XML architectures for electronic business-to-business

By

Peter Stamps

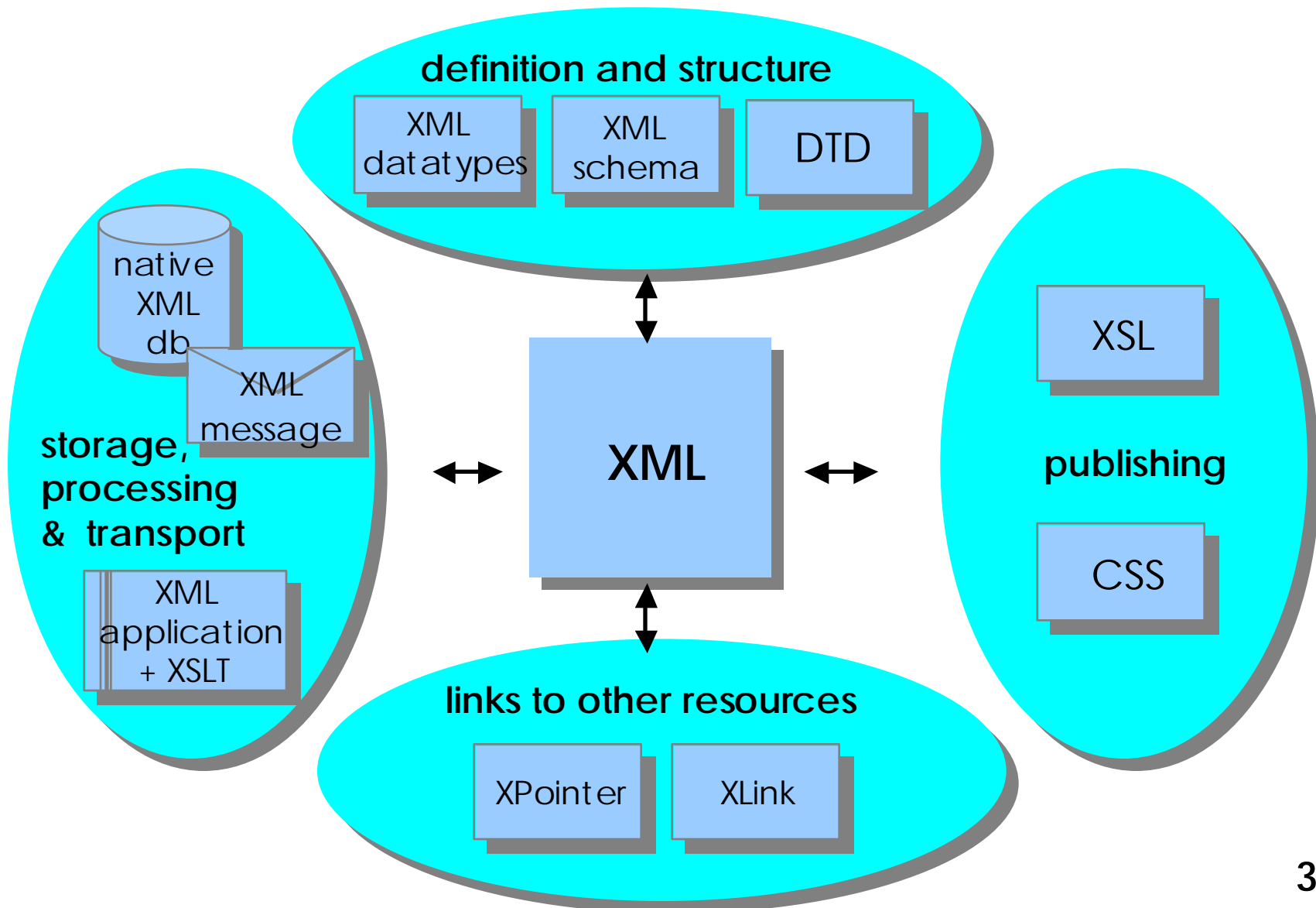March 28, 2001

SOFTWARE AG
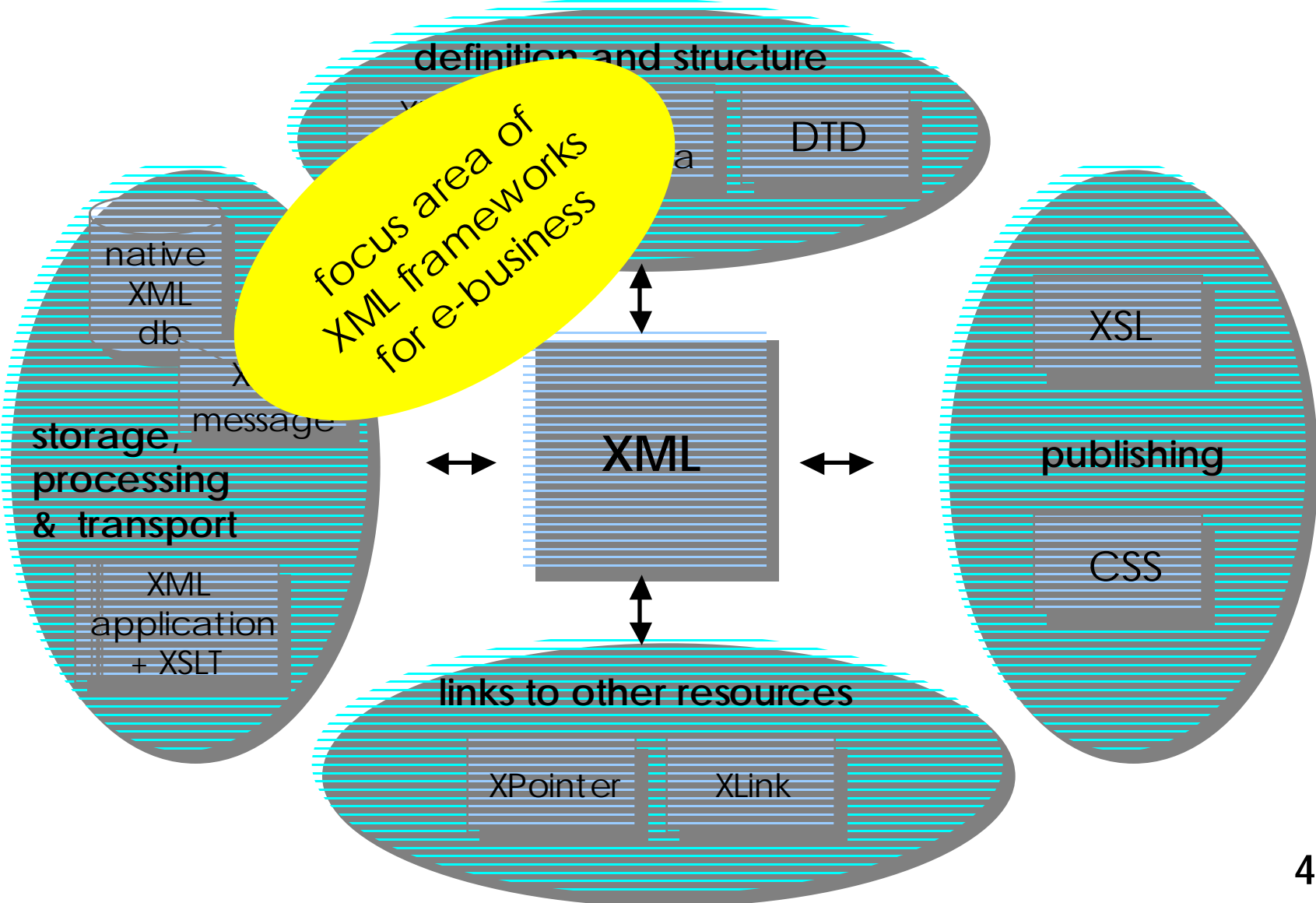
\<Agenda\>

➢ **XML usage & frameworks**

➢ **ebXML / BizTalk /eCo**

- Concepts
- Architecture
- Models

➢ **Architecture of XML message broker**

➢ **B2B scenario using XML messages**

➢ **Exchange implies storage**

- Native or in tables?

➢ **Working together**

- Classic systems with new XML based applications

<XML usage>

definition and structure

- XML datatypes
- XML schema
- DTD

storage, processing & transport

- native XML db
- XML message
- XML application + XSLT

XML

publishing

- XSL
- CSS

links to other resources

- XPointer
- XLink

3

<XML usage>

focus area of XML frameworks for e-business

definition and structure

DTD

native XML db

message

storage, processing & transport

XML application + XSLT

XML

XSL

publishing

CSS

links to other resources

XPointer   XLink

4

<Wellknown XML frameworks>

ebXML — Creating A Single Global Electronic Market (UN/CEFACT, OASIS)

➤ An **open XML-based infrastructure** enabling the global use of electronic business information in an interoperable, secure and consistent manner by all parties.
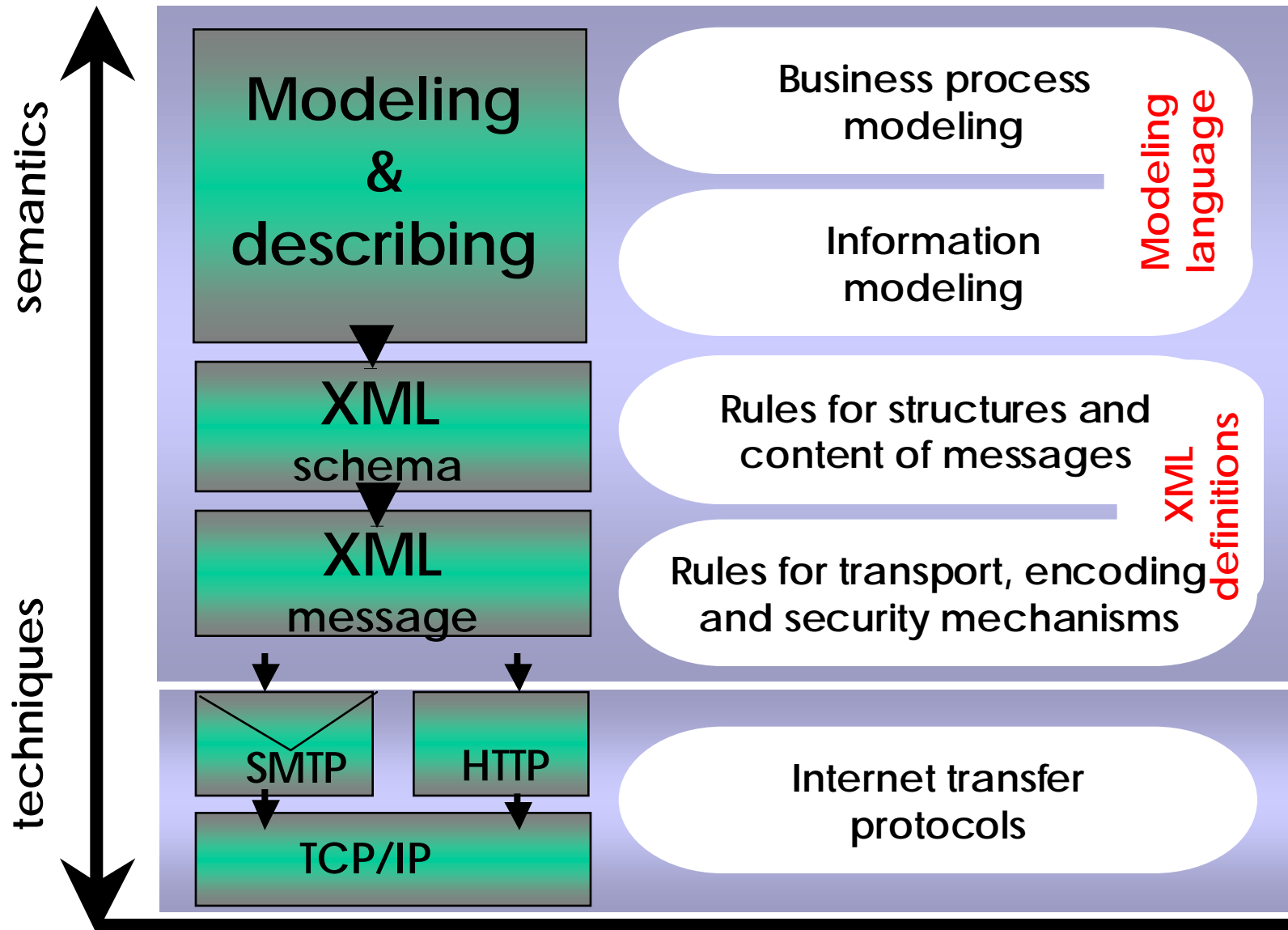
BizTalk — Enabling software to speak the language of business — Spotlight on XML

➤ The Microsoft (R) BizTalk framework is an **Extensible Markup Language (XML) framework** for application integration and electronic commerce.

eCo — THE eCo FRAMEWORK — A COMMERCENET PROJECT

➤ The eCo Specification is an **architectural framework** that enables businesses to discover each other on the World Wide Web and determine how they can do business
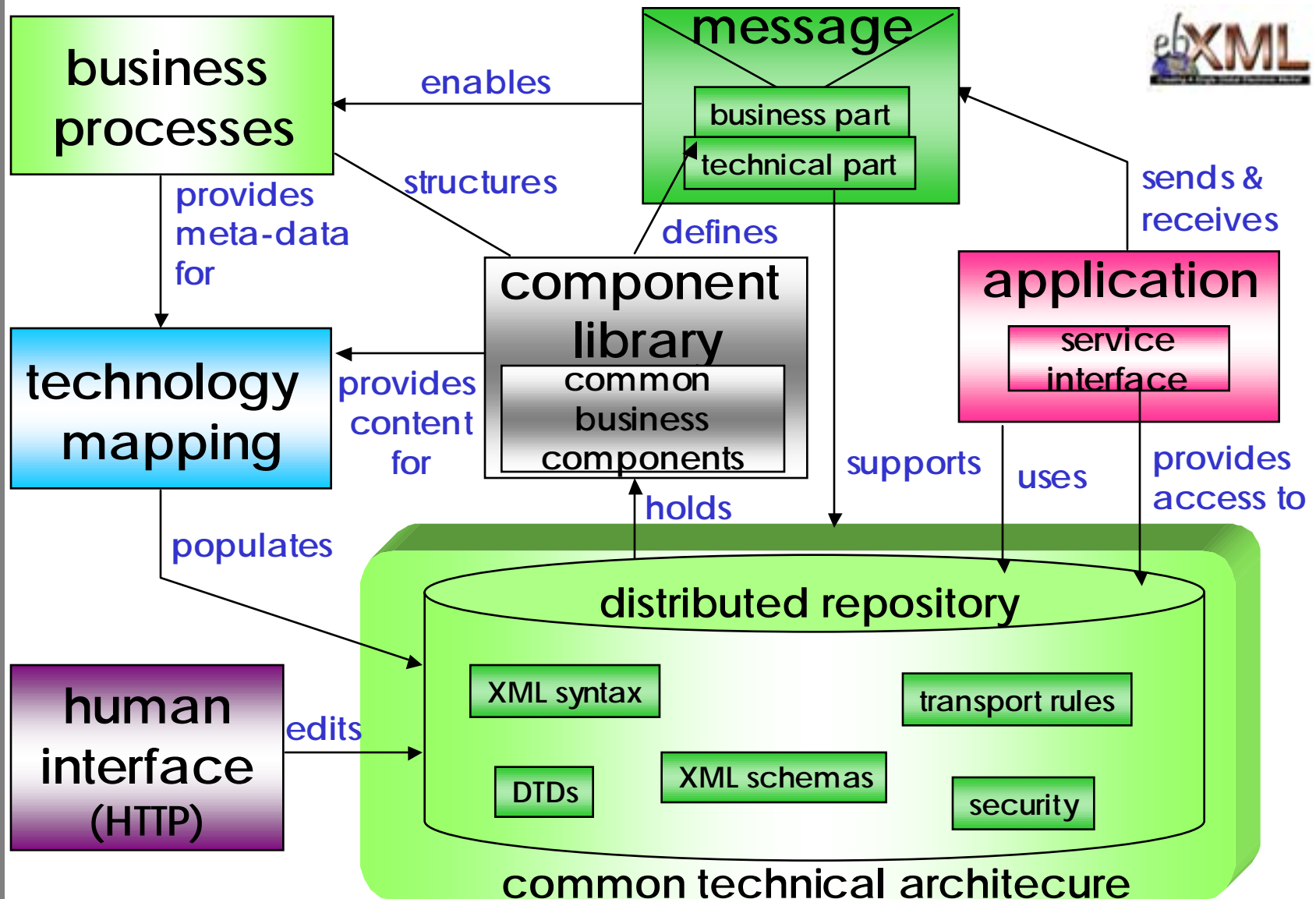
5

<Architecture XML framework>

Modeling & describing → Business process modeling, Information modeling (Modeling language)

XML schema → Rules for structures and content of messages (XML definitions)

XML message → Rules for transport, encoding and security mechanisms (XML definitions)

SMTP, HTTP, TCP/IP → Internet transfer protocols

semantics

techniques

6

<ebXML concepts & architecture>

➢ describes a business process and its associated information model

➢ registers and stores a business process and information meta model for sharing and reusing

➢ supports discovery of information about each participant

➢ describes a mutually agreed upon business arrangement

➢ describes a standardized business messaging service including configuration

business processes

enables

message

business part

technical part

structures

provides meta-data for

defines

sends & receives

component library

common business components

application

service interface

technology mapping

provides content for

supports

uses

provides access to

populates

holds

distributed repository

human interface
(HTTP)

edits

XML syntax

transport rules

DTDs

XML schemas

security

common technical architecure

8

<ebXML modeling techniques>

> **Requirements**
> (artifacts describing the problem)
> - **Use Case Diagrams**
> - **Descriptions**

> **Analysis**
> - **Activity diagrams**
> - **Sequence diagrams**
> - **Class diagrams**
>   **(capturing business messages)**

> **Design**
> (e.g. applying object-oriented principles)
> - **Collaboration diagrams**
> - **State diagrams**
> - **...**

Based on Unified Modeling Language

May be developed by industry groups, SMEs, and other organizations

9

business processes & information meta-models
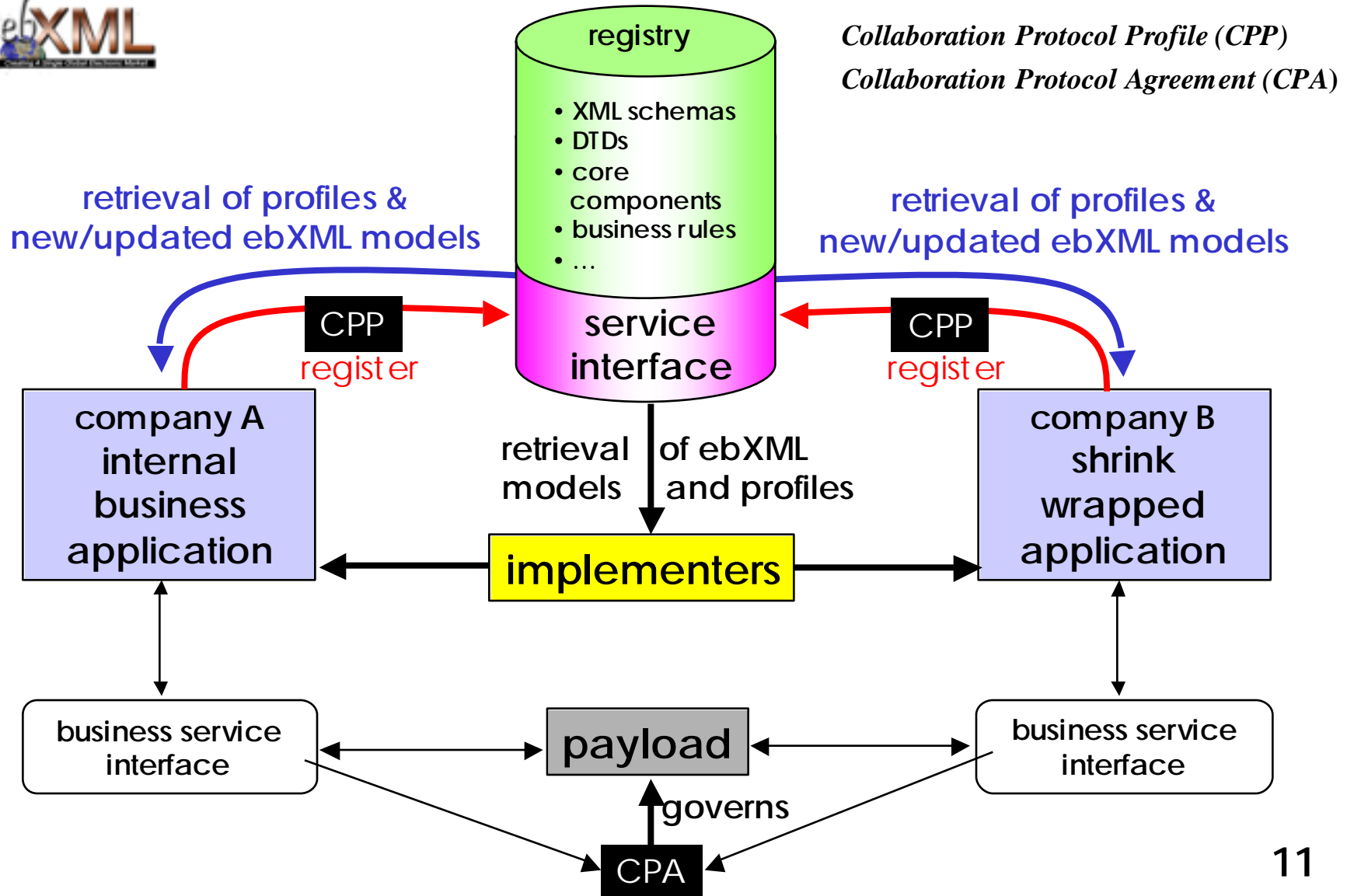documented using
UML

convert to XML and register

registry

- XML schemas
- DTDs
- core components
- business rules
- …

each item:
- is unique identifiable
- facilitates multilingual support
- is easy referenced

\<ebXML retrieving profiles & models\>

registry

- XML schemas
- DTDs
- core components
- business rules
- …

Collaboration Protocol Profile (CPP)

Collaboration Protocol Agreement (CPA)

retrieval of profiles & new/updated ebXML models

retrieval of profiles & new/updated ebXML models

CPP

register

service interface

CPP

register

company A internal business application

retrieval of ebXML models and profiles

company B shrink wrapped application

implementers

business service interface

payload

business service interface

governs

CPA

11

<ebXML transport envelop/payload>

ebXML

➤ **ebXML Message Envelope may be packaged using the MIME multipart/related content type**

➤ **may contain XML or other document formats e.g. images, text,...**

Transport Envelope (SMTP, HTTP, etc.)

ebXML Message Envelope (MIME multipart/related)

ebXML Header Envelope

ebXML Header Document

Manifest

Header

ebXML Header Container

ebXML Payload Envelope

Payload Document(s)

ebXML Payload Container

12

<ebXML message meta data>
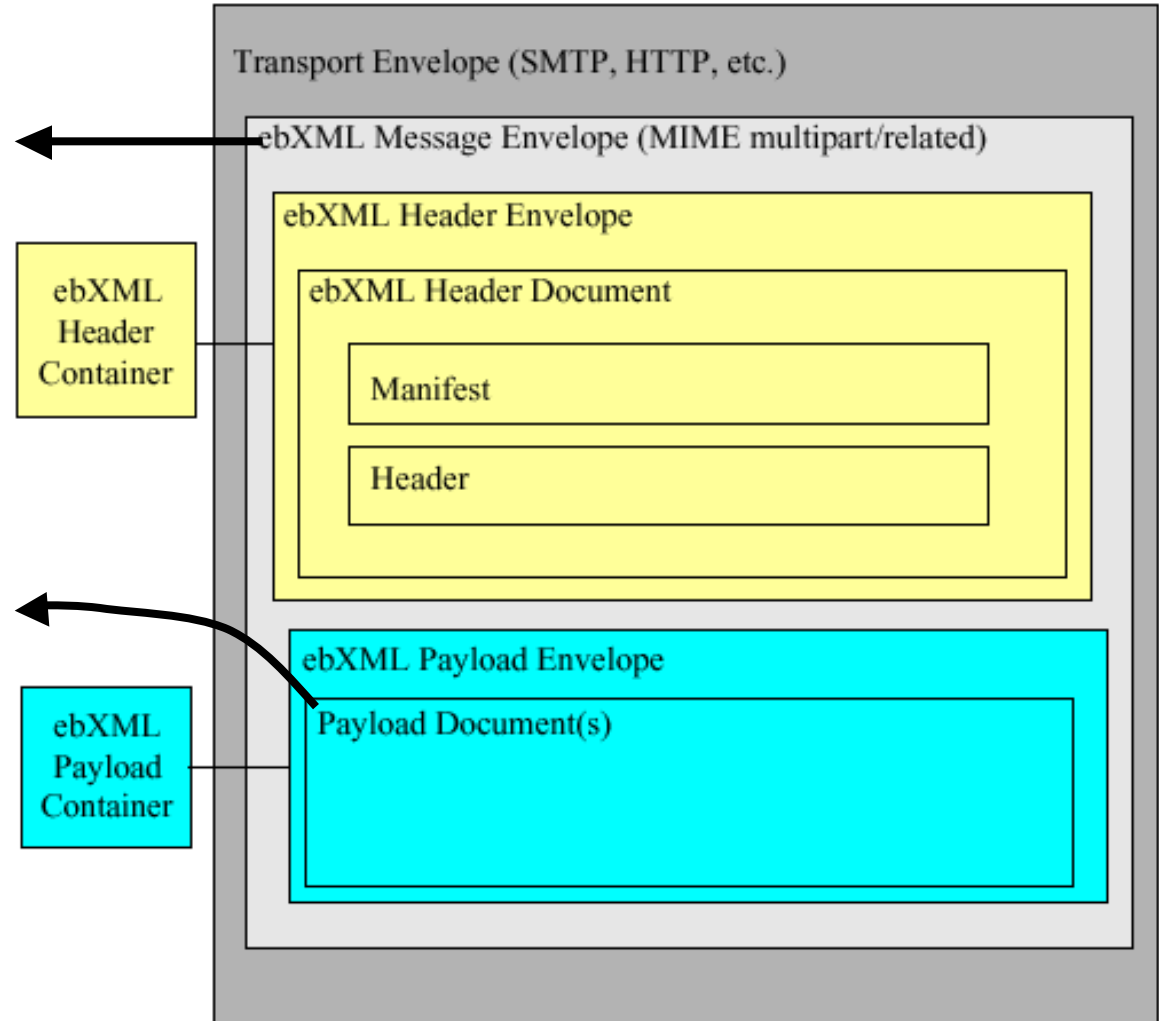
message example	
`<?xml version="1.0" encoding="UTF-8"?>`	
`<ebXML>`	root tag `<ebXML>`

`<routing version="1.0">`
`  <from>Trading Partner 1</from>`
`  <to>Trading Partner 2</to>`
`</routing>`
	routing information
	(a technical component)

`<process  type="Purchase_Order"`
`  version="1.17" owner="my_company"`
`  location=www.myc-repository.com/maps/>`
`…..`
`…..`
`</ebXML>`
	business process
	information incl. location
	for mapping template

13

trading partner 1

🚫

trading partner 2

X12

HL7

X12 to cbXML

ebXML

ebXML compliant application

cbXML to HL7

includes message brokering features

human interface
(HTTP)

(manual) search for mapping templates

registry

index service interface

• XML schemas
• DTDs
• core components
• business rules
• …

14

<BizTalk concepts & architecture>
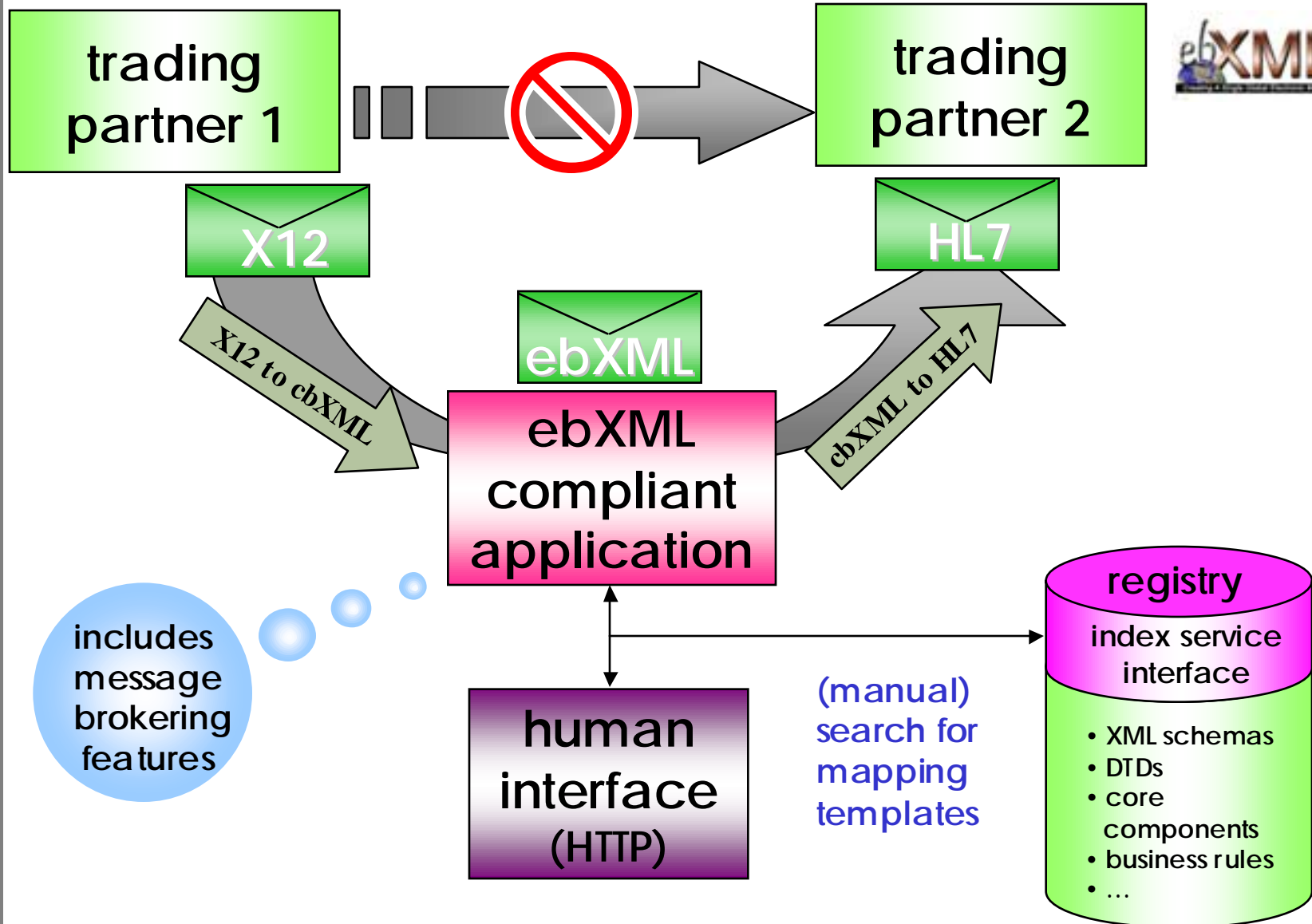
BizTalk

- ➤ is build on W3C XML standards

- ➤ provides implementation guidelines for XML-based document routing and exchange

- ➤ supports SOAP 1.1 for standards based messaging

- ➤ offers MIME support for business document attachments

- ➤ supplies message protocol support (HTTP, SMTP,…)

- ➤ encloses www.BizTalk.org: community and library

- ➤ includes Microsoft's products and tools

<BizTalk modeling tools>

BizTalk

➢ **Business processes are described in XLANG using the Visual XLANG Designer**
(tool based on Visio)

➢ **XML documents can be edited with BizTalk Editor**
(or other compliant editors: XMetaL, XML Spy)

➢ **XML documents can be mapped to other formats and transport protocols using BizTalk Mapper**
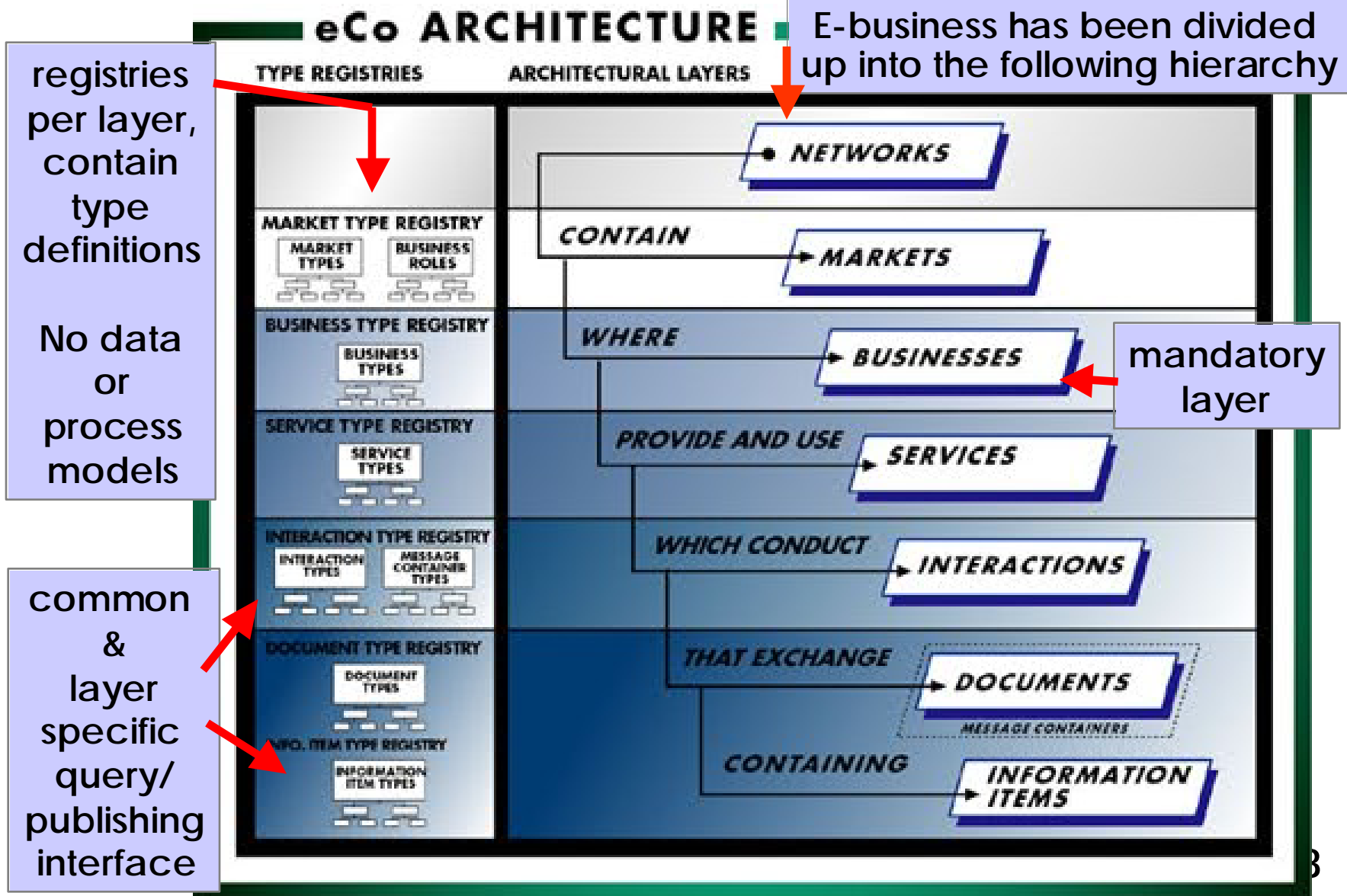
➢ **CommerceNet's eCo is an architecture and a set of semantic recommendations**

➢ **eCo focuses on interaction between business partners** (primarily HTTP(S) based)

➢ **eCo describes an e-commerce system in seven layers**

➢ **Each layer can type itself by referencing type definitions in one or more registries** (except network layer)

<eCo architecture>

eCo ARCHITECTURE

TYPE REGISTRIES   ARCHITECTURAL LAYERS

registries per layer, contain type definitions

No data or process models

common & layer specific query/ publishing interface

E-business has been divided up into the following hierarchy

mandatory layer

MARKET TYPE REGISTRY
MARKET TYPES   BUSINESS ROLES

BUSINESS TYPE REGISTRY
BUSINESS TYPES

SERVICE TYPE REGISTRY
SERVICE TYPES

INTERACTION TYPE REGISTRY
INTERACTION TYPES   MESSAGE CONTAINER TYPES

DOCUMENT TYPE REGISTRY
DOCUMENT TYPES

INFO. ITEM TYPE REGISTRY
INFORMATION ITEM TYPES

NETWORKS

CONTAIN → MARKETS

WHERE → BUSINESSES

PROVIDE AND USE → SERVICES

WHICH CONDUCT → INTERACTIONS

THAT EXCHANGE → DOCUMENTS

MESSAGE CONTAINERS

CONTAINING → INFORMATION ITEMS

➢ Example:
  query to a company's public interface and retrieve
  a list of services it offers:
  http://www.mycompany.com/BusinessGetServices

➢ This returns a XML document according to the
  EcoInterfaceList.dtd,
  which presents information about
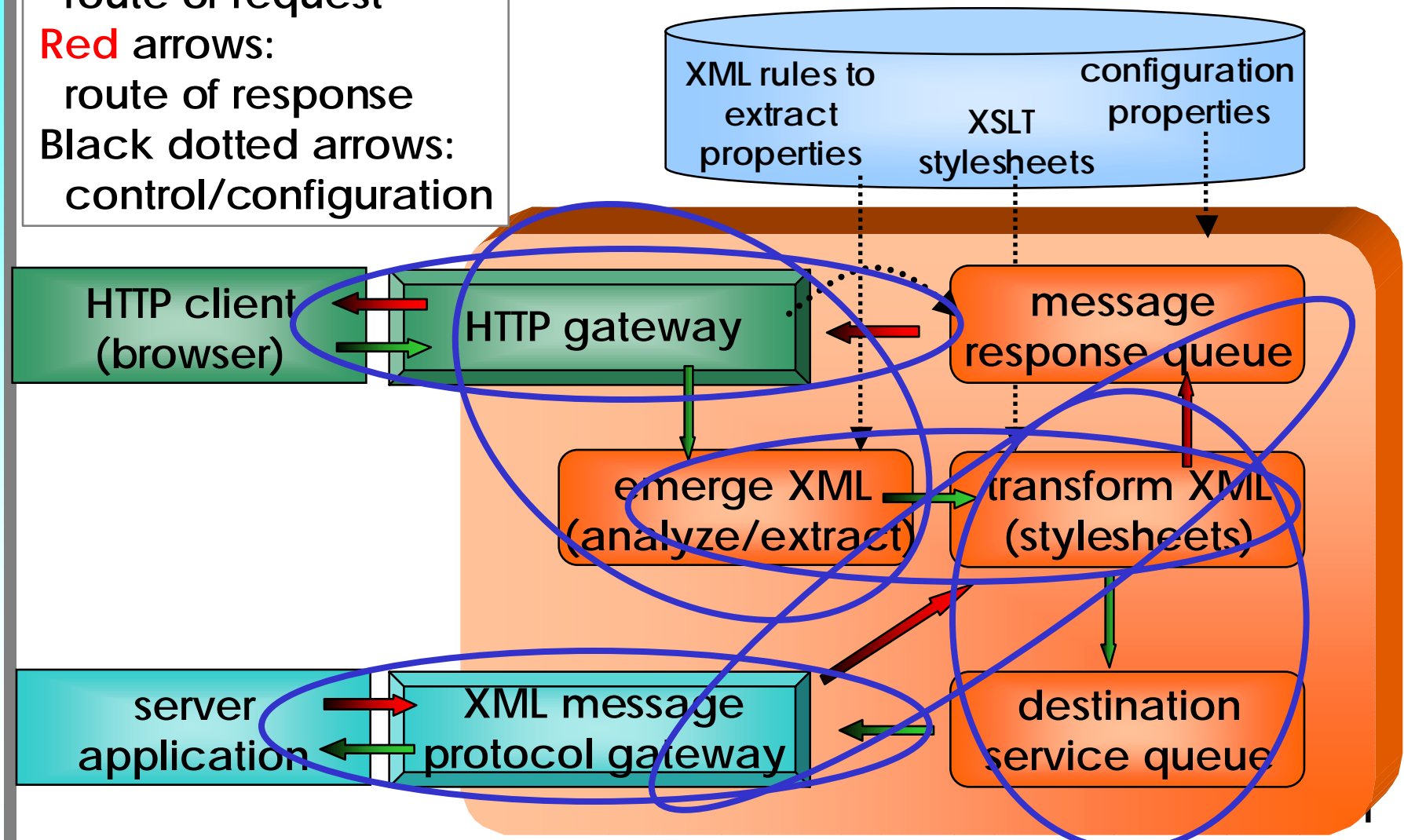 published interfaces

<Summary ebXML & BizTalk & eCo>

ebXML + BizTalk + eco

➢ concepts for **exchanging** business data

ebXML + BizTalk
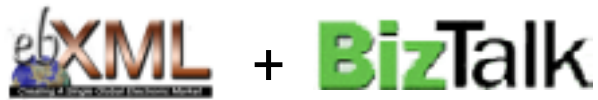
➢ a high-level design for attaching "payload" content to routing messages

➢ a specific XML schema for the "envelope"

\<Architecture XML message broker\>

Green arrows:
 route of request
Red arrows:
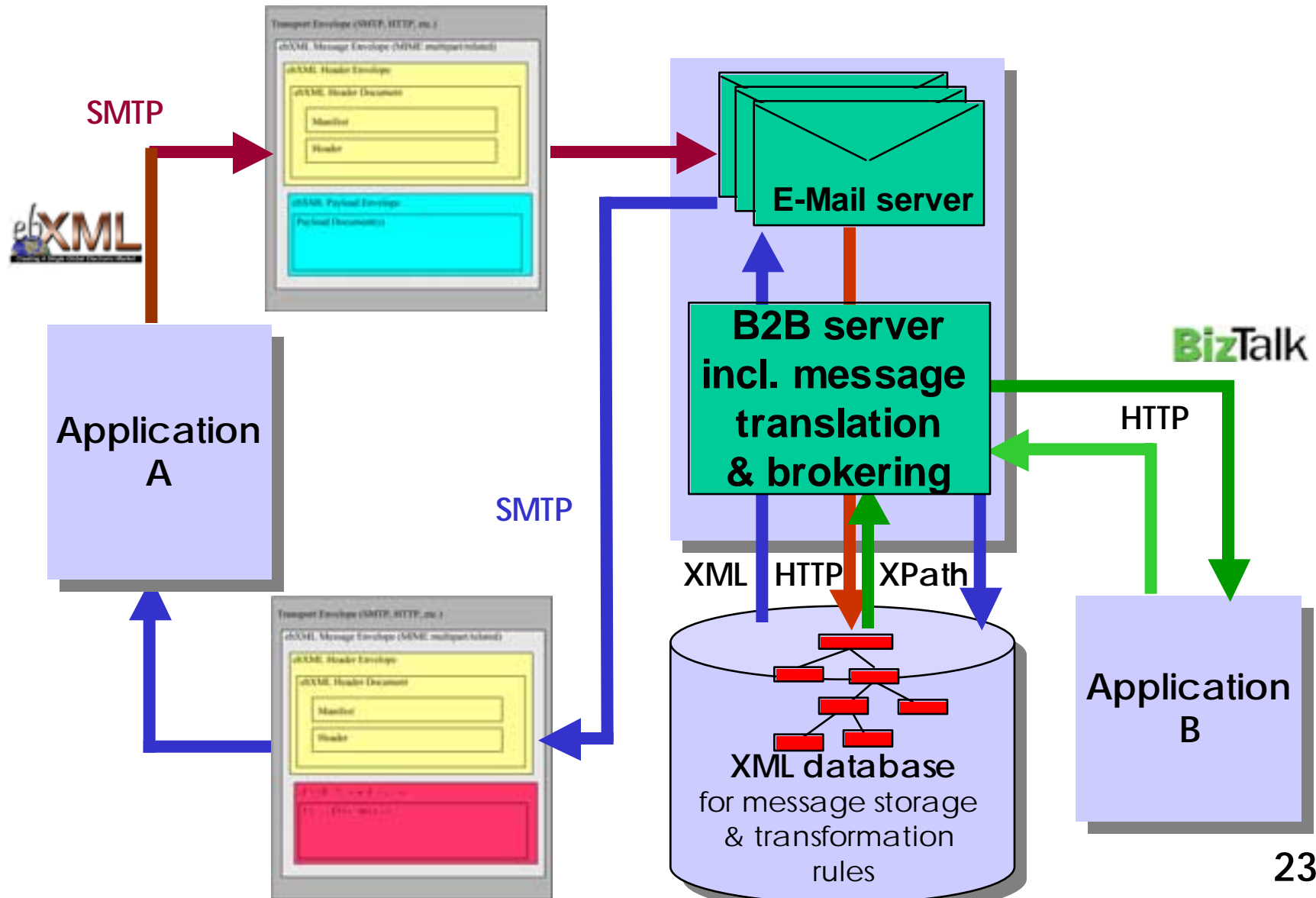 route of response
Black dotted arrows:
 control/configuration

XML rules to extract properties
XSLT stylesheets
configuration properties

HTTP client (browser)

HTTP gateway

message response queue

emerge XML (analyze/extract)

transform XML (stylesheets)

server application

XML message protocol gateway

destination service queue

\<Architecture XML message broker\>

Green arrows:
 route of request
Red arrows:
 route of response
Black dotted arrows:
 control/configuration

XML rules to extract properties

configuration properties

XSLT stylesheets

HTTP client (browser)

HTTP gateway

message response queue

emerge XML (analyze/extract)

transform XML (stylesheets)

server application

XML message protocol gateway

destination service queue

SMTP

E-Mail server

B2B server incl. message translation & brokering

HTTP

BizTalk

Application A

SMTP

XML   HTTP   XPath

Application B

XML database
for message storage
& transformation
rules

23

➢ **E-Business:**

→ exchanging electronic business information representing value (transactions)

➢ **It is about money, so:**

→ *need to* **apply legal & tax rules**

→ *need for* **auditing**

→ *need to* **keep information secured**

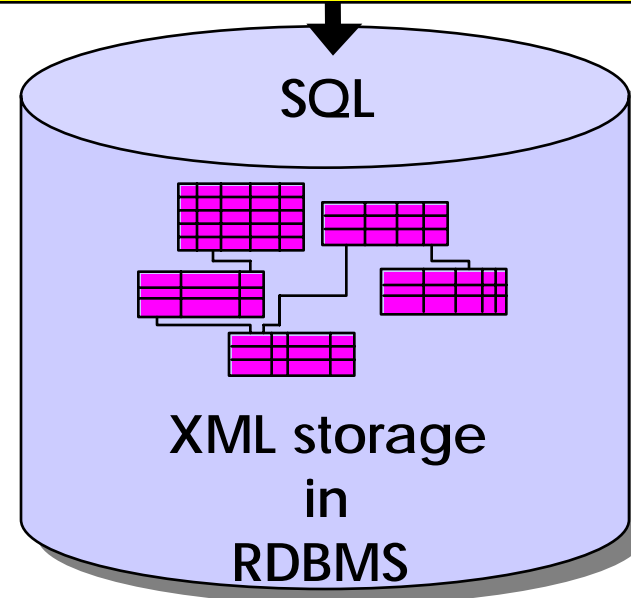→ *need to* **store & retrieve information**
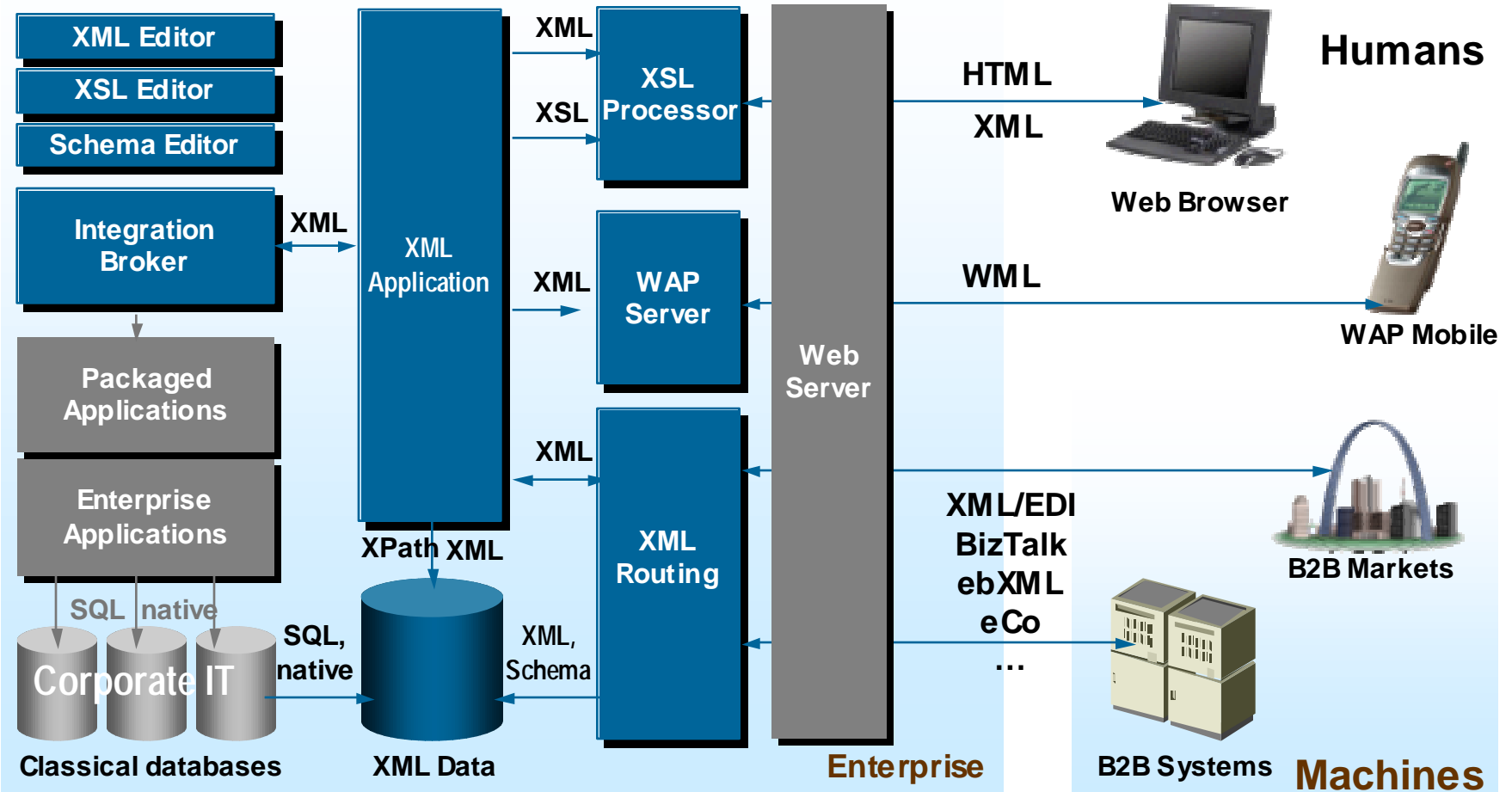
<Storage in XML or SQL database?>
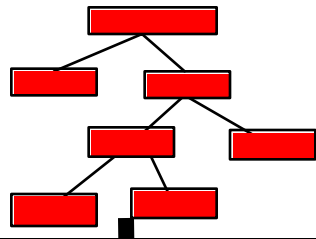
- no conversion needed
- no loss of semantic / sequence
- same as original: digital signature
- direct W3C XPath query support
- no access from SQL applications
- new technology; limited know how
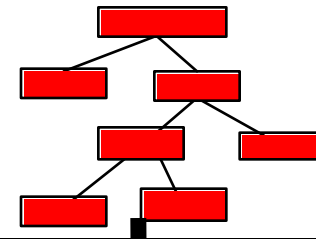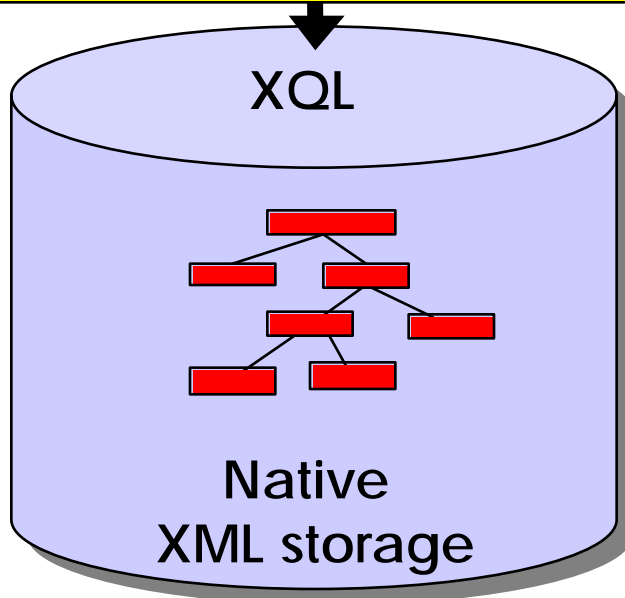
- conversion of structure needed
- risk to loose semantic / sequence
- digital signature difficult: in blob?
- map XPath to SQL; vice versa
- accessible from SQL applications
- 'old' technology; well known

XQL

Native
XML storage

SQL

XML storage
in
RDBMS

25

<Working together >

Humans

- XML Editor
- XSL Editor
- Schema Editor

Integration Broker — XML → XML Application

XML Application — XML → XSL Processor → HTML / XML → Web Browser

XSL Processor ↔ Web Server

WAP Server — WML → WAP Mobile

Packaged Applications

Enterprise Applications

XPath XML

XML Routing

Web Server

XML/EDI BizTalk ebXML eCo ... → B2B Markets

SQL native

Corporate IT — SQL, native → XML Data

Classical databases — XML Data — XML, Schema — XML Routing

Enterprise

B2B Systems **Machines**

26

➢ **XML has broad industry/government support**
- Universal W3C XML standards
- Vendors supplying
  - XML databases,
  - development and messaging tools
  - XML applications
- Industry specific standards for XML business documents

➢ **XML is new and on the move**
- Fast emerging new standards
- Limited know how available
- Can be overwhelming and complex
- Different frameworks
- Still needs evangelisation

Thanks for your visit!

Questions & answers

By

Peter Stamps

SOFTWARE AG