IDEAS ON ELECTRONIC COMMERCE

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The relevant papers are "A common business commu
cation language"

http://www-formal.stanford.edu/jmc/cbcl.html

and "Elephant: a programming language based on spe
acts"

http://www-formal.stanford.edu/jmc/elephant.html.

Common business communication language (1)

a premature idea

- written 1975, published 1982, unsuccessful propo
1988
- substantially overlaps XML and ICE
- used Lisp data format, e.g.
(PRICE $1.00) instead of <PRICE> $5.00 </PRICE
- Could have ((DISCOUNT PRICE 10%) $1.00), beca
the first position in a list need not be just a tag.
- Some people like the Lisp format, but apparently m
prefer the format inherited from SGML.
- Some CBCL features not in XML or ICE are likely
be needed eventually in inter-computer communicatio
- See www-formal.stanford.edu/jmc/cbcl.html

Common business communication language (2)

• More semantic features of natural language will
needed for business communication than have so far b
considered in the XML literature or in ICE.
• Generalized Chomsky principle: Any position may
occupied by an expression designating something of
right semantics, e.g. a price.
• Description (ι) and ϵ operators—"the" and "a". (IC
X)(P X) and (EPSILON X)(P X). The work of the l
cians may be useful.
Principle: Humans use "the" and "a". Inter-compu
will therefore need the equivalent of the these words.
• Adjectives and other modifiers.

EXAMPLES OF CBCL

a. (REQUEST-QUOTE (YOUR-STOCK A7305) (UN
100))

b. (REQUEST-QUOTE (PENCILS #2) (GROSS 10

c. (WE-QUOTE (OUR-STOCK-NUMBER A7305) (Q
TITY 100) (DELIVERY-DATE 3-10-77) (PRICE $1.0

The above examples correspond directly to ICE.

ADVANCED EXAMPLES OF CBCL

d. (REQUEST-QUOTE (ADJECTIVE (PENCILS #
YELLOW) (GROSS 100))

A program not understanding YELLOW could nevert
less understand that #2 pencils were called for, and co
reply that they don't have any pencils, if that were so

e. (PLEASE-RESERVE (EPSILON (X) (AND (IS-FL
X) (DEPARTS MONDAY) (ARRIVES (BEFORE WE
DAY))))).

$(\epsilon x)P(x)$ stands for "an x such that $P(x)$.

ELEPHANT 2000: A Programming Language for t Year 2005 Based on Speech Acts

I meant what I said, and I said what I meant. An I phant's faithful—one hundred percent.

also

An elephant never forgets. See the article.

http://www-formal.stanford.edu/jmc/elephant.html.

Thesis: The I-O statements of a programming langu for inter-computer communication should be defined speech acts.

SPEECH ACTS

Austin, J. L. HOW TO DO THINGS WITH WOR
(Oxford Univ. Press, 1962)

Searle, John R. SPEECH ACTS (Cambridge Univ. Pr
1969)

"I now pronounce you man and wife".

Speech acts include, offers, acceptances, statements, c
tions, promises, commands.

One can also state, describe, assert, warn, remark, co
ment, apologize, sentence, argue, persuade.

On the input side there is hear, read, understand, real

FEATURES OF ELEPHANT

- I-O is in speech acts.
- Correctness involves proper performance of spe acts.
- Programs can refer to the past. (skipped).
- Programs can be represented as sentences of lo (skipped)
- *Accomplishment* and *input-output* specifications.

AN ELEPHANT IS FAITHFUL

To be correct, an Elephant program must at least

- Keep promises
- Answer questions truthfully
- Answer questions responsively
- Make authorized commitments and not others

KINDS OF ELEPHANT I-O

- Requests (authorized, comprehensible)
- Questions (comprehensible)
- Answers to questions (truthful and responsive)
- Offers (authorized)
- Acceptances and refusals

- Promises (authorized and kept)

- Input (interpreted as requests, etc.)

ELEPHANT 2000 AIRLINE RESERVATION PROGRAM (1)

if $\neg full\ flt$ **then**

$accept.request\ commit\ admit(psgr, flt)$

$answer.query\ committed\ admit(psgr, flt)$

$accept.request\ decommit\ admit(psgr, flt)$

if $now = time\ flt \wedge committed\ admit(psgr, flt)$
then $accept.request\ admit(psgr, flt)$

$full\ flt \equiv$
$card\{psgr | committed\ admit(psgr, flt)\} = capacity\ flt$

ELEPHANT 2000 AIRLINE RESERVATION PROGRAM (2)

if $\neg full\ flt$ **then**
$accept.request$
$make\ commitment\ admit(psgr, flt)$

$answer.query\ exists\ commitment\ admit(psgr, flt)$

$accept.request\ cancel\ commitment\ admit(psgr, flt)$

if $now = time\ flt$
$\wedge\ exists\ commitment\ admit(psgr, flt)$
$\wedge\neg\ full1\ flt$
then accept.request $admit(psgr, flt)$

$$full \quad flt \equiv$$
$$card\{psgr | exists\ commitment\ admit(psgr, flt)\} =$$

$$full1\ \ flt \equiv$$
$$card\{psgr | did\ admit(psgr, flt)\}$$
$$= capacity\ \ flt$$

INTRINSIC CORRECTNESS OF ELEPHANT PROGRAMS

- Promises and internal commitments
- Keeping commitments is a form of internal correctn

i.e. not relative to an external specification.

- The mathematics is like that of input-output specif

tions.

- Giving true and responsive answers.

- Input-output specifications and accomplishment sp

fications are not intrinsic.

PROGRAMS AS SEMI-LEGAL PERSONS

- Programs act as authorized by their owners.
- Programs in commerce assume obligations and c
versely.
- They need a "uniform commercial code" so that e
detail of obligations doesn't require human negotiatio
- Micro-payments suggest micro-lawsuits.
- The program will micro-sue if not paid. It will pay ju
ments that go against it within its authorization.
- Maybe like purchasing agents or wholly owned s
sidiaries rather than as corporations.

INPUT-OUTPUT AND ACCOMPLISHMENT SPECIFICATIONS

- Illocutionary vs. perlocutionary speech acts
  - I tell you the meeting is tomorrow.
  - I inform you that the meeting is tomorrow. (Y believe it.)
  - I order you to come to the meeting.
  - I get you to come to the meeting.

- Input-output and accomplishment program specif
  tions.

  – It says "Cleared to land" only when it perce
    that the runway is clear.

  – It says "Cleared to land" only when the runwa
    clear.