A Metamodel for Enabling a Service Oriented Architecture

Baba Piprani, Chong Wang, and Keqing He

Outline

- Background
- Introduction of ISO 19763-5
- Positioning the Process Model in SDLC
- Processes in SOA
- ORM Schema of the Service Model
- SOA Overlay based on Atomic Process
- Summary

Your presenter…Baba Piprani, SICOM Canada

- Senior IT Consultant with over 30 yrs standardization experience…Computer Languages, SQL, Conceptual Schema, Data Modelliing, IRDS, Metadata Registry, MOF…

- Developed award winning implementations of standards-based Data Quality Firewalls for advanced generation architecture data warehouses and Web based applications using SBVR, ORM, NIAM, Master Data Management, Metadata Repositories/Registries using SQL DBMSs incorporating Service Oriented Architectures…

- Clients: Canadian Government departments Transport, Foreign Affairs, Defence, Superintendent of Financial Systems, Public Works…including private sector, and CNIS (China National Institute for Standardization)

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Background

- Many businesses suffer from weak IT infrastructure consisting of disconnected databases, applications and services…
- Glaring eye-opener…lack of documented business processes, data semantics
- New Technology, faster “processing” or shall we say “faster hard line undocumented garbage processing”…is here!

Recap…Conceptual Schema TR9007…

- Conceptual Schema essentially reflects static and dynamic behaviour rules of enterprise
- Processes address the dynamics part…and Process Modelling has been around for many decades along with their own paradigms

The fallacy of process modelling techniques…

- Various representational notations, description languages for focused domains…(it is a free world….)
- Most process modelling paradigms focus on flow of control of operations, weaving a complex scenario that may include several re-usable individual standalone processes in the form of a “service”…

How vs. What…

- Note: Processes represent the “How” part of the behavioural dynamics
- Focus is lost on the “What” part and its semantics which is normally buried or hidden as a “process”
- Hey…we need to orchestrate them together (see good old TR9007)..
- Change is more in the “how” and much less in “what”….e.g. airline ticket going from paper to e-ticket but person goes from point A to point B and associated semantics…

Background

- “Hype” concepts or “Buzzword” contexts…also bring in what is known as “Services”
- Services in a Services Oriented Architecture (SOA) has its own connotation…
  - Infrastructure Services Oriented Architecture (also known as Enterprise Service Oriented Architecture)
  - **Application Services Oriented Architecture..(this paper)**

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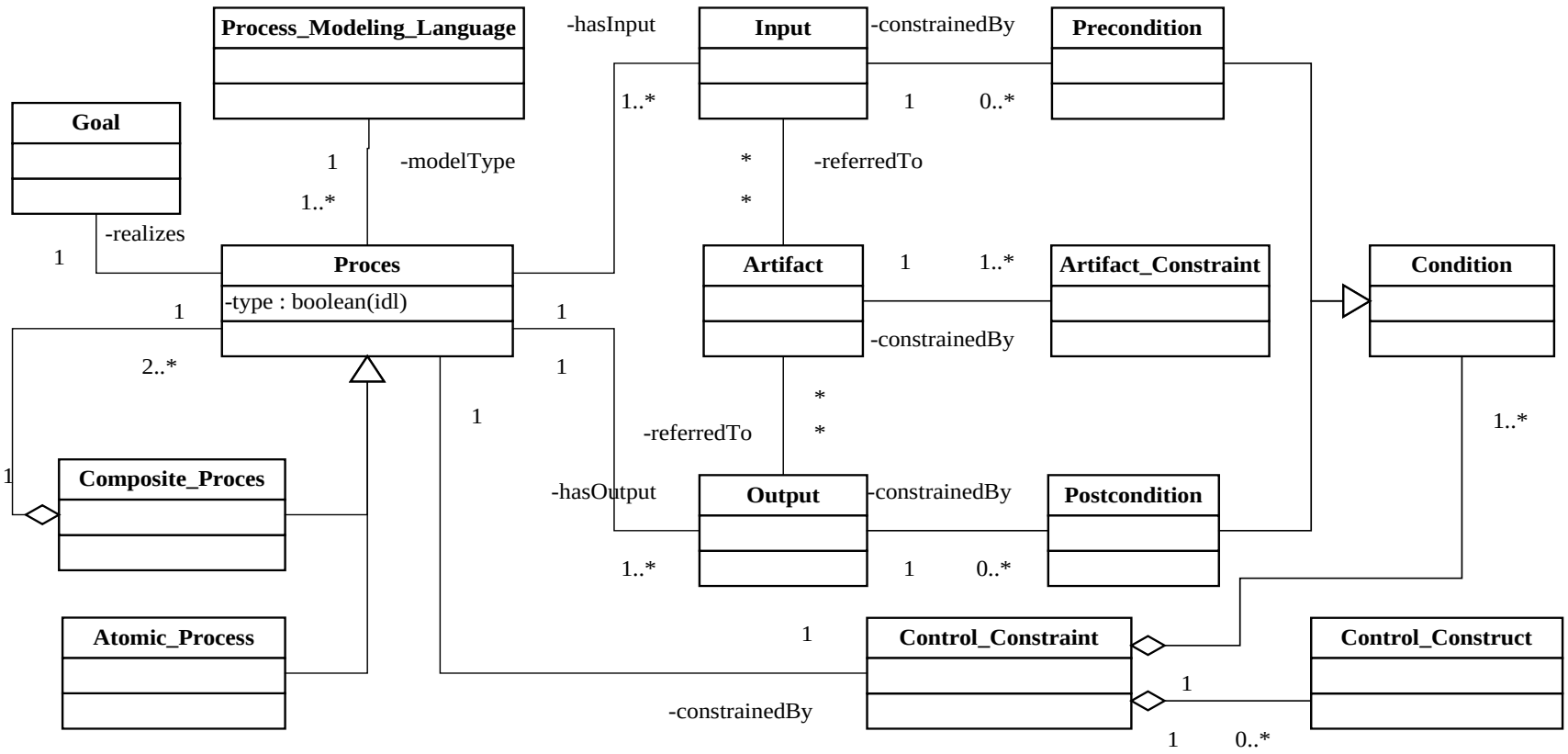
Objective of ISO 19763-5

- Aim: Enable availability, common sourcing, and reuse of various kinds of process models
  - includes workflows, business process, web services, software process
  - described by different process modeling languages

- Objective:
  - register administrative information of process models
    - Structural information
    - Semantic constraints within process models
    - Flows between processes
  - promote semantic interoperation between them

Overall structure of ISO 19763-5



Key concepts in ISO 19763-5

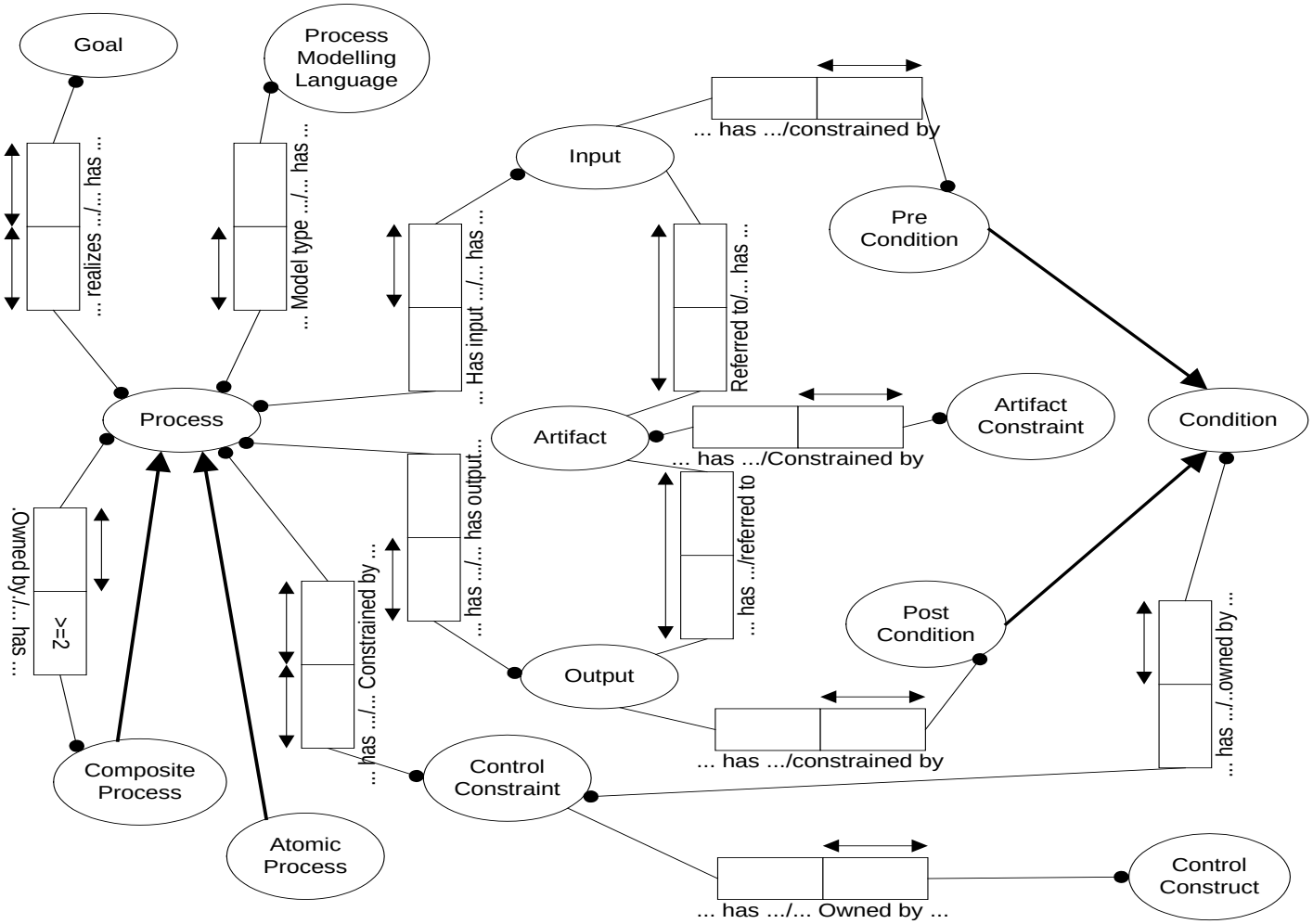
- **Atomic Process**: a process model that cannot be decomposed
- **Composite Process**: a process consisting of at least two sub-processes, which can be atomic process or other composite process
- **Process Model Language**: name of the modeling language adopted by the registered process model
- **Input**: the message to be transformed or used by a process model
- **Output**: the generated message after transforming

- **Control Constraint**: to specify sequence control of a Composite Process
- **Artifact Constraint**: to restrict semantics of artifacts in Input/Output
- **Precondition**: refers to Input specifying the information state that may exist and should be satisfied before execution
- **Postcondition**: refers to Output representing desirable outcomes when a process is completed as specified.

ISO 19763-5: Status

- Submitted in 2008 to ISO / IEC SC32 WG2 Metadata WG as a Working Draft
- Slated for progression into Committee Draft for 2009
- Open for review and comments

ORM schema of ISO 19763-5



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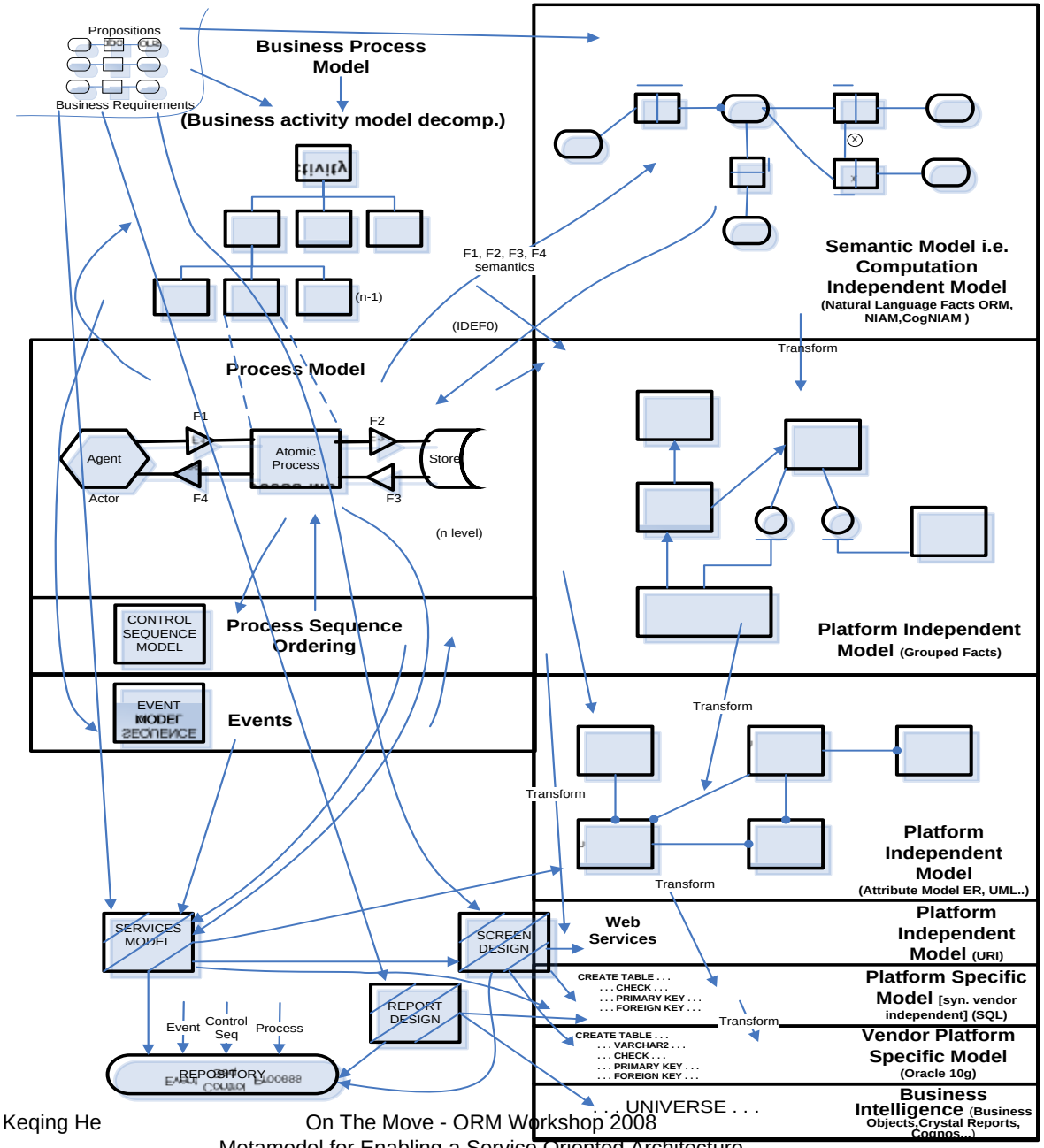
Positioning the Process Model in a model driven architecture SDLC…

- There are SDLCs and SDLCs and SDLCs…from waterfall, spiral, agile…whatever!
- Here is an SDLC that has been successfully followed for NIAM / ORM based projects over the past 20 years and more (since CRIS 82..) ---[OK, new terminology has been added to keep up with the times…]
- Entails formalizing a semantic model (NIAM / ORM) as the kingpin core supplying semantics to other components and derivation of metadata
- Many parallels to OMG's Model Driven Architecture and SVBR driven…

Positioning the Services and Processes in an overall ORM driven SDLC

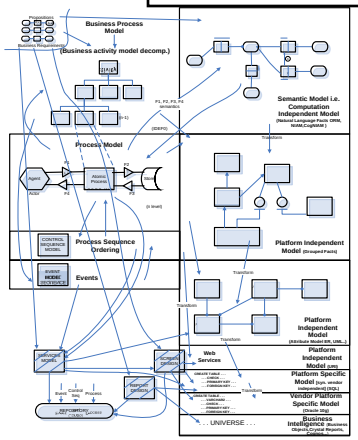


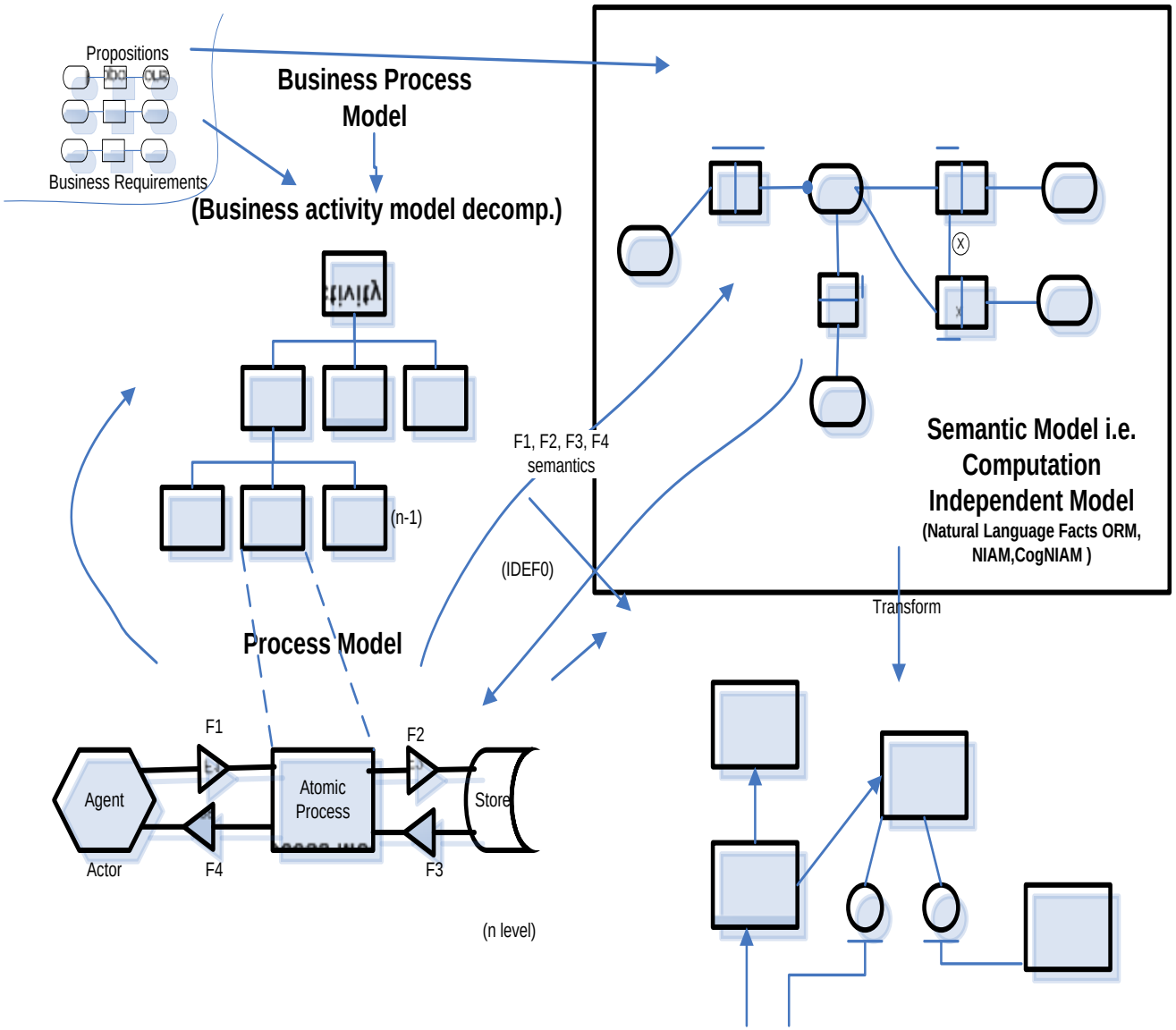
Business Activity Model ⟷ Semantic Model

- Starting with a forest level view, analyzing the flows between the decomposed lowest level process (elementary or atomic) to derive a strong semantic model

- MOST PROCESS MODELLING APPROACHES PAY LIP-SERVICE TO THIS "semantics" STEP---thus embedding their business rules in processes, sequences….

Positioning the Services and Processes in an overall ORM driven SDLC…





Elementary, my dear Watson…

- Note the separation of control sequence and event drivers from the atomic processes
- This is necessary, because when you address the viewpoint of a “service”…
- Rigidly defined services with non-reusable processes break quickly…
- Secret is to orchestrate atomic processes and stitch together the necessary couplings involving sequencing and events…to form a “Service”

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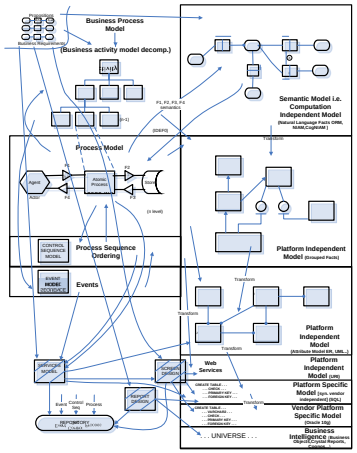
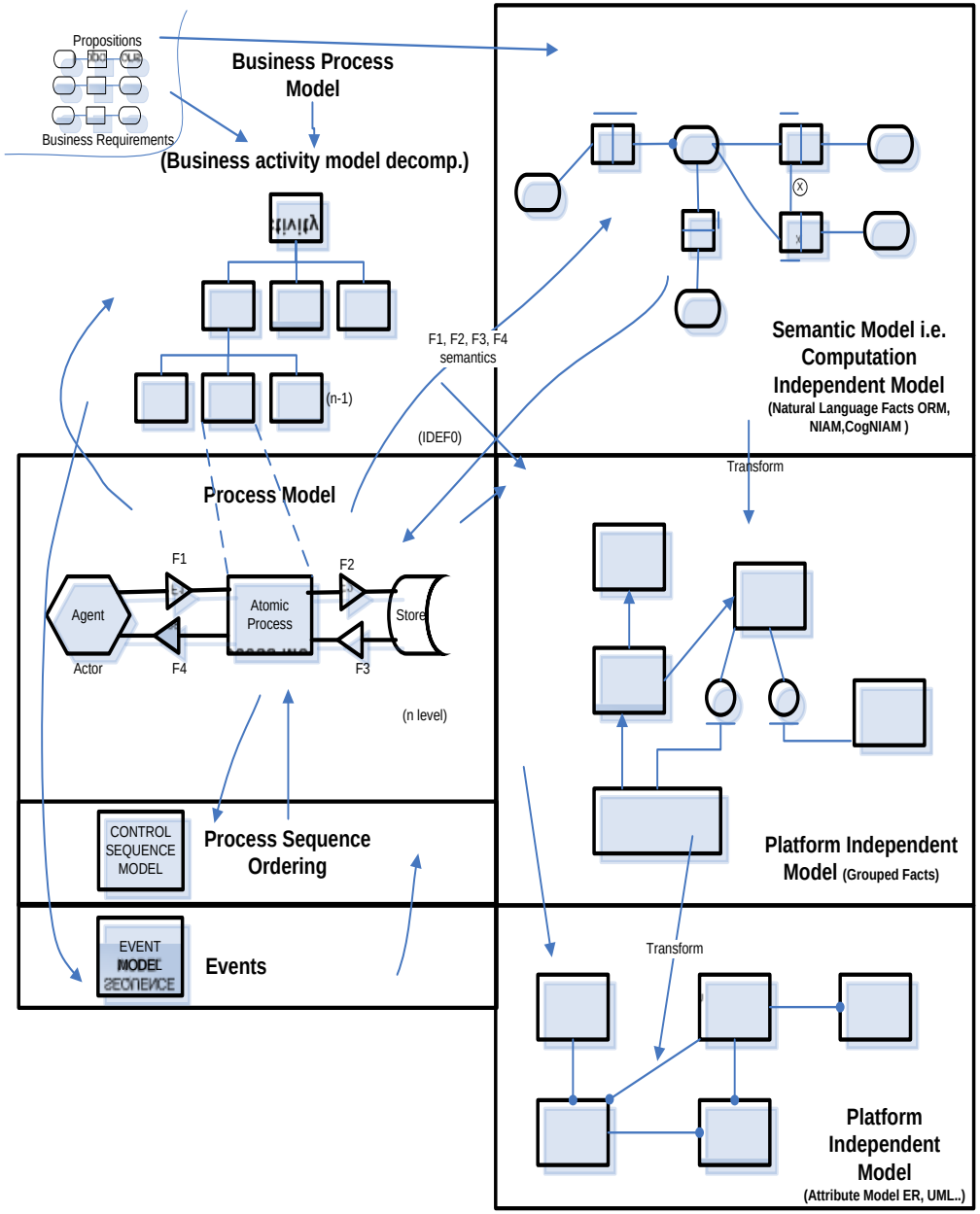
Positioning the Services and Processes in an overall ORM driven SDLC…



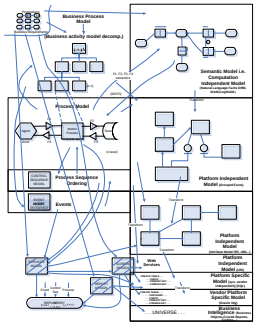


Applying to the selected IT infrastructure…

- And now position the processes, control sequences, and event drives---incorporating the application infrastructure components into a “service model”

- i.e. de-couple complex processes (built in sequencing, and consisting of splittable composite processes) to stitch the service deliverable fabric

Positioning the Services and Processes in an overall ORM driven SDLC…



CONTROL SEQUENCE MODEL

Process Sequence Ordering

EVENT MODEL

Events

Platform Independent Model (Grouped Facts)

Transform

Transform

Transform

Platform Independent Model (Attribute Model ER, UML..)

SERVICES MODEL

SCREEN DESIGN

Web Services

Platform Independent Model (URI)

CREATE TABLE . . .
. . . CHECK . . .
. . . PRIMARY KEY . . .
. . . FOREIGN KEY . . .

Transform

Platform Specific Model [syn. vendor independent] (SQL)

REPORT DESIGN

Event

Control Seq

Process

REPOSITORY

CREATE TABLE . . .
. . . VARCHAR2 . . .
. . . CHECK . . .
. . . PRIMARY KEY . . .
. . . FOREIGN KEY . . .

Vendor Platform Specific Model (Oracle 10g)

. . . UNIVERSE . . .

Business Intelligence (Business Objects,Crystal Reports, Cognos...)

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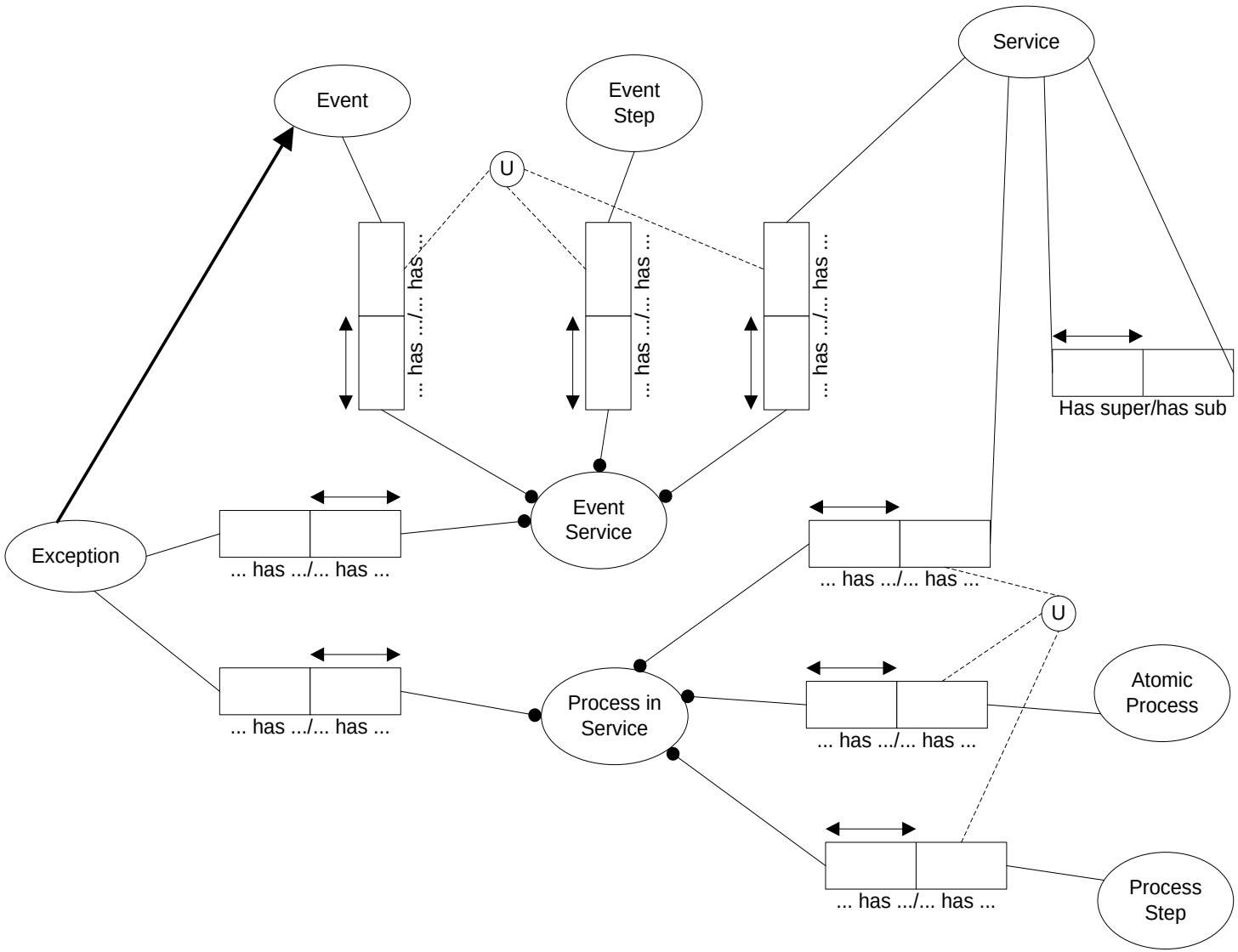
ORM Schema of Services Model….

- Extending the ISO 19763-5 metamodel to accommodate Services and Events
- Stitch together the processes for a service fabric…
- Relate the service to events…
- Accommodate the event with an event hierarchy…
- The ORM Schema of Services Model…

ORM Schema of the Service Model



Common Services Metadata

- Model of “Services” metadata includes…
  - Functionality metadata (the business…)
  - Technical metadata (the infrastructure…)
  - Context metadata (the mappings…)

- Services Category
  - Basic Services, Foundation Services, Management Services, Management Services, Security Services, Business Services, Identity Services….

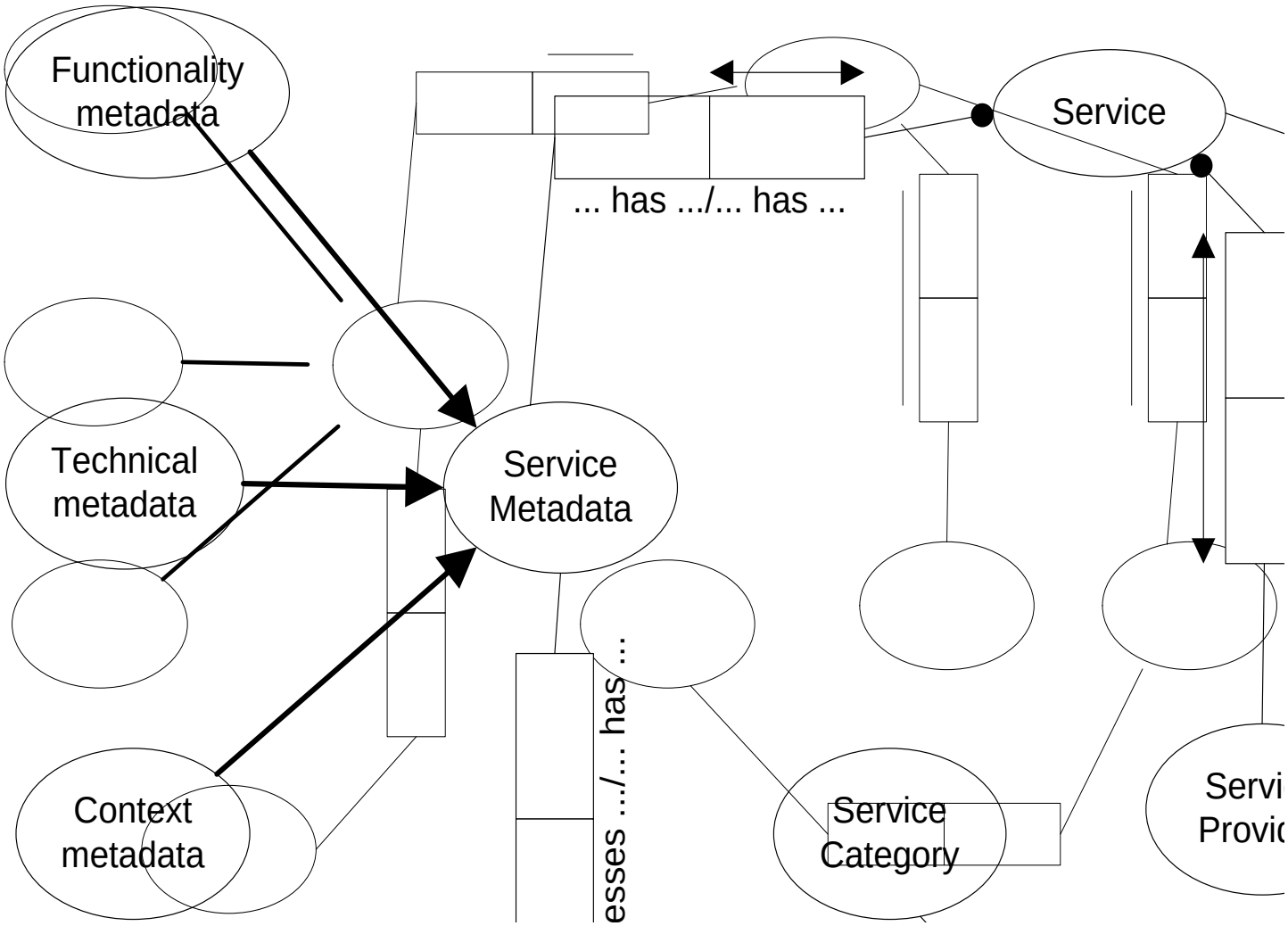
- The ORM Schema of the Common Services Metadata…

Services hierarchy….

- Services hierarchy to accommodate a “Service Decomposition”…
- Some ask..is “Service” a “Process”?.....

  Wo, Wo, Wo! There are differences…a process is performed in order to achieve a service deliverable, while a service is in itself deliverable component
  - a service is a commitment of the business to achieving an outcome
  - A process is a mechanism to deliver or achieve that outcome

ORM Schema of the Common Services Metadata



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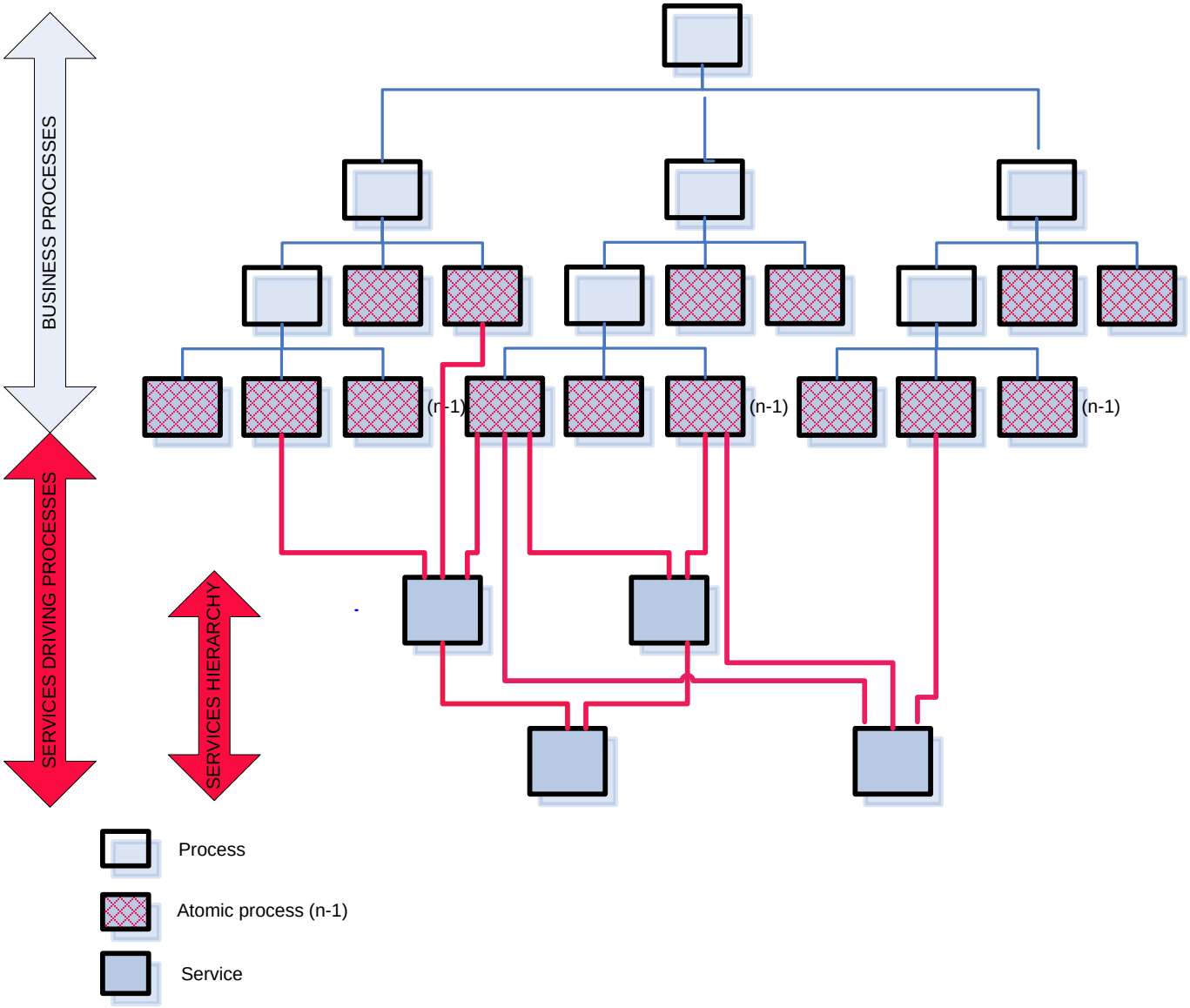
SOA Overlay based on Atomic Processes…

Or…How to avoid a spaghetti Services Oriented Architecture resulting from an ad hoc assembly of interwoven applications?

- Business Process Modelling is “top down”
- SOA is a bottom up procedure
  - Service requires the execution of one or more re-usable atomic processes as per the Event and Control Sequence models…
- Hey…you have something that works and is solid!!!

Overlay Positioning Services and Processes



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Summary

- Generally, processes and services lose emphasis on data and semantics
- Process sequencing buried in complex thread--- not flexible, not reusable, resulting in redundancies and anomalies
- These complex operations are essentially reusable elementary atomic processes
- ISO 19763-5 is extended with an ORM defined Service Model and Common Services Metadata model

Summary

- Secret is to unravel the complex thread and “insulate” a service by separating
  - Control and sequencing
  - Event driven services
  - Strong NIAM / ORM driven data schema containing business rules that were formerly interwoven
- Don’t knock it….it works…and works damn well!!!

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