability**

Responsive Future Internet



- Creates/Enables an environment which proactively satisfy needs of its “**prosumers**”

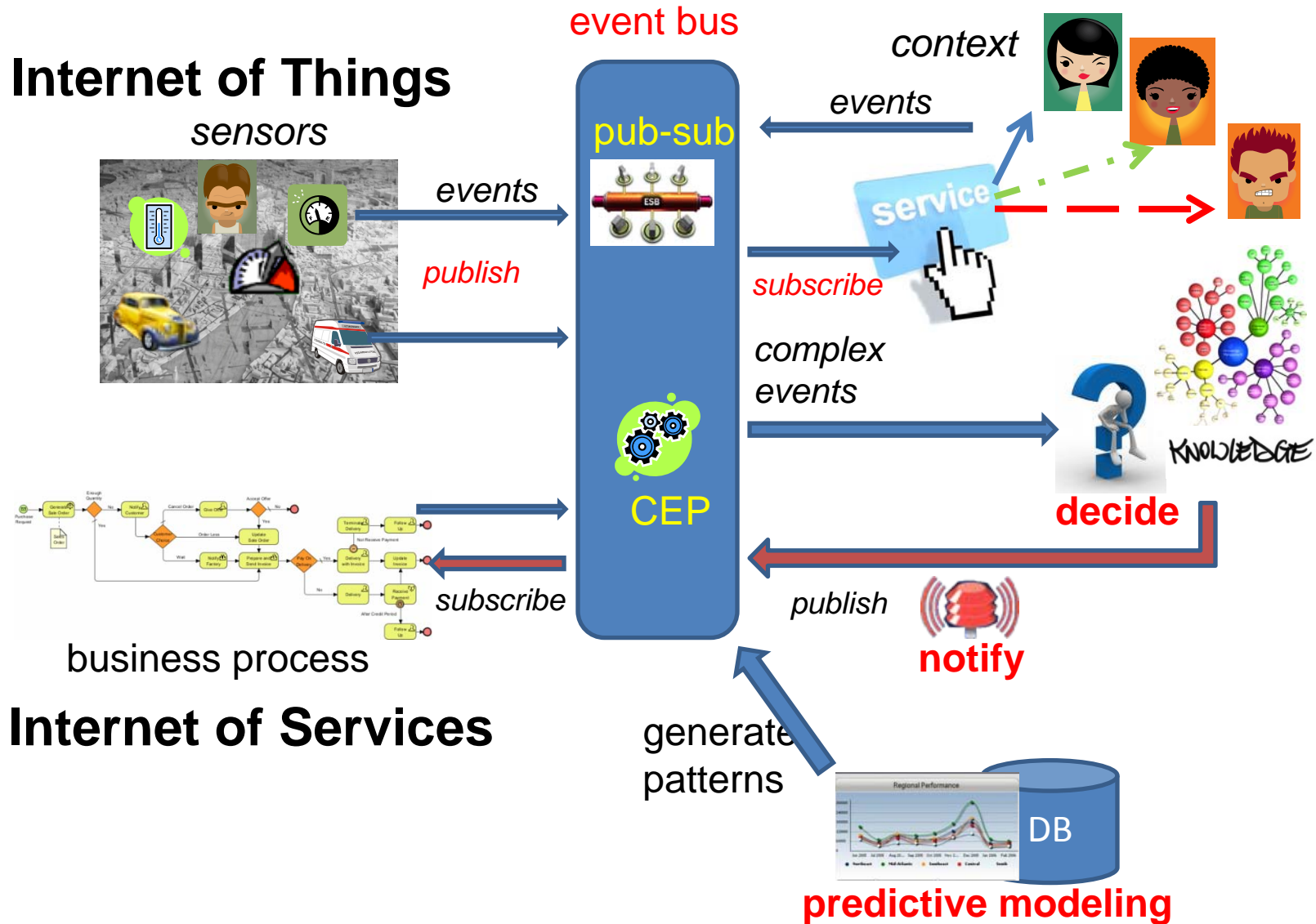
- **It senses continuously**
 - Continuously monitoring the whole environment in order to anticipate problems and opportunities, incl. users‘ needs

- **It responds proactively**
 - Changing running processes before the situation escalates

- **It self-evolves**
 - The discovery and inclusion of new event/data sources and new consumers of events that will be pushed. It must be done dynamically and in an automatic way.

- Example: an early warning system that senses in real time who might be in danger and proactively adapt running processes

Crucial feature: connecting IoT and IoS



Core Platform – requested components

- **Data/Event-driven orientation**
 - Scalable/distributed Event bus
 - Self-evolving nature (new sources and sinks)

- **Complex Event Processing**
 - Event streams
 - high throughput
 - complex and heterogeneous data
 - unreliable data

- **Complex Event Pattern Management**
 - Automatic discovery and maintenance
 - Reasoning
 - Visualization

Future Internet Architecture: IoS and Web events



PL▶Y



▲LERT



Complex Event Processing/Management

- An infrastructure for the intelligent, real-time processing of a huge amount of heterogenous, complex and unreliable data streams in a highly-distributed and dynamic environment
- Intelligent CEP framework (iCEP), iCEP.fzi.de
 - end-to-end solution for event processing, starting from the definition of complex event patterns, through intelligent detection, till advanced 3-D visualization of complex events
 - CEP as a Service
 - **management** of complex situations to be detected, including their discovery and evolution
 - **intelligent processing** of their data in real time in order to proactively detect interesting situation, including **reasoning** about events (over time, space, context, their relations and constraints):
 - **active visualization** of the results of processing, supporting the decision making process (e.g. through root-cause analysis) and

Thank you!



Intelligent Complex Event Processing

Benefits of a responsive Future Internet

- Benefits:
 - Continuous optimization of the life and business in the city
 - Continuous improvement/personalization of offered services
- Improved emergency management
 - Better early warning systems
- More efficient traffic management
 - Better resolving of ad-hoc situations (e.g. jams)
- Advanced m-Commerce
 - More offering for LBA

Expected functionalities from Core Platform

- context awareness
- sensor networks
- advanced real time processing capabilities handling huge volume of data (events)
- ad hoc service composition
- event-driven architecture