OBJECT MANAGEMENT GROUP

Workshop on Distributed Object Computing for Real-time and Embedded Systems

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The Power of Now®

Complex Event Processing for Real-Time Commerce

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Presenter

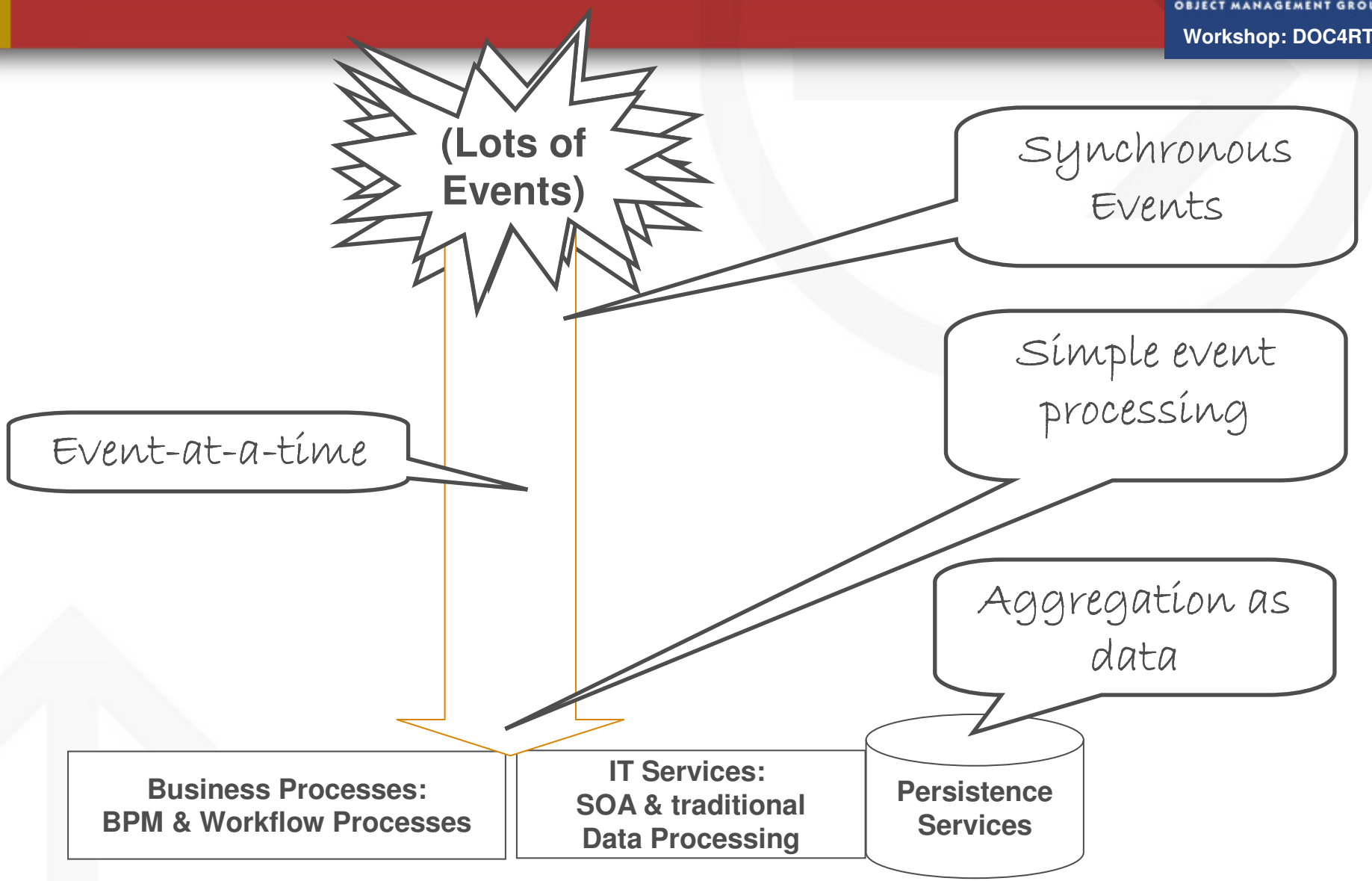
- **Presenter:**
  Paul Vincent, CTO Business Rules and CEP, TIBCO Software
  - Member OMG PRR and W3C RIF rules standards bodies
  - Co-author CEP Blog http://tibcoblogs.com/cep

- **TIBCO Software Inc.:**
  - Provides enterprise software that helps companies achieve service-oriented architecture (SOA) and business process management (BPM) success
  - Headquartered in Palo Alto, California
  - Over 3,000 customers and offices in 40 countries
  - CEP product is TIBCO BusinessEvents
    - Developed from a customer solution and launched 2005
    - Currently at Release 3.0

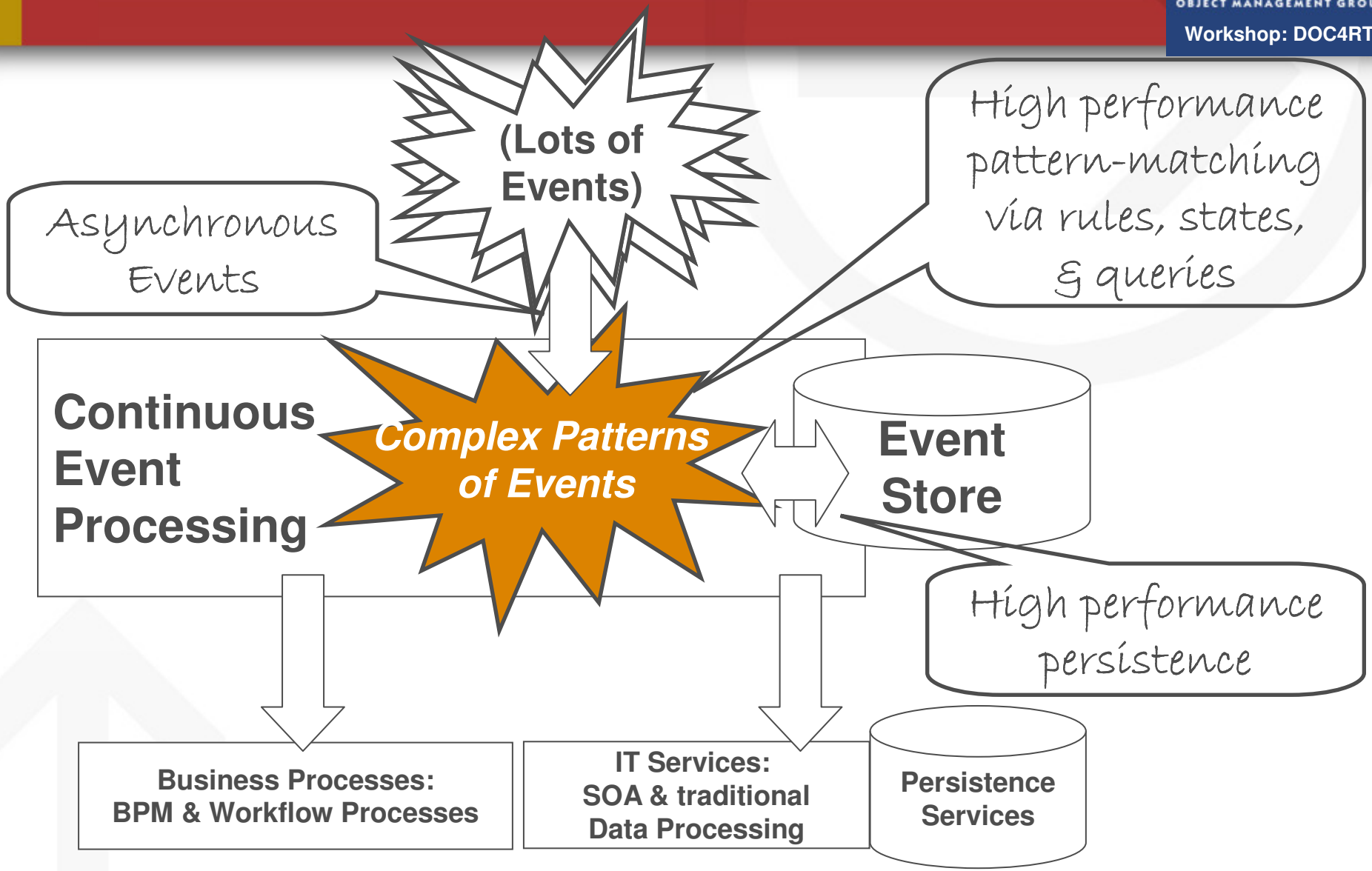
Agenda for this session

1. Conventional vs Complex Event Processing
2. Example: CEP in Logistics & Operations

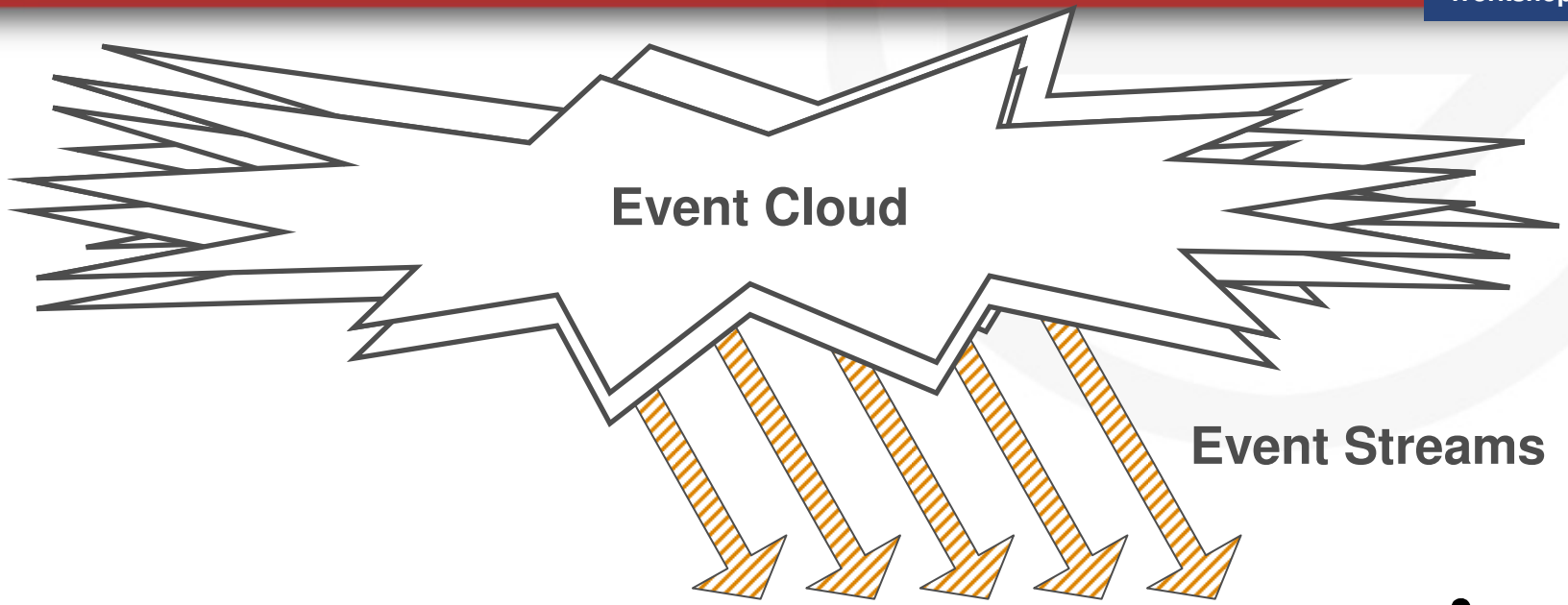
Conventional Event Processing



Complex Event Processing



CEP Terminology



- CEP (technology) applies pattern detection & filtering to the event clouds & streams and their histories
- Multiple modelling / execution paradigms are available for pattern detection

What does CEP Solve?

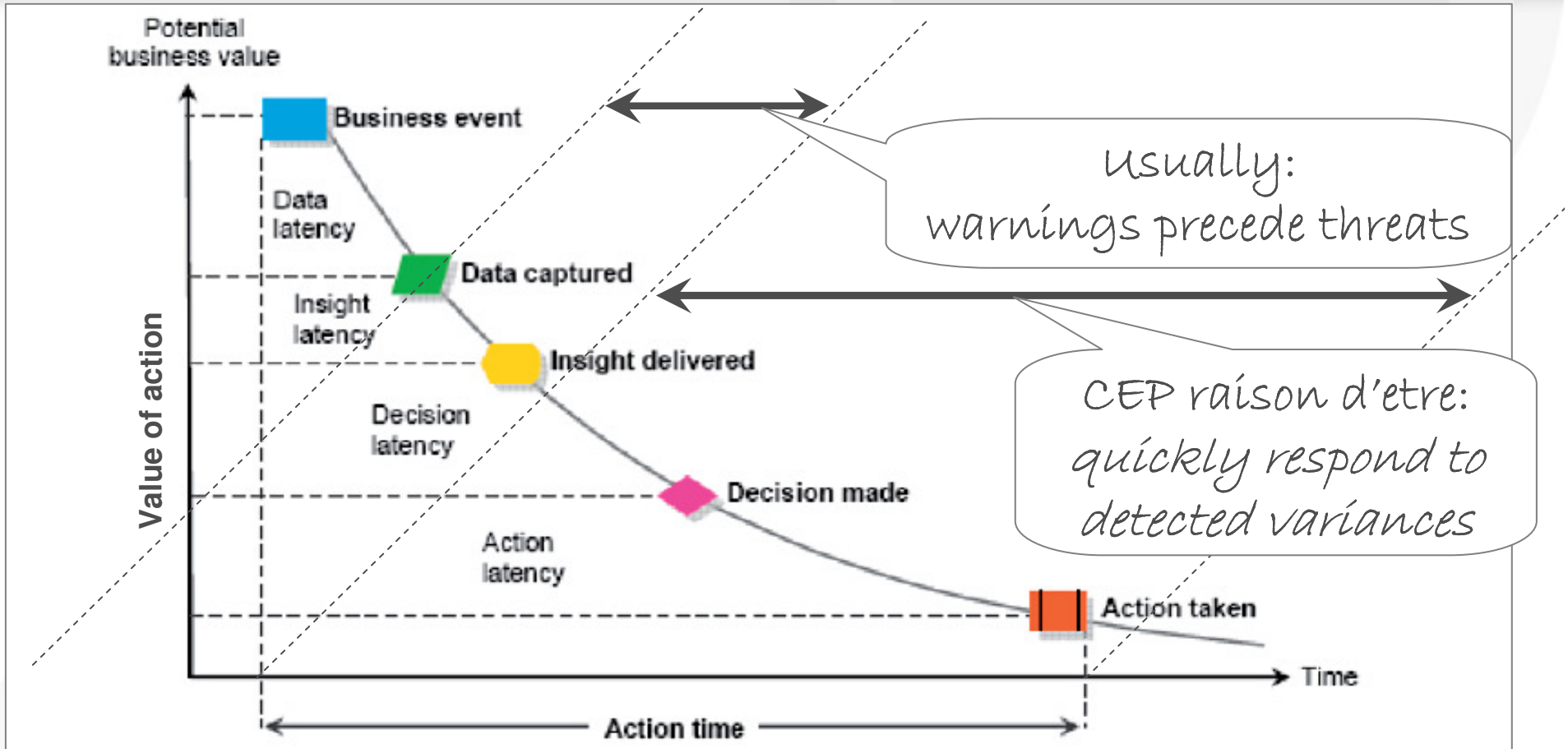


Figure 1: The steps involved in taking action to respond to business events

the "Latency Problem"

Where CEP fits in Real-Time Commerce

"Situational Awareness"

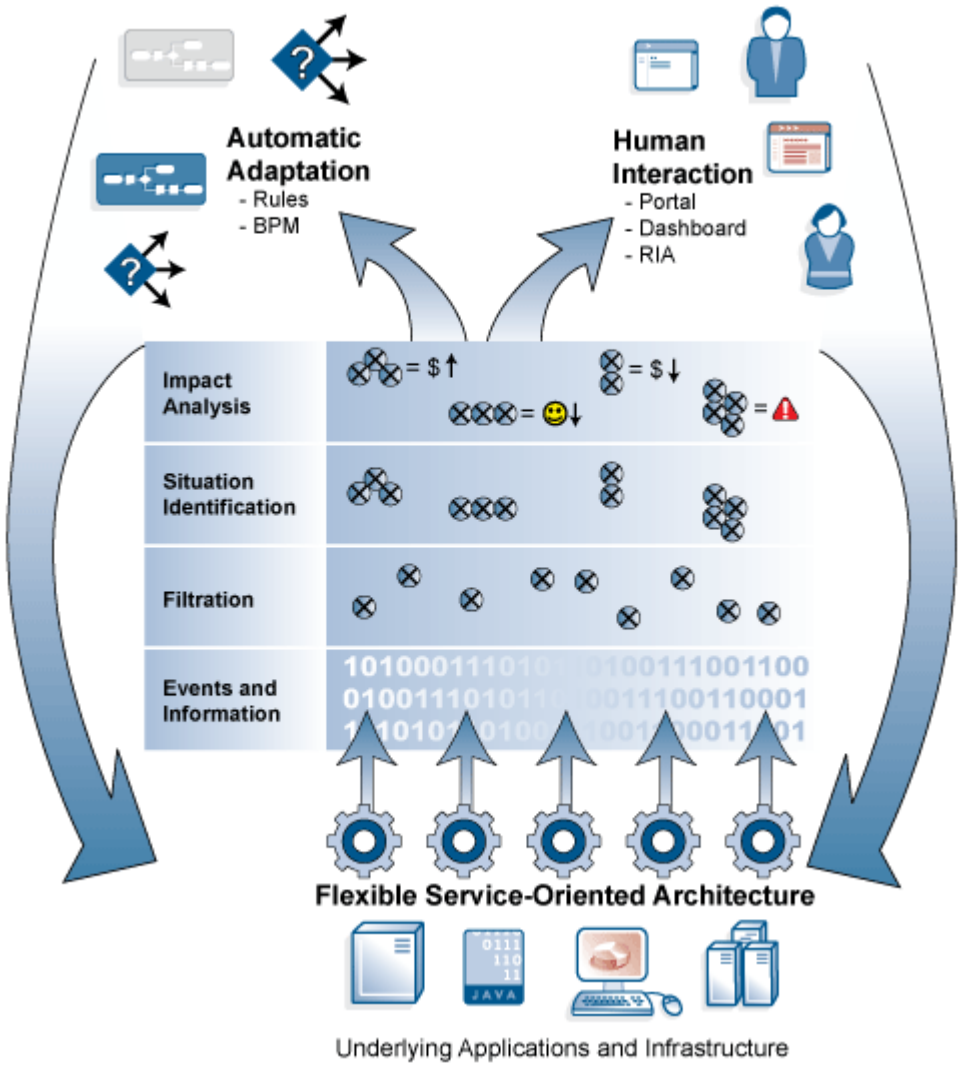
"Sense and Respond"

"Track and Trace"

Complex Event Processing
TIBCO CEP Reference Architecture example

Decision Processing

Event Processing

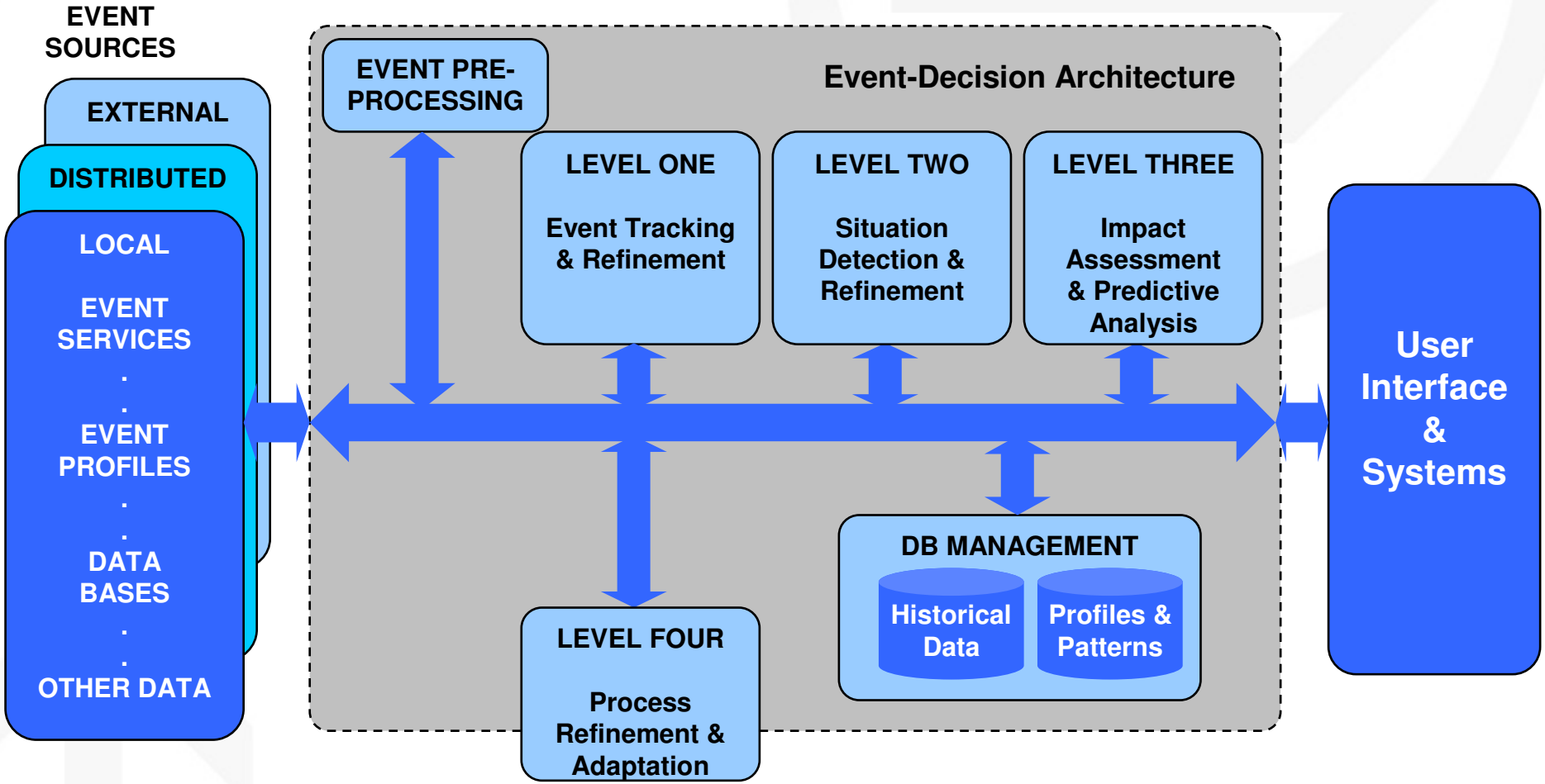


Strategic rules

Tactical rules

Operational rules

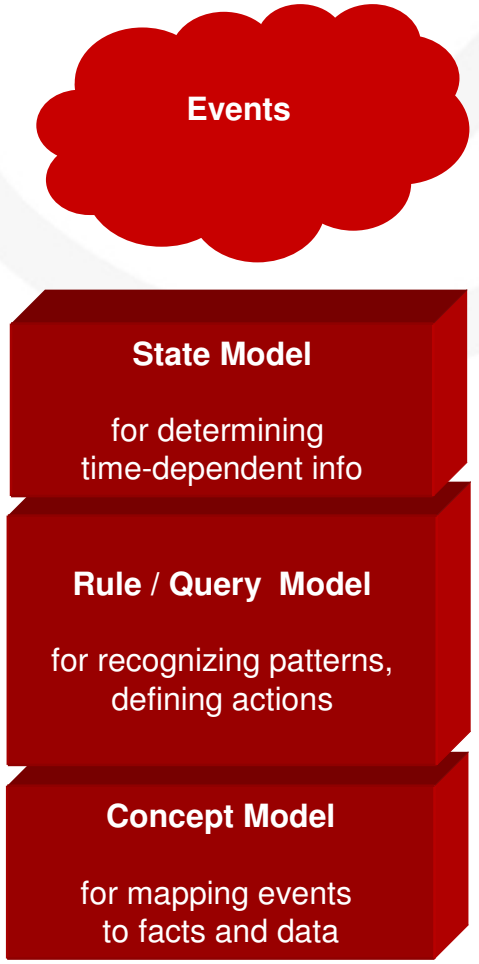
An Event-Decision Architecture



-- Adapted from JDL
Steinberg, A., & Bowman, C., Handbook of Multisensor Data Fusion, CRC Press, 2001

Requirements for CEP Technology

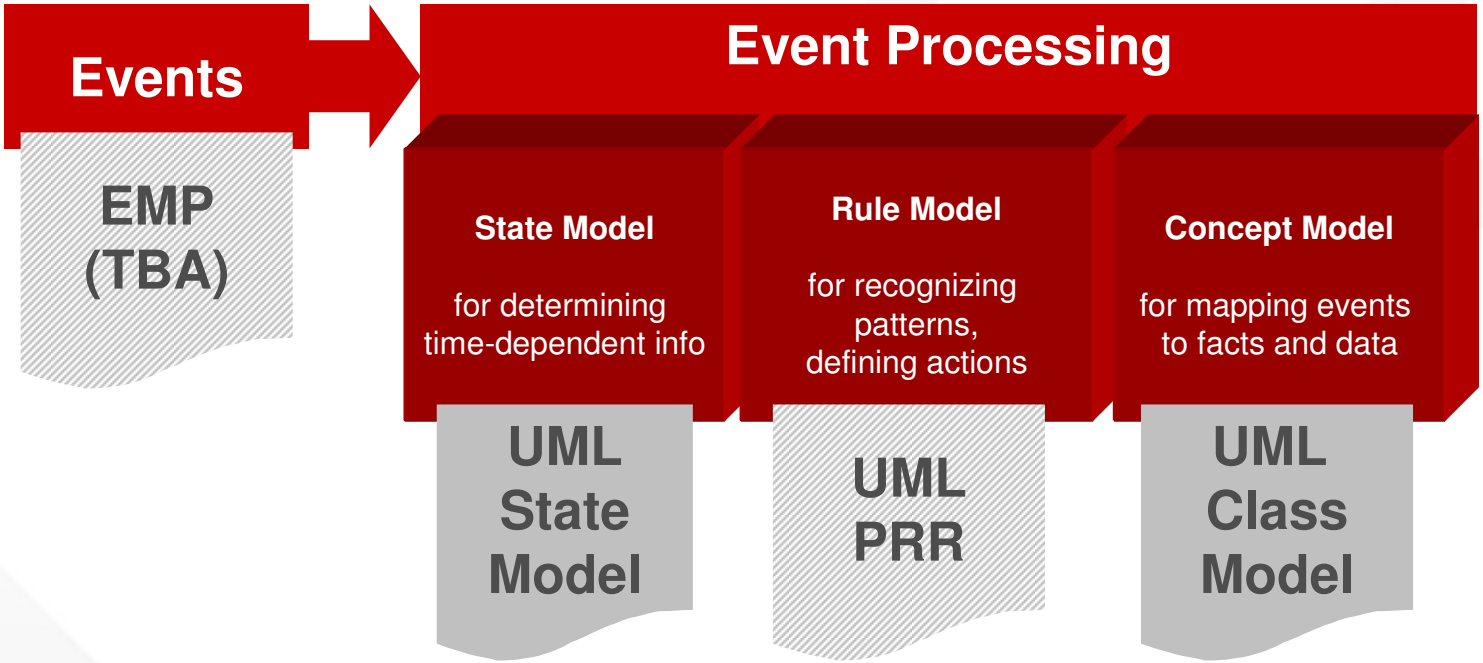
- **Access and Monitor the "Event Cloud"**
  - JMS, RV, SmartSockets, TCP/IP, etc…
  - Timers [Lack of Events]
  - Can determine event state changes
- **Apply Business Logic and Intelligence**
  - When {condition/query} => Then {action}
  - Optimized Condition Checking
  - Maintain State and Facts over time
  - Execute Rules based on addition, removal, modification of Facts



Example CEP Product Architecture (TIBCO's)

Standards and CEP

- CEP Technologies and Standards



Example CEP Solutions

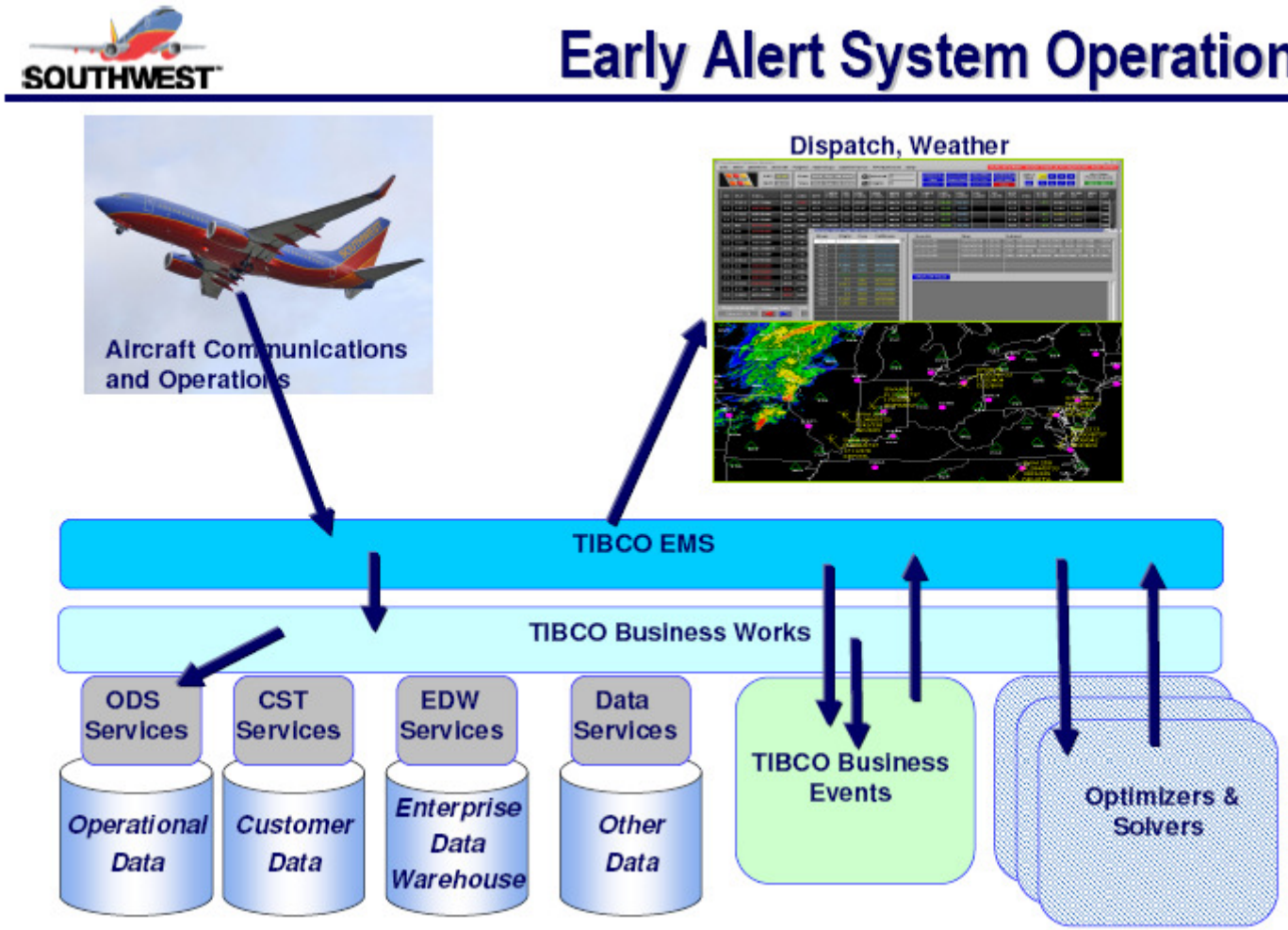
Industry	Applications
Transportation	Track & Trace
Telecommunications	Service monitoring
Business Hub (B2B)	Supply Chain monitoring
Financial Services	Algorithmic Trading
Manufacturing	Supply Chain monitoring
Banking	Personalized Customer management
Supply Chain - Logistics	Track & Trace
Energy	Power Grid monitoring
Government	Anti Money-Laundering

Example: Airline Operations

Target problems to solve ….

- Curfews
  - Some stations have end-of-the-day restrictions on landings and takeoffs that cannot be violated or will impose a heavy fine. Need to catch these problems sooner, in order to implement a less disruptive solution. Sometimes solving these earlier allows us to do a 'no-cost' irregular operation. This will improve Customer Experience, Crew Costs.
- Holdings
  - E.g. Flight 'A' is holding 15 mins for connecting Customers from flight 'B'. Subsequently, flight 'B' is now running 45 mins late. We do not want to hold flight 'A' anymore if we know that it will be an extra 45 mins late. We want to go ahead and send 'A' on time, and worry about the connecting passengers from 'B' separately.
- Dispatcher situational awareness
  - Alerts to Dispatchers if events in the ATC system would influence their flight plans, e.g. add fuel on board to allow for long holding patterns because if they can't get to alternate station because it is over capacity they may have to return to departure station; or they may need to hold departures. This warning should prevent and/or reduce the number of flight diversions.
- Total Business Optimization
  - End Goal

CEP Solution



CEP User Interfaces

SOUTHWEST

Operational Awareness Map

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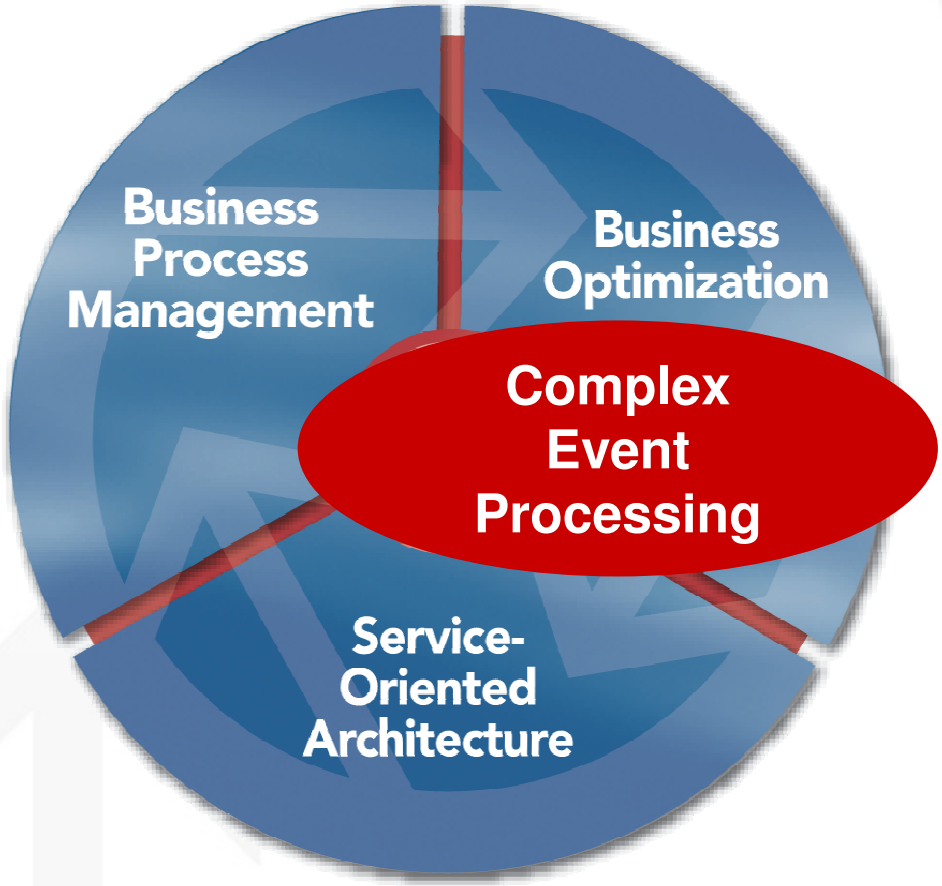
Summary



- Event-based real-time view of business is very important
- Complex Event Processing brings continuous real-time awareness from the "event cloud"

Thank You