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Using a Performative Subsumption Lattice to Support Commitment-based Conversations

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2005/07/27 Commitment-based Conversations 1

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Message Format

- Envelope
 - Can be understood by all agents
 - Tag/value pairs
 - CASA can use KQML (next slide) or XML syntax
- Content
 - Might only be understood by specific agent
 - The **language** tag specifies the format of the content

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Message Format: Envelope

:performative	performative
:act	act
:to	URL
:from	URL
:sender	URL
:receiver	URL
:in-reply-to	string
:reply-with	string
:conversation-id	string
:language	string
:language-version	string
:content	content
:version	version-spec
:ontology	ontology-spec
:timeout	time

2005/07/27 Commitment-based Conversations 3

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Message Format: XML DDT

```
<!DOCTYPE CASAMessage [
<!ELEMENT CASAMessage (version, performative, act?, sender, receiver, from?, to?, timeout?, reply-with?, in-reply-to?, language?, language-version?, ontology?, ontology-version?, content?)>
<!ELEMENT version (#PCDATA)>
<!ELEMENT performative (#PCDATA)>
<!ELEMENT act (#PCDATA)>
<!ELEMENT sender (#PCDATA)>
<!ELEMENT receiver (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT timeout (#PCDATA)>
<!ELEMENT reply-with (#PCDATA)>
<!ELEMENT in-reply-to (#PCDATA)>
<!ELEMENT language (#PCDATA)>
<!ELEMENT language-version (#PCDATA)>
<!ELEMENT ontology (#PCDATA)>
<!ELEMENT ontology-version (#PCDATA)>
<!ELEMENT content ANY > ]>
```

2005/07/27 Commitment-based Conversations 4

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Message Format: Example

```
:performative request
:act inviteToJoinCD
:to casa://123.181.6.101/Bob
:from casa://123.181.6.65/Alice
:receiver casa://123.181.6.101/CDagent1
:sender casa://123.181.6.65/Alice
:reply-with casa://123.181.6.65/Alice$$1453
:language casa.URL
:language-version 1.0
:content casa://123.181.6.101/CDagent2
```

2005/07/27 Commitment-based Conversations 5

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FIPA Performatives

2005/07/27 Commitment-based Conversations 6

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FIPA Performatives

performative Added categories

2005/07/27 Commitment-based Conversations 7

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FIPA Performatives

performative Added categories Arranged in a lattice

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FIPA Performatives

performative Added categories Arranged in a lattice Extended

2005/07/27 Commitment-based Conversations 9

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Policies

P-inform	commits the addressee to acknowledge
P-ack	releases informed agents of the commitment to acknowledge
P-request	commits the proposed agents to reply
P-counteroffer	commits addressees to reply
P-reply	releases proposed agents of the commitment to reply and releases counteroffered agents of the commitment to reply
P-agree	an acceptance realizes the shared uptake of proposed/counteroffered commitments
P-done	releases accepted agents of the commitment earlier agreed to

2005/07/27 Commitment-based Conversations 10

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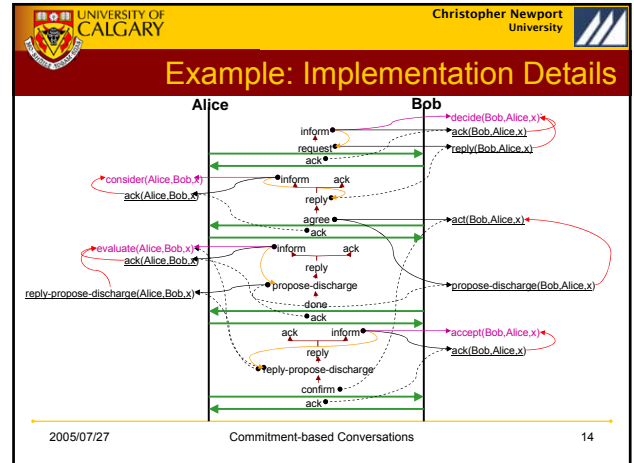
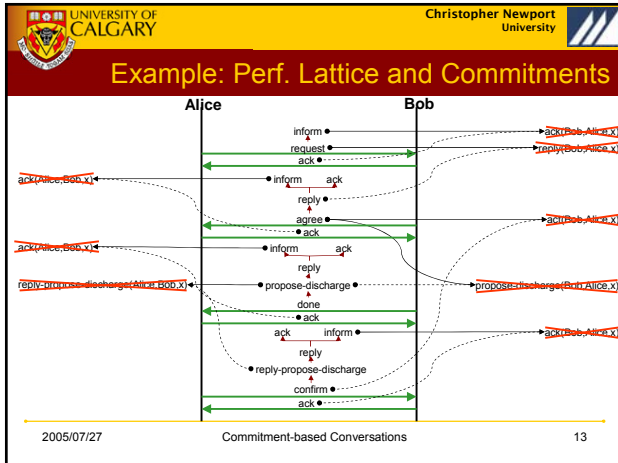
Policies → Commitment Operators

2005/07/27 Commitment-based Conversations 11

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Example: Informally

2005/07/27 Commitment-based Conversations 12



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Conclusions

- Arranging performatives in a lattice simplifies interpretation
- Messages (performatives) → policies → commitment operators → shared social commitments
- Easily observable by 3rd parties
- Agents do not have to be *implemented* in the SC style (eg. could be BDI internally)
- Turn taking arises naturally

2005/07/27 Commitment-based Conversations 15