Enabling Collective Knowledge Work through the Design of Mediating Spaces

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Agenda

A. What's different around collective knowledge work?

B. How can we enable collective knowledge work?

C. Where is this framework being applied?

D. How can I learn more?

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A. What's different around collective knowledge work?

  ► The changing world of knowledge work: a straw poll

B. How can we enable collective knowledge work?

C. Where is this framework being applied?

D. How can I learn more?

What was your world like in 1992?

- Bill Clinton elected president, Al Gore as vice-president (Nov. 3)
- Prince and Princess of Wales agree to separate (Dec. 9)
- Bush, Mulroney and Salinas signed NAFTA (Dec. 17)
- World Series: Toronto Blue Jays defeated Atlanta Braves (4-2)
- Winter Olympics in Albertville: Bonnie Blair, Kristi Yamaguchi
- Summer Olympics in Barcelona: Carl Lewis
- Johnny Carson hosts *The Tonight Show* for the last time
- Movies: *Unforgiven, The Crying Game, Howard's End, Glengarry Glen Ross, The Player*
- Academy Award for Best Picture: *Silence of the Lambs*
- Grammies: *Unforgettable*, Natalie Cole; *Losing My Religion*, REM, *Something to Talk About*, Bonnie Raitt

Source: http://www.infoplease.com

An exercise on a work life that has changed ...

What was your business world like in 1992?

- IBM reports a year-end loss, for the first time, of US$564 million, on revenues of US$64.8 billion.
- IBM introduces the Thinkpad, with a radical new pointer device.
  - Thinkpad 700C, trackpoint, 25MHz i486, 10.4" screen
- IBM ships OS/2 2.0; Microsoft ships Windows 3.1.
- Apple Computer and IBM found Taligent.
- Creative Labs introduces the Sound Blaster 16 with ASP.
- Apple Computer chairman John Sculley coins the term Personal Digital Assistant.
- "AT&T Paradyne continued its modem technology leadership by announcing today it has developed a modem that achieves the world's fastest transmission speeds of 28,800 bps over standard telephone lines." [www.att.com/press, Nov. 16]
- "During the summer, students at NCSA in Champagne-Urbana modify Tim Berners-Lee's hypertext proposal. In a few weeks MOSAIC is born within the campus. Larry Smarr shows it to Jim Clark, who founds Netscape as a result". [www.computerhistory.org]

Sources: http://www.heuse.com, http://www.att.com, http://www.computerhistory.org

If you are a knowledge worker ...

1992 Agree	1992 Disagree		2002 Agree	2002 Disagree
		More than 40% of my work time was/is in a designated shared/co-located physical workplace (e.g. office, customer site, classroom, conventions)		
		More than 40% of my work time is/was coordinated vertically/hierarchically (e.g. formal manager or leader) vs. horizontally/peer-to-peer (e.g. non-manager team lead, community)		
		More than 40% of my work time in/was in shared/interactive informatic mediation (e.g. teleconferences, videoconferences, web conferences, forums, teamrooms, Sametime/AOL IM, e-meetings)		

Over the past ten years, how has the interaction between knowledge workers changed?

Riddle: What did the initials IBM mean in 1992? And now, in 2002?

Shared Physical Spaces

- The "office" (with water cooler)
- Meetings with "face time"
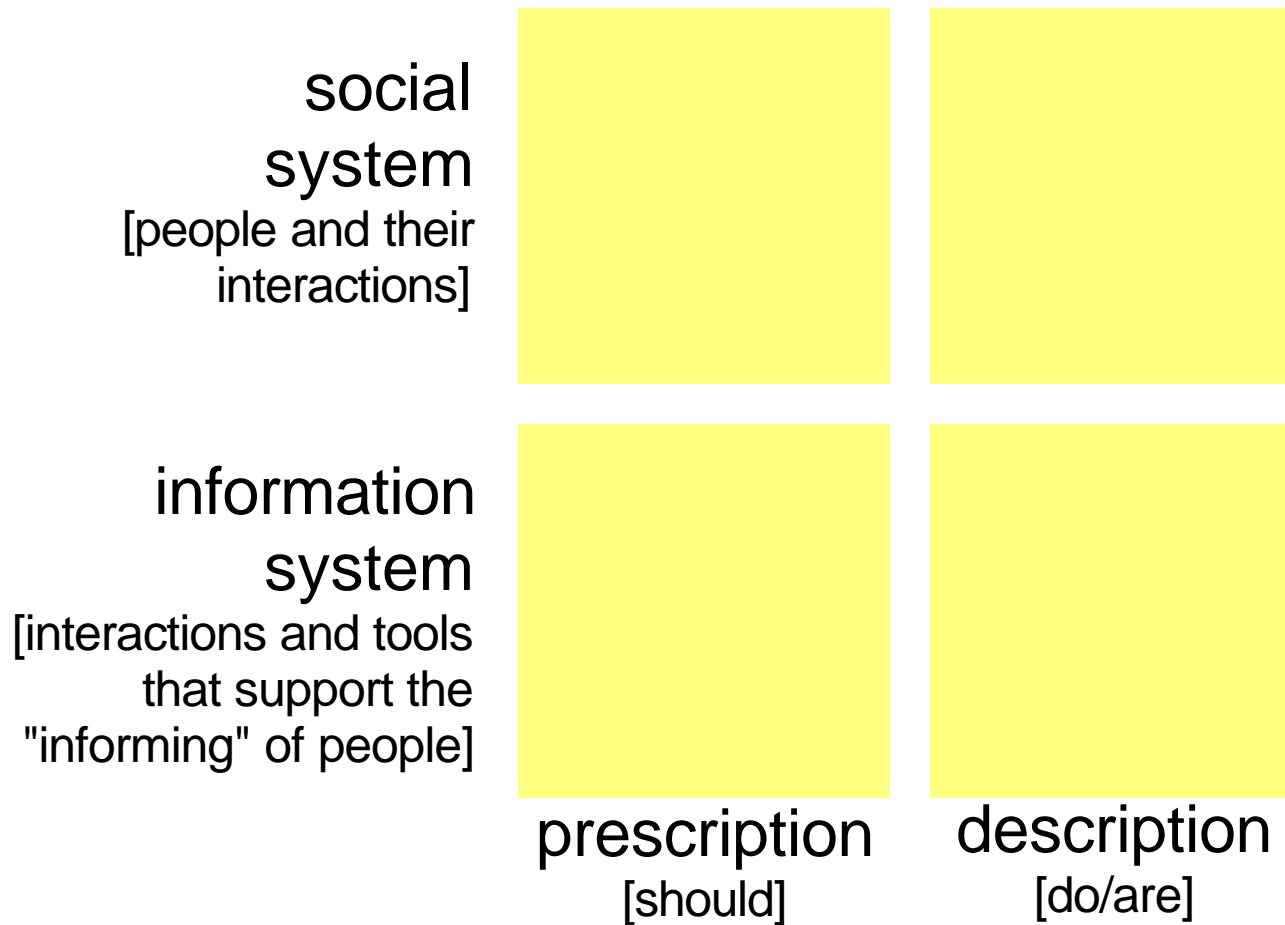- Conventions and conferences

Shared Information Spaces

- Teleconferences, videoconferences
- Teamrooms, forums
- Instant messaging (Sametime, AIM)

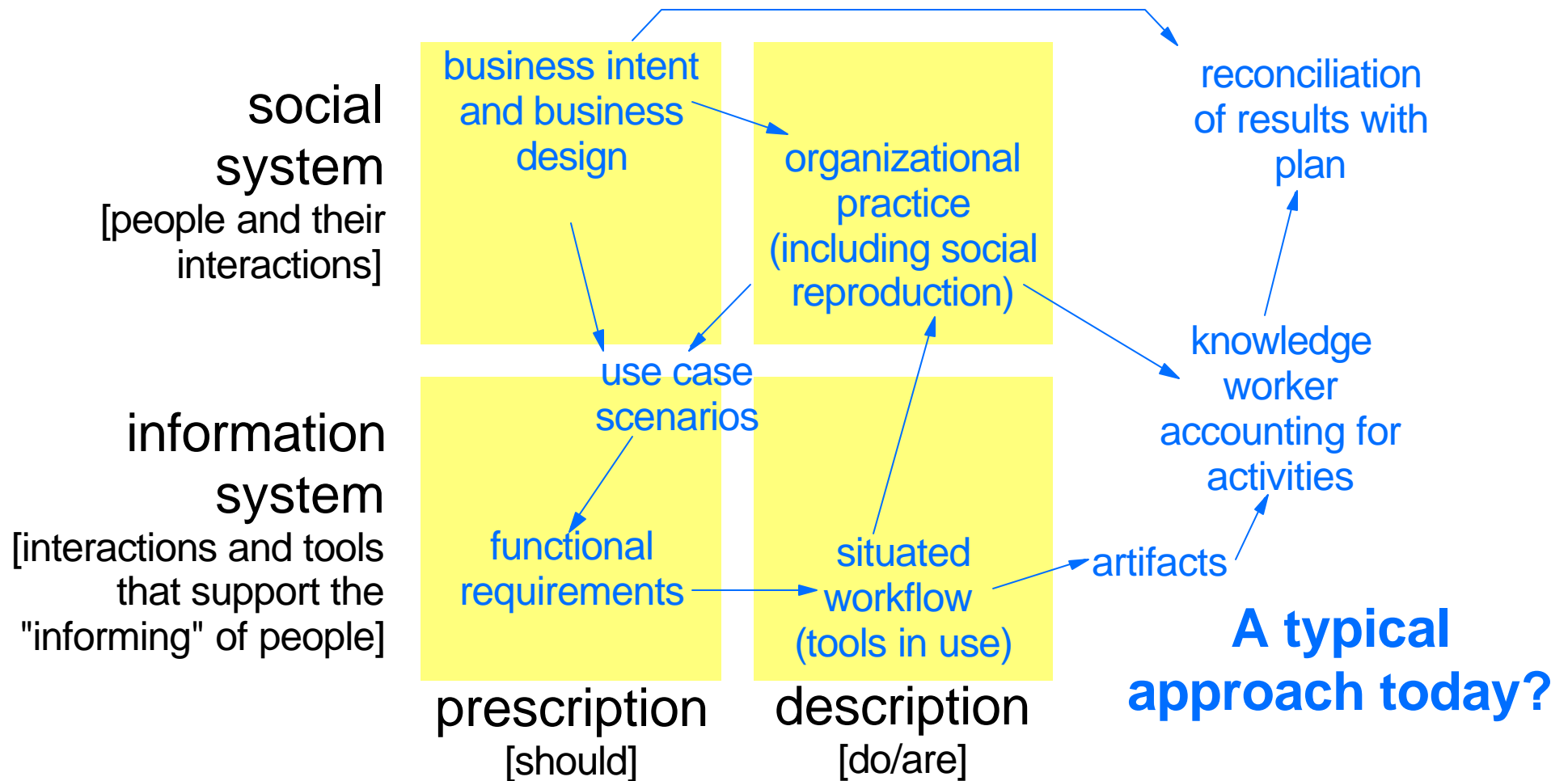How has this changed our understanding of collaborative work?

Agenda

A. What's different around collective knowledge work?

B. How can we enable collective knowledge work?
  - ► Entanglement: social systems + information systems
  - ► A framework of three mediating spaces

C. Where is this framework being applied?

D. How can I learn more?

Collective knowledge work means concurrent design in both social and information systems

social
system
[people and their
interactions]

information
system
[interactions and tools
that support the
"informing" of people]

prescription
[should]

description
[do/are]

In practice, do the designs of the social system and information system mutually adjust?

social
system
[people and their interactions]

information
system
[interactions and tools that support the "informing" of people]

business intent and business design

organizational practice (including social reproduction)

reconciliation of results with plan

use case scenarios

knowledge worker accounting for activities

functional requirements

situated workflow (tools in use)

artifacts

prescription
[should]

description
[do/are]

A typical approach today?

There is an inherent uncertainty between design and its realization in practice, since **practice is not the result of design but rather a response to it**. As a consequence, the challenge of design is not a matter of getting rid of the emergent, but rather of including it and making it an opportunity.

Etienne Wenger, *Communities of Practice: Learning, Meaning and Identity*, Cambridge University Press, 1998, p. 233.

Social interaction is commonly understood as mediated by physical spaces and social spaces

Physical Space
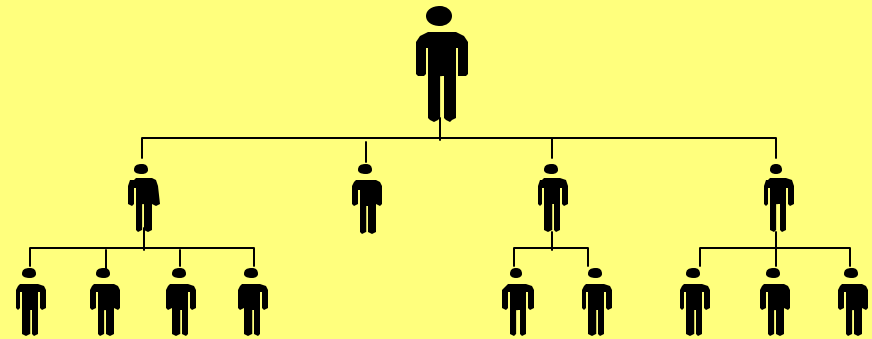### mediating social interaction
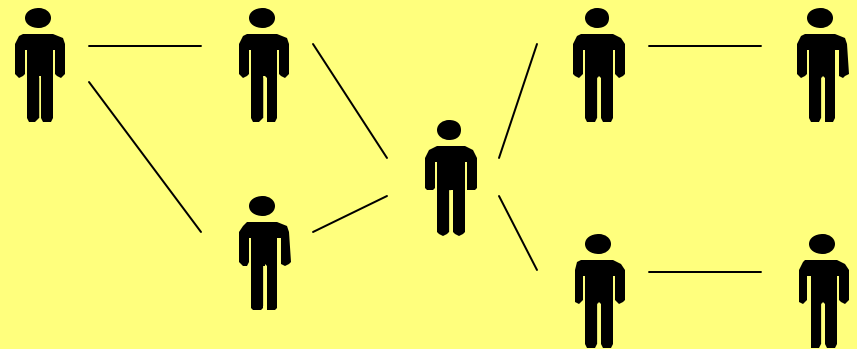
Example: an alcove
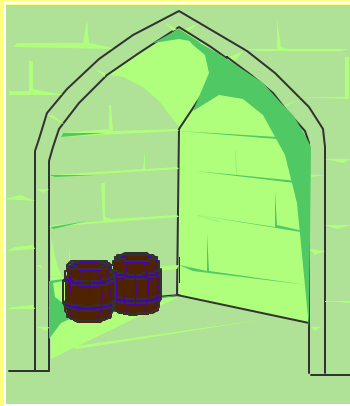
Example: a commons

Social Space
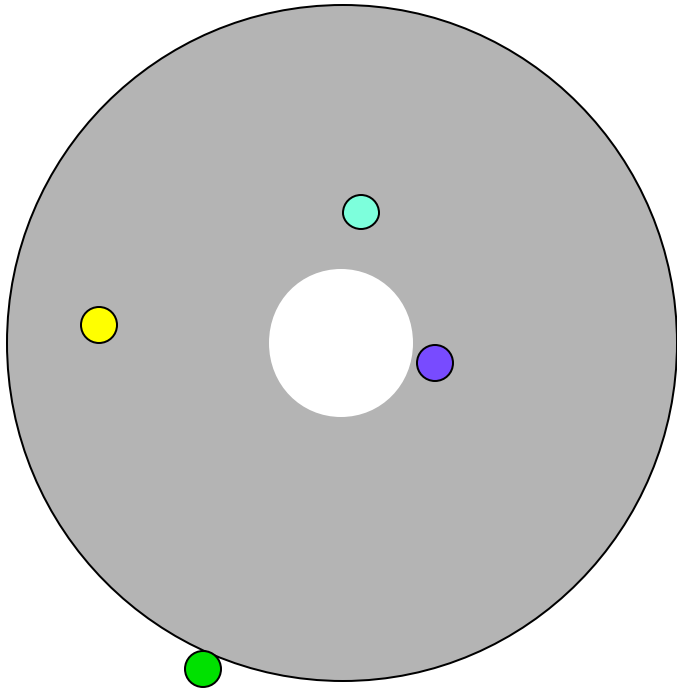### mediating social interaction

Example: a social hierarchy

Example: a social network

Advances in supporting persistent conversation draws attention to spatial aspects in information

The absence of physical and social cues in computer-mediated conversation results in the need for:

Social translucence: I know you're there

Social proxies: I can see your participation

Indexability: I can search and trace the threads
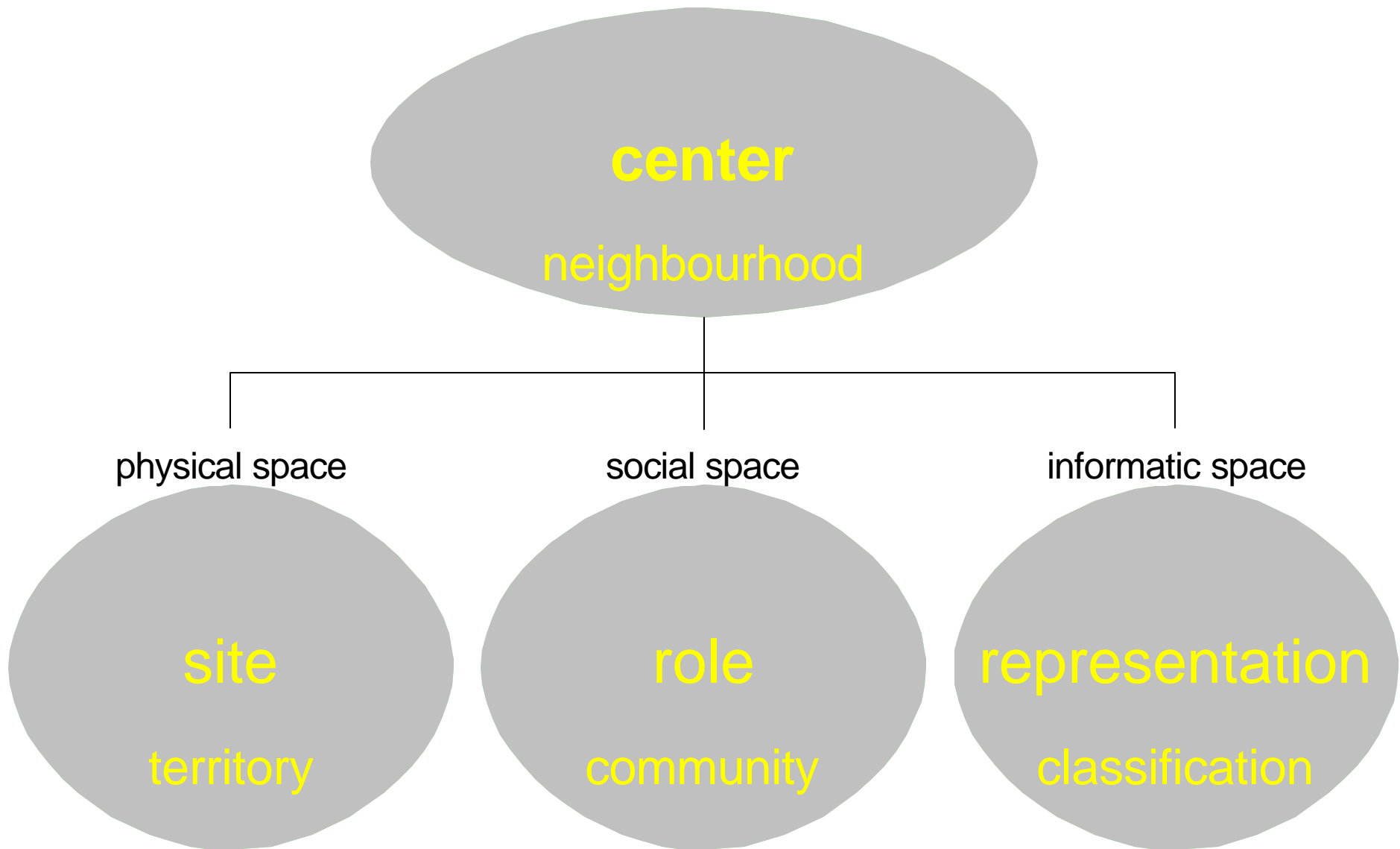
Shared context: I can understand why that was said
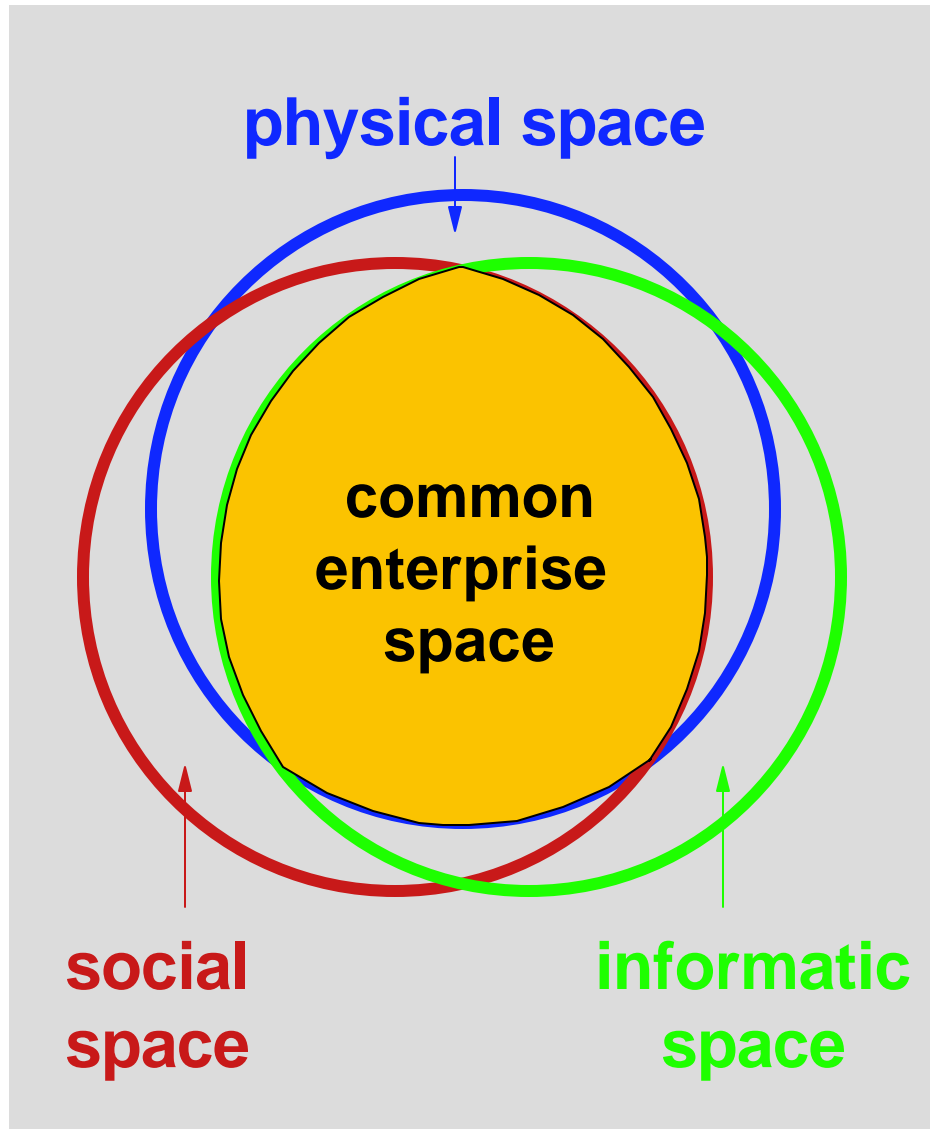
References:
Thomas Erickson, David N. Smith, Wendy A. Kellogg, Mark Laff, John T. Richards, and Erin Bradner, "Socially Translucent Systems: Social Proxies, Persistent Conversation, and the Design of 'Babble'", in *Human Factors in Computing Systems: The Proceedings of CHI '99*. ACM Press, 1999.

Thomas Erickson, "Persistent Conversation: Discourse as Document", minitrack introduction in the *Proceedings of the Thirty-Second Hawaii International Conference on Systems Science*, (J. F. Nunamaker, Jr. and R. H. Sprague, Jr., editors), January, 1999. Also republished as "Persistent Conversation: An Introduction" in the *Journal of Computer Mediated Communication*, Vol. 4, #4, June 1999.

Space mediates social interaction, with physical, social and informatic contexts around proximity

center

neighbourhood

physical space   social space   informatic space

site

territory

role

community

representation

classification

With a compact design, infrastructure enables work mostly over common, overlapping spaces

physical space

common enterprise space

social space

informatic space

Source: David Ing (IBM Advanced Business Institute) and Ian Simmonds and Tom Erickson (IBM T.J. Watson Research Center)

With expansiveness, the infrastructure enabling work shifts focus to the intersections
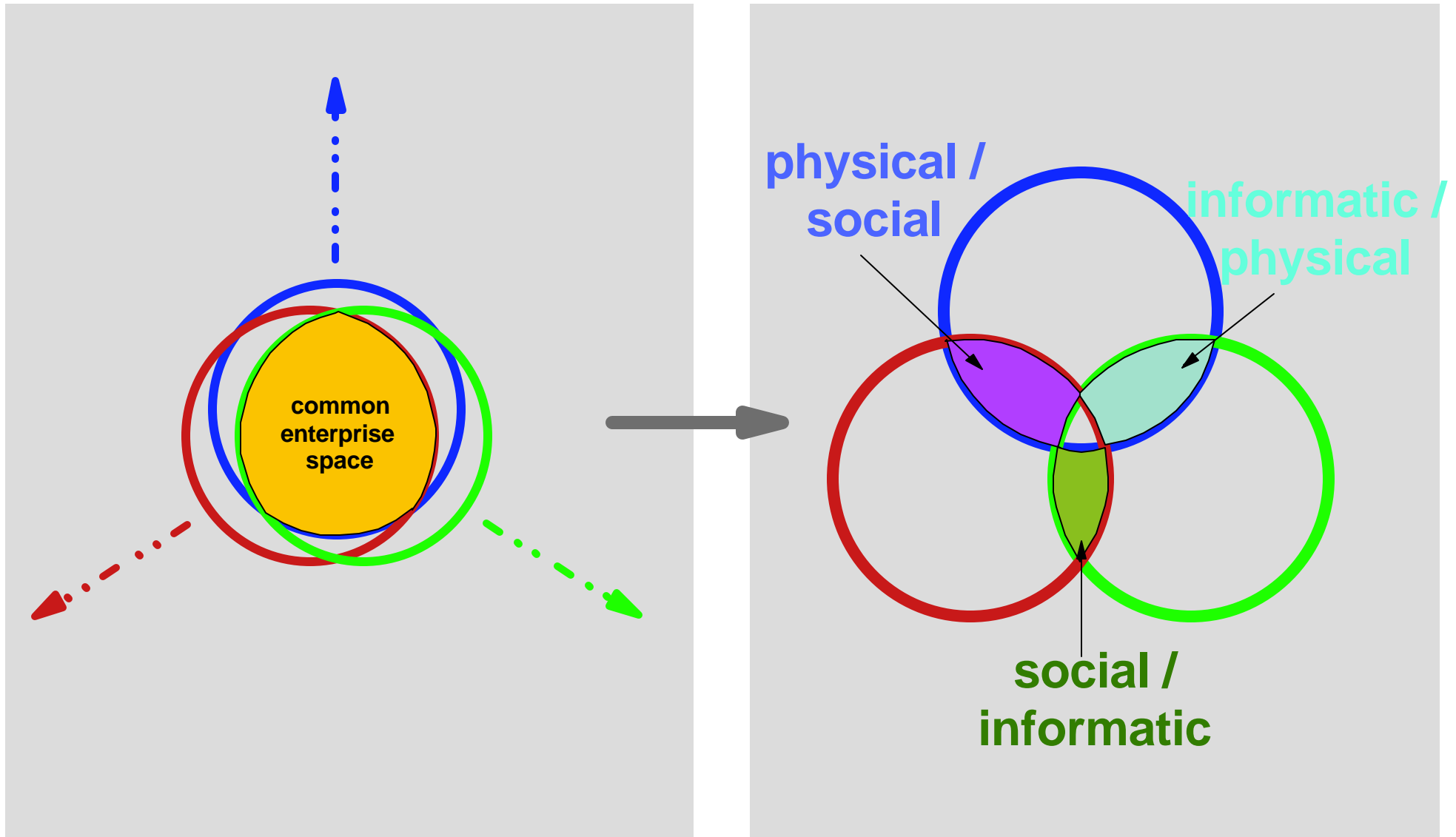
common enterprise space

physical / social

informatic / physical

social / informatic

Source: David Ing (IBM Advanced Business Institute) and Ian Simmonds and Tom Erickson (IBM T.J. Watson Research Center)

Agenda

A. What's different around collective knowledge work?

B. How can we enable collective knowledge work?

C. Where is this framework being applied?
  - ▶ Business Design "Discovery" Workshops
  - ▶ Information Modelling Approach & Tools
  - ▶ Socio-Informatic Pattern Language

D. How can I learn more?

Selected NetGen accounts benefited from pre-sales facilitation to uncover business design

The challenges ...	*The approach ...*
● Sales cycle stalled, chicken-egg funding	● Pre-sales expert facilitation
● Business strategy entangled with IT capabilities (e-MP)	● Business context aligned with follow-on IT architecture definition
● Unknowns, uncertainty, dot-com-speed strategy	● Magnitude estimates, Adaptive Enterprise concepts [Haeckel/ABI]
● Servers located in NA and/or AP, global reach to web customers	● Business direction --> capabilities --> infrastructure in three mediating spaces

Note: This program is now available at IBM Palisades as the "Designing an Adaptive Business 'Fast-Start' Workshop. A simpler version suitable for client reps seeking self-facilitation can be found on the e-Business Advisor as a "Solution Pathfinder".

Understanding refines from intent to investment

A. Introduction & Framing

| *I. Design Environment* | B. | C. |

| *II. Business Direction* | D. | E. |

| *III. Capability Investment* | F. | G. |

| *IV. Capability Deployment* | H. | I. | J. |

| *V. Enabling Infrastructure* | K. |

L. Findings & Next Steps

Key questions include why, and how much

A. Introduction and Framing

I. Design Environment	B. Customer Set(s)	C. Influencers

II. Business Direction	D. Organizational Purpose & Bounds	E. Strategic Control

III. Capability Investment	F. Capacity & Capabilities	G. Capital Flows

IV. Work Deployment	H. Sites & Territories [Physical Space]	I. Roles & Communities [Social Space]	J. Representations & Classifications [Informatic Space]

V. Enabling Infra-structure	K.		
	(i) Workplace Facilities [Physical / Social]	(ii) Conversation Workspaces [Social / Informatic]	(iii) Information Architecture [Informatic / Physical]

L. Findings & Next Steps

The business sizing can prime IT architecture

capabilities

Sites & Territories
[work deployment in physical space]

e.g.,
Where are the key capabilities to
   be located? [function, region]
What territory will each site
   serve? [customers, suppliers]

Roles & Communities
[work deployment in social space]

e.g.,
Who will be accountable to
   provide capabilities?[sponsor]
What expertise defines the
   community [skills, knowledge]

Representations & Classifications
[work deployment in informatic space]

e.g.,
Where representations are relevant
   in foresight? [forecasts]
What classifications help? [making
   sense, keeping order, coord]

Workplace Infrastructure
[physical / social enablement]

How much in workplace facilities
   will be required to properly
   support capabilities?
   [physical dimensions, features
   required]

Conversation Workspaces
[informatic / physical enablement]

How much in conversation
   spaces will be required to
   properly support capabilities?
   [volume of conversations,
   features required]

Information Architecture
[social / informatic enablement]

How much in information
   architecture will be required to
   properly support capabilities?
   [amount of computing and
   storage, features required]

Ibex aims to better reflect the rapid changes in structure around business information
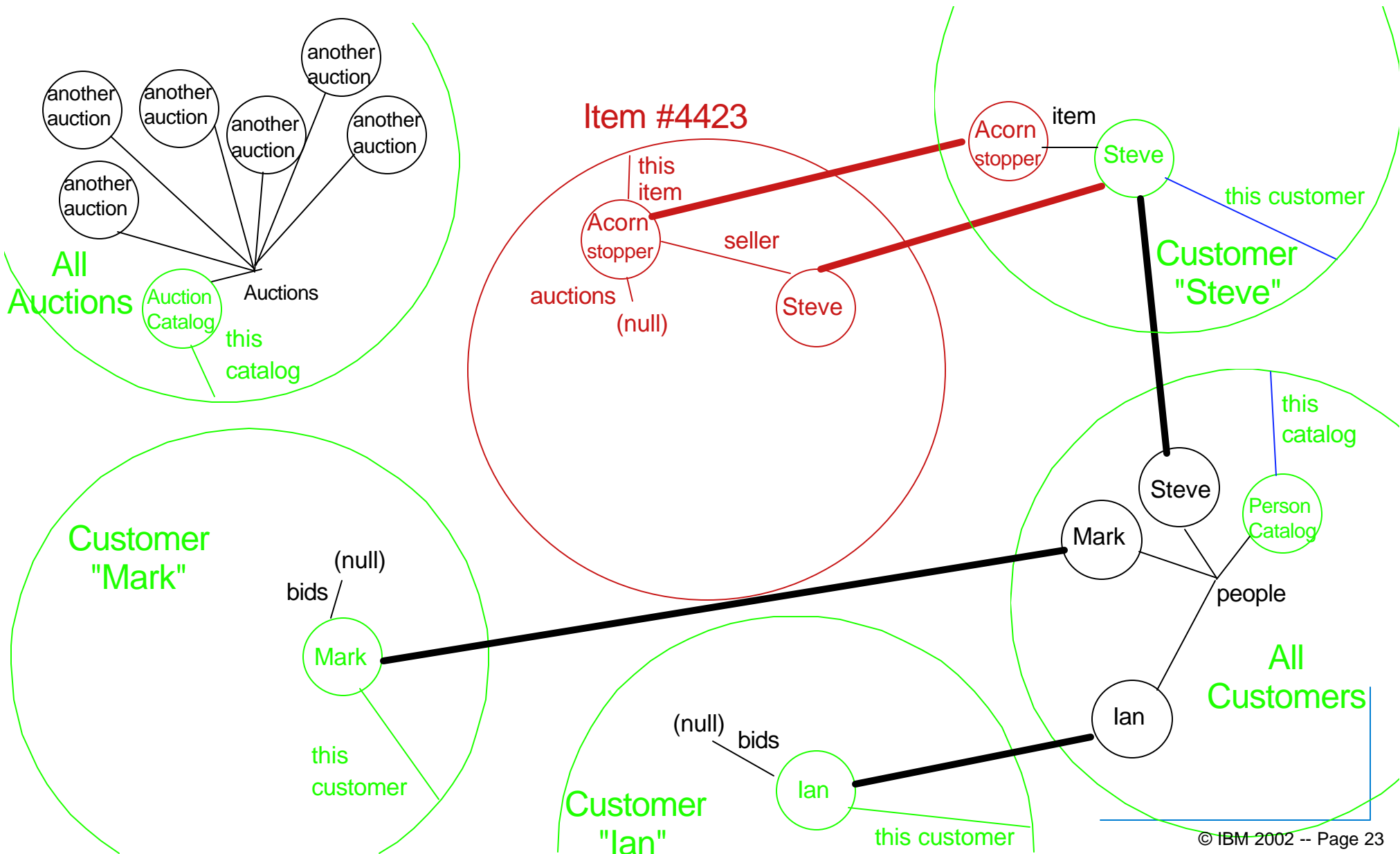
Traditional view ...	*Ibex view ...*
• Goal: Efficient completion of well-defined information systems	• Goal: Workable information systems adaptable to changes
• Emphasis on capturing procedure (as means)	• Emphasis on states -- operations as pre- and post-conditions
• Static single classification, hierarchical tree fixed	• Multiple classifications, dynamic for changed states
• Tools to be structured to support specified functions	• Resources provided that can be deployed for the tasks at hand

Each informatic space groups information. Information in one space may correspond to information in another
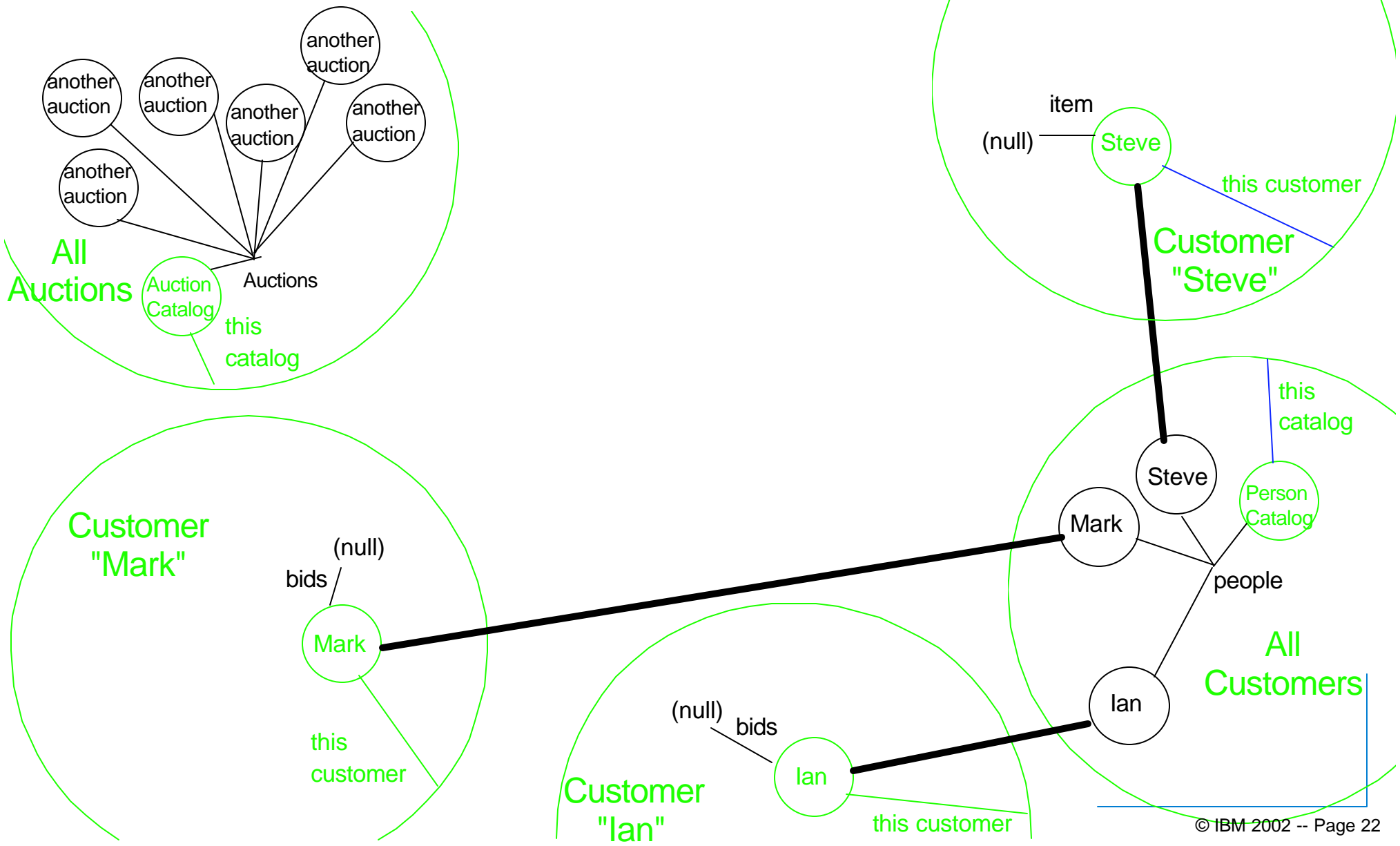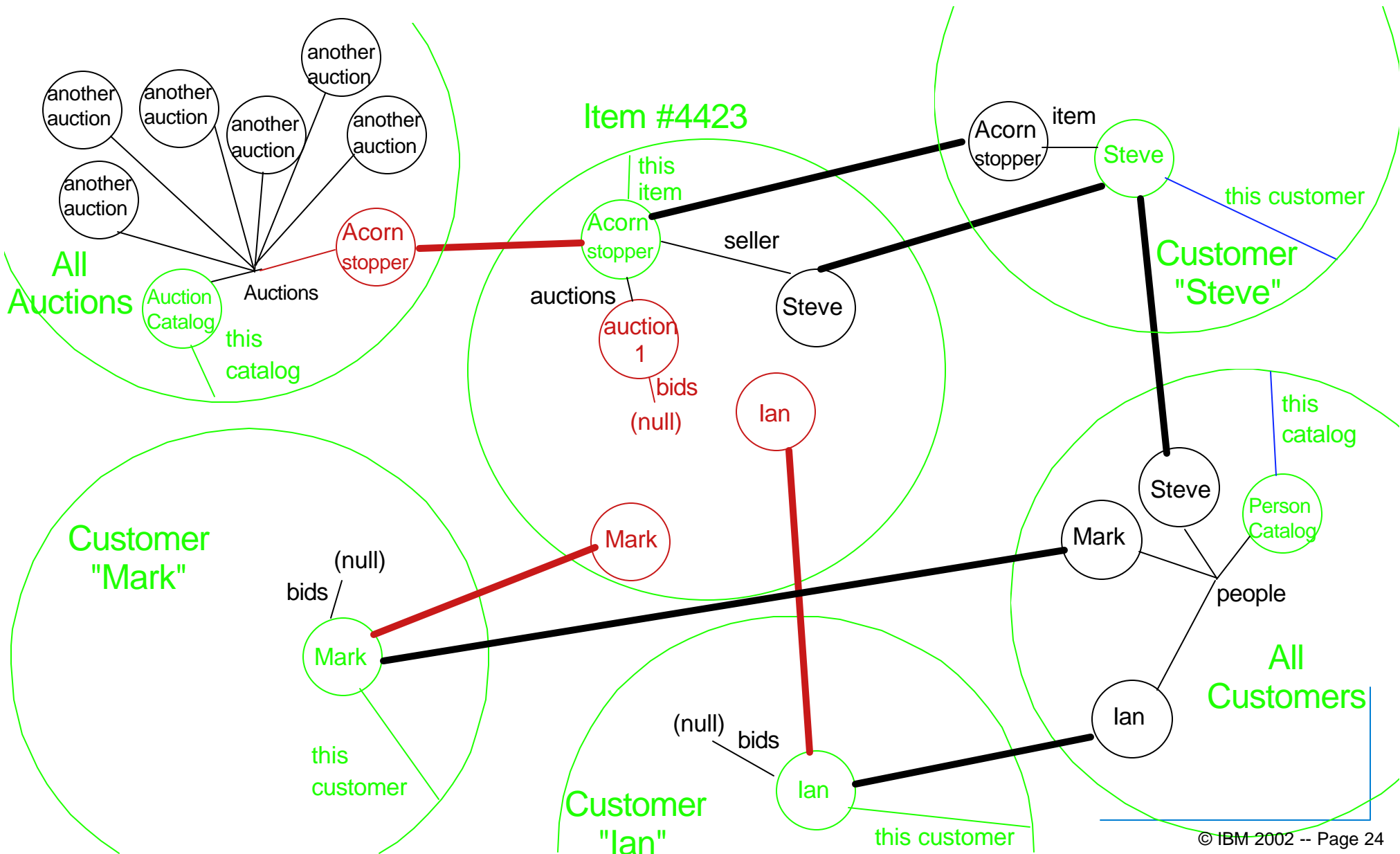
It is a common operation to create a new space for a new purpose, and connect to other spaces that define context

All Auctions

another auction

another auction

another auction

another auction

another auction

another auction

Auctions

Auction Catalog

this catalog

Item #4423

this item

Acorn stopper

seller

auctions (null)

Steve

Acorn stopper

item

Steve

this customer

Customer "Steve"

this catalog

Person Catalog

Steve

Mark

people

Customer "Mark"

(null)

bids

Mark

this customer

Ian

All Customers

(null)

bids

Ian

Customer "Ian"

this customer

Information in one space may be disclosed in a second space, alerting people who are frequently there

another auction

another auction

another auction

another auction

another auction

another auction

another auction

Item #4423

All Auctions

Auction Catalog

this catalog

Auctions

Acorn stopper

Acorn stopper

this item

Acorn stopper

item

Steve

seller

this customer

auctions

Steve

Customer "Steve"

auction 1

bids

(null)

Ian

this catalog

Customer "Mark"

Mark

Steve

Person Catalog

(null)

bids

Mark

Mark

people

Ian

All Customers

this customer

(null)

bids

Ian

this customer

Customer "Ian"

Participants may be allowed to perform specified operations within other spaces
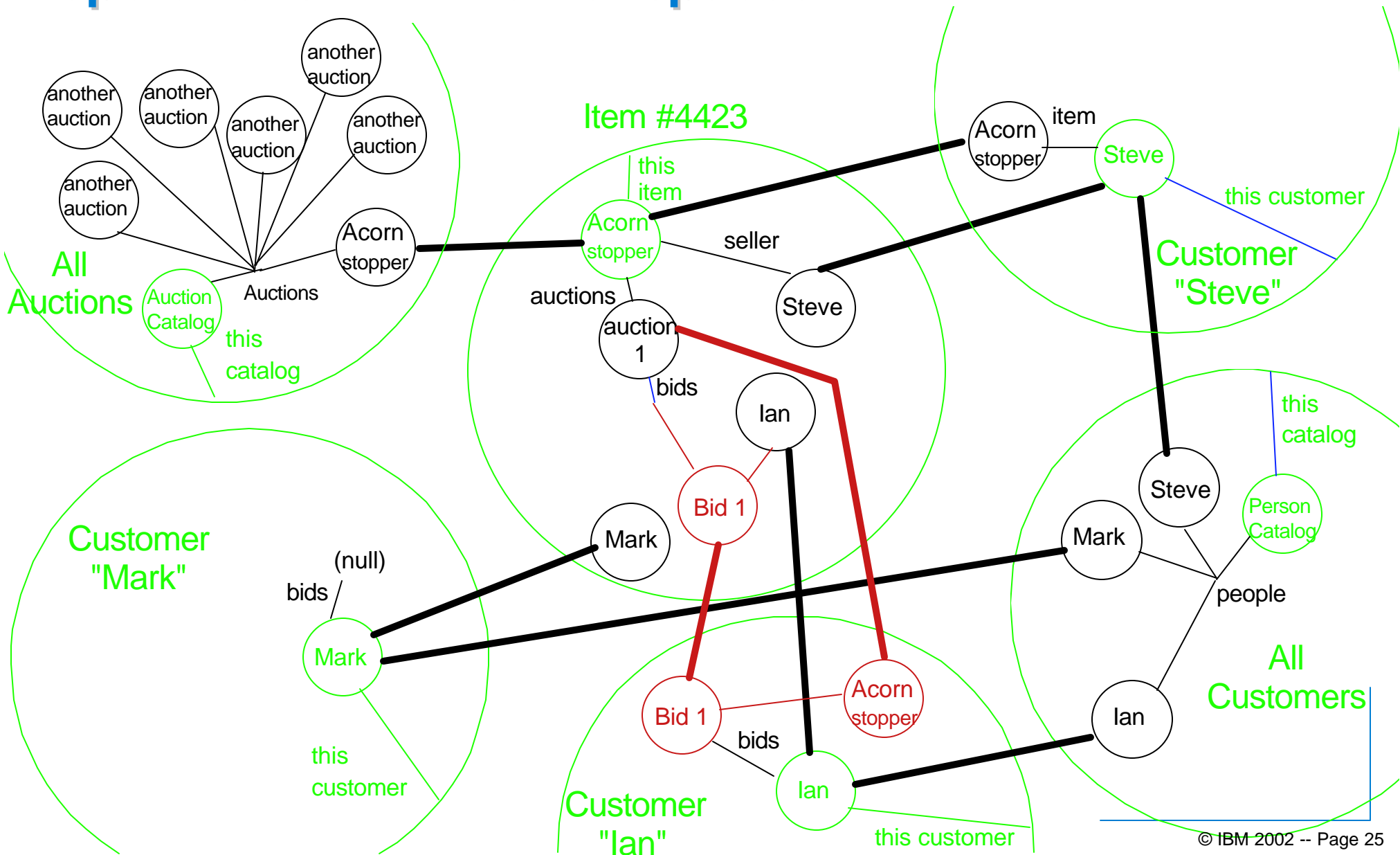
Each space governs "who can do what, when", but the actual sequencing is determined by users

Item #4423

All Auctions

another auction

another auction

another auction

another auction

another auction

another auction

Acorn stopper

Auctions

Auction Catalog

this catalog

this item

Acorn stopper

seller

auctions

Steve

auction 1

bids

Ian

Acorn stopper

Bid 2

Bid 1

Customer "Mark"

Acorn stopper

Bid 1

Mark

bids

Mark

this customer

Bid 1

bids

Ian

Acorn stopper

Customer "Ian"

this customer

Acorn stopper

item

Steve

this customer

Customer "Steve"

this catalog

Steve

Person Catalog

Mark

people

All Customers

Ian

A pattern language may ease the communication on the design of socio-informatic enablement

► Initial research suggests four categories of patterns:

- Analogues to long term uses of dedicated built physical environments
  - e.g., spaces to support master-apprentice relationships and others as described by Alexander et al.
- Analogues to short term uses of general purpose physical environments
  - e.g., events such as meetings, conferences, auctions and fairs, which were not described by Alexander et al.
- Socio-informatic patterns that have evolved from the industrial era into the network economy
  - e.g., news gathering and creation
- Truly new socio-informatic patterns
  - e.g., persistent conversations, as found in Babble

Development of patterns is in the early stages, and interesting ideas are welcomed

- ► Inside & Spinside Accounts*
  - Separation of two different uses of accounts
  - Inside == coordination with peers within a community of practice
  - Spinside == reporting up a hierarchy or to some other external agency
- ► Appropriate Diversity of Venues
  - Conversations in one context not appropriate in another
  - Venues for participation: e.g. 9/11 venting in newsgroup, temporarily tolerated since no other appropriate formal venue
  - Policing: e.g. 9/11 venting moved to a new newsgroup
  - Editorial/moderation: permission to repost from newsgroup to a webpage?

* This name was suggested by Tom Erickson, on an observation by Lucy Suchman.

Agenda

A. What's different around collective knowledge work?

B. How can we enable collective knowledge work?

C. Where is this framework being applied?

D. How can I learn more?
   - ► General Systems Theory
   - ► Purposefulness, Social Theory
   - ► Built Environments

These ideas are the product of joint research in management theory, computer-supported cooperative work & information modelling tools

▶ On specific projects ...

- Business Design Discovery Workshop (and the Adaptive Enterprise framework) -- David Ing
- Ibex -- Steve Abrams, Ian Simmonds
- Socio-Informatic Pattern Language -- Ian Simmonds, John Thomas
- Loops/Babble -- Wendy Kellogg, Tom Erickson

▶ On the concepts behind the three mediating spaces ...

- Various white papers (some in progress) -- David Ing or Ian Simmonds
- Look into some of the foundations on the pages that follow ...

General Systems Theory provides definitions rigourous across social and information systems

function [contribution of part to containing whole(s)]

== the outcome, or results produced

== outputs, ends, effect

structure [part-part arrangement in space]

== components and their relationships
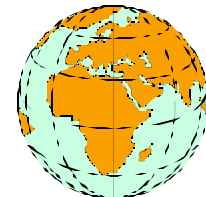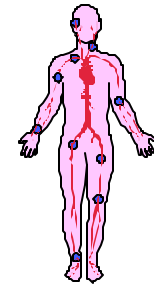
== inputs, mean, cause

open system
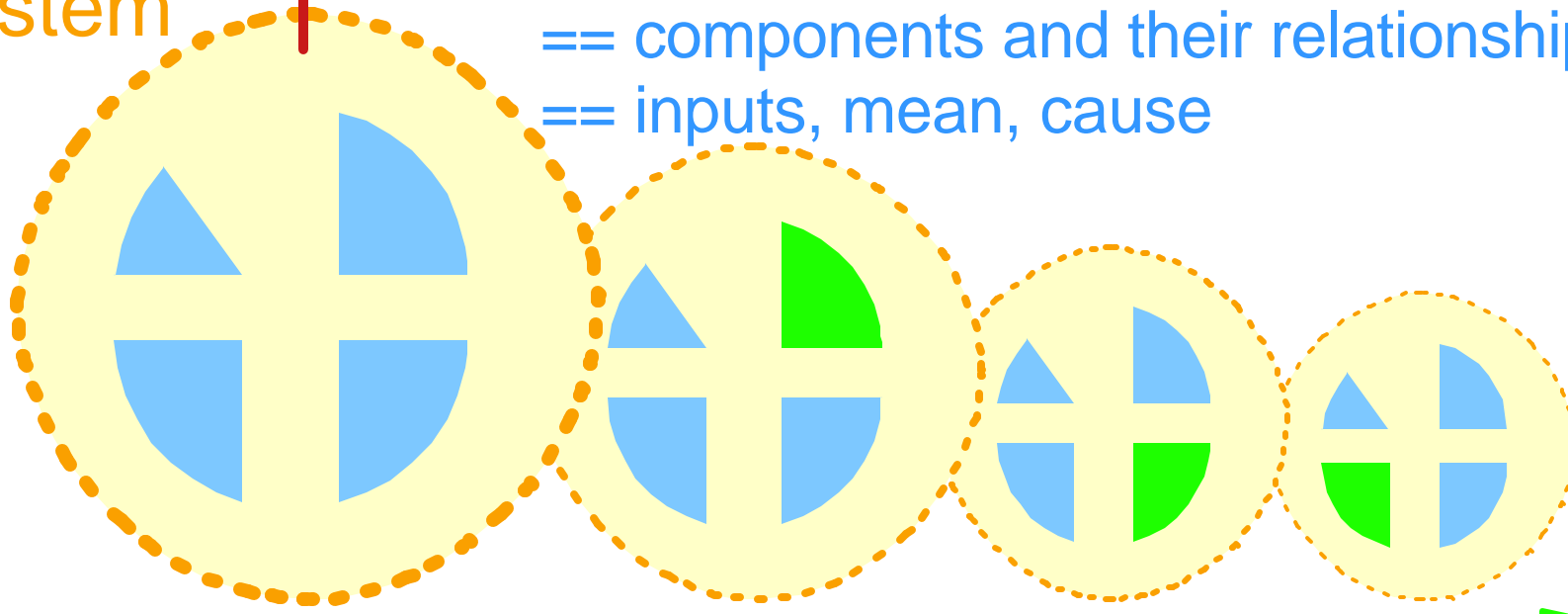
time

process [part-part arrangement in time]

== the sequence of activities and know-how required to produce outcomes

Adapted from Jamshid Gharajedagh,: *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*, Butterworth Heinemann (1999), p. 110.

In a categorization of purposefulness, social systems have unique properties

Systems can be categorized by purposefulness
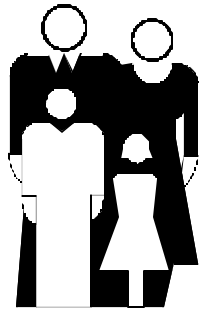
Systems and models	Parts	Whole
Deterministic	Not purposeful	Not purposeful
Animated	Not purposeful	Purposeful
Social	Purposeful	Purposeful
Ecological	Purposeful	Not purposeful

Purposeful = ideal-seeking, demonstrating will

Source: Russell L. Ackoff and Jamshid Gharajedaghi, "Reflections on Systems and their Models",
Systems Research, Vol. 13, No. 1, 1996, pp. 13-23.

Postmodern social theory adds an understanding of everyday practices and social reproduction

Social reproduction of practice -- Pierre Bourdieu

Habitus: a system of general generative schemes that is both durable (inscribed in the social construction of the self) and transposable (from one field to another), function on an unconscious plane, and take place within a structured space of possibilities (defined by the intersection of material conditions and field of operation). [p. 4]

Capital: a form of power [that ...] serves to theoretically mediate individual and society. [.... There exists an] interplay among what he distinguishes as social, cultural, and economic capital. [pp. 4-5]

Field: a frame for a "relational analysis," ... an account of the multidimensional space of positions and the position taking of agents. The position of a particular agent is the result of an interplay between that person's habitus and his or her place in a field of positions as defined by the distribution of the appropriate form of capital. [p. 5]

Source: Moishe Postone, Edward LiPuma, and Craig Calhoun, "Introduction: Bourdieu and Social Theory", in *Bourdieu: Critical Perspectives*, Craig Calhoun, Edward LiPuma and Moishe Postone (editors), Polity Press, 1993, pp. 1-13.

Style and disclosive spaces -- Spinosa, Flores & Dreyfus

Style acts as the basis on which practices are conserved and also the basis on which new practices are developed. Thus style is the ground of meaning in human activity. A style, or the coordination of actions, opens a disclosive space and does so in a threefold manner:
(1) by *coordinating* actions,
(2) by determining how things and people *matter,* and
(3) by being what is *transferred* from situation to situation.
These three functions of style determine the way anything shows up and makes sense for us. [p. 20]

Source: Charles Spinosa, Fernando Flores & Hubert L. Dreyfus, *Disclosing New Worlds: Entrepreneurship, Democratic Action and the Cultivation of Solidarity*, MIT Press, 1997.

Information systems should be constructed like well-designed buildings -- in shearing layers
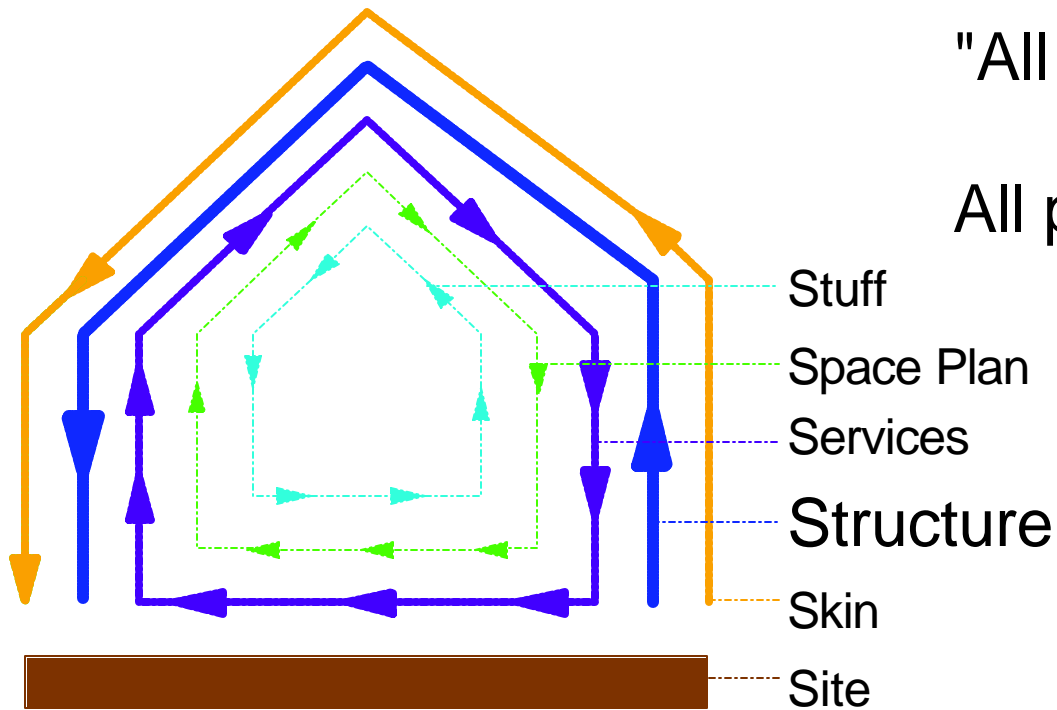
"All buildings are predictions.

All predictions are wrong." (1)

Stuff
Space Plan
Services
Structure
Skin
Site

The iron rule of planning is: whatever a client or architect says will happen with a building, won't. (2)

Source (1) and (2): Stewart Brand, *How Buildings Learn: What Happens After They're Built*, Penguin, 1994.

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