Web Services Framework
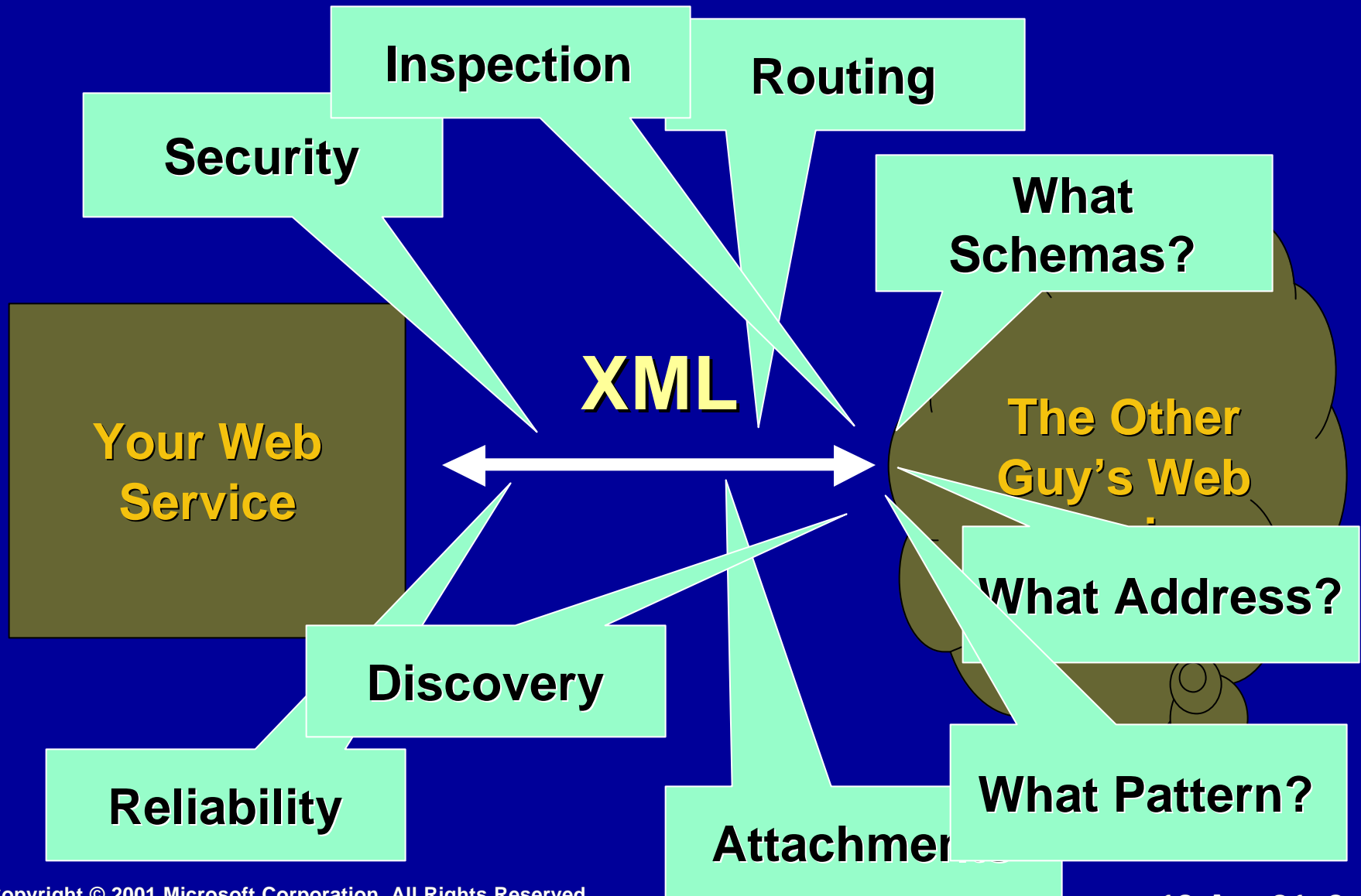
Paper by IBM and Microsoft

Andrew Layman, XML Web Services Architect, Microsoft
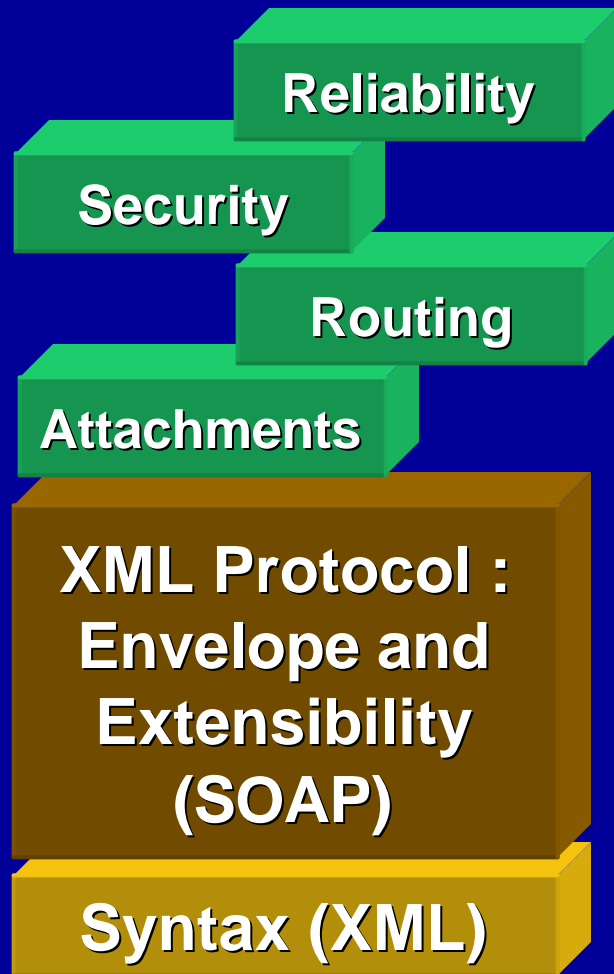
Interoperating Applications

Inspection

Routing

Security

What Schemas?

XML

Your Web Service

The Other Guy's Web

What Address?

Discovery

What Pattern?

Reliability

Attachments

Web Services Roadmap

Future

In Proc

Existing

Reliability

Security

Routing

Attachments

XML Protocol : Envelope and Extensibility (SOAP)

Syntax (XML)

Process Flow Pattern Description

Service Description (WSDL)

Structure (XML Schemas)

Directory (UDDI)

Inspection

Wire

Description

Discovery

Wire Protocol Elements

Reliability

Security

Routing

Attachments

**XML Protocol :
Envelope and
Extensibility
(SOAP)**

Syntax (XML)

Wire

Binary Attachments

❖ **Sometimes, conversion of large non-XML data into XML binary (e.g. base64) format is too expensive.**

❖ **Sending the data without conversion would be attractive.**

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Routing and Correlation

- ❖ **ID of sending party**
- ❖ **ID of destination party**
- ❖ **Possibly, Ids of intermediaries**
- ❖ **Means to Correlate a reply to the sent message.**

| origin | ⟶ | Intermediate | ⟶ | destination |

Security

- ❖ **Digital Signature**
  - ➢ **Prove who sent the message (actually, prove that the message's creator had access to a certain secret.)**
  - ➢ **Prove that the message was not altered *en route*.**
- ❖ **Encryption: Prevent third parties from reading the message.**
- ❖ **Whole message or specific parts of messages.**
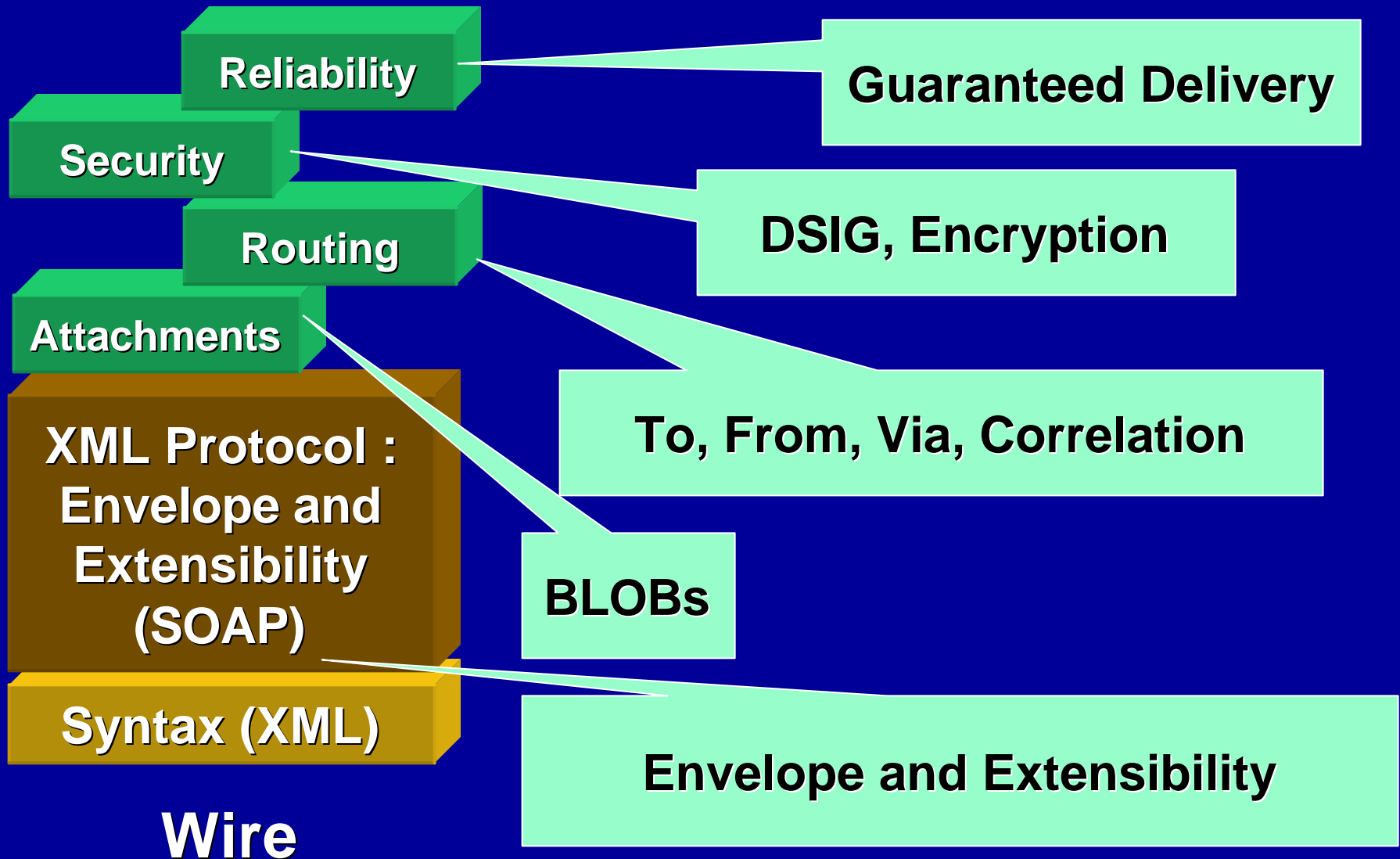- ❖ **Not channel-level. Either per message or associated with long-running "business" transaction.**

Guaranteed Delivery

❖ **At least once**

❖ **Not more than once**

❖ **In Order**

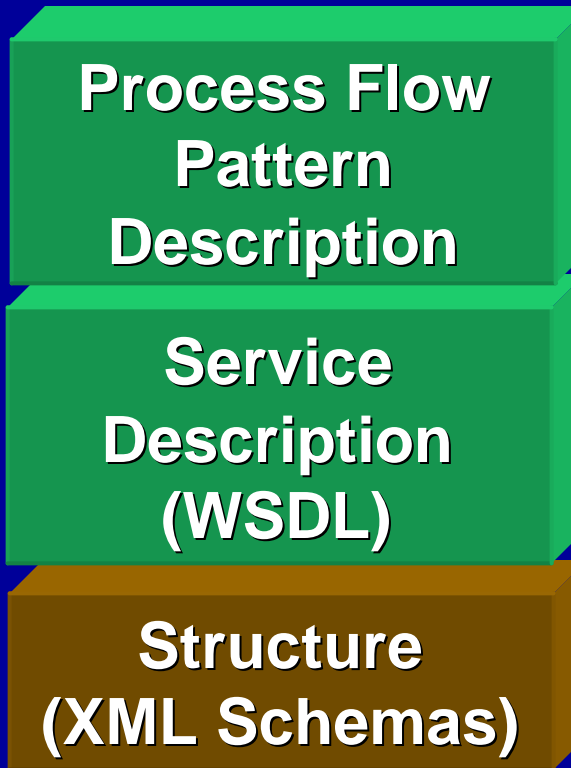❖ **If the above are not achieved in an agreed-on time, both parties detect that failure has occurred.**

Issue: Scope

- ❖ **Often, parties don't just send one message in isolation, but exchange a number of messages back and forth.**

- ❖ **E.g. Inventory Inquiry, Inventory Confirmation, Purchase Order, PO Confirmation, Shipment notice, Invoice, Payment Advice**

- ❖ **Should influence our thinking about correlation, security and guaranteed delivery.**

- ❖ **Implies that there is a *pattern* of messages between the parties.**

Wire Protocol Elements

Reliability

Guaranteed Delivery

Security

Routing

DSIG, Encryption

Attachments

XML Protocol : Envelope and Extensibility (SOAP)

To, From, Via, Correlation

BLOBs

Syntax (XML)

Envelope and Extensibility

Wire

Service Description

Process Flow Pattern Description

Service Description (WSDL)

Structure (XML Schemas)

Description

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Schemas

- ❖ **Atomic Datatypes**

- ❖ **Structured Datatypes**

- ❖ **Subtypes and Classification**

Web Service Description

- ❖ **What to send: Messages**
    - ➢ **Collection of abstract types that may be sent and received.**
    - ➢ **May have named internal parts.**
    - ➢ **Bound to specific syntax.**
- ❖ **Where to send: Ports**
    - ➢ **Collection of abstract types to which to send the messages.**
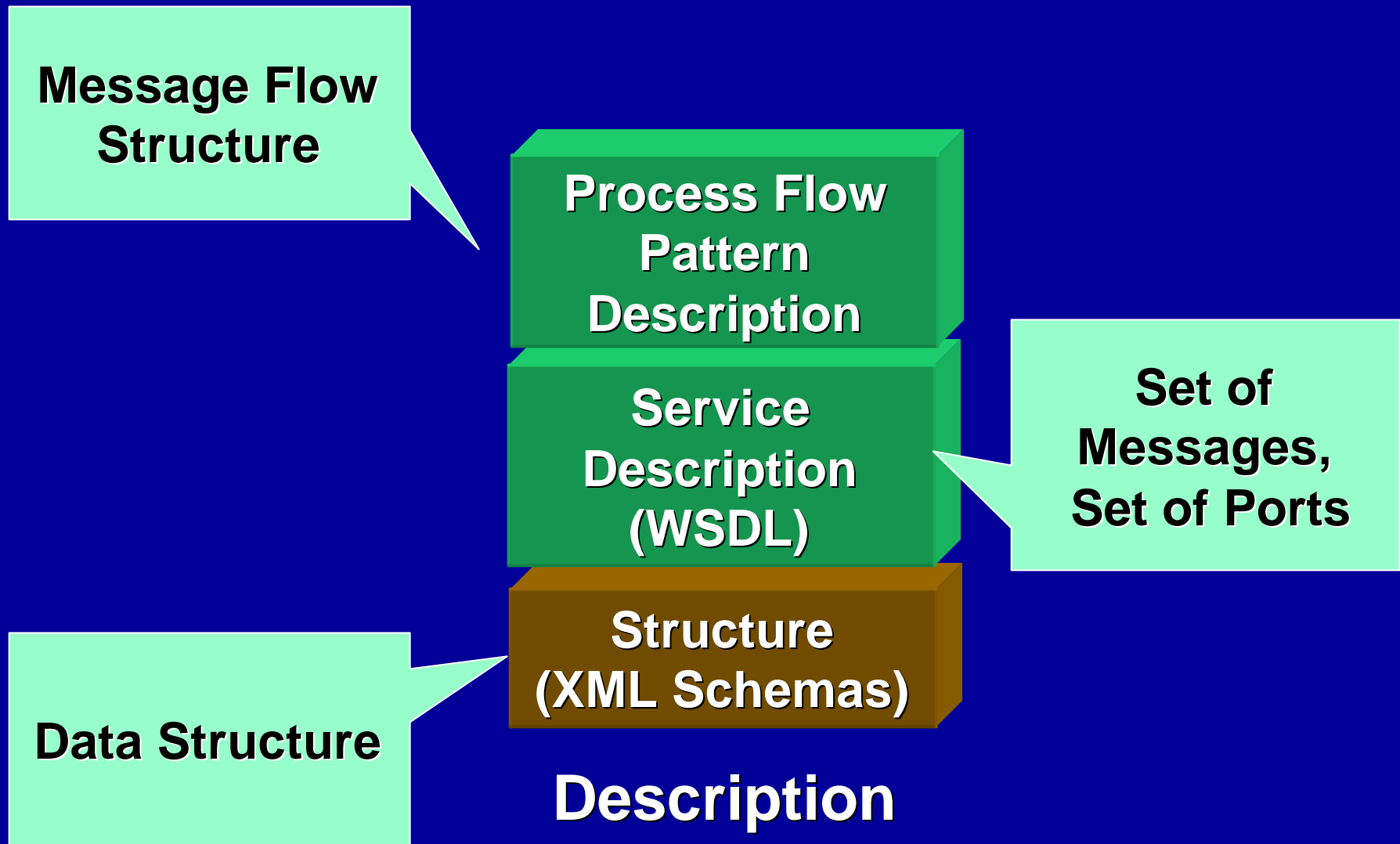   - ➢ **Bound to specific Addresses.**

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Process Flow Patterns

❖ **Which patterns of messages are valid**

❖ **Built on the elements of the service description**

A

B

Purchase Order

Confirm

Invoice

Payment

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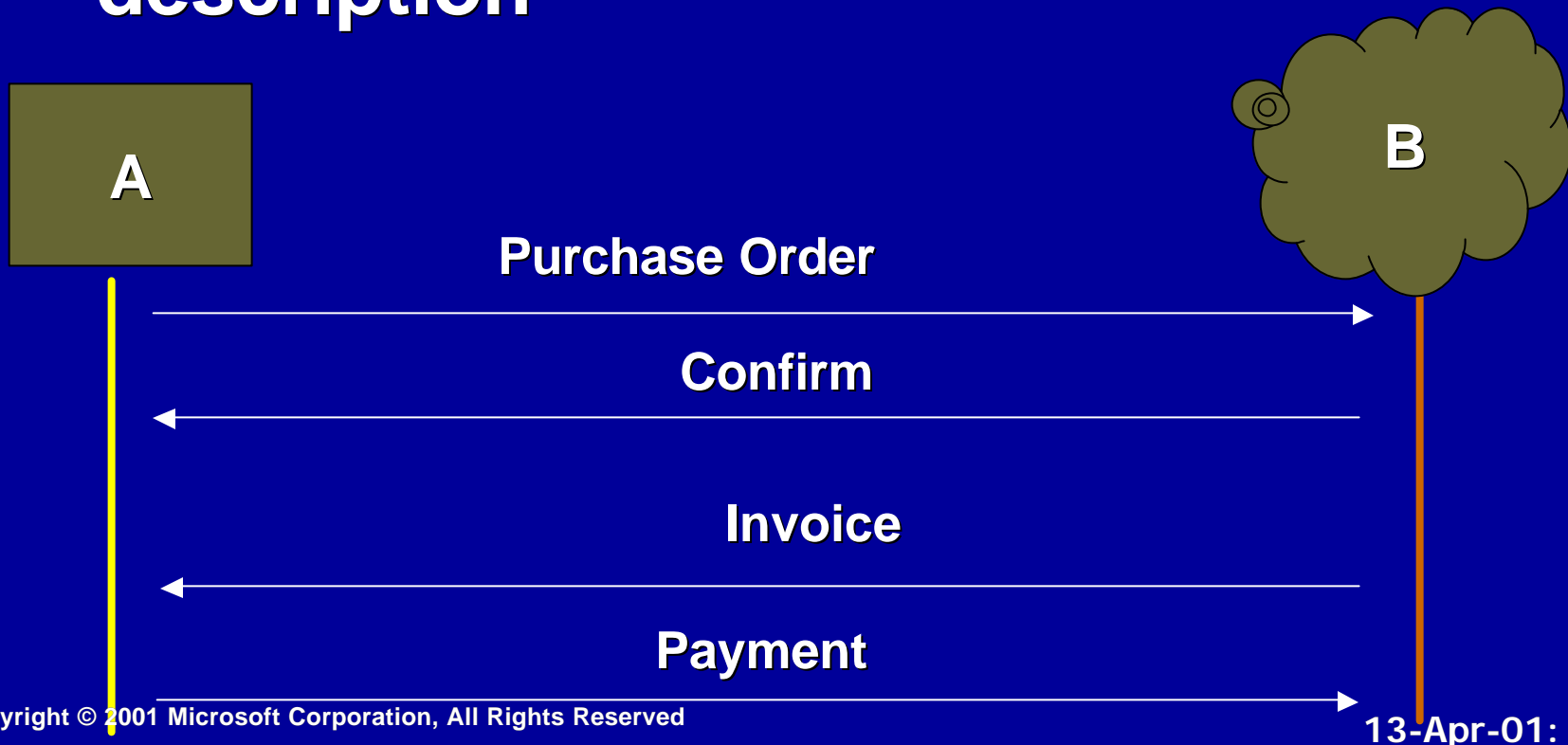
Issue: Scope Again

- ❖ A *pattern* of messages suggests a long-running dialogue between the parties.

- ❖ Defense against replay attacks suggests connection between security and at-most-once delivery.

- ❖ Should influence our thinking about wire protocols and the description of services.

- ❖ These should be thought about in the context of potentially long-running dialogues.

Service Description

Message Flow Structure

Process Flow Pattern Description

Service Description (WSDL)

Set of Messages, Set of Ports

Structure (XML Schemas)

Data Structure

Description

Discovery

Find a Service based on some characteristics.

Given a Service, what is its Description?

Directory (UDDI)

Inspection

Discovery

Conclusions

- ❖ **Protocols are the basis for Interoperability**

- ❖ **Protocols are not just individual messages, but *patterns* of messages.**

- ❖ **The Web Services Framework is an *integrated* design.**

- ❖ **Each part needs to be *designed* and *tested* in the context of the others.**

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