

Collaborative Software

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CMSC434 - Intro to HCI
Spring 2011

Slides (slightly) modified from Scott Klemmer

Questions?

www.CourseEvalUM.umd.edu

No class May 9

HOF/S presenters upload slides, but no
presentation

Presentations next week in order on
website



(How) can we design software to facilitate collaboration?

same time
synchronous

different time
asynchronous

same place
colocated

different place
remote

Time/Space
Groupware Matrix

Source: Wikipedia, Johnson, 1993 in Rosales, B.M., (1999), *Readings in human-computer interaction toward the year 2000*, Morgan Kaufmann Publishers.

Different time / different place

- Communication + Coordination
- Wiki
- Blogs
- Workflow
- Version Control

- Shared participation over time
- Geographically world wide

- Traditional focus of "CSCW" work

Source: Wikipedia.

Track Changes

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Samantha Smith 4/8/04 11:14 AM
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Document Collaboration

- How many of you have used Google Docs to collaborate on document?
- Can range from same time to different time, depending on use case
- Challenge: make it more than just Microsoft Word with the network added

same time
synchronous

different time
asynchronous

same place
colocated

different place
remote

Time/Space
Groupware Matrix

Communication + coordination
email, bulletin boards, blogs,
asynchronous conferencing, group
calendars, workflow, version control,
wikis, ...

Source: Wikipedia, Johnson, 1993 in Roscher, B.M., (Eds.), (1999), *Knowledge in human-computer interaction toward the year 2000*, Morgan Kaufmann Publishers.

Same time / different place

- Remote interaction
- Video-Conferencing,
- Real-time groupware
- Messaging (Instant messaging, Email)
- Virtual worlds
- Multi-User editors
- Shared Screen (vnc)

- Multi-user participation
- Nonverbal cues

Source: Wikipedia

Example: recent enhancements in same time / different place



Skype 1.0



Skype

Date	Total user accounts (in millions) ⁽¹⁾	Active users — daily presence (in millions) ⁽²⁾	Skype to Skype minutes (in billions)	SkypeOut minutes (in billions)
Q4 2006	74.7	12.8	N/A	N/A
Q1 2006	84.8	13.2	8.8	0.7
Q2 2006	113.1	16.6	7.1	0.8
Q3 2006	128.8	18.7	8.6	1.1
Q4 2006	171.2	21.2	7.6	1.3
Q1 2007	195.9	23.2	7.7	1.3
Q2 2007	218.6	23.9	7.1	1.3
Q3 2007	243.7	24.2	8.1	1.6
Q4 2007	276.3	27.0	11.9	1.8
Q1 2008	308.3	31.3	14.2	1.7
Q2 2008	338.2	32.0	16.8	1.9
Q3 2008	370	33.7	18.9	2.2
Q4 2008	405	36.9	20.8	2.6
Q1 2009	440	42.2	23.8	2.9
Q2 2009	480	-	25.5	3.0
Q3 2009	521	-	27.7	3.1
Q4 2010	660	-	-	-

Source: Wikipedia.

same time
synchronous

different time
asynchronous

same place
colocated

different place
remote

Time/Space
Groupware Matrix

Remote interactions
video conferencing, instance messaging, chats/MUDs/virtual worlds, shared screens, multi-user editors, ...

Communication + coordination
email, bulletin boards, blogs, asynchronous conferencing, group calendars, workflow, version control, wikis, ...

Different time / same place

- Continuous task
- Team rooms
- Large displays

Source: Wikipedia

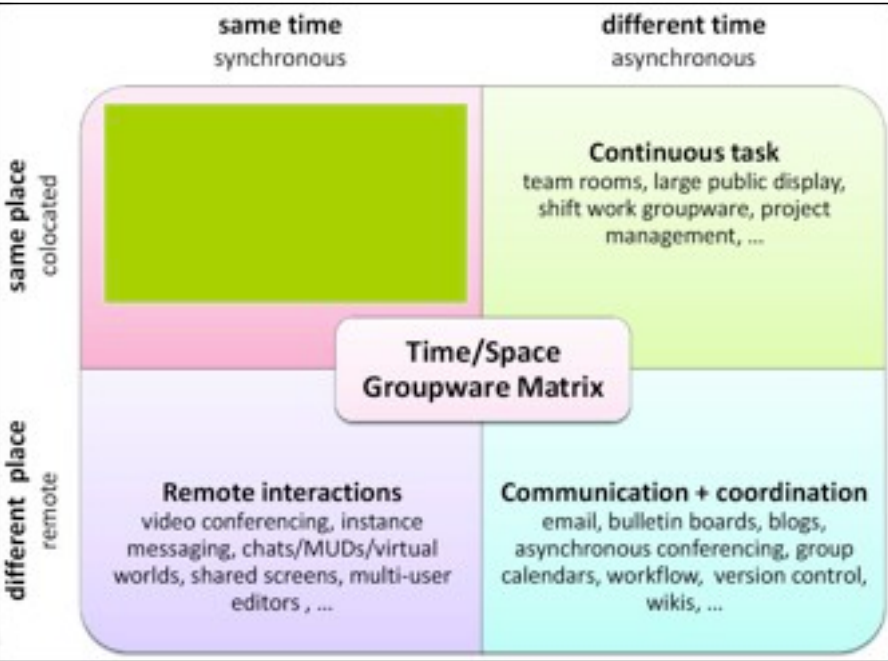
Example: ideas for different time / same place

Lean Manufacturing:
Visible System Metrics



Machine Number	Next Job SKU#	Current Job%	OEE %
0000000000	0000000000	26%	26%
0000000000	0000000000	96%	77%
0000000000	0000000000	44%	88%
0000000000	0000000000	15%	43%
0000000000	0000000000	26%	63%

Source: <http://www.adaptivethinking.com>



Source: Wikipedia, Johnson, 1993 in Rosales, B.M., (Eds), (1999), *Readings in human-computer interaction toward the year 2000*, Morgan Kaufmann Publishers.

Same time / same place

- Face to face interaction
- Roomware
- Shared tables, wall displays
- Group Decision Support Systems (GDSS)
- Single display groupware

Source: Wikipedia.

The original example: same time / same place

With
"PowerPoint
Slides"



Without
"Slides"



Source: <http://www.presentation.com.com/presentation/2006/03/index.html>

Example : same time / same place



Microsoft Surface

Source: Microsoft Surface, <http://www.microsoft.com/surface/>

Single Display Groupware



same time
synchronous

different time
asynchronous

same place
colocated

Face to face interactions
decision rooms, single display
groupware, shared table, wall
displays, roomware, ...

Continuous task
team rooms, large public display,
shift work groupware, project
management, ...

**Time/Space
Groupware Matrix**

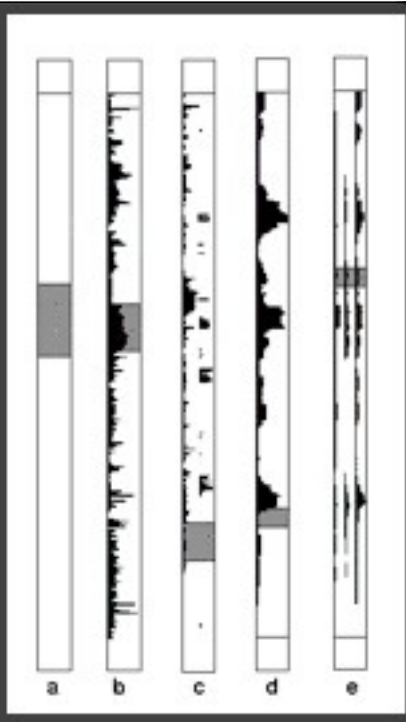
different place
remote

Remote interactions
video conferencing, instance
messaging, chats/MUDs/virtual
worlds, shared screens, multi-user
editors, ...

Communication + coordination
email, bulletin boards, blogs,
asynchronous conferencing, group
calendars, workflow, version control,
wikis, ...

Beyond
Being
There

History
Enriched
Digital
Objects



What succeeds today?

- Collocation for tightly coupled work
 - because you get common ground and rapid rich interaction for free
- Remote work that is loosely coupled
 - because it doesn't require high interaction
 - use video and other high bandwidth to overcome loss of common ground
 - travel often
- Ideally some initial face-to-face meetings

Distance Work will Only Increase

- 67% of companies anticipate increased reliance on virtual teams
 - 80% for companies with 10,000+ employees
- 35% of respondents rated difficulty of management as top challenge for virtual teams
- 92% said trust is critical for virtual teams

Survey by Institute for Corporate Productivity

Geographic dispersion & software development

- Software outsourcing is increasingly common
- But software development takes longer when performed by geographically distributed teams
 - Compare software development efficiency, when all developers are at one location or distributed across sites
 - Two different software development organizations
 - Time to complete an "MR" (Modification Request)

Study	Team type		Ratio
	Single site	Multiple site	
Herbsleb	5.0	12.7	2.5
Espinosa	48.2	97.2	2.0
Days from start to completion of MR			

Collocation supports awareness & increased frequency of communication

- Visual information supports information pick-up without explicit communication →
 - Common ground
 - Trust
 - Opportunities for communication
 - Identification of appropriate times for communication
- Examples of walking down corridor

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Live video to support informal interaction

- Early systems for distributed work tried to leverage affordances of the visual channel
 - Video Window
 - Montage
- => Pretty consistently ineffective

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Change the metaphor

Goal should be to support the *functions* of collocation and not the *form*

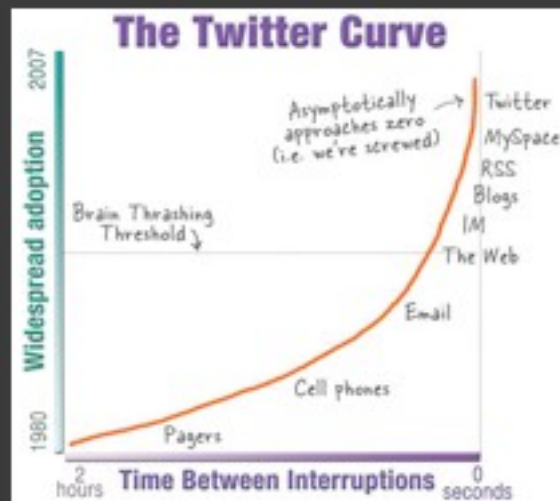
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Lower tech solutions: Text based, manual awareness displays

The screenshot displays a social media interface with three overlapping user profiles and their recent text-based updates. The background is dark, and the text is white. The users are: hardillb (with a small profile picture), Stimpdawg (with a red cartoon dog profile picture), and jyunderwood (with a profile picture of a man). The updates are listed in a vertical stack, with the most recent at the top. Each update includes a timestamp and a source (e.g., 'from web').

- hardillb**:
 - listening to roo's presentation <http://...> half a minute ago from web
 - working from home about 4 hours ago
 - @kellypuffs: aye, up north about 15 hours ago
 - up north about 18 hours ago from web
 - Listening to the Radio: 1 Escapist about 19 hours ago
 - wondering if anybody if going to be about 20 hours ago
 - getting older 01:14 AM October 03, 2007
 - suffering from insomnia 12:21 AM October 03, 2007
 - Back from the gym to find that September 30, 2007 from web
 - Trying to write a c lib for audioSc publsh it. 12:44 AM September 30, 2007
- Stimpdawg**:
 - off to work now..... 1 minute ago from web
 - off to work now... hope it's not to about 10 minutes ago
 - what the hell... usb controller about 11 minutes ago
 - wondering if i've made it safely... about 12 minutes ago
 - great... can't find my glasses 11 hours ago
 - going to hop in the shower... 20 minutes ago
 - laptop is slow... i'm going to look about 25 minutes ago
 - jeez why can't i find Popper be about 26 minutes ago
 - ok maybe it's just the slow internet about 27 minutes ago
 - the internet hates me 30 minutes ago
 - i should really defrag my computer about 35 minutes ago
 - for once i'm up early... i have a h about 40 minutes ago
 - oh no... stomach is hurting... sigh about 45 minutes ago
 - with hdmail is so slow about 1 hour ago
- jyunderwood**:
 - going to watch Stars vs Bruins tonight at 7:30 4 minutes ago from web
 - p.m.
 - being audited at work. booo. about 21 hours ago from web
 - deciding... Tomorrow: Physics exam or Stars vs Avalanche... Tricky. 06:46 PM October 03, 2007 from web
 - listening to "Exodus Honey" by Honeycut. You should too. Really. 05:57 PM October 01, 2007 from web
 - in need of a light trim. 09:41 AM October 01, 2007 from web
 - trying to focus long enough on studying to say i actually did some. 06:49 PM September 30, 2007 from web
 - new glasses today.. yay. 10:32 AM September 21, 2007 from web
 - crawling under my desk and hiding from all the crazy customers at work. 11:44 AM September 20, 2007 from web

Raises its own problems



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Some fundamental shifts are occurring in practice

- Highly distributed work groups have been successful by not striving for the collocation ideal
 - Wikipedia,
 - > 500,000 successful articles
 - Each written by 10s - 1000s of editors & large time periods
 - Coordination via the malleable & revertible artifact
 - Coordination thru text linked to the artifact
 - Open source software
 - Highly distributed teams
 - Task decomposition
 - Database driven production, with formalization to reduce the need for direct interpersonal communication
- Maybe the comparison with collocated work is fundamentally misleading. Fundamentally new structures are possible...

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Wisdom of the Crowds (Surowiecki)

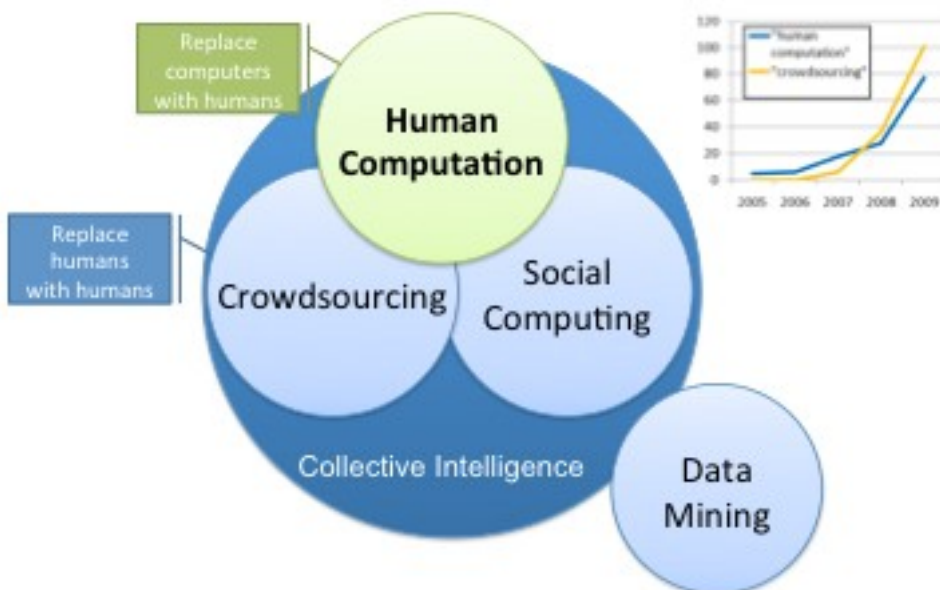
• Tasks:

- At predicting the future (prediction markets)
- At solving tough problems (InnoCentive)
- At collecting / filtering info (Digg, Delicious, Twitter)
- At democratizing production (Wikipedia)
- At doing work (GWAP)

• Motivations:

- Pay (Amazon Mechanical Turk)
- Fun/reputation (GWAP, StackOverflow)
- Was doing it anyway (Re-captcha, Fold.it)
- Altruism (anonymous blog comments)

Human Computation Taxonomy



Challenges

- Disparity of benefit between worker and requester
- Motivation must scale
- Balance openness with quality / malicious behavior
- Integrate / aggregate information