

Usage of Business Process Choreography

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Agenda

- ◆ Introduction
- ◆ Lifecycle
 - Design phase
 - Usage phase
 - Managing phase
- ◆ Remarks

About this talk

- ◆ This talk is about possible usages with XML form of Business Process Choreography.
 - Before usage discussion, we will consider what it means by standardizing Business Process Choreography in XML, utilizing Web Services within Business Processes.
 - Focuses are on two kinds of usages, i.e. one in defining, and one in processing Business Process Choreography.

What is Process?

- ◆ Process* : A collection of steps taking place in a prescribed manner and leading to an objective.
 - A process may have multiple starting points and multiple end points.
 - The prescribed manner may be a partially ordered sequence.
 - A process specification can be a workflow specification.
 - An enterprise specification may define types of processes and may define process templates.

* from ITU-T Rec. X 911 | ISO/IEC 15414
RM-ODP Enterprise Language

What is Business Process and Choreography?

- ◆ Business Process: A collection of business steps taking place in a prescribed manner and leading to business objective, where all the terms used to describe business process are independent of specific technologies. (my definition)
- ◆ Choreography: “The sequence of steps and movements in dance, especially ballet.” (by The Concise Oxford Dictionary)

Business Process Choreography?

- ◆ Business Process constructed from Choreography of Web Services, or Web Services Choreography to form Business Process (my definition again)

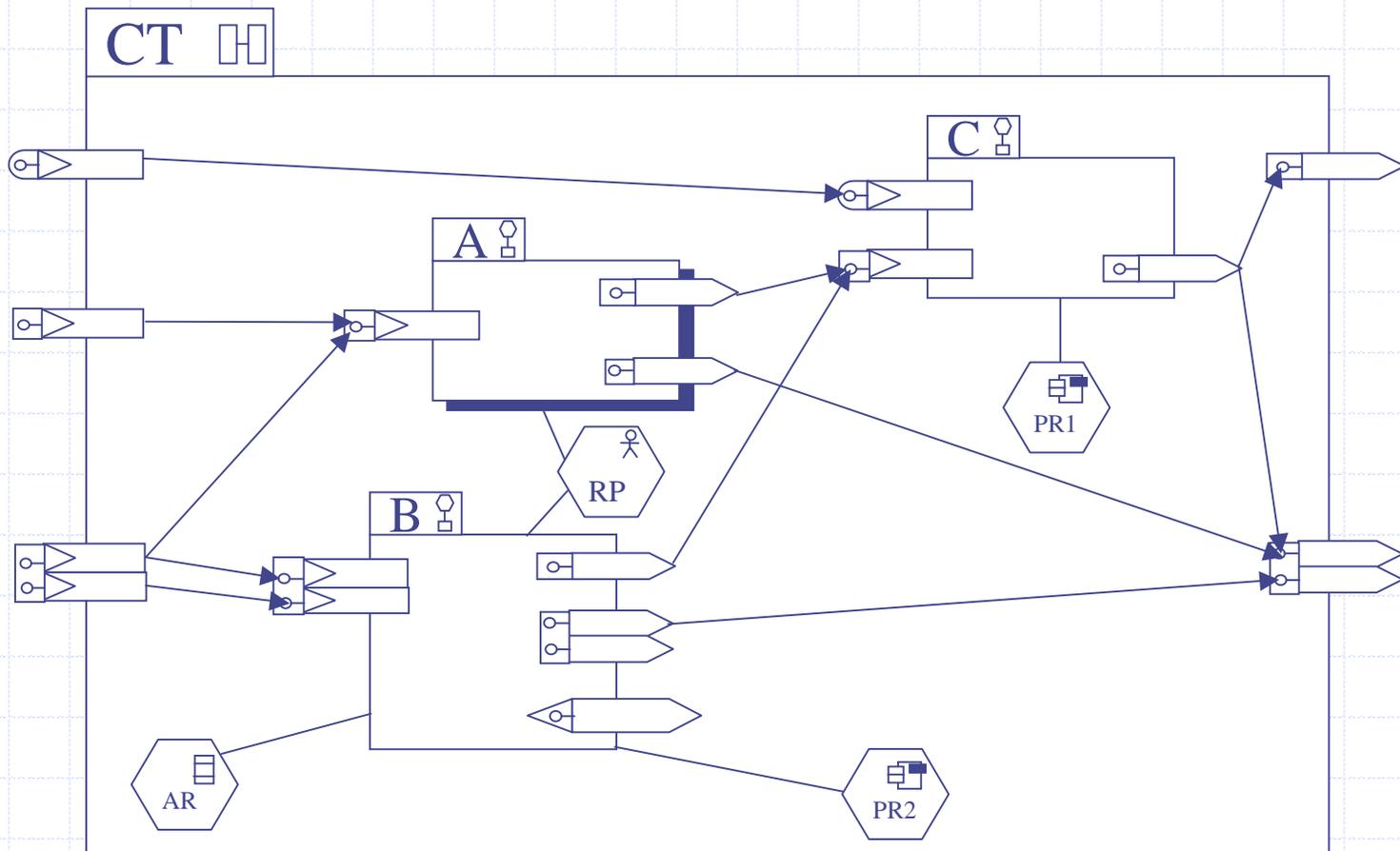
Business Process Modeling in OMG

- ◆ OMG has already developed specification for Business Process modeling, i.e. Business Process Profile in UML Profile for EDOC (Enterprise Distributed Object Computing).
- ◆ The specification defines a UML Profile (extension) to describe Business Process.

Business Process Profile

- ◆ Component Collaboration Architecture
 - Defines “ProcessComponent” as composable and de-composable modeling element with ports (interface) and protocol (behaviour) specification
- ◆ Business Process inherits above and defines:
 - CompoundTask (Process)
 - Activity (Step)
 - ProcessRole (Performer, Artifact, ResponsibleParty)
 - Data Flow and Event
 - ...

EDOC Business Process Notations



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Web Services?

- ◆ How is EDOC Business Process related to Web Services?
- ◆ Business Process Choreography is a kind of EDOC Business Process where:
 - All the ResponsibleParties are “Systems” (no human activities included), and
 - All the Activities are performed locally or using Web Services.

Languages/Notations

- ◆ Some languages/notations in this area:
 - BPML (BPMI)
 - BPSS (ebXML)
 - BPEL4WS
 - WSCI
 - WSCL
 - XPD (WfMC) etc.
 - And, any one of above should be able to describe EDOC Business Process (Choreography), because they have rich enough descriptive power.

Semantically Common Vocabularies/ Functions for BP Choreography

◆ From EDOC Business Process Profile:

- Process
- Activity
- Port
- Event
- Exception
- Data flow
- Flow patterns

BP Choreography Definitions as XML documents

- ◆ All the existing languages are XML based.
 - Because, XML is currently the most accepted standard for defining/processing structured documents.
- ◆ There are several aspects.
 - Since they are XML “documents,” they can be considered as “data.”
 - ◆ “Data” should be stored and managed, and may be modified.
 - ◆ “Data” could be sent as message content.
 - ◆ “Data” could be combined and/or refined.

Benefits

- ◆ People can understand and communicate with each other regarding business processes, because they are in text form (using XML tools).
- ◆ Systems can process them, because they are well structured (using interpreting software).
- ◆ And, more in the following slides.

BP Choreography Lifecycle

◆ Design (Defining) phase

- How can I define or construct BP Choreography?

◆ Use (Processing or executing) phase

- How can I find and make use of BP Choreography?

◆ Maintenance or management phase

- How can I modify my BP Choreography to keep up with the changing business environment?

Design and Use

- ◆ Defining XML documents is like creating office documents, so you will need:
 - Editing tools (with/without GUI) or white paper with your pen
 - Libraries (or fragments of usable XML documents)
 - Templates (for instantiation)
 - Composition/Decomposition tools (reuse of existing XML documents), and Basic Control Flow Pattern libraries
 - Optimization tools
- ◆ Processing of XML documents:
 - Issues: by whom, from where, when, and how?

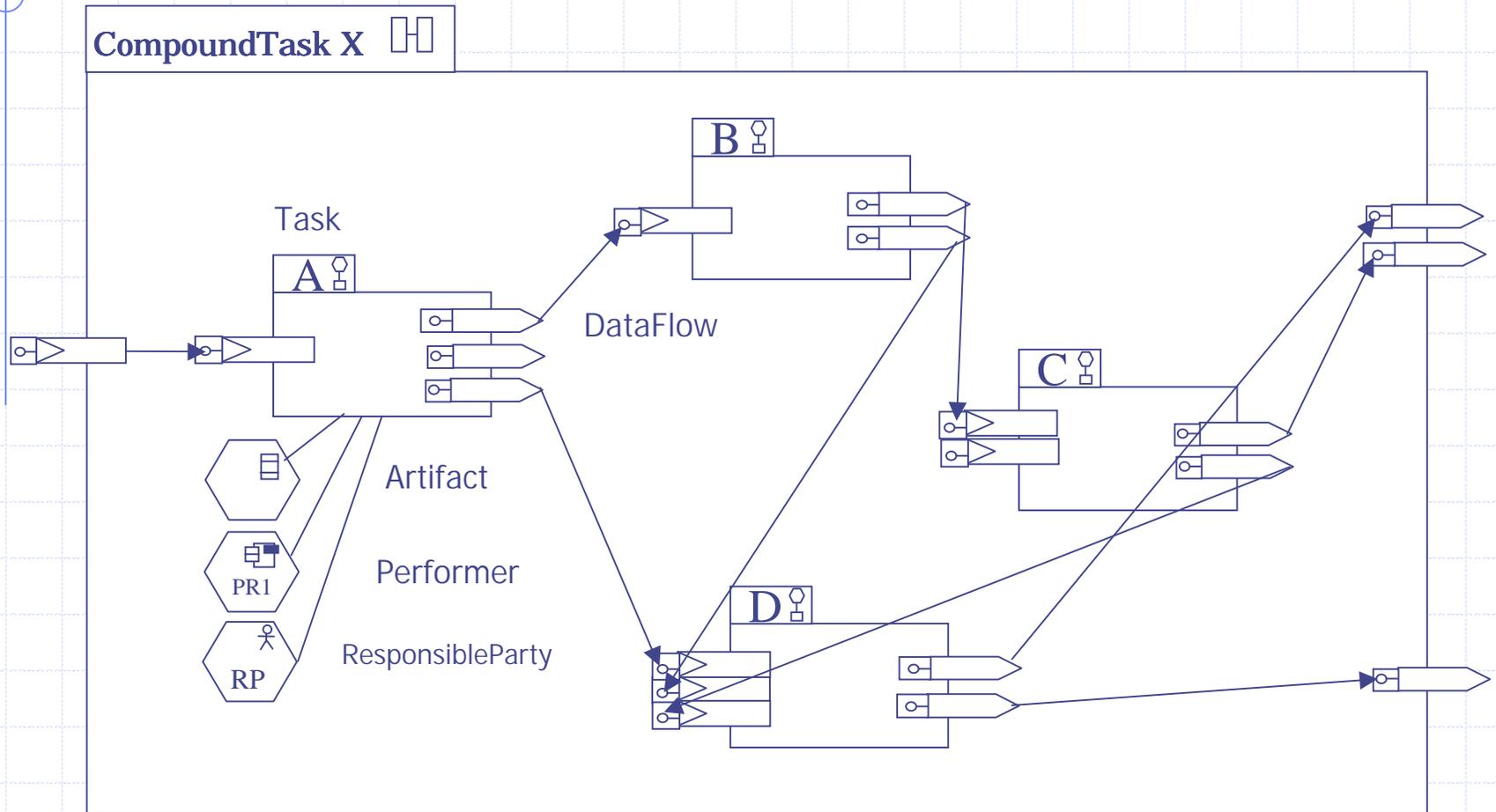
BP Choreography Design

- ◆ Requirements or UML diagrams (or EDOC Business Process Diagram) describing a sequence of steps to achieve its business objective
- ◆ Structural consideration
- ◆ Libraries
 - Template library
 - Parts library
 - Control Flow Pattern library
 - Existing BP Choreography Definitions library

Structural aspects

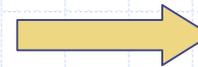
- ◆ Business Process may be hierarchical.
 - e.g. business processes defined according to organizational structure
- ◆ Business Process may be recursive.
 - e.g. to achieve various types of “loops”
- ◆ Business Process may have association or channel with other Business Processes.
 - e.g. to provide and/or get information with each others

An example



Re-use

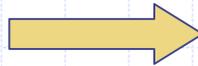
- ◆ Find the suitable & proven BP Choreography data
 - Meta-data or classification data useful
- ◆ Use it as is or adapt it for your needs



BPC Library

Template Library

- ◆ Find the suitable & proven BP Choreography template data
 - Meta-data or classification data useful
 - Provide information (e.g. parameters) to instantiate the business process choreography to meet your needs



BPC Templates Library

Parts or pattern Library

◆ Find the suitable & proven BP Choreography parts data

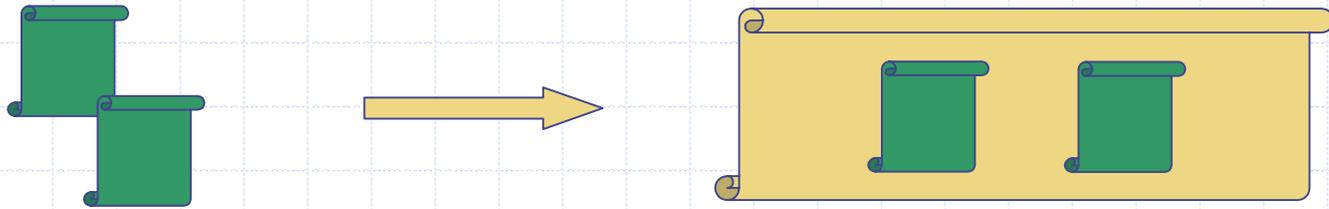
- Meta-data or classification data useful
- Use parts to create the business process choreography to meet your needs
- May require tools



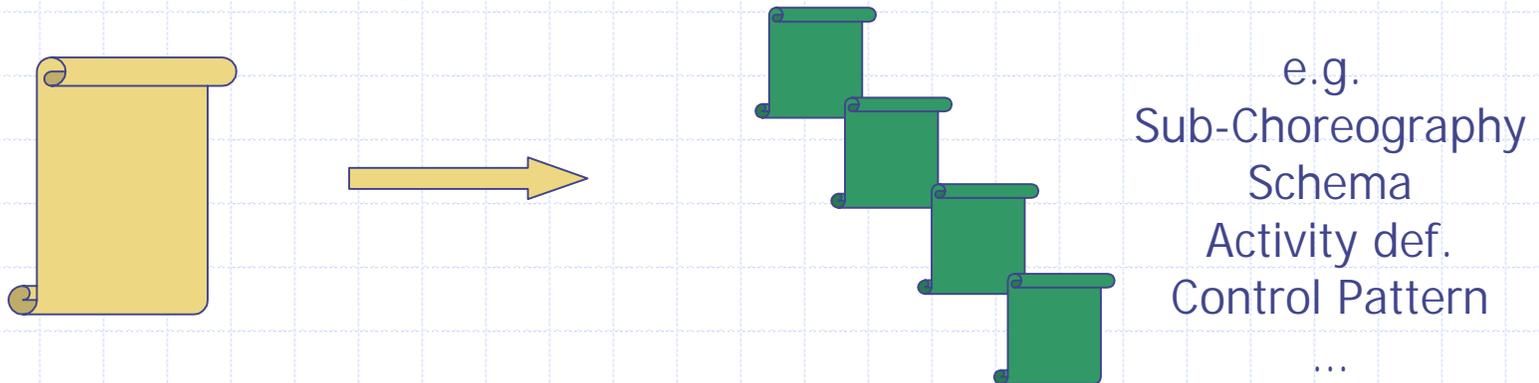
BPC Parts Library

Composition/Decomposition

◆ Composing BP Choreography



◆ Decomposing BP Choreography



Basic Control Patterns

- ◆ Some example of basic control patterns
 - Chain (sequencing)
 - Joining
 - Dividing
 - ◆ Spawn (parallel execution w/o joining)
 - ◆ Fork (parallel execution w joining)
 - Nesting
 - Looping
 - Conditional Branch

Refine or Optimization

◆ Necessary when:

- configuration of systems change (including introduction of new sub-systems), or
- when two or more choreographies are composed into one (there may be some redundancies or different policies or ...)

◆ Remember a term “BPR”? It is about reengineering (refining, optimizing) business processes.

BP Choreography Usage

- ◆ Dynamic or Runtime Usage (Processing)
 - Register business process choreography document
 - ◆ to public registry (possibly with BP Language ID)
 - Discover and instantiate business process choreography document
 - ◆ discovery by enquiry, or
 - ◆ discovery by notification (publish/subscribe)
 - ◆ instantiation with e.g. initial value provision
 - Drive business process
 - ◆ from central control node
 - ◆ from multiple control nodes (hierarchical)
 - ◆ from each participating node

Registration or Publication

◆ Web Services based

- Put it on private registry and share them within e.g. the enterprise.
- Put it on public registry for search and access

◆ Proactive publication

- Publicize it to parties and systems via notifications (e.g. email, messaging, and pub/sub notification)

Discovery

◆ Enquiry

- To private registry
- To public registry
- To known systems

◆ Getting notified

- Email
- messaging
- Pub/Sub notification

Instantiation

- ◆ Based on the following:
 - Business Process Choreography Data
 - Business Process Choreography Template
 - Business Process Choreography Parts
 - Business Process Choreography Control Pattern Parts

- ◆ Construct complete Business Process Choreography and provide “values” to make it ready for execution

Processing style

- ◆ A term just for this presentation
- ◆ A target of “Technology Mapping” in OMG Model Driven Architecture where:
 - Platform Independent Model = Business Process Choreography/Definition
 - Platform Specific Model = Models described with specific “Processing style” with more details (e.g. model for CORBA system or model for .NET)

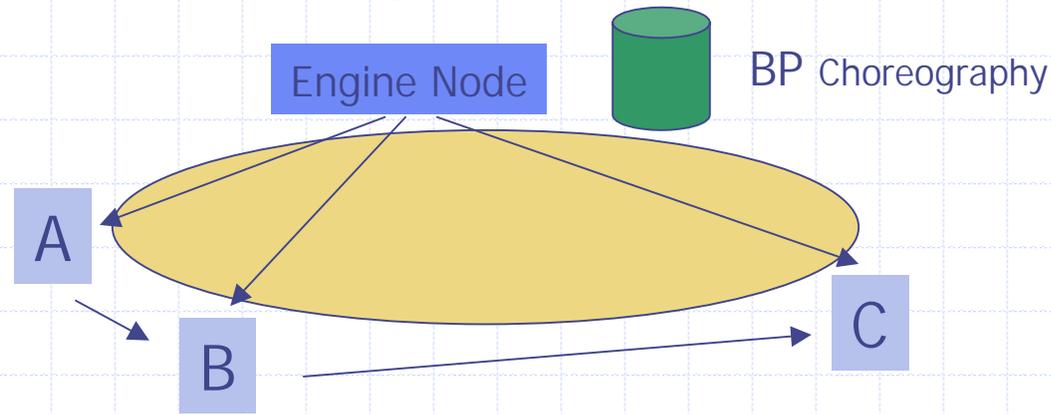
Processing style

- ◆ Central Control (no central reference)
 - BP Choreography is processed at Central Control system, and Web Services is used to request services provided by each participating systems.
- ◆ Central Reference (no central control)
 - BP Choreography is placed on central server and is accessed from participating systems.
- ◆ Multiple Copies (no central control)
 - BP Choreography is copied and placed on every system for execution of each part.
- ◆ Distributed Control (no central control)
 - BP Choreography itself is communicated among participants for execution of each part.

Central Control

◆ Central Control (no central reference)

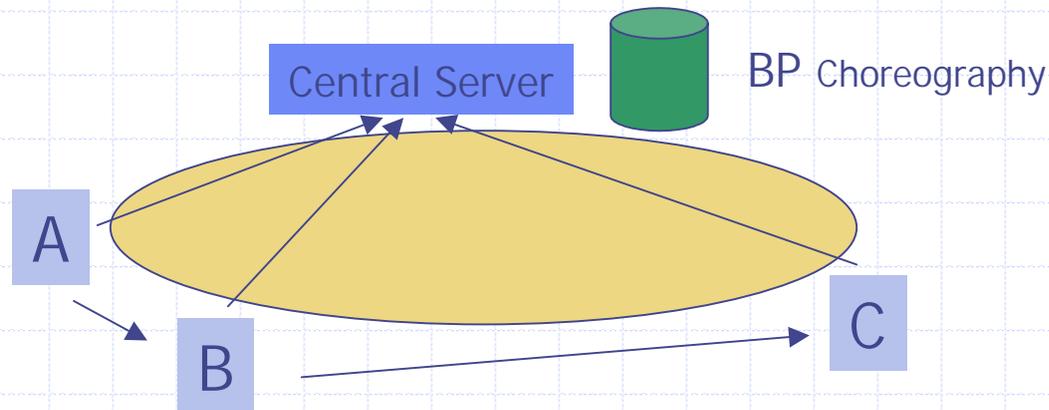
- BP Choreography is processed at Central Control system, and Web Services is used to request services provided by each participating systems.
- Like Workflow Engine



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Central Reference

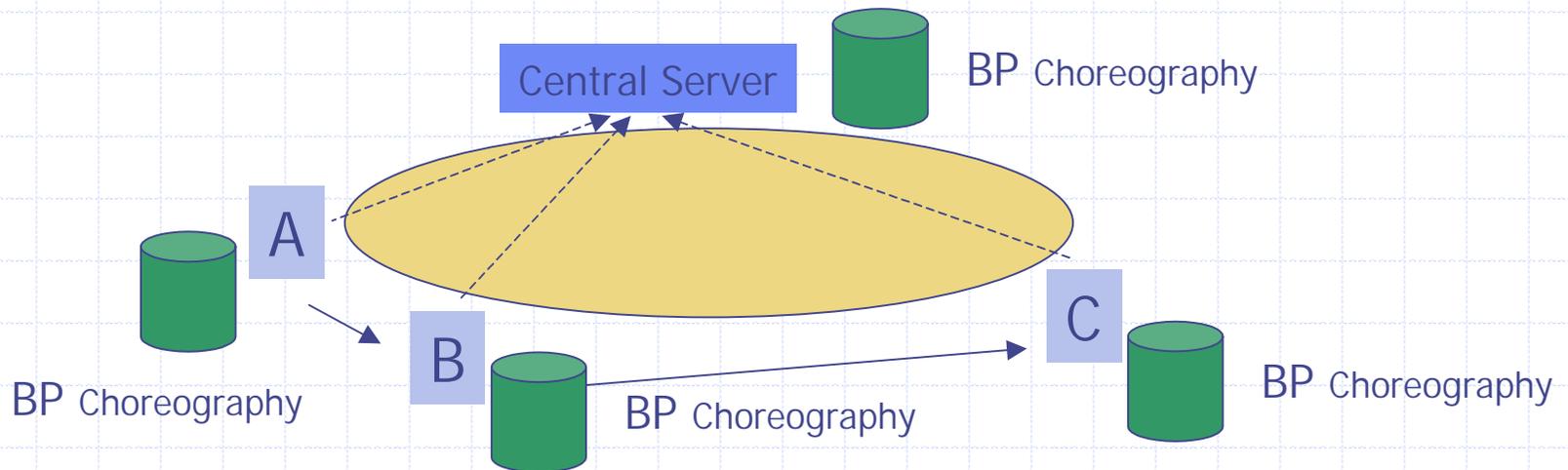
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Multiple Copies

◆ Multiple Copies (no central control)

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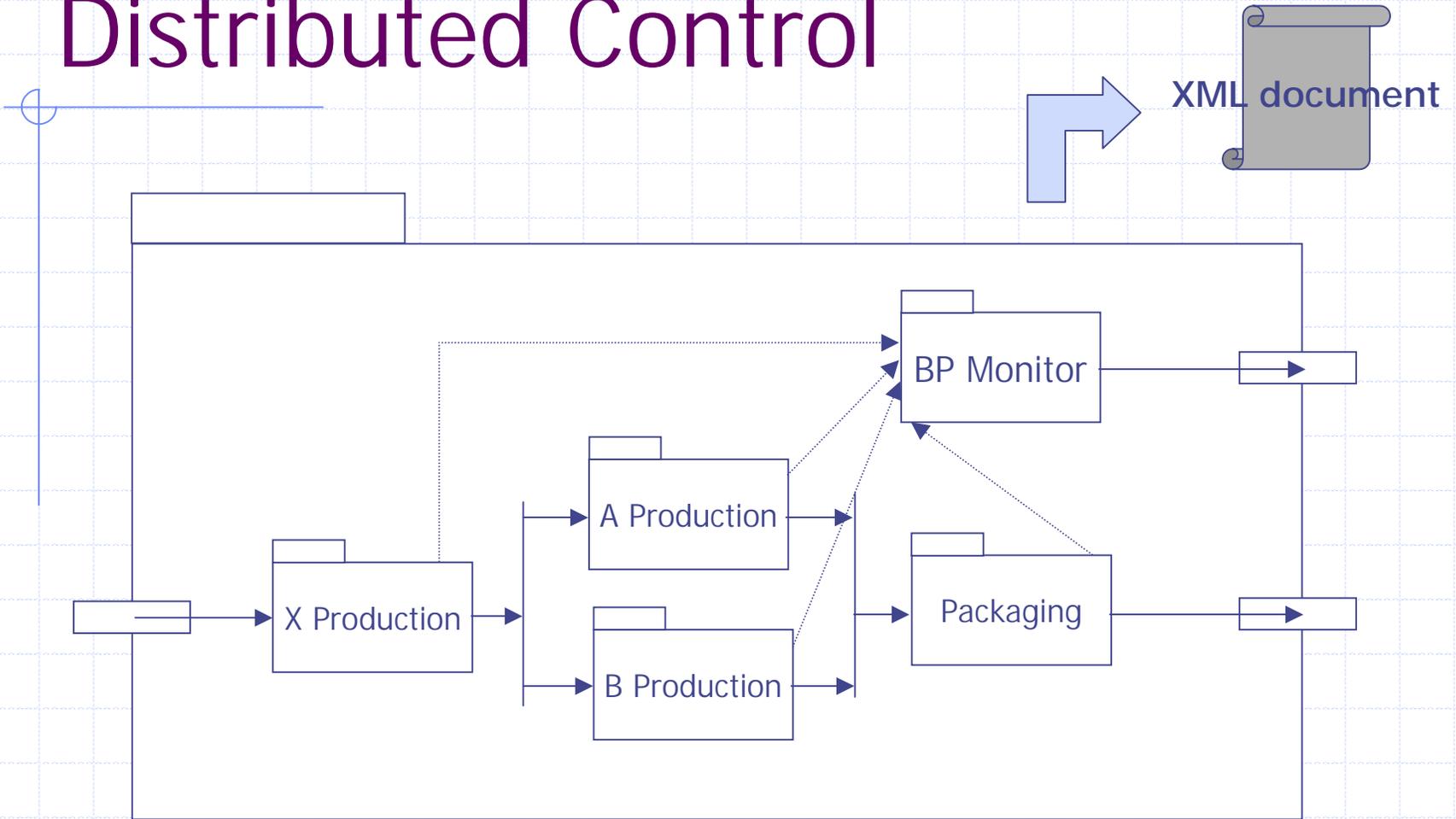
Distributed Control

- ◆ Distributed Control (no central control)
 - BP Choreography itself may be communicated among participants for execution of each part.
 - Combination of BP Choreography and Distributed Computing framework

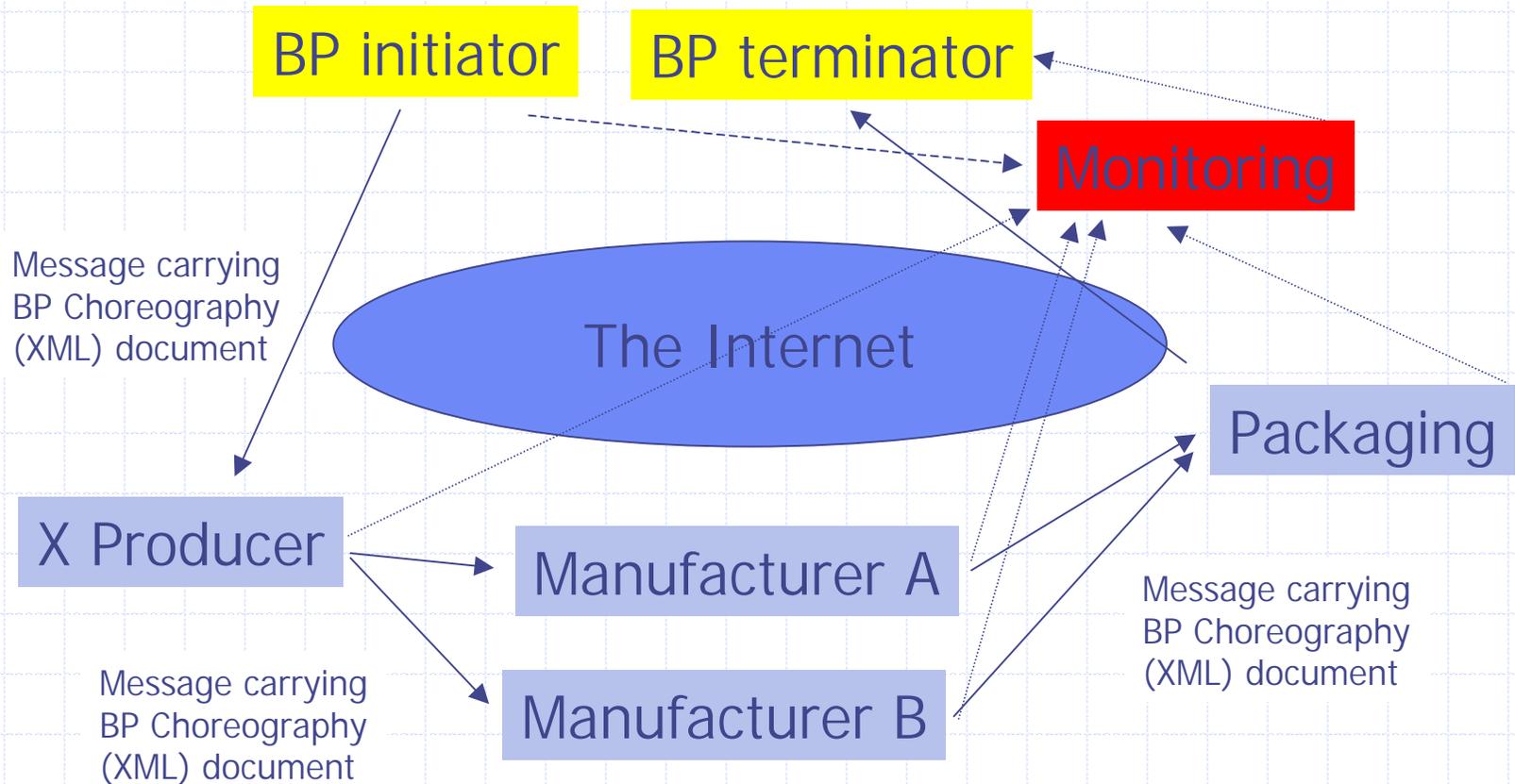
Distributed Control

- ◆ A simple B2B example:
 - Purchase raw material of X
 - Dependent on the quality of delivered X, purchased material will be divided into two sets and provided to:
 - ◆ Manufacturer XA to produce product A, for X with quality grade $\geq G$
 - ◆ Manufacturer XB to produce product B, for X with quality grade $< G$
 - After production is complete, products are shipped to packaging company (the company starts packaging when both products arrives)

Distributed Control



Distributed Control



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Distributed Control

◆ What's good about this?

- Control is distributed (no central authority) therefore every participant can be equally autonomous.
- A system executing the next step could be discovered dynamically (with UDDI etc.)
- Executing systems can perform their tasks with good understanding of the business context.

◆ Trade-offs

- Monitor is needed for tracking and initiating compensation actions when necessary.
- Requires interpreting software.
- May require more security e.g. digital signature.

Managing BP Choreography Data

◆ XML document is Data:

- May be managed by Web Server and DBMS
 - ◆ Needs security capability
 - ◆ Access control, digital signature, etc.
- Updated by Update Transactions
 - ◆ Needs transaction capability
 - ◆ May be a part of Business Process (updating Business Process Choreography Data)

Remarks

- ◆ Once captured as XML document, Business Process Choreography or Web Services Choreography becomes data.
- ◆ Data can be managed centrally or distributed (DBMS).
- ◆ There are two phases regarding data: designing/defining and using/processing
- ◆ Processing of BP XML data should be looked at with processing styles (abstract platforms).
- ◆ Central control is not the only solution.

References

- ◆ UML & UML Profile for EDOC
 - http://www.omg.org/technology/documents/modeling_spec_catalog.htm
- ◆ W3C Web Services Choreography WG
 - <http://www.w3.org/2002/ws/chor/>
- ◆ OMG Web Services Workshop 2002 Proceedings



Thank you very much for listening!

Any questions or comments?