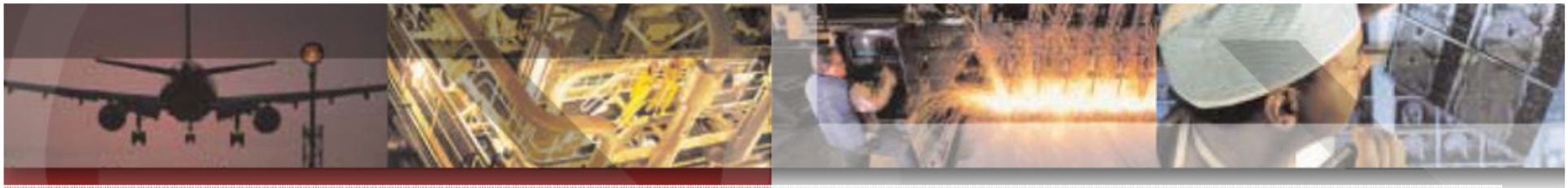
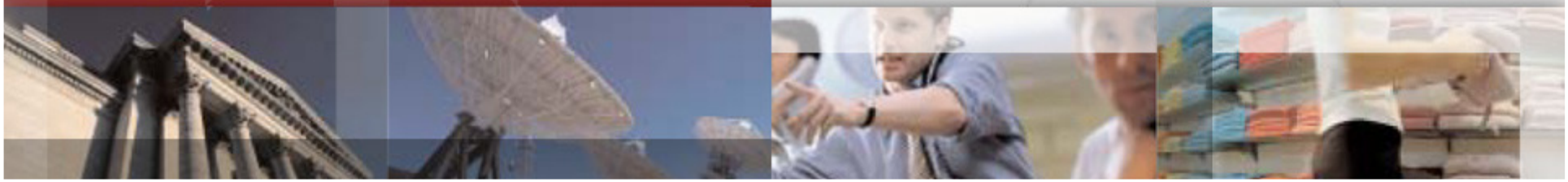


The Role of Rules in CEP and Rule Standards

TIBCO®
The Power of Now®

Paul Vincent,
CTO Business Rules and CEP, TIBCO Software

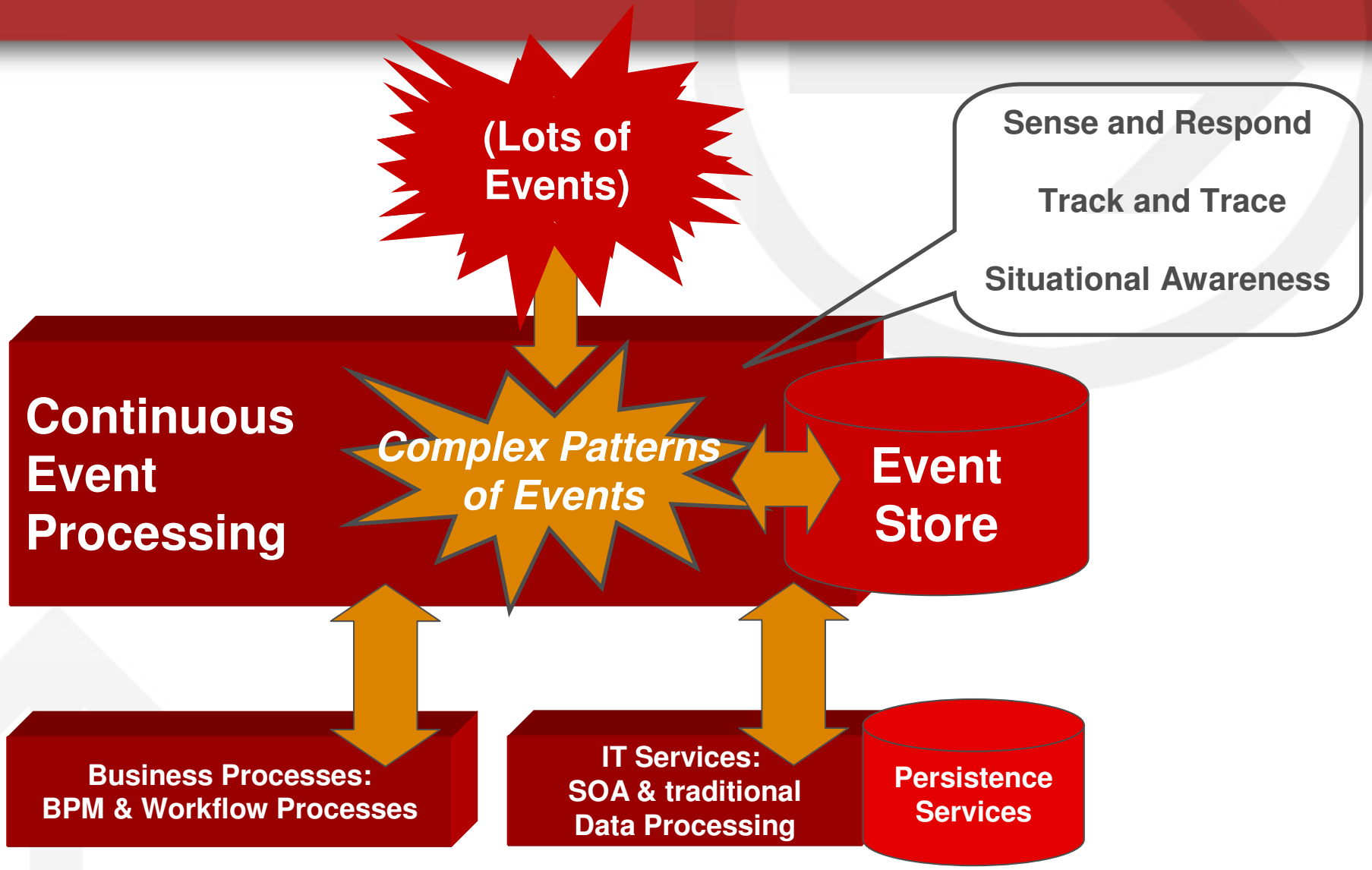


Presenter

- **Paul Vincent,** MSc, BSc, MBCS, CEng
  - Business Rules and Complex Event Processing specialist
  - Contributor to relevant standards (OMG PRR, W3C RIF) and industry consortia (EPTS)
  - Contributor to http://tibcoblogs.com/cep/
- **TIBCO Software**
  - Provides enterprise software that helps companies achieve service-oriented architecture (SOA) and business process management (BPM) success
  - Over 3,000 customers and offices in 40 countries
  - 3 main technology areas: SOA, BPM and Business Optimization
    - CEP: TIBCO BusinessEvents
    - CEP Customers: Telco, Finance, Manufacturing/RFID, Transport/Logistics
  - Contributor to / member of OMG, OASIS, W3C, etc

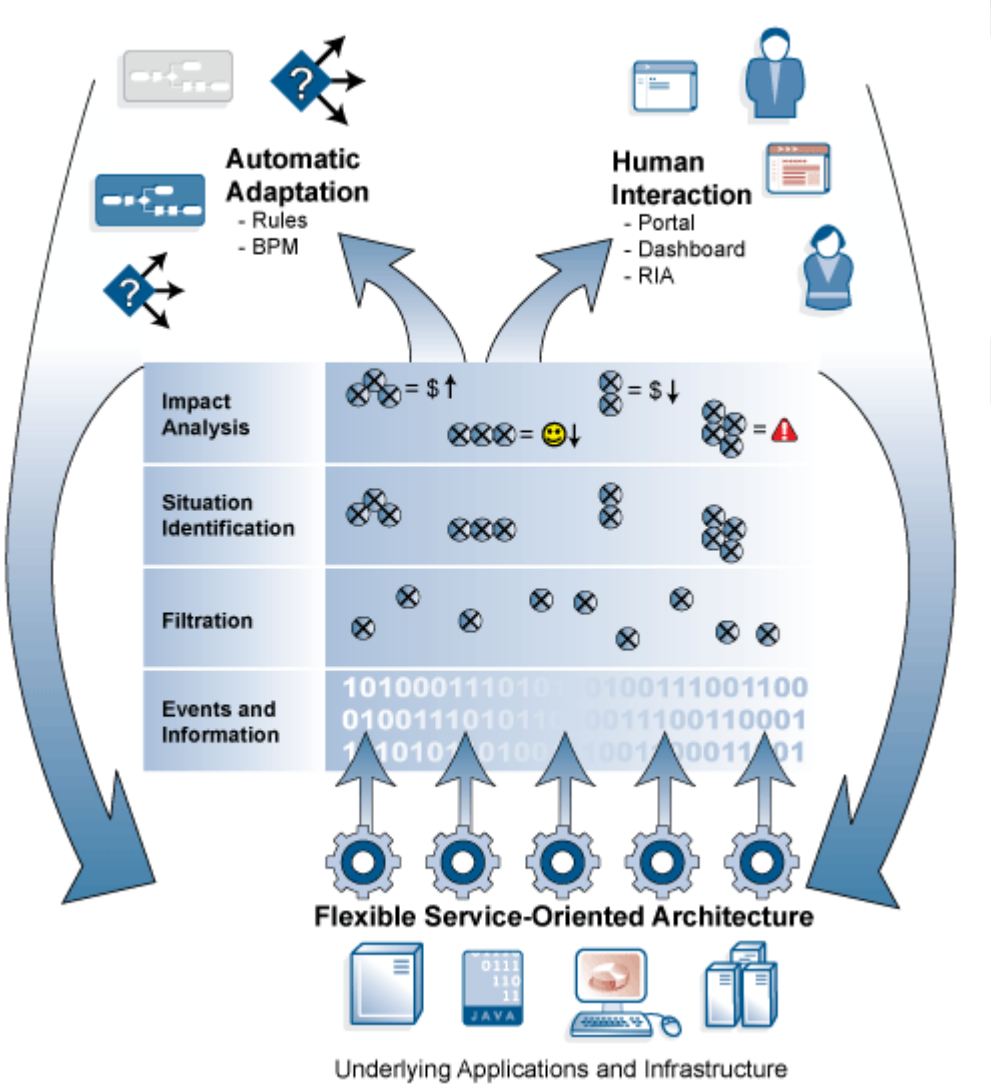
© 2008 TIBCO Software Inc.

Complex Event Processing

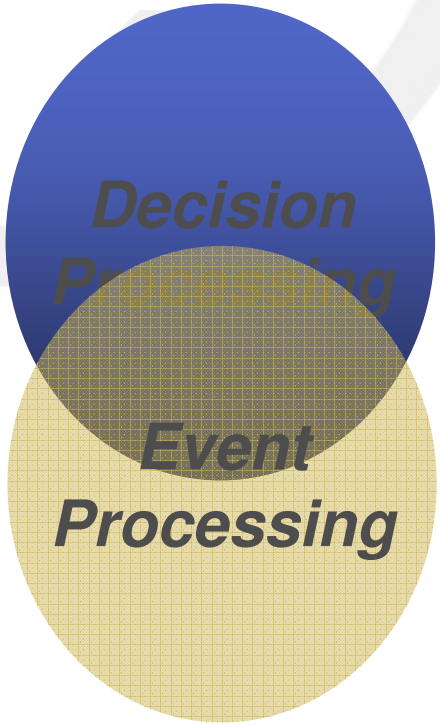


© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Complex Event Processing



Processing type:



© 2008 TIBCO Software Inc.
TIBCO
The Power of Now®

Complex Business Problems

- **Fraud / Theft**
  - Thousands-to-millions of high-value small-size product items or transactions
  - How do you identify known patterns of “suspicious” behavior?
- **Logistics / Scheduling**
  - Raw material, production & delivery scheduling and resources are complex and prone to change
  - How do we reallocate resources to handle business and production changes?
- **Activity Monitoring**
  - Complex production and supply process with multiple actors
  - How to measure and action Key Performance Indicators?

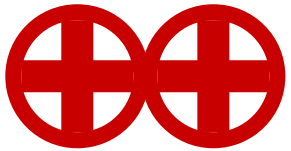
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Associated Events

- **Positive Events**
  - Product item X arrives at Production station S from Store T
  - Production worker Y arrives at Production station S
  - Production contract for item Z by time T is posted

- **Negative Events**
  - Product item X has been in transit to Store T for >15 minutes
  - Subcomponent Y hasn't arrived at the Production station by the ETA
  - Delivery of contract Z has not taken place

- **Sets of Events**
  - 5+ items of Product item type Y failed to arrive at destination
  - Supplier Y was 5 mins late for 1 delivery, but made it early to the next
  - Return rate on component Z exceeds SLA %



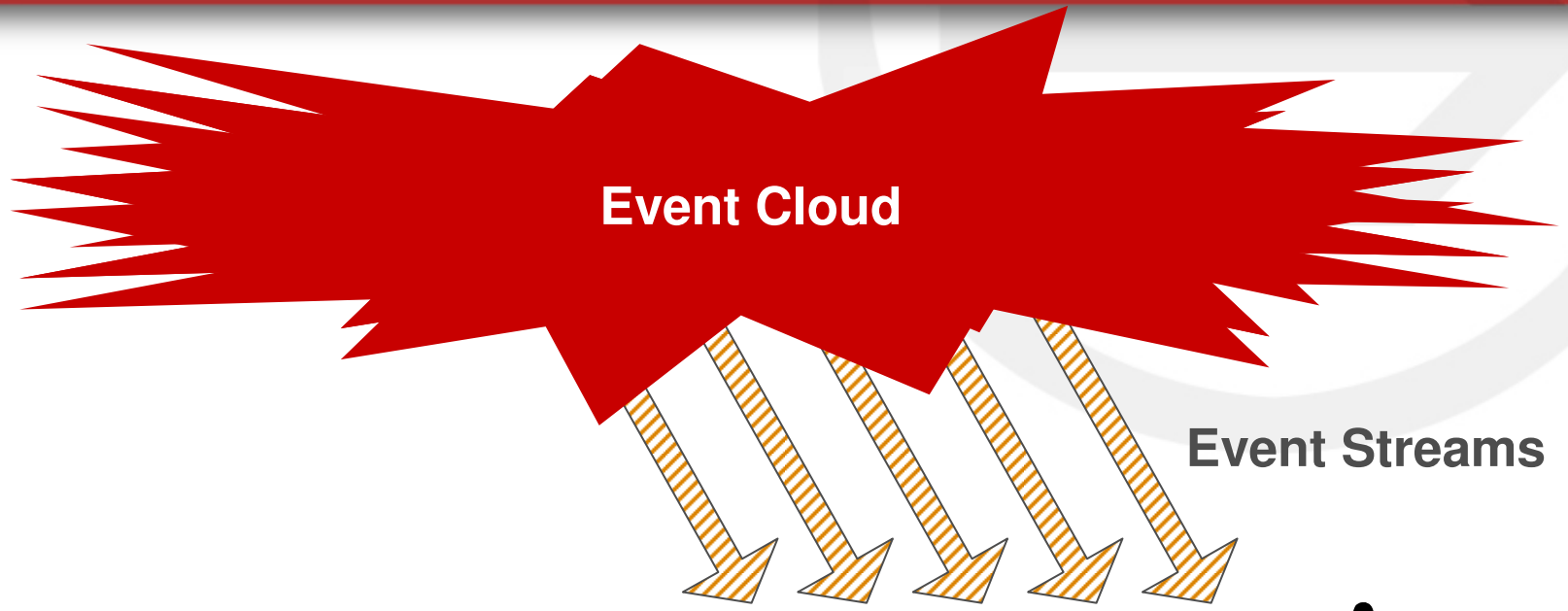
© 2008 TIBCO Software Inc.

Significant features of these Events

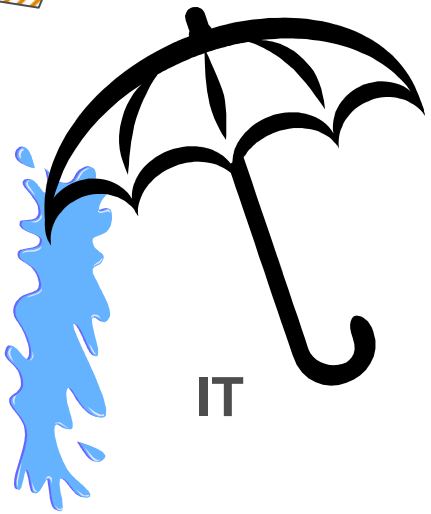
- **Time Sensitivity**
  - A thief may leave the building at the same time as stolen product
  - A product should take 40 minutes to travel a given production line segment
- **Distributed Event Sources**
  - A series of produced items fails at various QA stages, and their common attribute was a storage location
  - Multiple suppliers for a subcomponent are reporting delivery delays

© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

CEP Technologies are diverse



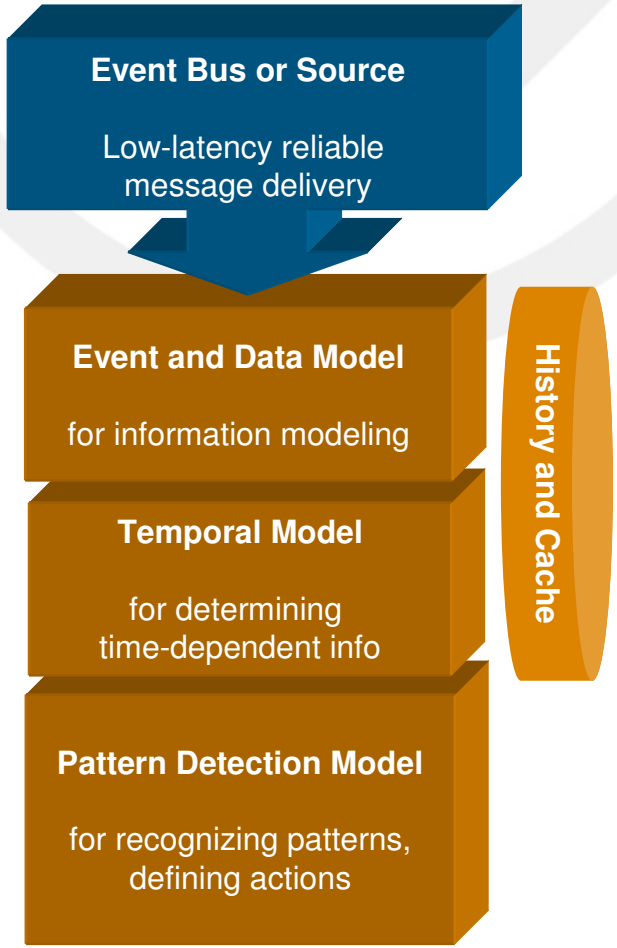
- CEP applies pattern detection (including filtration) to the event cloud / streams / history thereof
- Multiple modelling + execution paradigms available for pattern detection
- No single standard likely to suffice



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

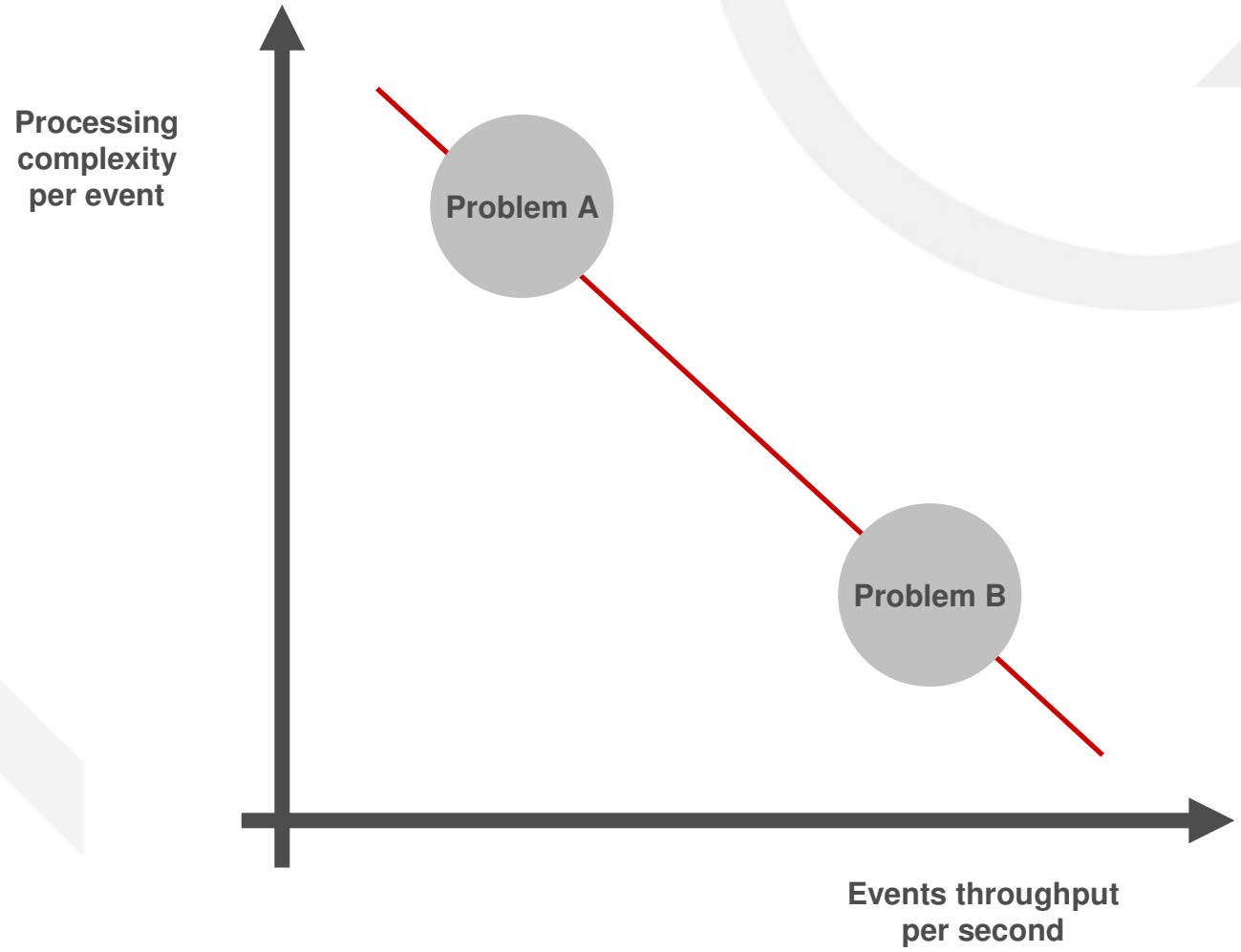
"Requirements for CEP Technology"

- **Access and Monitor the "Event Cloud"**
  - JMS, RV, MQ, TCP/IP, etc…
  - Timers to detect lack of events
  - Determine event state changes
- **Match Patterns, Apply Business Logic**
  - Detect events
  - Detect event patterns
  - Maintain State and Facts over time
  - Update Detection algorithms as events change



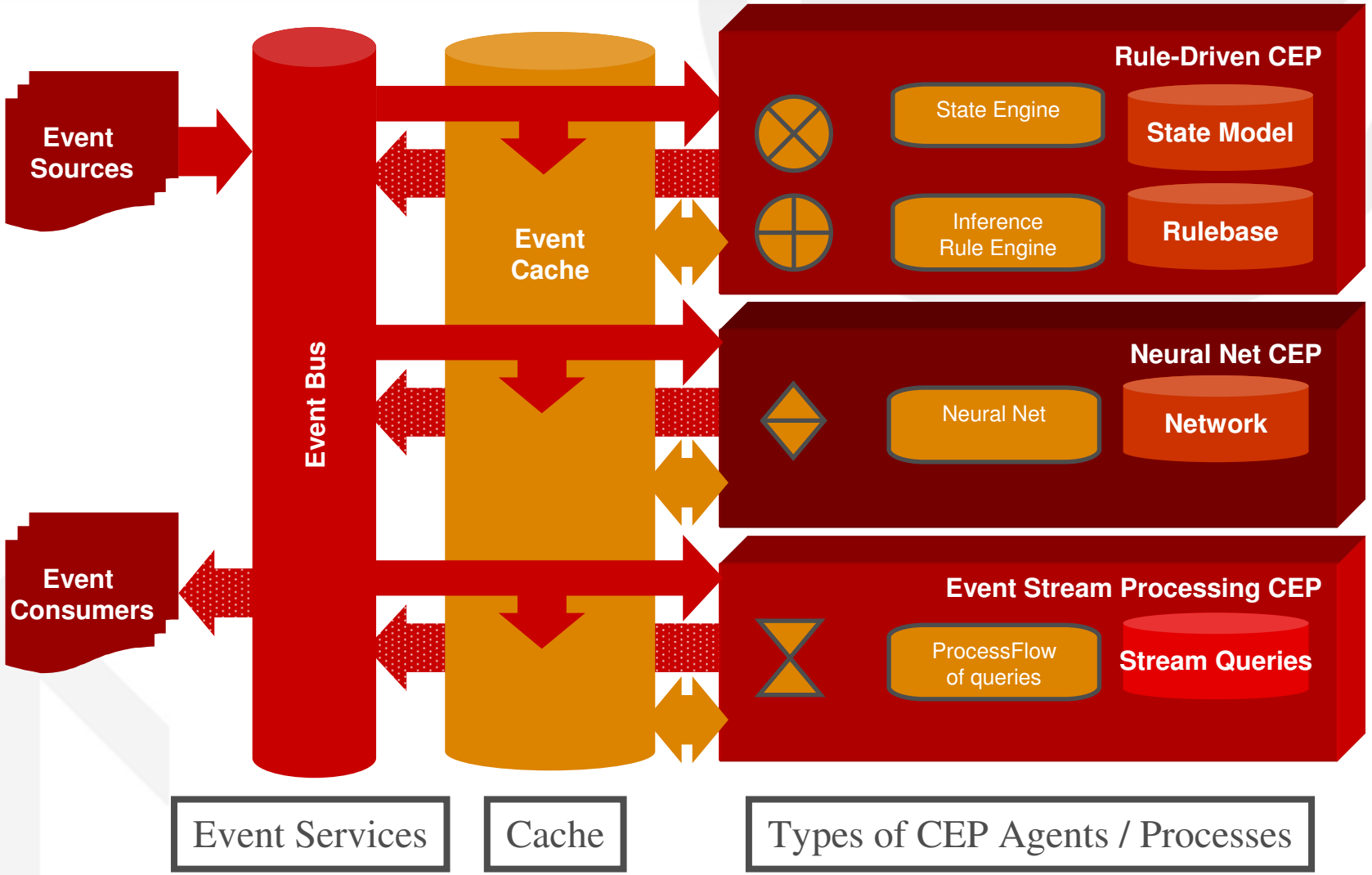
© 2008 TIBCO Software Inc.

CEP Problem Characteristics



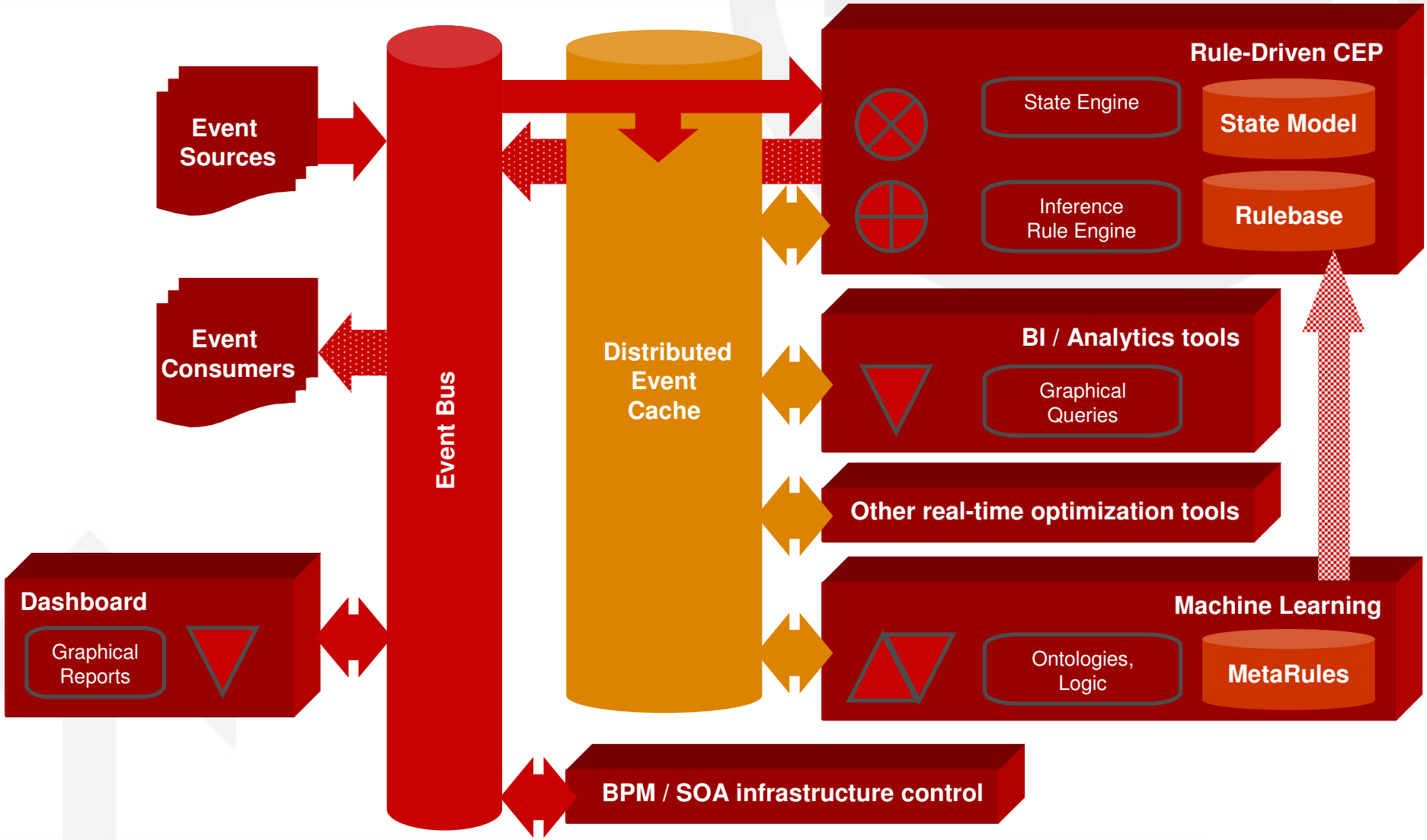
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Different CEP Implementations



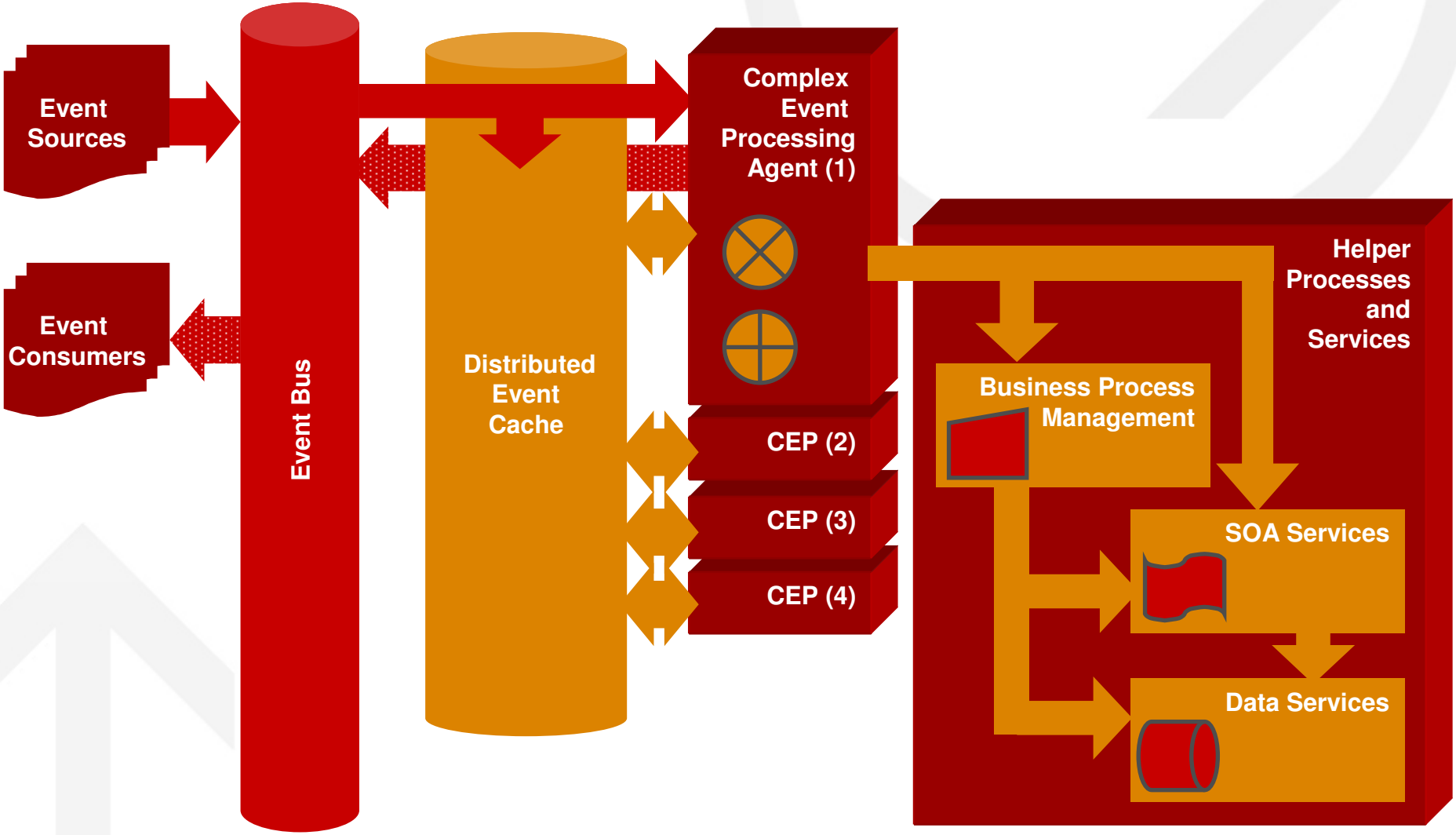
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Advanced CEP Architectures



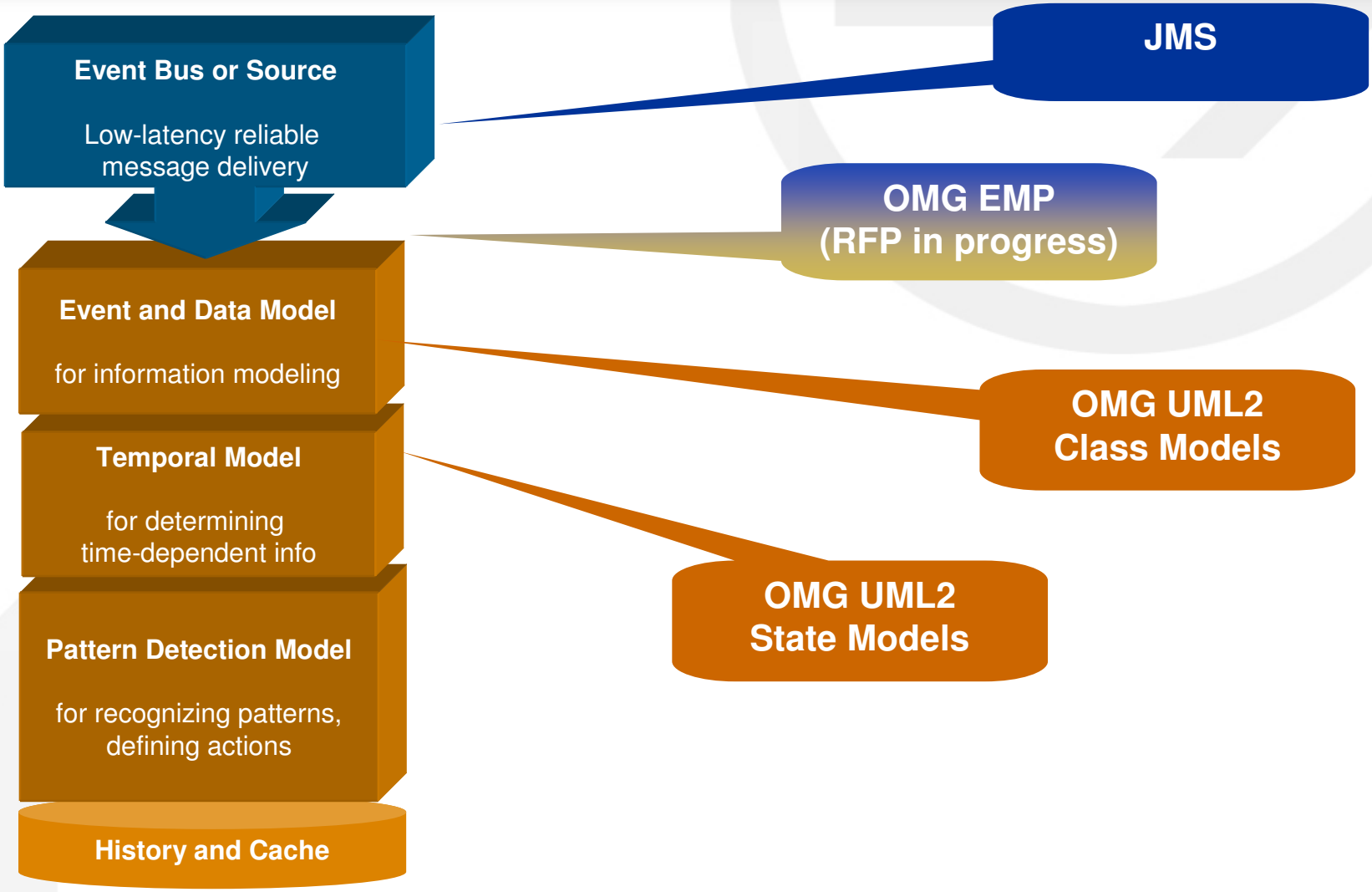
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

CEP and Other Architectures



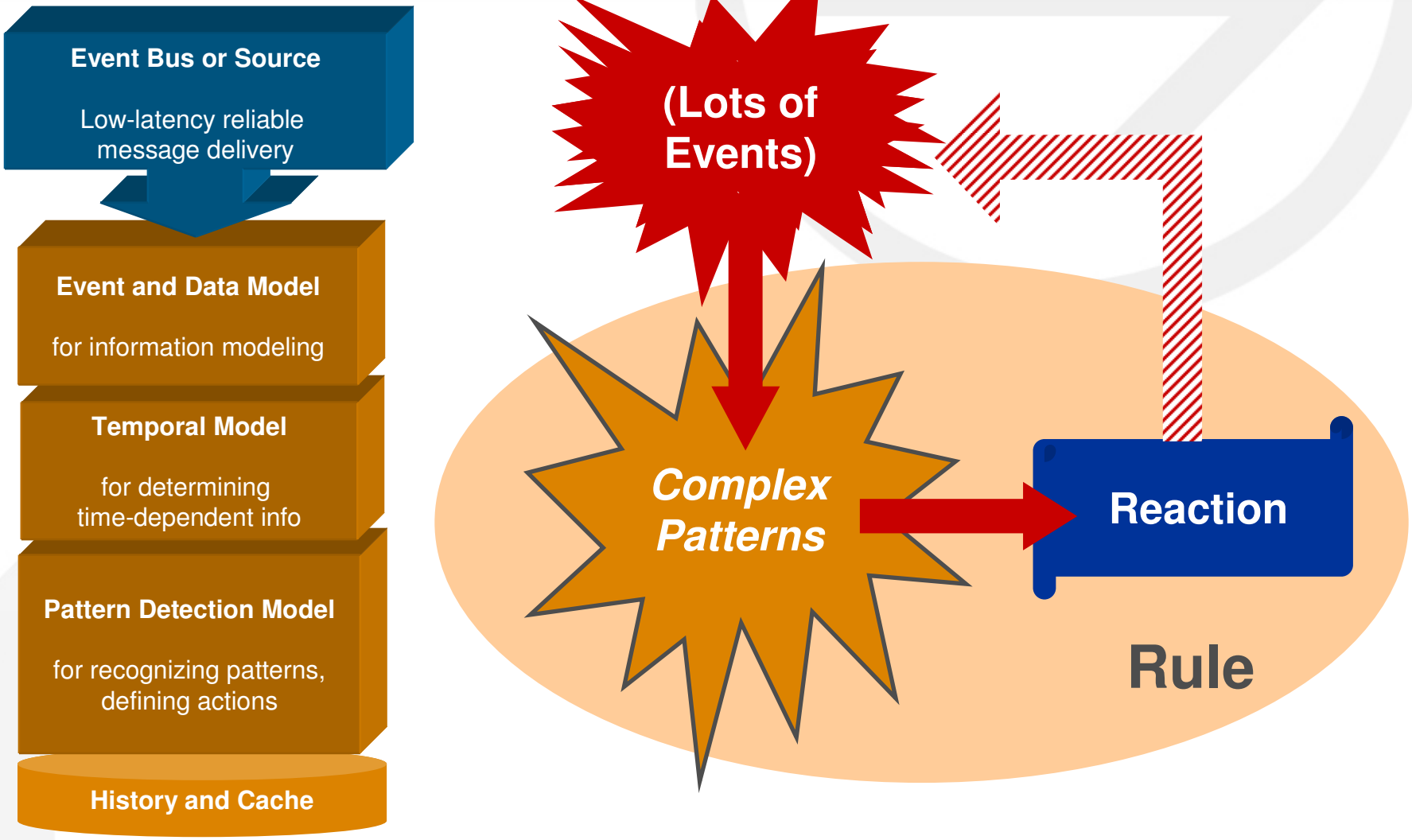
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Example Related Standards



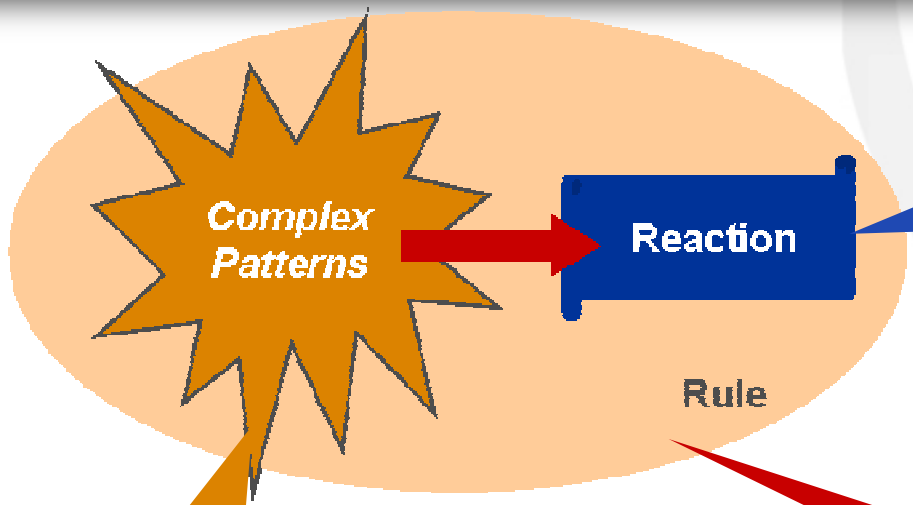
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Rule-oriented view of CEP Patterns



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Rule Representation options



Common representations:

Script languages

Java-based languages

…

Common representations:

Continuous Query Languages

Production Rule Conditions

…

Common execution semantics:

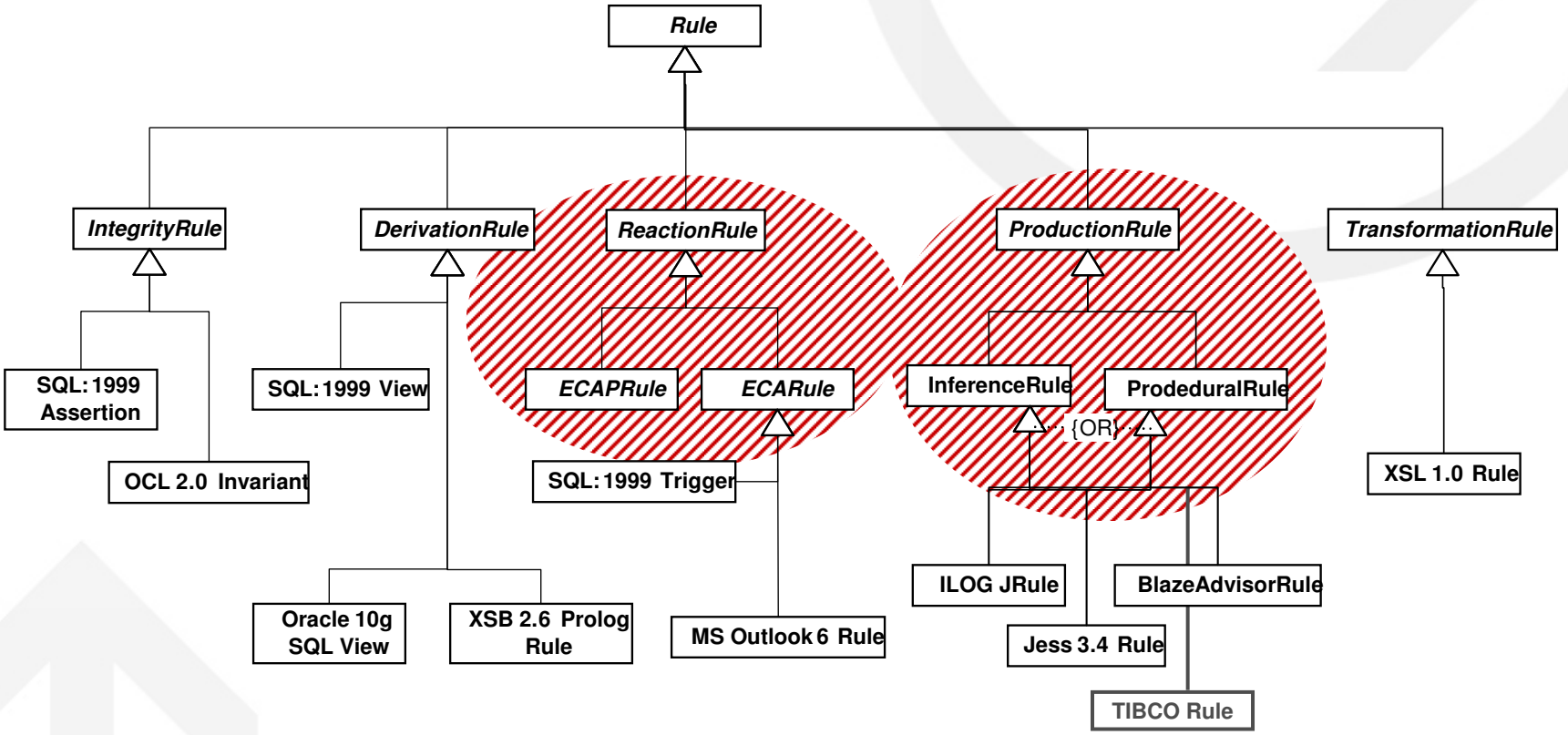
Orchestration/ordering of queries

Rete-based inferencing

…

© 2008 TIBCO Software Inc.

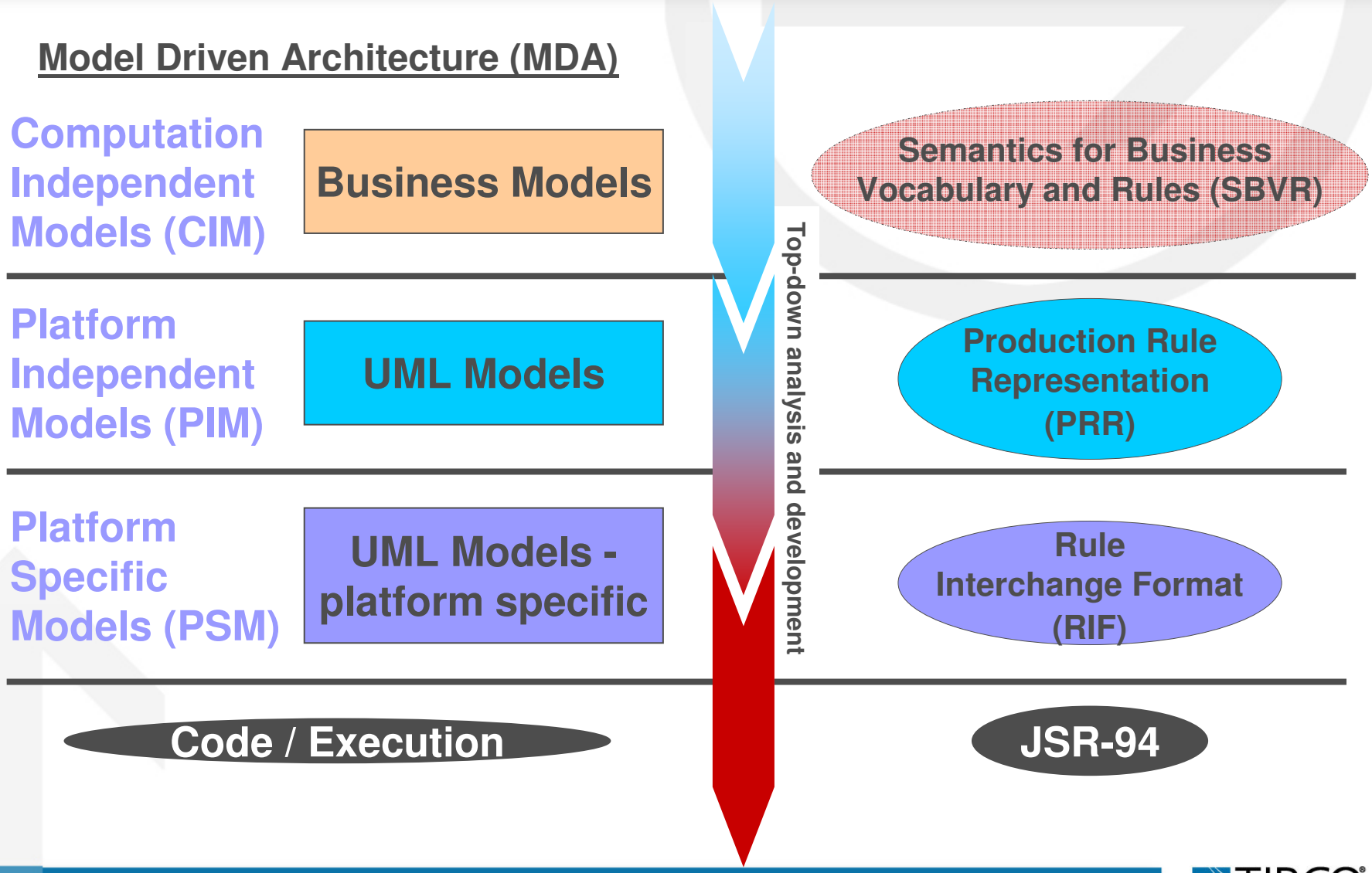
Rule types for CEP



Rule classification
per Gerd Wagner, RuleML

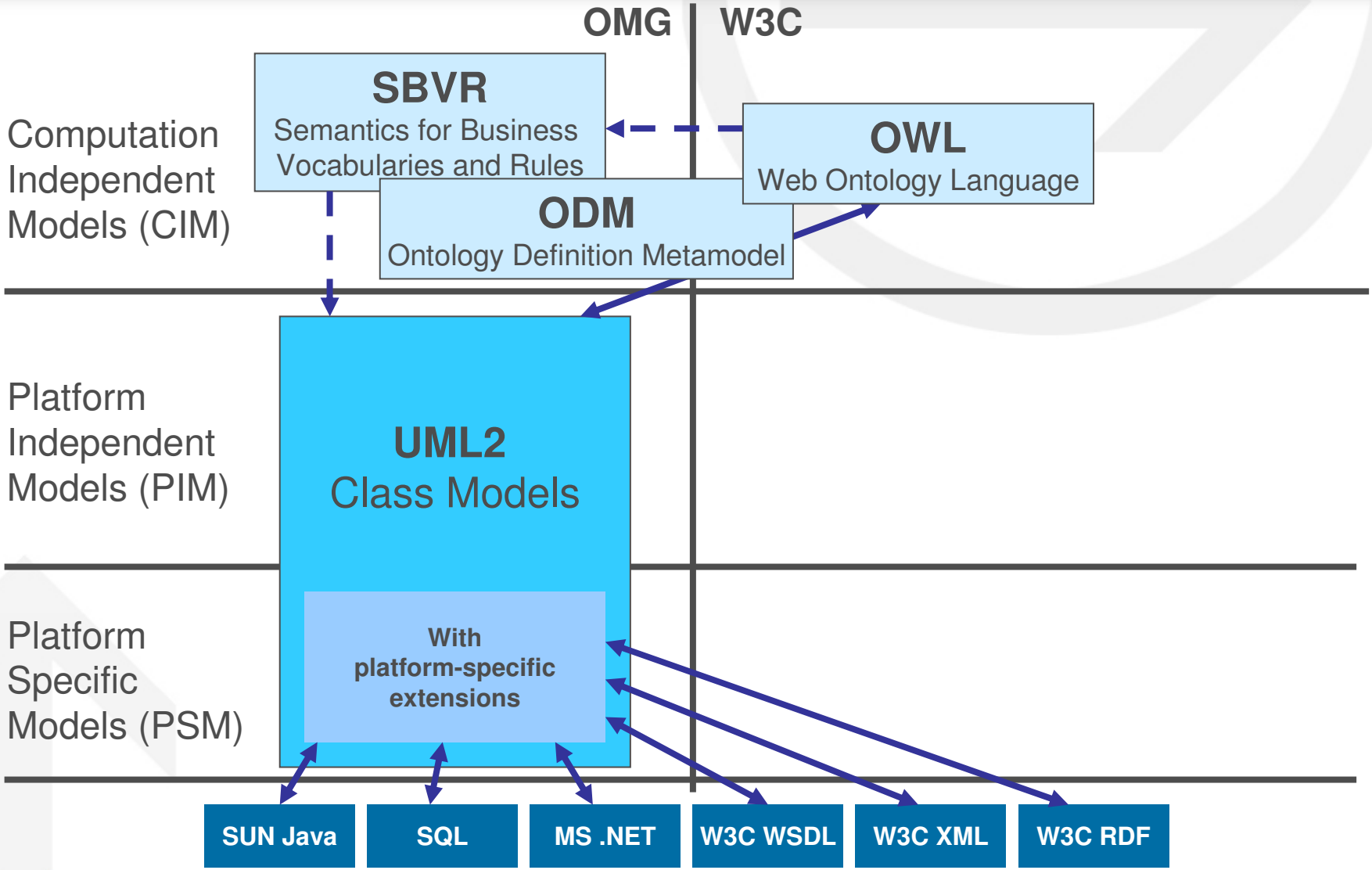
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Current Standards for Rules (per OMG MDA)



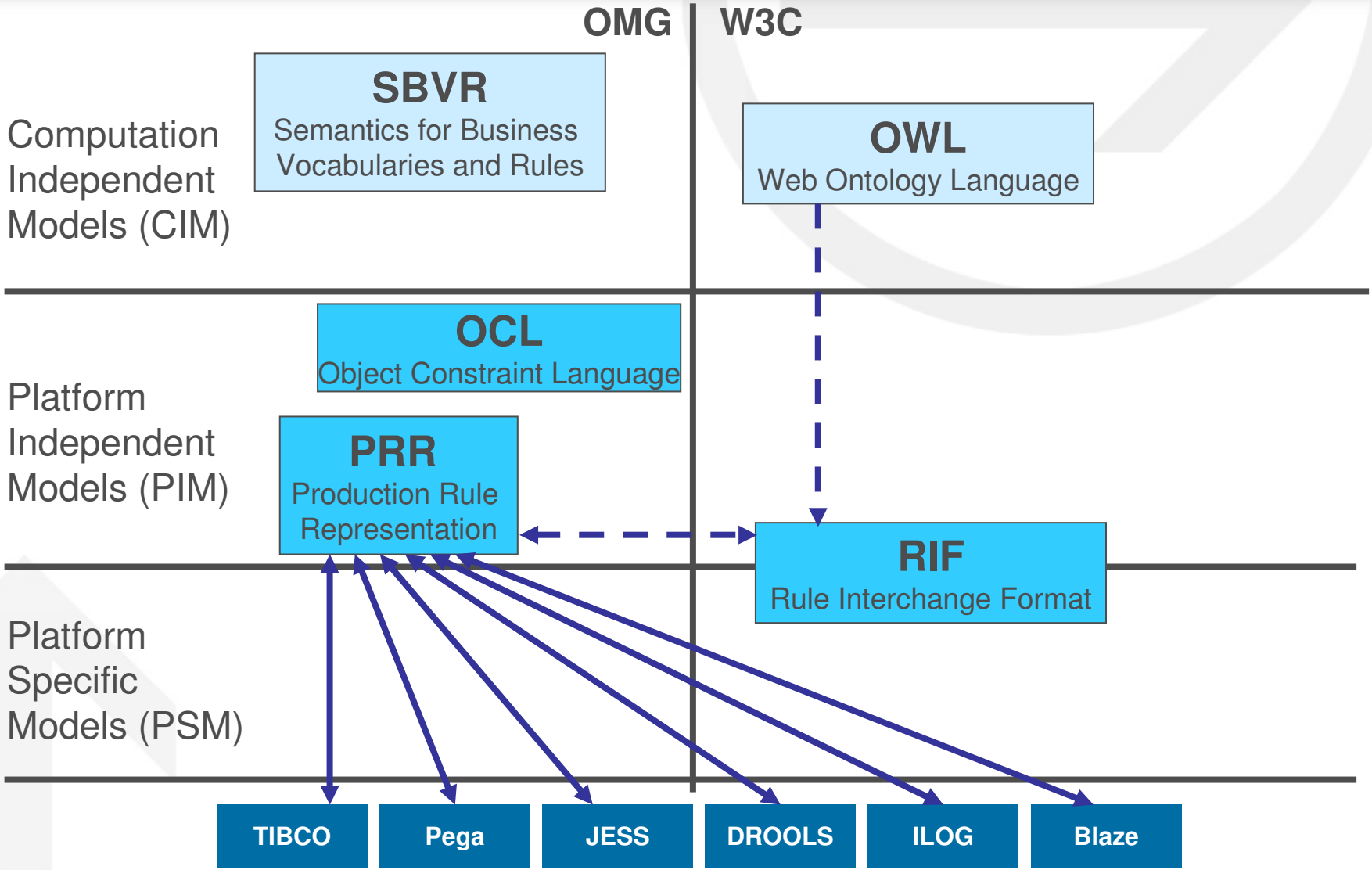
© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

OMG MDA and Class/Object/Data Models



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

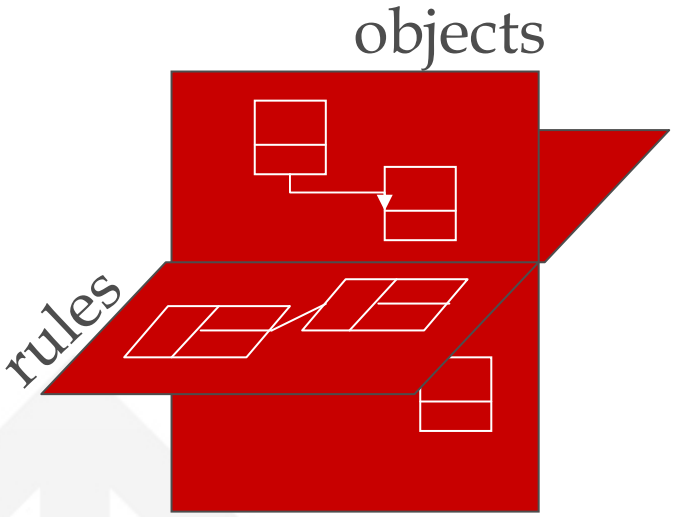
OMG MDA and Rule Models



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

MDA PIM: OMG PRR

Production Rule Representation (PRR)



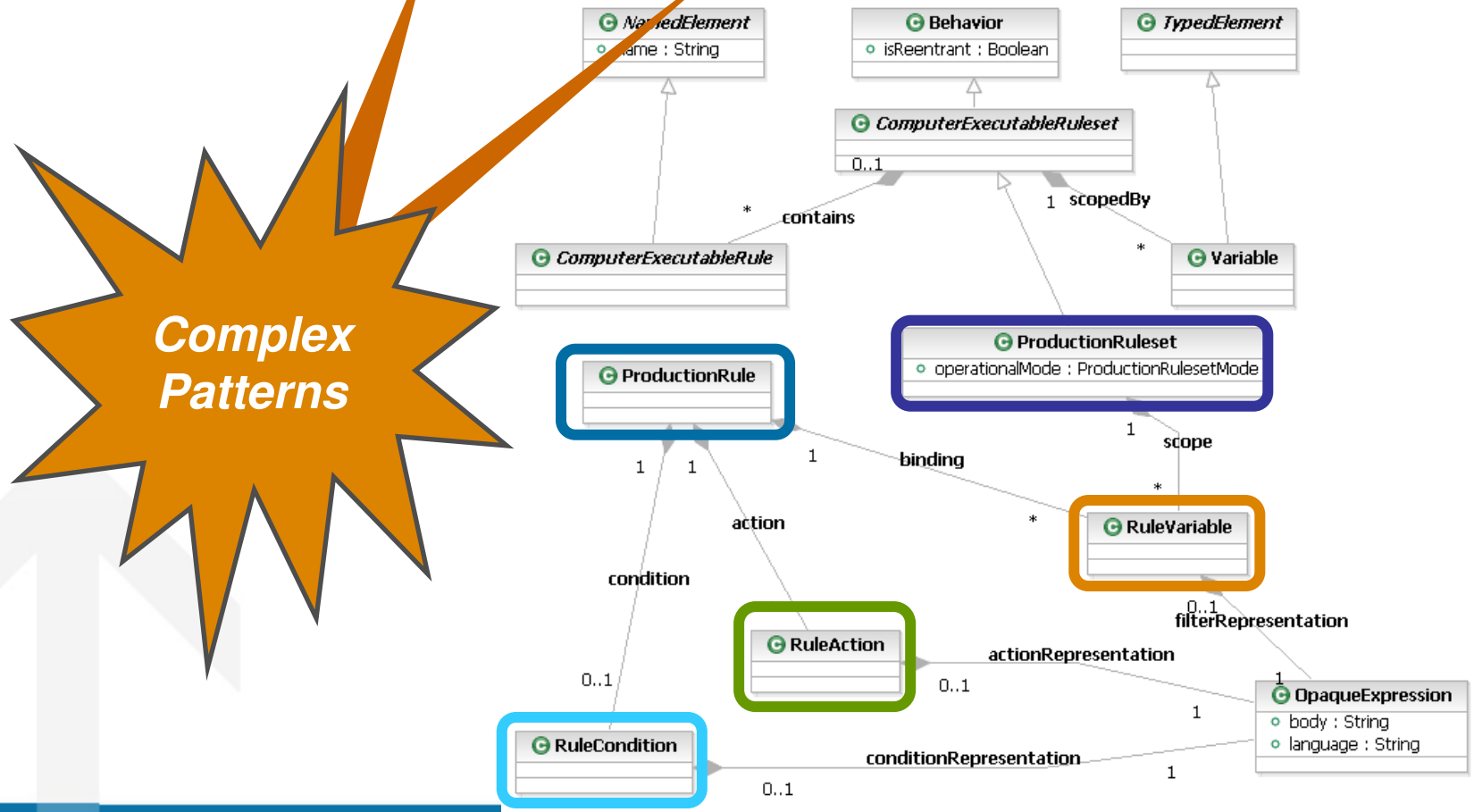
- **Formal UML model for production rules**
  - Defined in UML
  - Extends UML so production rules are **1st class citizens** alongside objects
- **Vendor-neutral UML-friendly rule representation**
  - Rules specified via tools, not manually!
- **2 rule "semantics" (types):**
  1. Forward chaining inference rules (e.g. Rete-model)
  2. Sequentially processed procedural rules (e.g. scripts)
- **Import/export for rule modeling**
  - XMI between UML tools and BREs

ILOG Changing the rules of business™ TIBCO The Power of Now® IBM FairIsaac RuleML Realize your Knowledge sandpiper software

© 2008 TIBCO Software Inc.

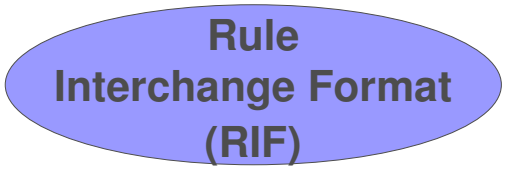
PRR metamodel

- Ruleset = collection of Rule
- Rule is (for RuleVariables) if <Condition> then <Actions>



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

MDA PSM: W3C Rule Interchange Format

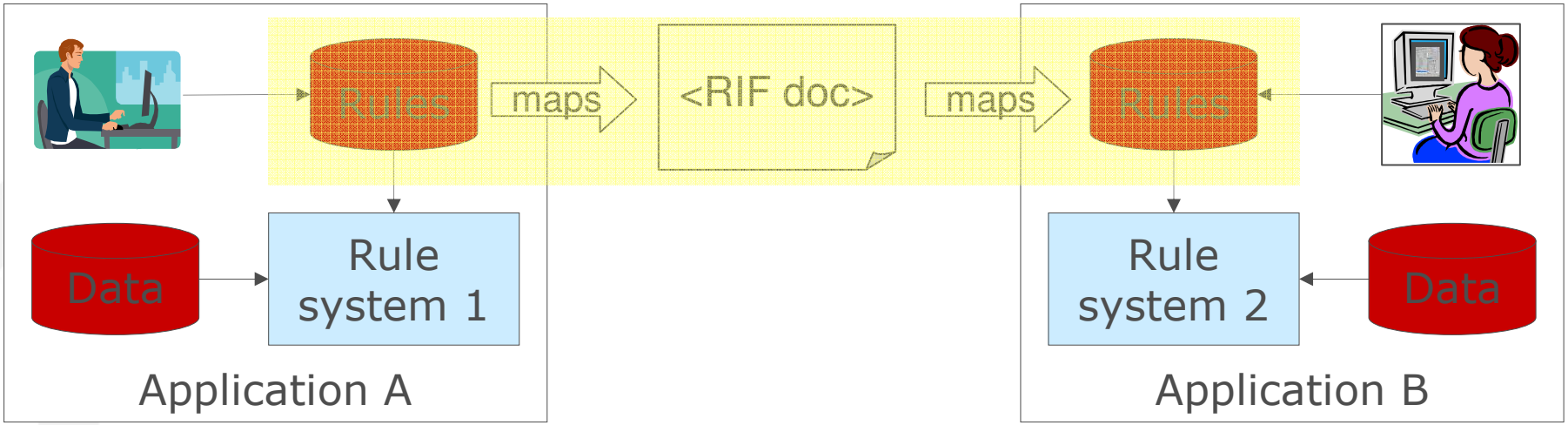


- **Rule Interchange Format proposed as a cross-vendor and cross-rule-type rule interchange representation**
- **Consortium of developers and researchers from the**
  - rule vendor community (TIBCO, Fair Isaac, Ilog, Oracle, etc)
  - research community (RuleML.org, DERI, REWERSE, IBM R&D, etc)
  - end-user community (MISMO, Betfair, MITRE, etc)
  - CEP members include TIBCO, Prova

© 2008 TIBCO Software Inc.

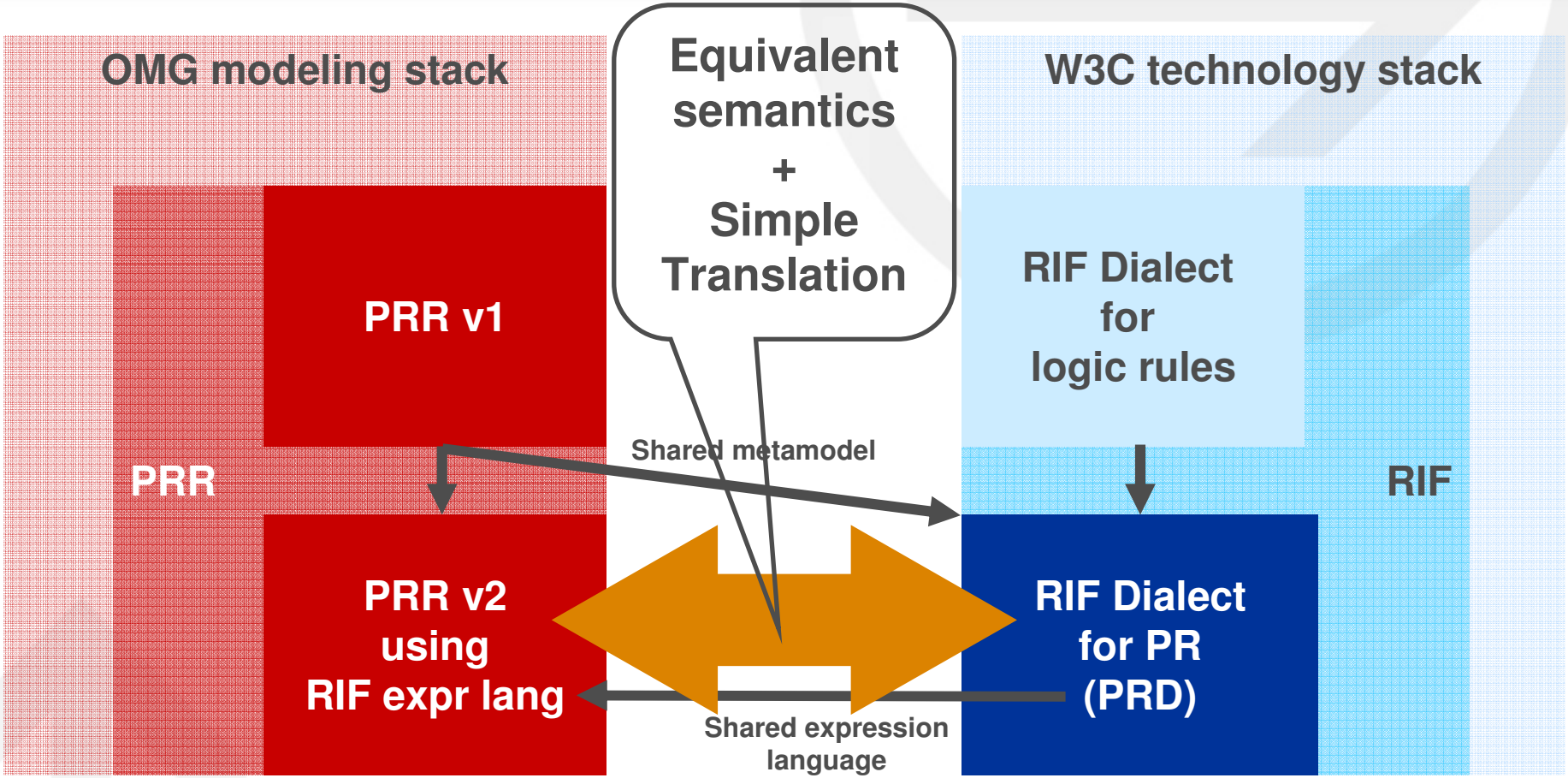
RIF = Superset rule language

- **A format (but actually a language itself)**
  - Allows rules written for one application to be published, shared, and re-used in other applications and other rule engines.
  - Part of W3C's larger mission of enabling the sharing of information in forms suited to machine processing
  - Includes semantic web rule languages as well as commercial tools



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Equivalences in PRR and RIF

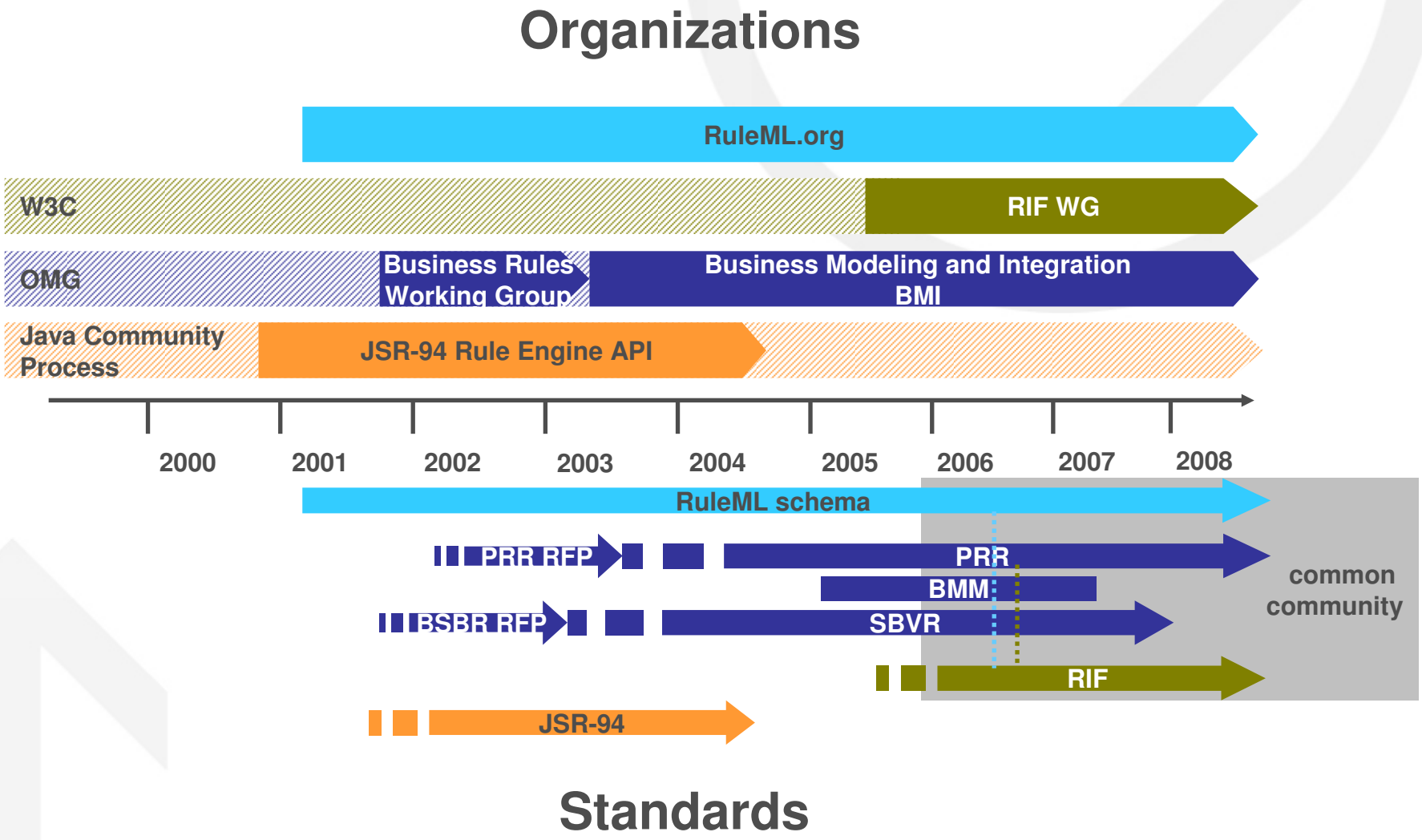


Modeling: design time

Interchange: run time

© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Timeline for Rule Stds



© 2008 TIBCO Software Inc.
TIBCO The Power of Now®

Summary

- **Rules are a relevant pattern for CEP modeling + implementation**
- **Rule standards now in development by a large, active community**
  - CEP members include: TIBCO, Prova
  - Vendors involved who have other groups doing CEP: Oracle, IBM
  - Standardization process improves communication among vendors, academics ➔ better understanding of rules and rule uses
- **PRR and RIF PRD kept in sync by common membership**
- **Timescale: PRR1.0 finalization, PRD Draft in 2008**

© 2008 TIBCO Software Inc.

The End

Q&A

© 2008 TIBCO Software Inc.

References & Q&A

- **OMG = http://www.omg.org**
  - OMG BMI = http://bmi.omg.org/
    includes the Business Rules Working Group (PRR and SBVR standards)
    as well as BPMI (BPMN standard)
  - OMG PRR details [OMG only] =
    http://www.omg.org/techprocess/meetings/schedule/Prod._Rule_Representation_RFP.html
- **W3C = http://www.w3.org**
  - W3C RIF = http://www.w3.org/2005/rules/wg
- **Java JSR-94 = http://www.jcp.org/en/jsr/detail?id=94**
- **Academic Community**
  - RuleML = http://www.ruleml.org/
  - Related EU projects: http://rewerse.net/

© 2008 TIBCO Software Inc.