

# Services Modeling Using BPMN 2.0

## *- It's Not Just Boxes and Arrows Anymore! -*

Presented By Lloyd Dugan  
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# Outline

- Overview of BPMN
- Services Modeling with BPMN
- Enterprise Services in BPMN
- Semantic BPMN (Teaser)
- Author's Information

# Business Process Modeling Notation

## - *BPMN 2.0 Introduction* -

- **Business Process Model & Notation (BPMN) – BPMN 2.0 spec released 1/2011**
  - Developed by the Object Management Group (OMG) as the standard notational language for modeling business processes
  - Based on the leading graphical process modeling techniques (UML Activity Diagrams and Sequence Diagrams, IDEF0, Flowcharts, IDEF, EPCs)
    - Added some new elements (e.g., new event types and activity types)
    - Defined conformance classes (Descriptive, Analytical, and Common Executable)
    - **Promoted data representations (data objects, data inputs/outputs, data stores) to first class elements**
    - **Formalized spec in XMI-based meta model, and serialized model into a standard XML format**
    - **Added the use of item definition to define structure for data representations, including messages**
    - **Interchange of model data and diagram across tools**

*{see recent demonstration at OMG Tech Meeting in Berlin <http://www.omg.org/news/releases/pr2013/07-23-13.htm>}*
- **BPMN specifies a Business Process Diagram (BPD)**
  - Features:
    - Easy to model BPDs and easy to understand (must be understandable to non-technical audiences)
    - Able to depict complex business processes (must be translatable to process execution languages)
  - Approach:
    - BPMN uses shapes that are familiar to most process modelers and business process management system (BPMS) development platforms (e.g., rectangles for activities, diamonds for gateways, arrows for sequence, or messages, etc.)
    - **Each of the shapes can be used in a simplistic manner or can be extended with more semantics (e.g., further subtypes of events, activities, gateways)**
    - **With the advent of “model as data” comes the need to bring strong modeling guidance (modeling primitives and patterns) and attribution schemes (for generating the desired XML data) to ensure the creation of quality models that are inter-comparable and consistent**

# Business Process Modeling Notation

## - Qualifies as Visual Programming Language-

Major Improvement	Examples from the Spec	Impact on Executability
Richer notational set and associated modeled behaviors	New or improved event types and behaviors, and addition of reusable Call Activity	Comprehensively covers programmable functions and system behaviors
Better support for abstraction of executable functionality	Requirement of WSDL for service calls, and addition of Business Rule Task	Enhances the role of orchestration and makes it more stateless
Better representation of components in process execution	Improved mapping to BPEL, and new attributes of messages and data objects	Enables alignment with service representations (e.g., SCA component assembly)
Structured capture and standardization of implementation detail	Use of standards (WSDL, XPath, XSD), and serialized XML for model attributes	Design-time model can be exported or interpreted as a run-time construct

# Services Modeling with BPMN

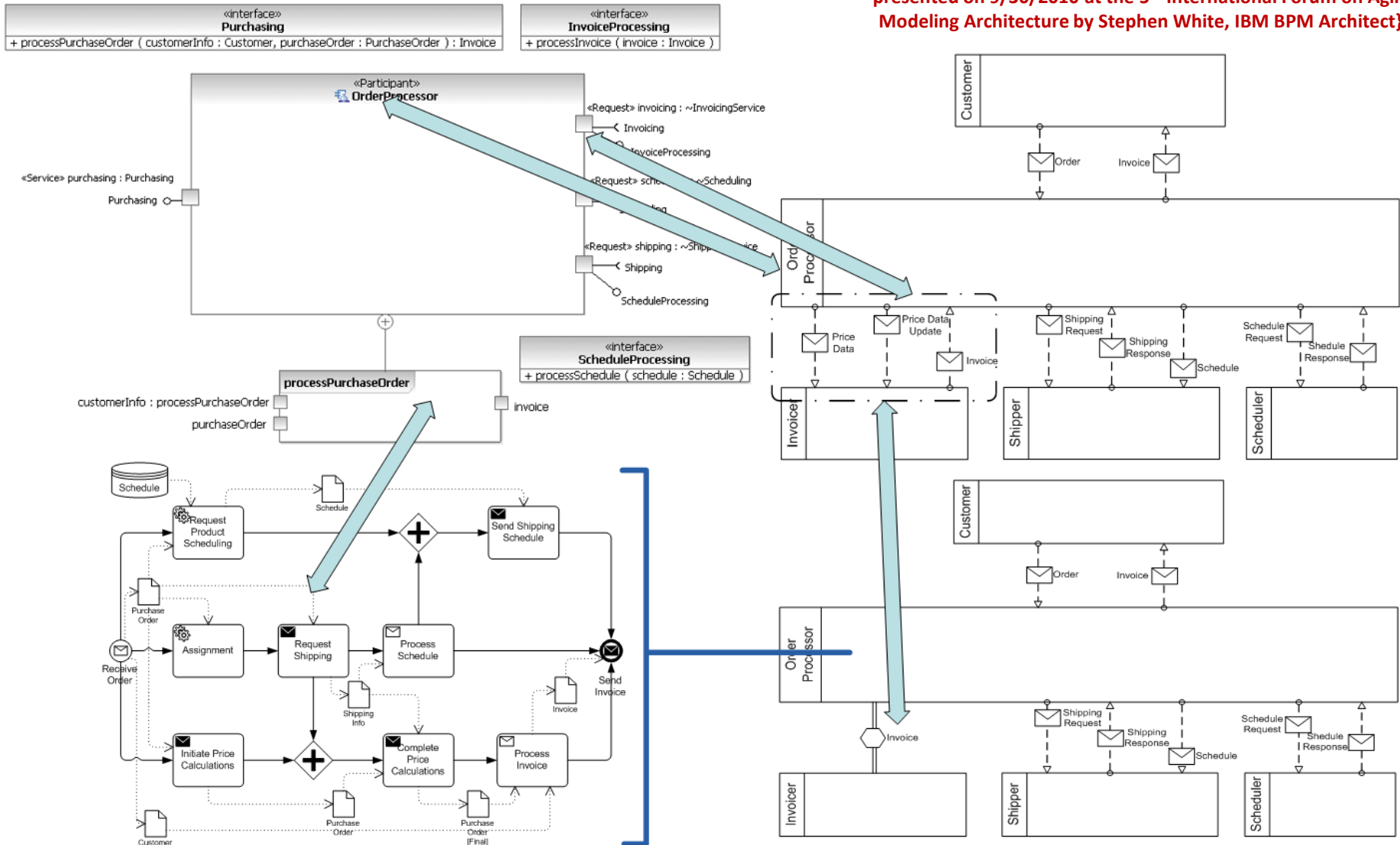
## - Overview of What BPMN Provides -

- **BPMN incorporates the use and representation of services**
  - Certain task types and message event types use messages, interfaces, and services with named operations
  - **Service level modeling (for more structured processes) is ripe for BPMN R&D (other is case management)**  
*{Source: "Future of BPMN" presented on 9/6/2012 at BPM 2012 Conference by Stephen White, IBM BPM Architect}*
- **Service modeling issues to resolve include:**
  - **Which representation alternatives to use: SoaML (OMG), SCA (OASIS), SOA ontology (The Open Group), BPMN ontology (several candidates), others?**
  - BPMN meta model, schema, and spec rules are...challenging to interpret and realize, leading to inconsistent interpretations (and no reference model or implementation exists)
  - Concept of executable BPMN complicates discussion, particularly with BPMS pure play vendors (with engine only) vs. BPMS platform vendors (also with middleware) competing for market share
  - Full support for BPMN and attribution of BPMN XML elements is problematic due to tooling limitations and lack of clarity in certain cases as to spec's intentions and meanings

# Services Modeling with BPMN

## - Early Mapping of BPMN To Services -

{Source: "Supporting MDA through Integration of BPMN and SoaML"  
presented on 9/30/2010 at the 5<sup>th</sup> International Forum on Agile  
Modeling Architecture by Stephen White, IBM BPM Architect}



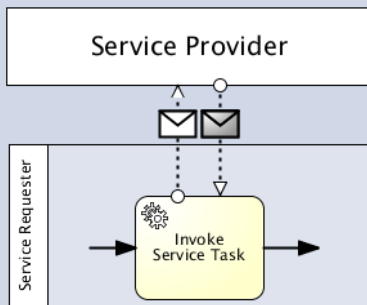


# Services Modeling with BPMN

## - Message Exchange Patterns (1) -

These are Blocking Until Response is Received...So these Should be for Short-running Transactions

### Synchronous Request/Response – Service Task



#### Operation

SCA Invocation Type = call

Name = Appropriate Name

#### Implementation Component

Type = Web Service, URI, Other

Name = Corresponds to Type

#### Messages

##### Request to Service

Message Name/ID = Appropriate Name

Type = Initiating



##### Response from Service

Message Name/ID = Appropriate Name

Type = Non-initiating



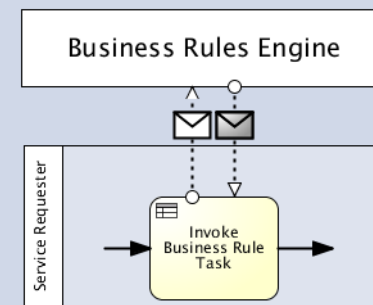
Payload = Inbound Subset per Defined Schema for Service

Payload = Outbound Subset per Defined Schema for Service

Correlation Key = Same as for Response

Correlation Key = Same as for Request

### Synchronous Request/Response – Business Rule Task



#### Operation

SCA Invocation Type = call

Name = None – Is Assumed

#### Implementation Component

Type = Web Service, URI, Other

Name = Corresponds to Type

#### Messages

##### Request to Service

Message Name/ID = Appropriate Name

Type = Initiating



##### Response from Service

Message Name/ID = Appropriate Name

Type = Non-initiating



Payload = Inbound Subset per Defined Schema for Service

Payload = Outbound Subset per Defined Schema for Service

Correlation Key = Same as for Response

Correlation Key = Same as for Request

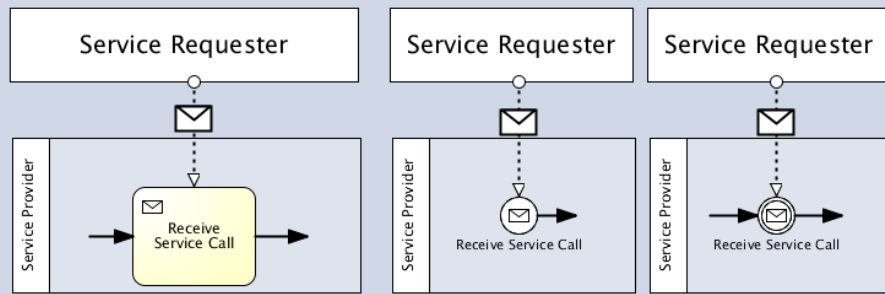


# Services Modeling with BPMN

## - Message Exchange Patterns (2) -

**These are not Blocking Until Response is Received...So these Should be for Long-running Transactions**

### Asynchronous Request/Response – Request



#### Operation

SCA Invocation Type = call

Name = Appropriate Name

#### Implementation Component

Type = Web Svc, URI, Other

Name = Corresponds to Type

#### Messages

##### Request to Service

Message Name/ID = Appropriate Name

Type = Initiating

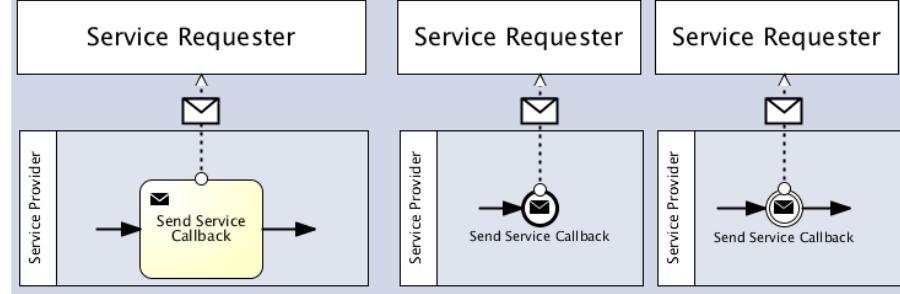


N/A

Payload = Inbound Subset per Defined Schema for Service

Correlation Key = Same as for **Response**

### Asynchronous Request/Response – Response



#### Operation

SCA Invocation Type = callback

Name = Appropriate Name

#### Implementation Component

Type = Web Svc, URI, Other

Name = Corresponds to Type

#### Messages

##### Response from Service

Message Name/ID = Appropriate Name

Type = Initiating



N/A

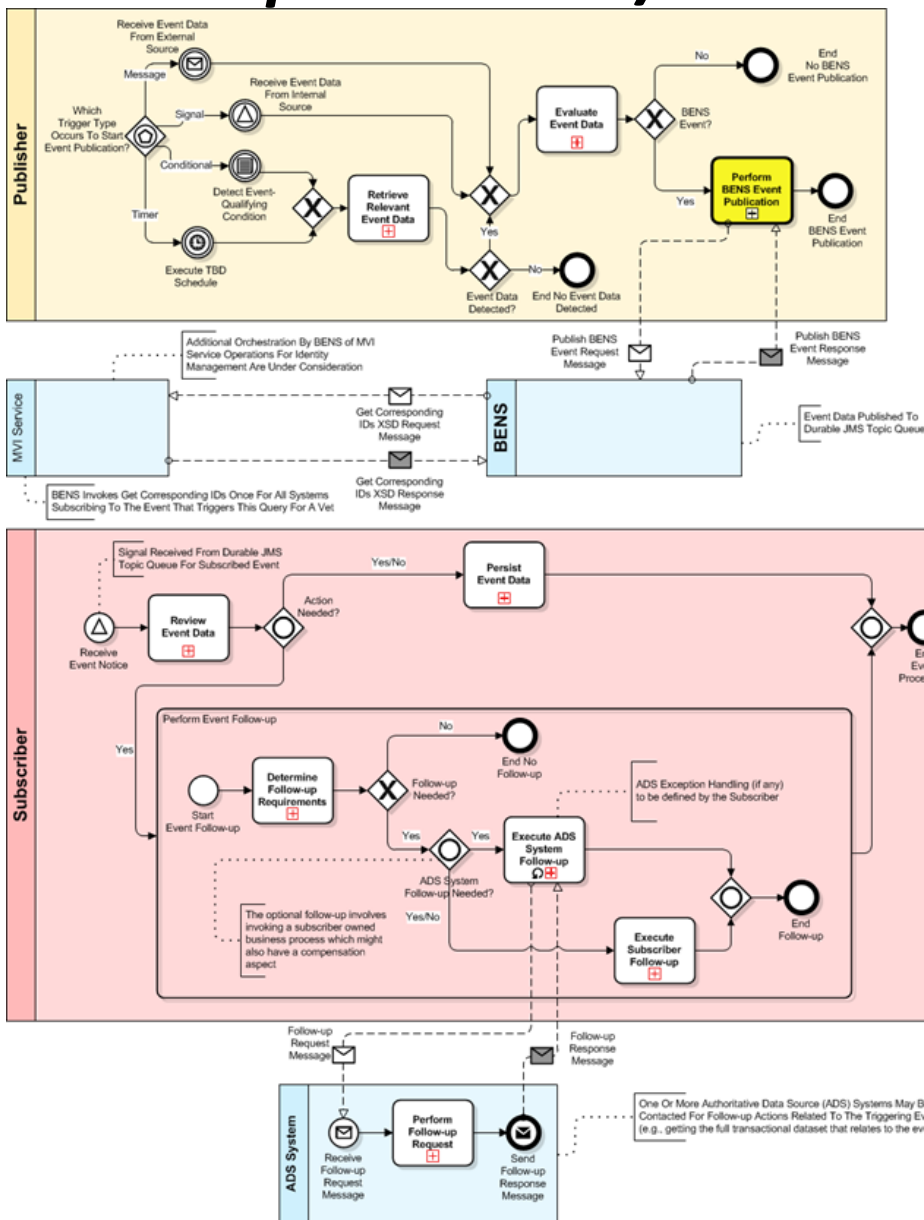
Payload = Outbound Subset per Defined Schema for Service

Correlation Key = Same as for **Request**



# Enterprise Services in BPMN

## - Example: Publish/Subscribe Services -



**Subscribing System  
Is Alerted To  
Published Event**

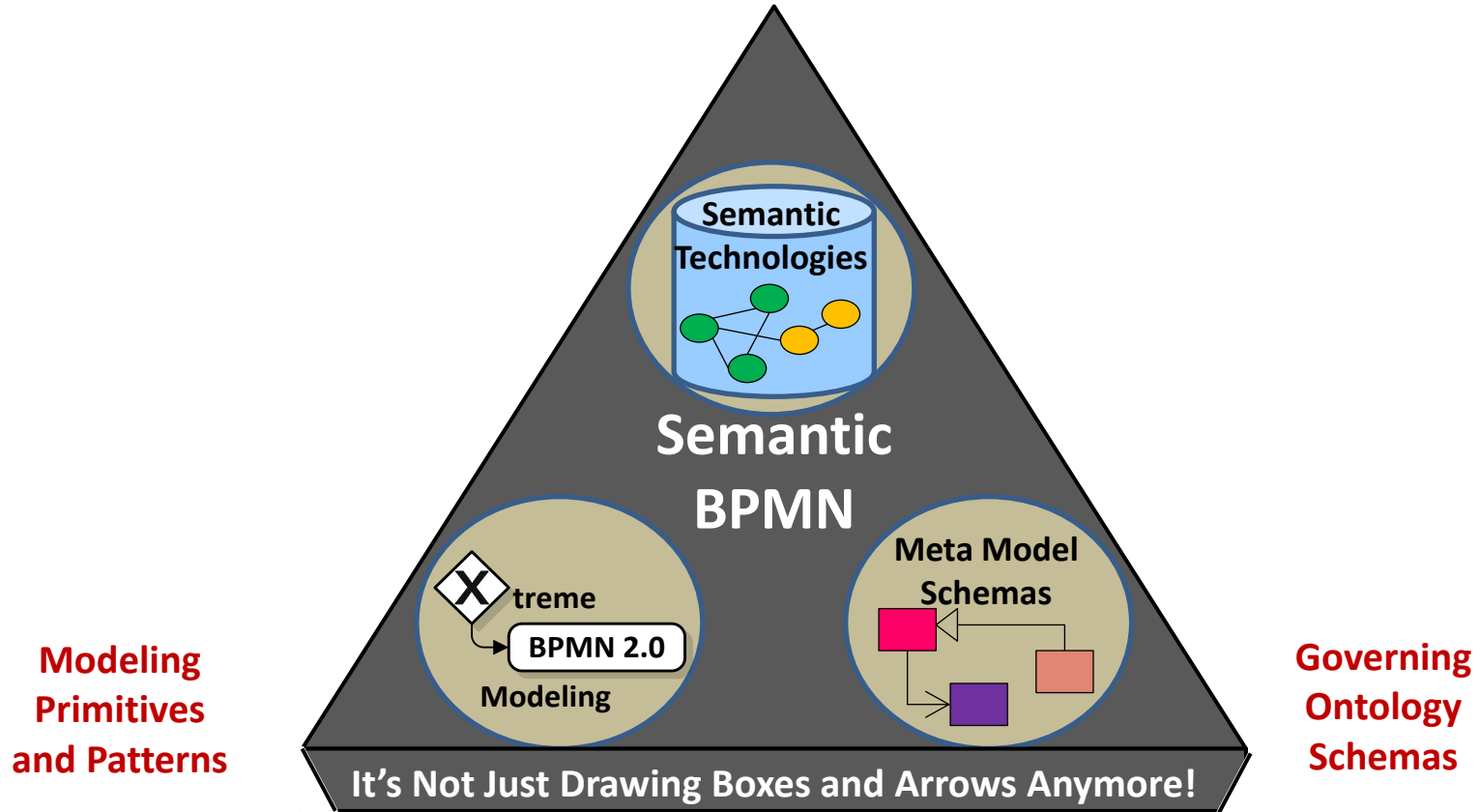
**Publishing System  
Invokes the Publication  
Service**

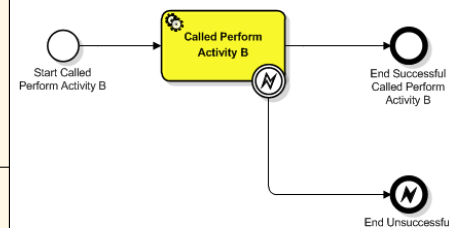
**Subscribing System Gets  
Needed Data Based on  
Published Event**

# Semantic BPMN (Teaser)

## - *Conceptual Overview* -

### Semantic Representations and Engine



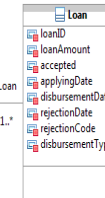
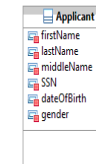
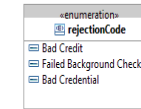


- **Identifying services used in the model (interfaces, messages, and operations) – Shows alignment with SOA framework**
- **Determining structural relationships in the model that define sequence or use of modeling guidance – Shows conformance with defined conventions or methods/styles(e.g., Gateway use)**
- **Representing key architectural concepts in spec-conforming ways – Ensures that model data can be inserted into parent architectures in a semantically correct manner**

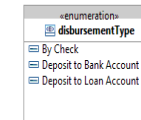
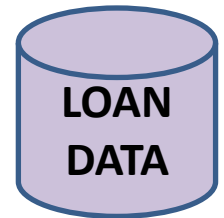
# Semantic BPMN (Teaser)

- Sample Query: Find All Service Task Classes -

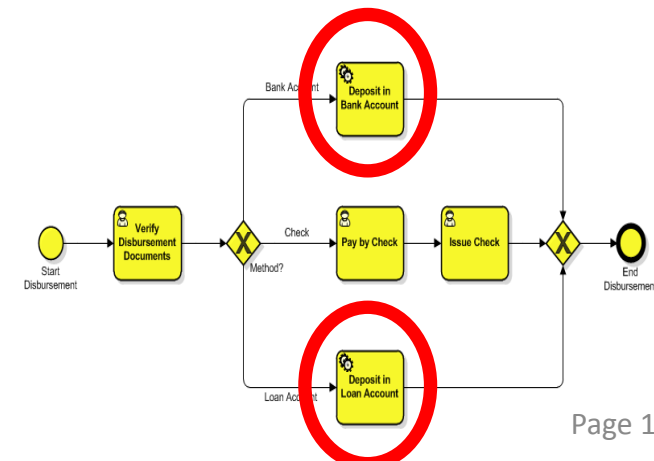
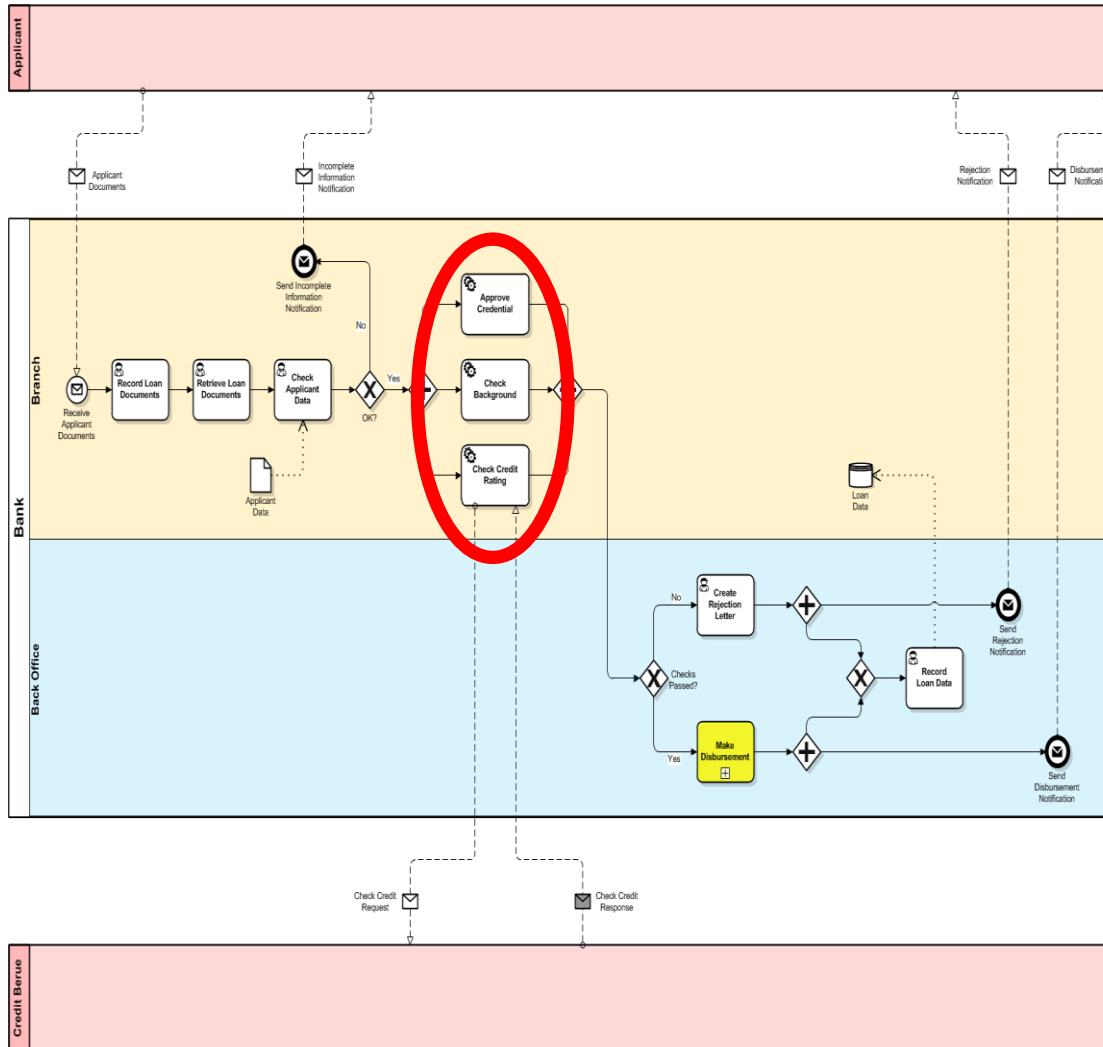
Enterprise  
Data Model



Loan  
Instance  
Data



Make Disbursement Sub-Process



# Semantic BPMN (Teaser)

***- Sample Results: Found All Service Task Classes -***

## Query-1

# Find all ServiceTask classes

SELECT ?serviceTaskName

WHERE {

    ?serviceTask rdfs:subClassOf Activities:ServiceTask;

    rdfs:label ?serviceTaskName.

}

## Results-1

1 - Deposit in Loan Account

2 - Check Credit Rating

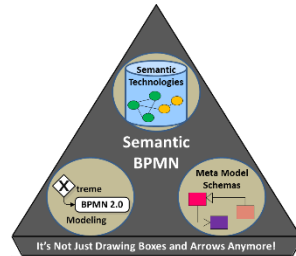
3 - Approve Credential

4 - Check Background

5 - Deposit in Bank Account

# Authors' Information

## - Founders of Semantic BPMN -



- Lloyd Dugan

- Titles and Affiliations:

- Independent Contractor, LAB Derivations (BPMN4SCA), Sole Proprietor
    - Chief Architect, Business Process Management, Inc. ([www.bpm.com](http://www.bpm.com))
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    - Member of Workflow Management Coalition (WfMC) and the WfMC's Business Process Simulation Working Group (BPSim)
    - Member of OMG BPMN Model Interchange Working Group (MIWG)
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