

UUCON[®] 2010

Track and Trace for Automatic Adaptation

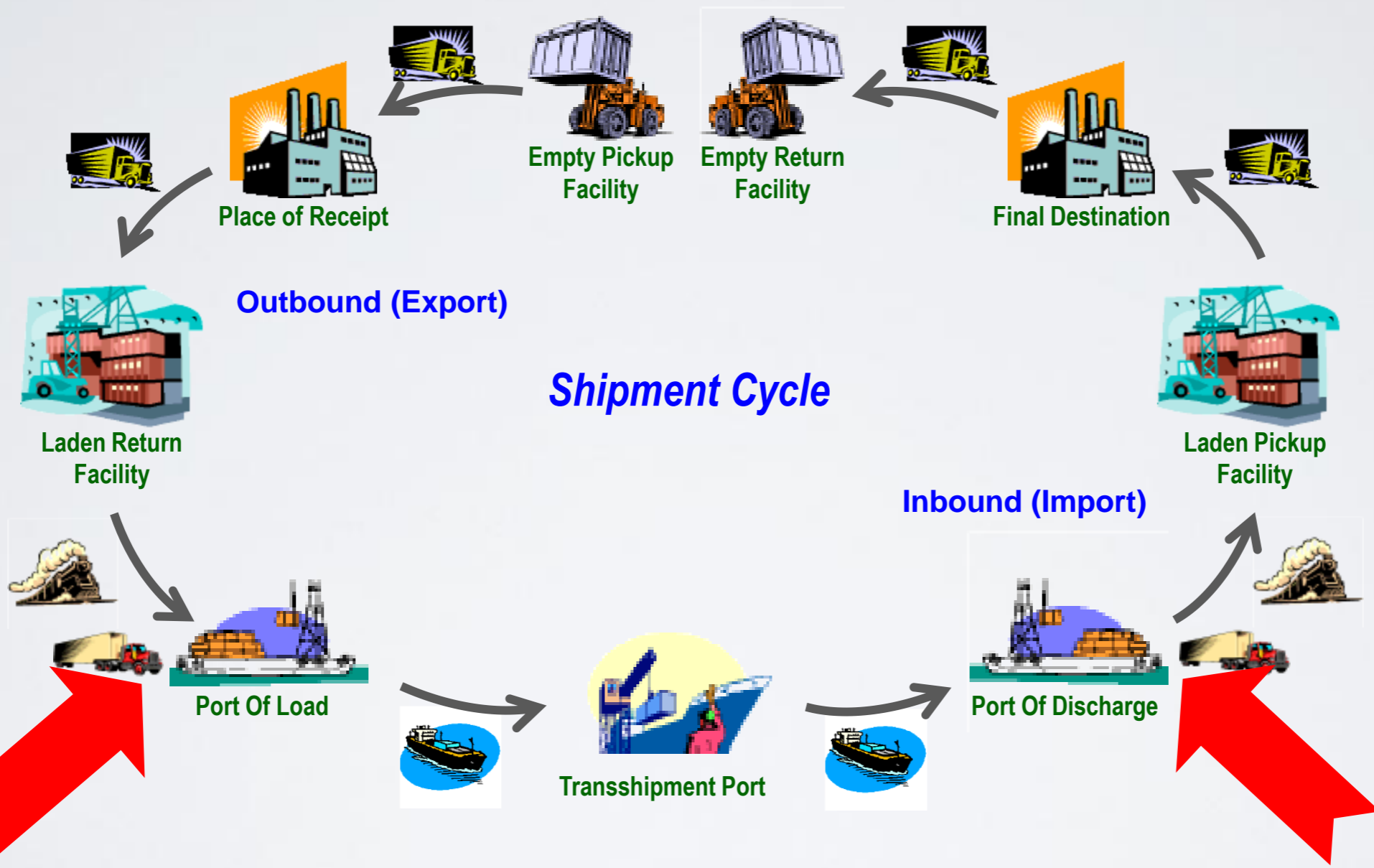
Matt Rosen

Director of Application Development, Orient Overseas Container Line (OOCL)



- Orient Overseas Container Line
 - Founded in 1947
 - Part of Grand Alliance operating 150 ships
 - Fleet of 500,000 containers
 - 230 offices in 58 countries worldwide
 - \$6.5 billion in revenue in 2008
(\$4.6 billion in 2009!)
 - Considered a leader in IT among ocean container carriers
 - TIBCO customer since 2006

Shipment Cycle



Shipment Cycle

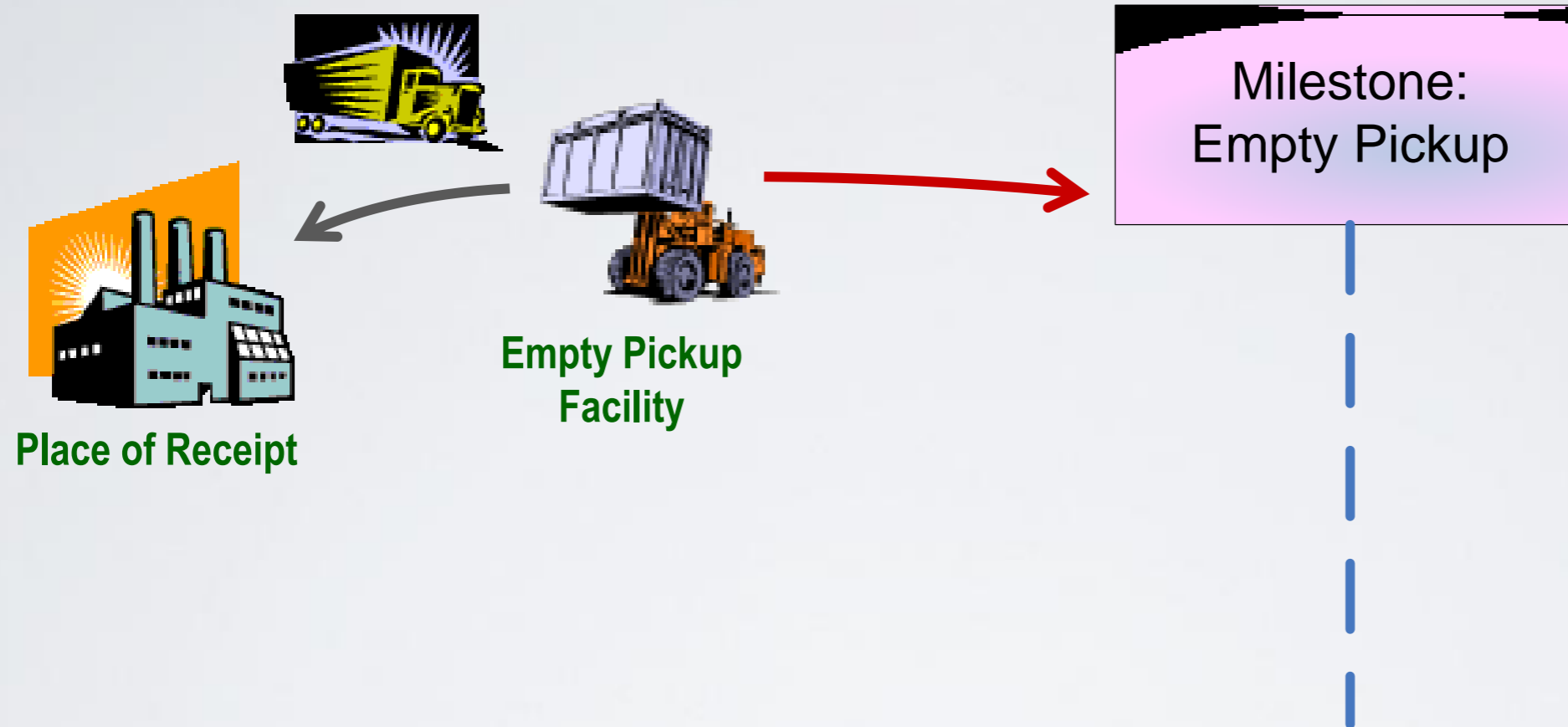
Cutoff for 1st Port of Load

Availability for Last Port of Discharge



Proprietary Orient Overseas Container Line Limited

Shipment Milestone - Example

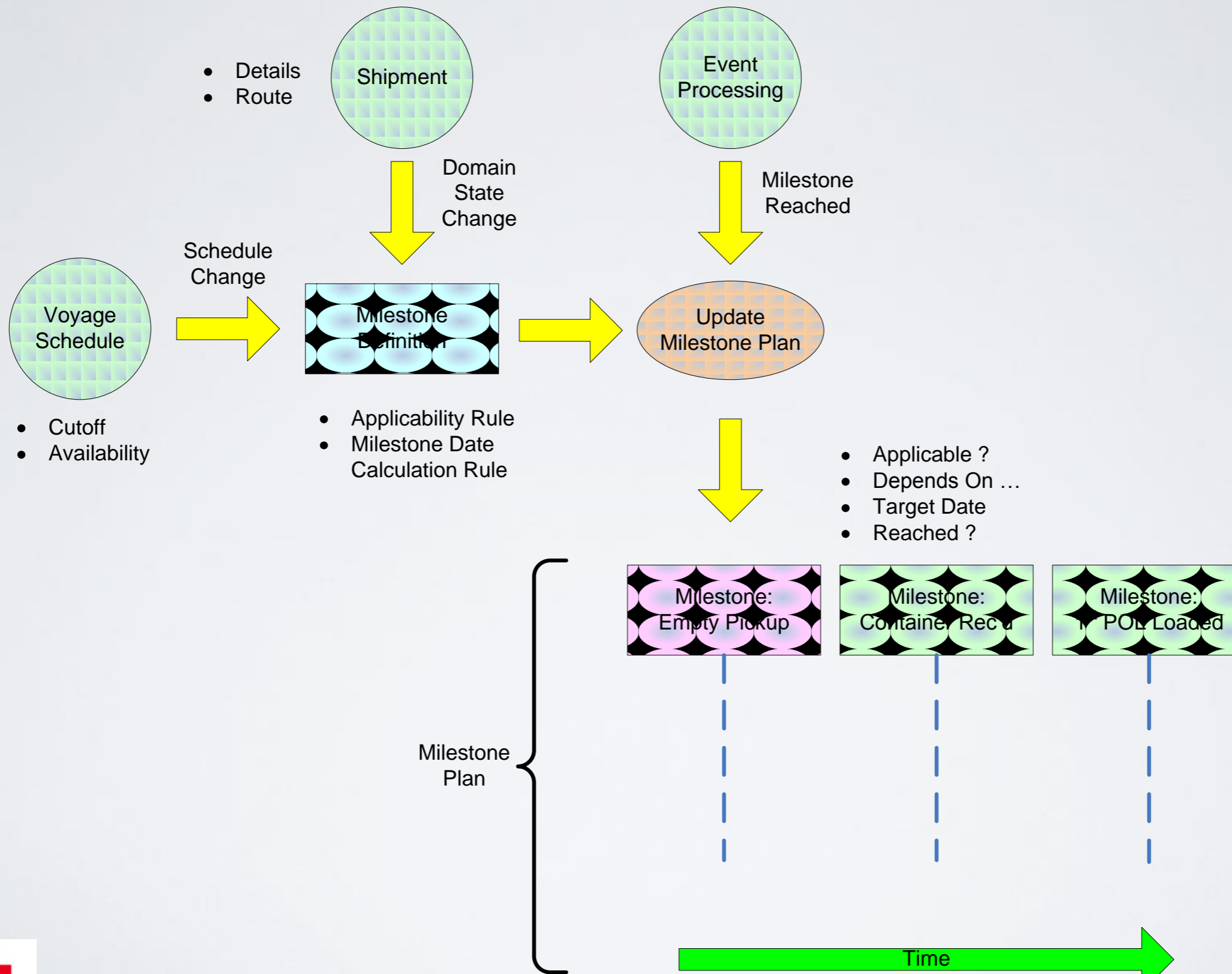


Rules

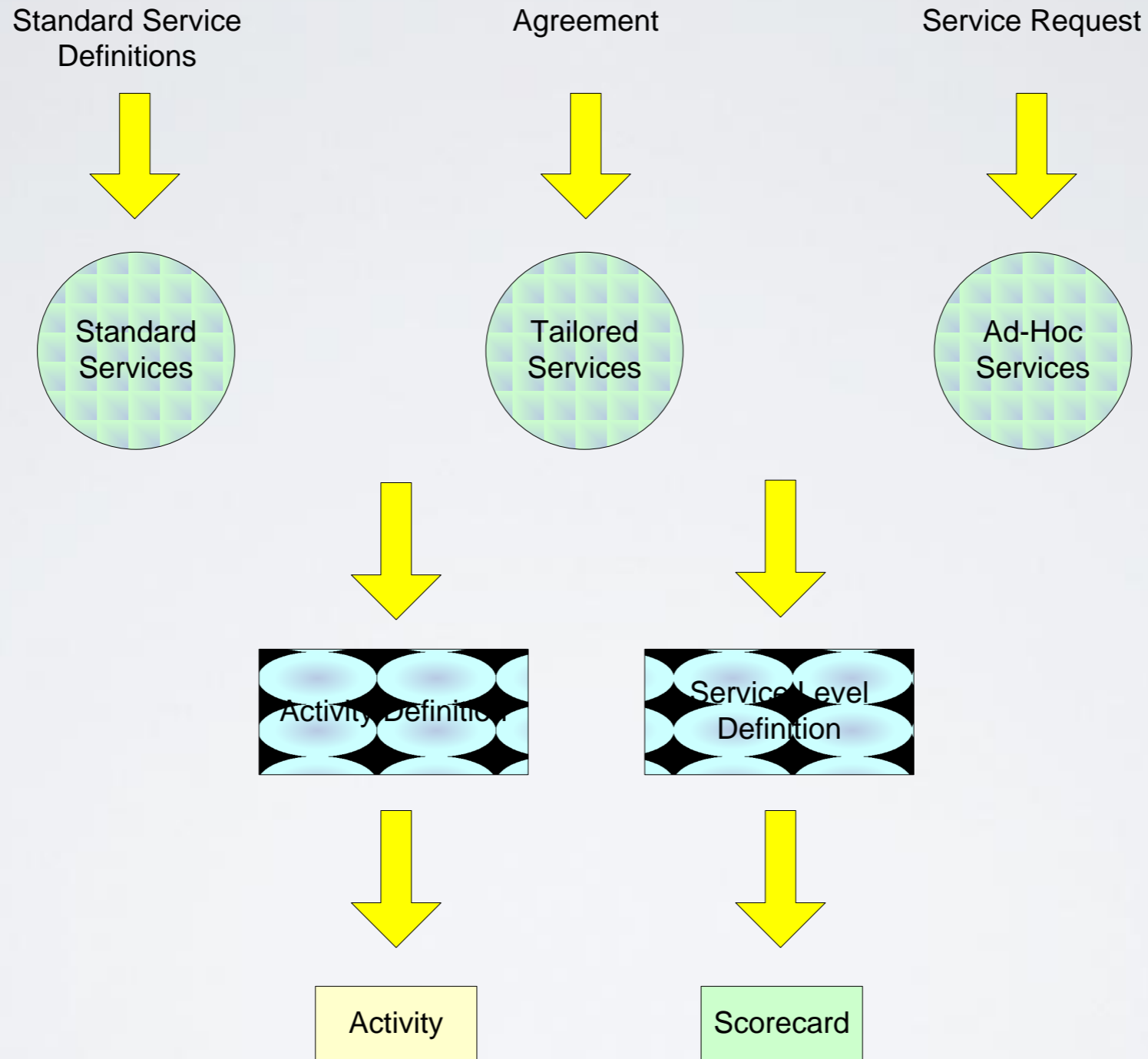
- Does the milestone apply for this case?
- When should the milestone be reached?
- Does it depend on any prior milestones?
- Has the milestone been reached yet?

State

Milestone Plan



Activities and “Scorecards”

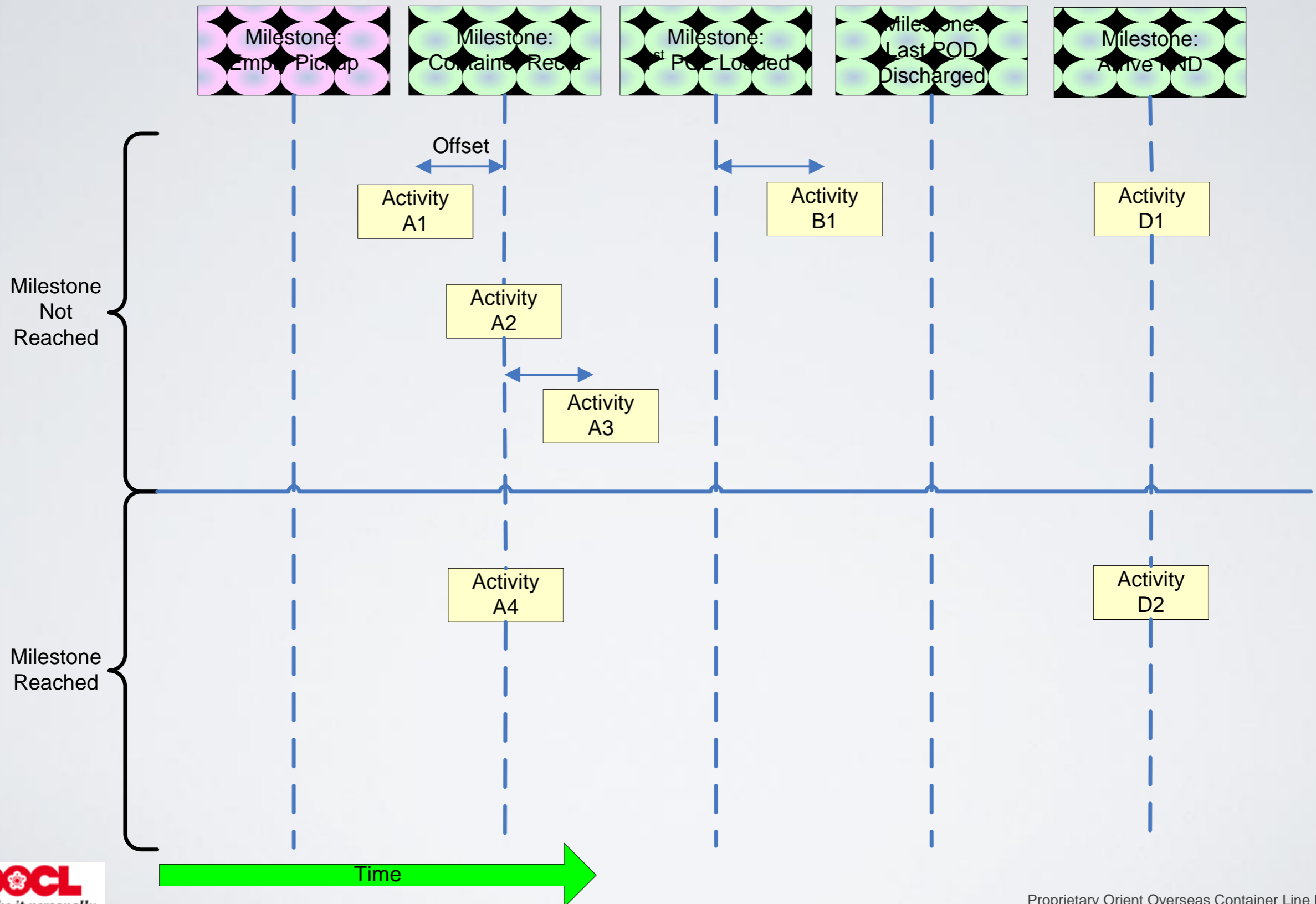


- Activity Type
- Associated Milestone
- Time Offset

- Time Period
- Target Metric
- Trigger Event Type

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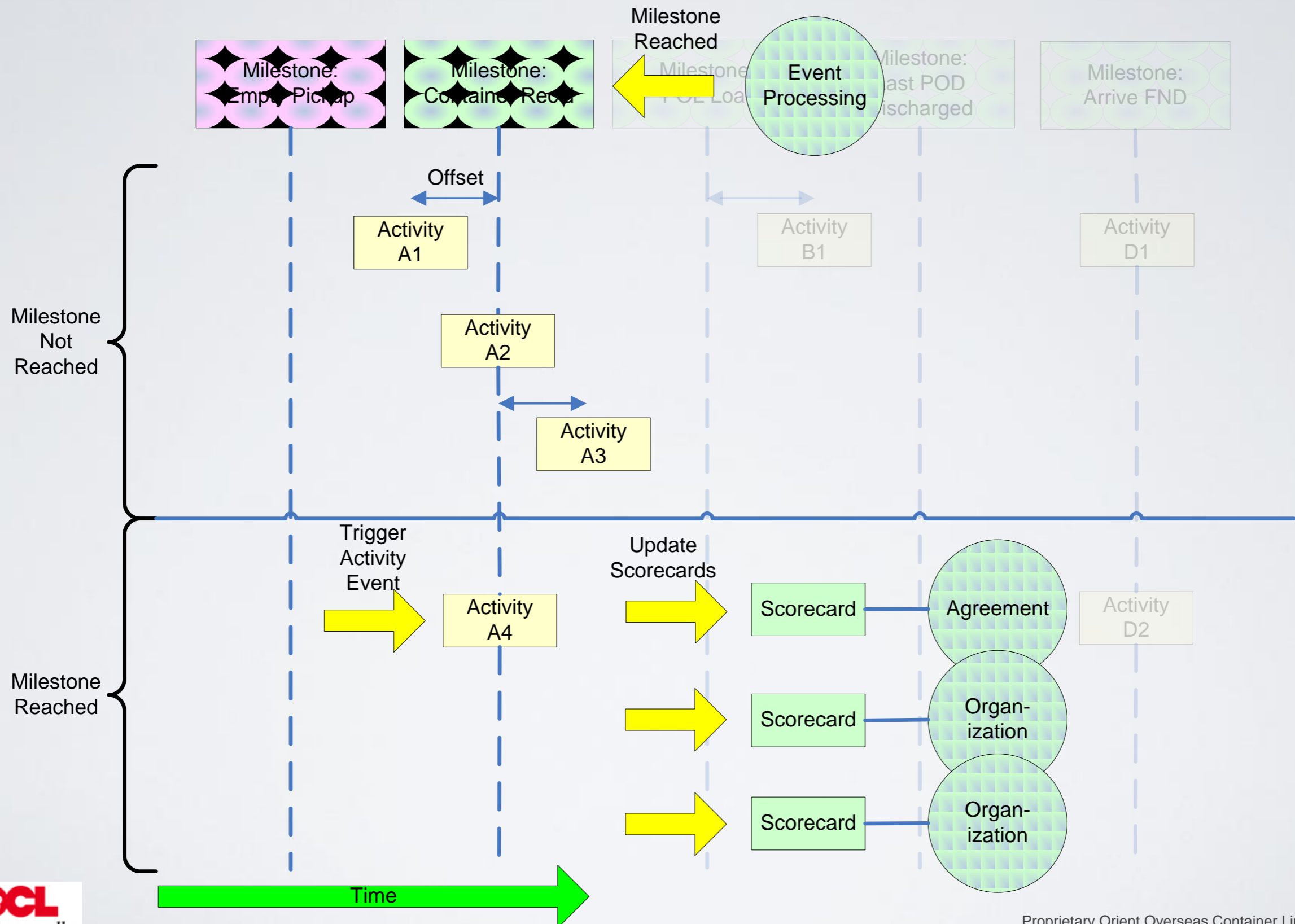
Activity Plan = Milestone Plan + Activity Definitions



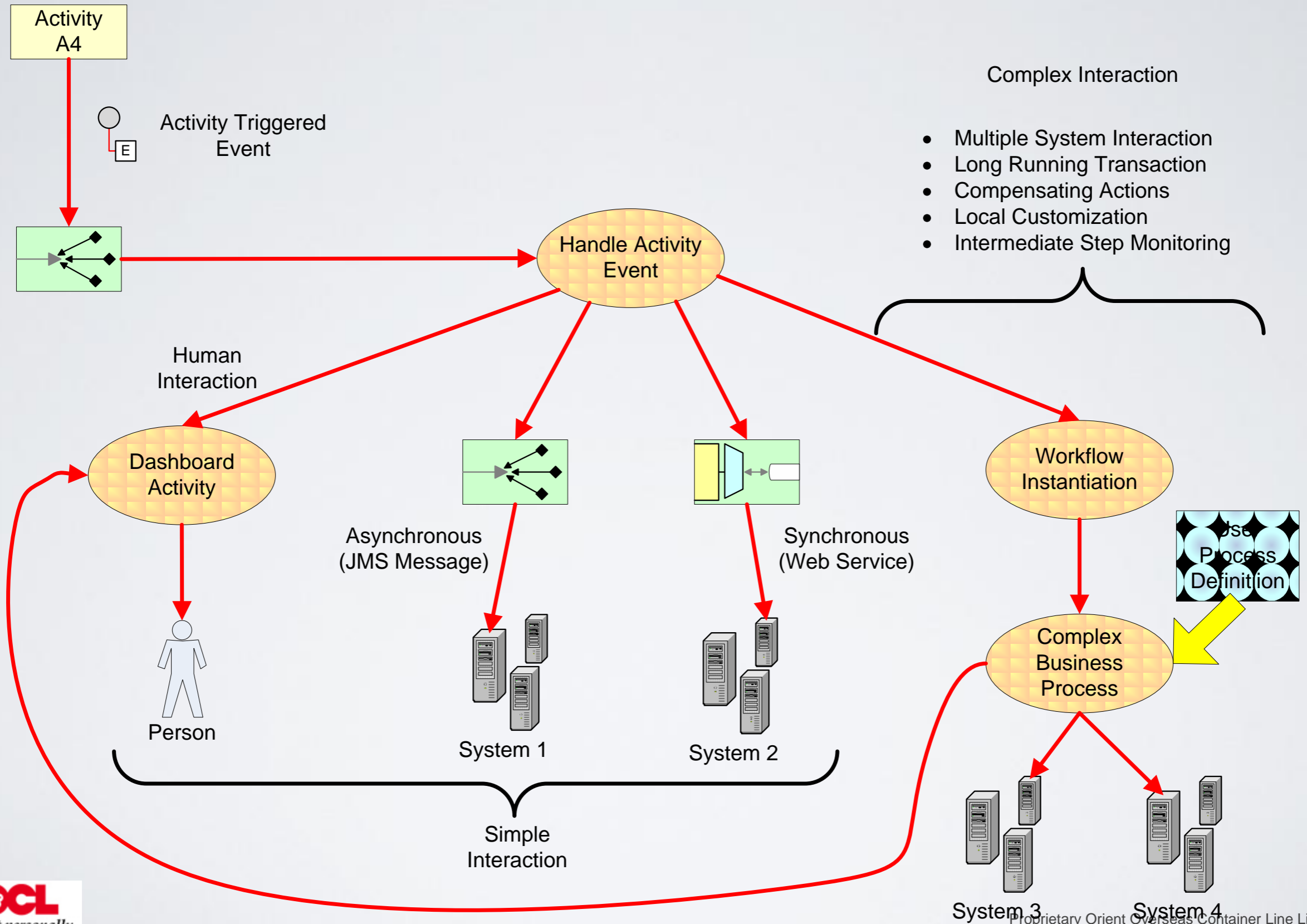
Types of Events

- Domain State Change
 - Scope: Business key of domain object that changed
 - Response: Update the Milestone and Activity Plan
- Milestone Reached
 - Scope: Key of shipment and milestone identifier
 - Response: Trigger activities associated with “milestone reached” condition.
- Timed Events
 - Scope: Created for activities associated with “milestone not reached” condition.
 - Response: Trigger activity

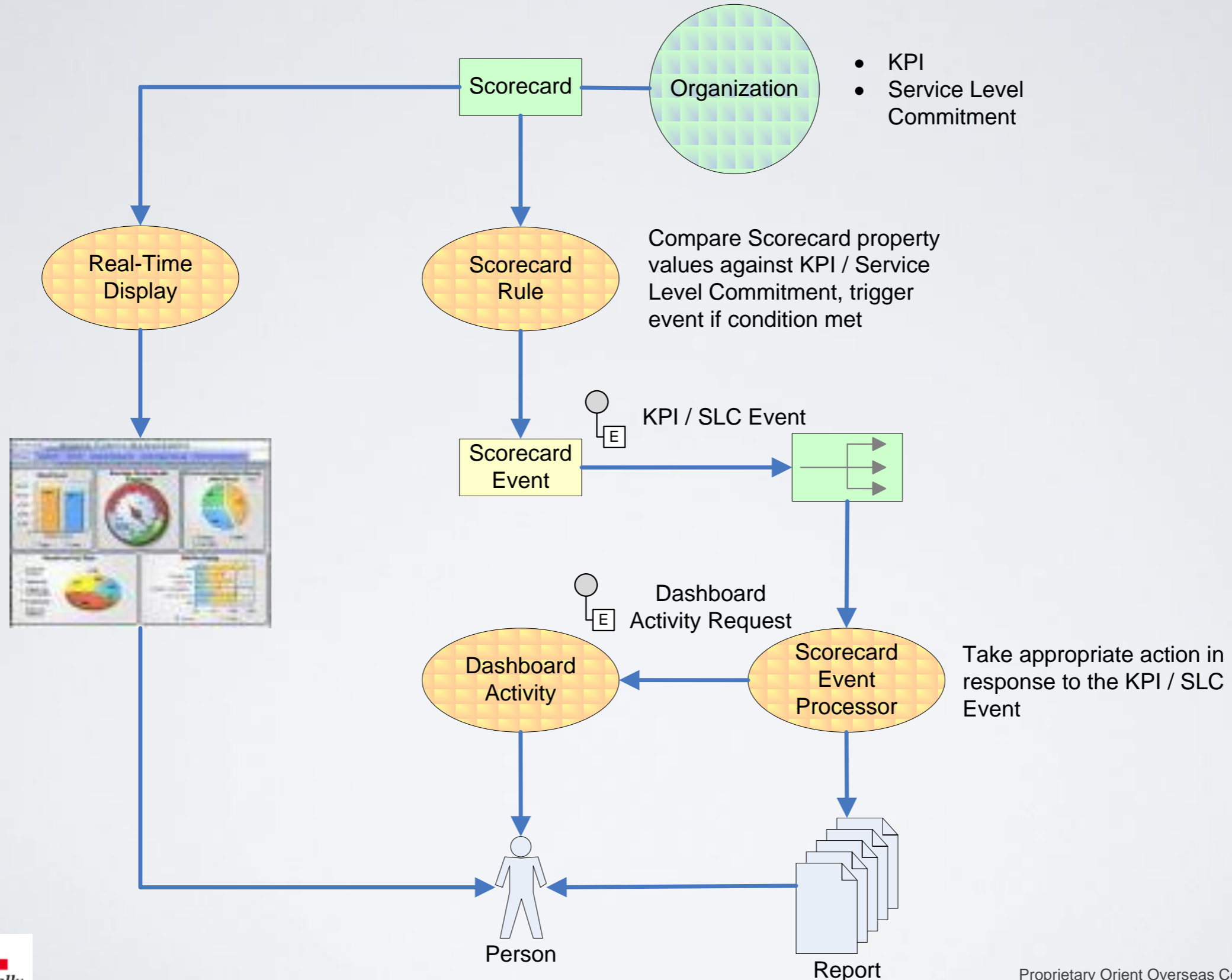
Event Processing Example: Milestone Reached



Responding to Triggered Activities



“Scorecards” (In Progress)



Simple Scaling Arithmetic

| | |
|-------|---|
| 8,000 | New shipments per day |
| 100 | Average shipment lifecycle in days |
| 2 | Average containers per shipment |
| 64 | Milestones per container, average |
| => 54 | Million active milestones average (timed events in BE) |

Average of 700k shipment domain state change events per business day.
=> ~20 events per second in peak hour.

Downtime recovery standard (recover from 2 hours downtime in 1 hour)
=> ~60 events per second during recovery.

Shipment Execution Plan (SEP) Implementation #1

- All development in J2EE
- Team of 6 including developers, team lead and BA
- Used internally developed framework for strict event sequencing
- Development took 8 months
- Initial rollout had issues with performance and monitoring
- Redeployed 3 months later
- Solution was in production for 2 years

Main Issues

- Changes in rules required technical release
- Adding new milestone types required technical release
- Development productivity in further enhancing and extending application

Shipment Execution Plan (SEP) Implementation #2

- Use Oracle BPEL Process Manager for milestone tracking
- Team of 3 developers, some Oracle professional services assistance
- Used internally developed framework for BPEL process management
- Pilot implementation for 3 milestone types
- Development took 4 months
- Solution was in production for 1 year, co-existing with J2EE version

Main Issues

- Complexity of BPEL process definitions in real-world scenarios
 - Exception handling
 - Monitoring
 - Recovery
- Solution had scalability issues if all milestone types added

Shipment Execution Plan (SEP) Implementation #3

- Complete re-implementation in TIBCO Business Events
- Team of 3 developers, TIBCO professional services 1 person-month
- Initial POC completed in 3 weeks
- Production version completed in 2 months
- Deployment, reliability testing, performance tuning completed over 4 months with assistance from TIBCO Quantum Leap team
 - Solution provided for large volume of timed events
- In production since August 2009 (BE 3.0.1 HF 3)

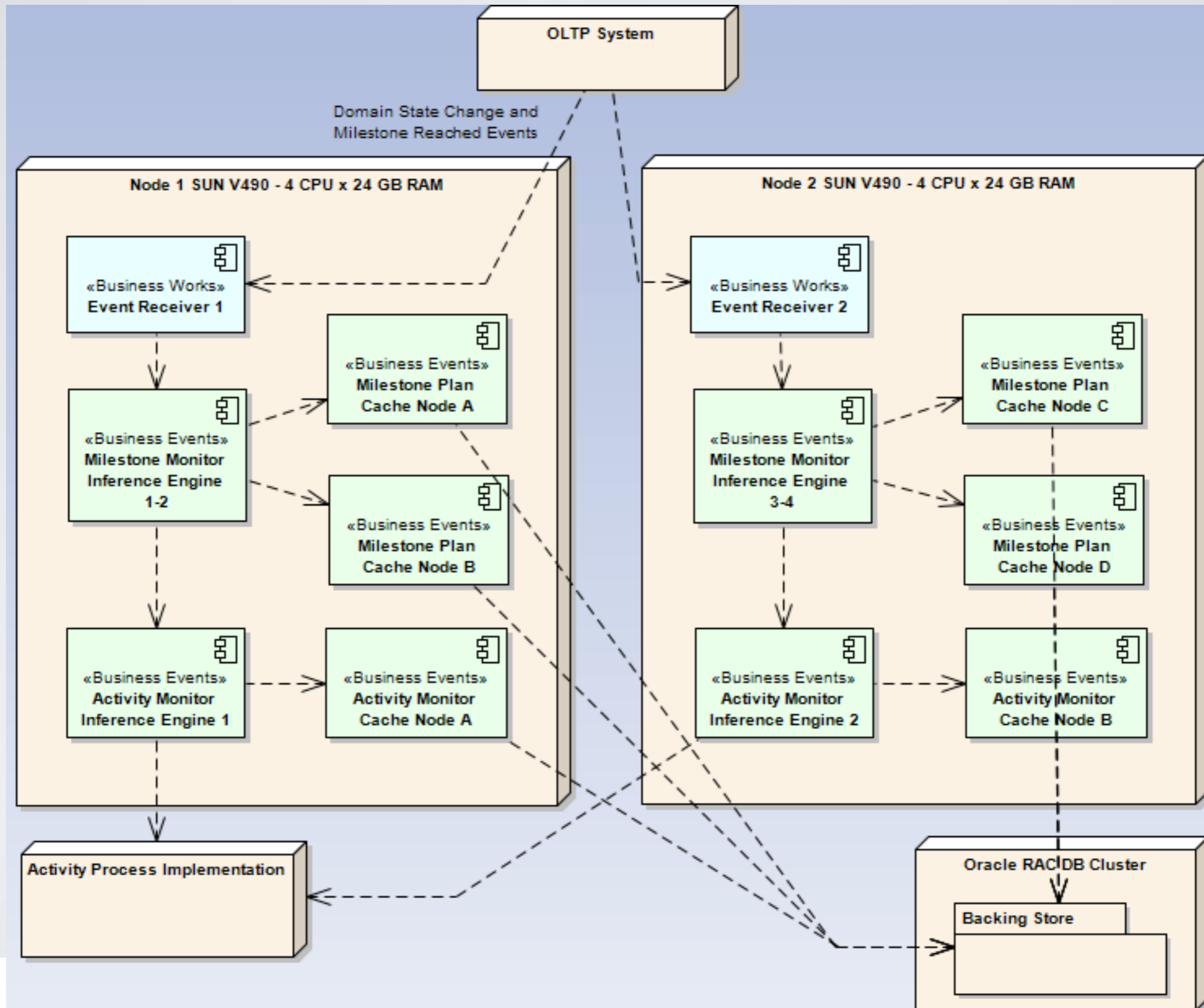
Benefits

- Increased agility of applications
 - New milestones can be added without technical release
 - Elegance of declarative programming model / rules based approach
- Scalability and performance of solution
- Potential for “re-use” of concepts and events

TIBCO Assistance Areas

- Professional services in reviewing application design, deployment, and monitoring
 - What JMX or Hawk agent metrics to pay attention to
 - Which need timely alert / automated shutdown
- Engineering collaboration on handling large number of concurrent timed events
 - Provided simple scheduled event mechanism that can be invoked from a rule. Reduces memory and object count for these simple scheduled events.
- Scalability of backing store on DB
 - Cache aside architecture option
- Configuration parameter tuning

Physical Deployment



Return on Investment

- Replacing regional or local “silo” applications
 - Daily refresh, high data latency
 - All manual, no automation
 - No integration to OLTP applications
 - No built-in measurement for continuous process improvement
 - Relatively high development cost, lower agility
 - No reuse of business rules and key business objects (BE concepts)
- Example: Rail Billing (May 2010)
 - 20,000 rail bill requests received per month
 - All manual currently, expect 98% automation under BE solution
 - Development cost (activity process implementation) = \$80,000 (one-time)
 - Benefit internal efficiency = \$50,000 per month
 - Benefit in customer convenience from expanded service hour availability

Lessons Learned

- Declarative programming is not procedural programming
 - Basic TIBCO 2 day course was very helpful
- Most of the work for a BE project is in the “back-end”
 - Early POC success can be misleading
- Consider how exception handling and logging will be handled up front
- Monitoring can wait until later
 - Exposed JMX and Hawk agent metrics are generally sufficient
 - Consider monitoring the underlying distributed cache (Coherence)
- Get a starting project template from an experienced team
- Business Events performs much better on a multiple CPU vs a multiple core box

Q&A

TIBCCommunity.com
Keep the conversation going.