

Otiyami: 2 → see Stanford P.D. professor  
on other geometric designs

crown/claw pulled up  
rest on object

Alan's idea:  
attach the wires to  
the middle tubing

Bill: copyright  
visualization of idea

PACHINKO  
passive gate  
array

Scott: a gate that shows  
who walked through it last  
Bill: a gate that measures  
ceremonial gates

# Collaborative Software

SEVO 1 close  
SEVO 2 open

interlocking  
turnstile

turnstiles

SCOTT KLEMMER  
FALL 2011  
[cs147.stanford.edu](http://cs147.stanford.edu)

GE  
Airport  
Explosion Detector







What makes for  
effective *online*  
communities?

Same Time

Different Time

Collocated  
(Same Place)

Remote  
(Diff't Place)

# Same time / same place

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

# Example : same time / same place



Microsoft Surface




# Different time / same place

- Message Boards
- Dedicated Team rooms
- Large displays



# Example: ideas for different time / same place

Lean Manufacturing:  
Visible System Metrics



A man in a grey shirt is pointing at a production rate board. The board displays a table with columns for HR, TARGET, ACTUAL, TARGET ACCUM., ACTUAL ACCUM., +/-, and NOTES. The data is for PART # 1354-R2.

HR	TARGET	ACTUAL	TARGET ACCUM.	ACTUAL ACCUM.	+/-	NOTES
1	75	75	75	75	0	
2	75	72	150	147	-3	← Ran short of Print fuel rollers
3	75	70	225	217	-8	
4	75	75	300	296	-4	
5	75	75	375	371	-4	
6	75	75	450	450	0	
7	75	75	525	528	+3	
8	75	75	600	600	0	

Notes: Don't Need new spec. sheet printed for R2. old one destroyed. Thanks A.



A man in a light blue shirt is pointing at a production board. The board displays a table with columns for PART #, TARGET, ACTUAL, and a color-coded bar chart. The data is for PART # 1354-R2.

PART #	TARGET	ACTUAL
1354-R2	75	72



A digital display showing machine metrics. The display has four columns: Machine Number, Next Job SKU#, Current Job%, and OEE %. The data is as follows:

Machine Number	Next Job SKU#	Current Job%	OEE %
15	1531	75%	72%
17	1572	95%	77%
21	1514	44%	82%
22	1499	15%	93%
23	1528	26%	63%



A digital display showing area metrics. The display has four columns: Location, Flow Rate, Temperature, and PPM Emission. The data is as follows:

Location	Flow Rate	Temperature	PPM Emission
Area 1	245	355	11000
Area 2	355	400	12000
Area 2A	423	350	12500
Area 3	564	275	13000
Area 4	343	320	11500
Area 5	250	330	11000
Area 5A	452	390	15500
Area 5B	356	345	11750
Area 6	475	400	12000
Area 6A	276	275	12000
Area 6B	285	275	13500



# Same time / different place: Technologies

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

# Same time / different place: Affordances

- Multi-user participation
- Nonverbal cues
- Differing levels of fidelity (text, voice, avatar)



# The Picturephone, 1964



*A logical extension of today's telephone service.*

## **Bell System introduces PICTUREPHONE service**

Both ends of telephone conversations are instantly "seen" from the moment you pick up the receiver. And Touch-Tone® is there, too.

New Touch-Tone Control Console, Chicago (Professional Buildings), Washington (National Geographic Society Building) and service.

Bell System PICTUREPHONE service lets you call as well as talk to the telephone. And Touch-Tone® is there, too.

For the first time, people can make a local telephone call to another city — the latest example of the research, invention and development that are constantly improving the communications we provide.

This new service is being offered in the

areas listed at the left. Bell System installations at each local office will allow you to "see" incoming calls as well as outgoing calls. And you can see the other side.

Further development of PICTUREPHONE service is still in the future. But the service is working now toward the goal of providing you with better, more useful, more convenient communication by telephone.



**Bell System**

*Working for you*

Western Telephone & Telegraph Co. and Associated Companies



**Picturephone® installation showing Touch-Tone® control console.**



# Example: Skype


Date	Total user accounts (millions) <sup>[22][23][24][25][26][27][28][29]</sup>	Active users, daily use (millions) <sup>[30][31][32]</sup>	Skype to Skype minutes (billions) <sup>[33]</sup>	SkypeOut minutes (billions)	Revenue USD (millions)
Q4 2005	74.7	10.8	N/A	N/A	N/A
Q1 2006	94.6	15.2	6.9	0.7	35
Q2 2006	113.1	16.6	7.1	0.8	44
Q3 2006	135.9	18.7	6.6	1.1	50
Q4 2006	171.2	21.2	7.6	1.5	66
Q1 2007	195.5	23.2	7.7	1.3	79
Q2 2007	219.6	23.9	7.1	1.3	90
Q3 2007	245.7	24.2	6.1	1.4	98
Q4 2007	276.3	27.0	11.9	1.6	115
Q1 2008	309.3	31.3	14.2	1.7	126
Q2 2008	338.2	32.0	14.8	1.9	136
Q3 2008	370	33.7	16.0	2.2	143
Q4 2008	405	36.5	20.5	2.6	145
Q1 2009	443	42.2	23.6	2.9	153
Q2 2009	483	?	25.5	3.0	170
Q3 2009	521	?	27.7	3.1	185
Q4 2009	?	?	36.1	?	?
2010 (full year)	?	?	190	12.8	860

Year	International call market share
2005	2.9% <sup>[35]</sup>
2006	4.4% <sup>[35]</sup>
2008	8% <sup>[34]</sup>
2010	13% <sup>[36]</sup>

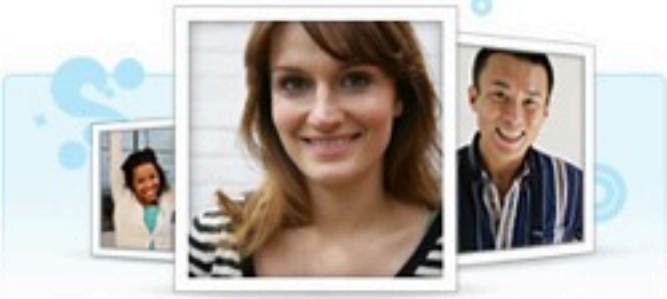
23rd

November 2010

Celebrating 25 million concurrent users

  
Neil Stevens

Yesterday we reached a new milestone for peak concurrent users: 25 million people online, on Skype, at the same time. Our software is designed to handle large numbers of concurrent users, with [wideband audio](#) and [group video calls](#) all flowing smoothly around the world – from mothers in Montevideo to their sons in San Francisco, and from contractors in Canberra to their suppliers in Seoul.



In 2009, our users spoke, stared and sung for 113 billion Skype-to-Skype minutes – and for the first six months of this year, approximately 40% of Skype-to-Skype minutes were video minutes. All of this made possible by software built by a team of just under 800 people\*. How do we do this?

Very simply: we do one thing. Our single minded focus is on building the best communications products, and building them for the whole world. This is not a hobby – it's who and what we are. And at Skype, we have one ambition: to build communications products which billions of people embrace every day.

Skype software takes care of the complexities of network topography, firewalls, different OSes, multiple devices – computers, and a myriad of connection types, leaving you to do the talking, laughing, smiling, crying, singing, dancing and more. Because we think 25 million is worth celebrating.

\* as of June 30, 2010

Comments (8)

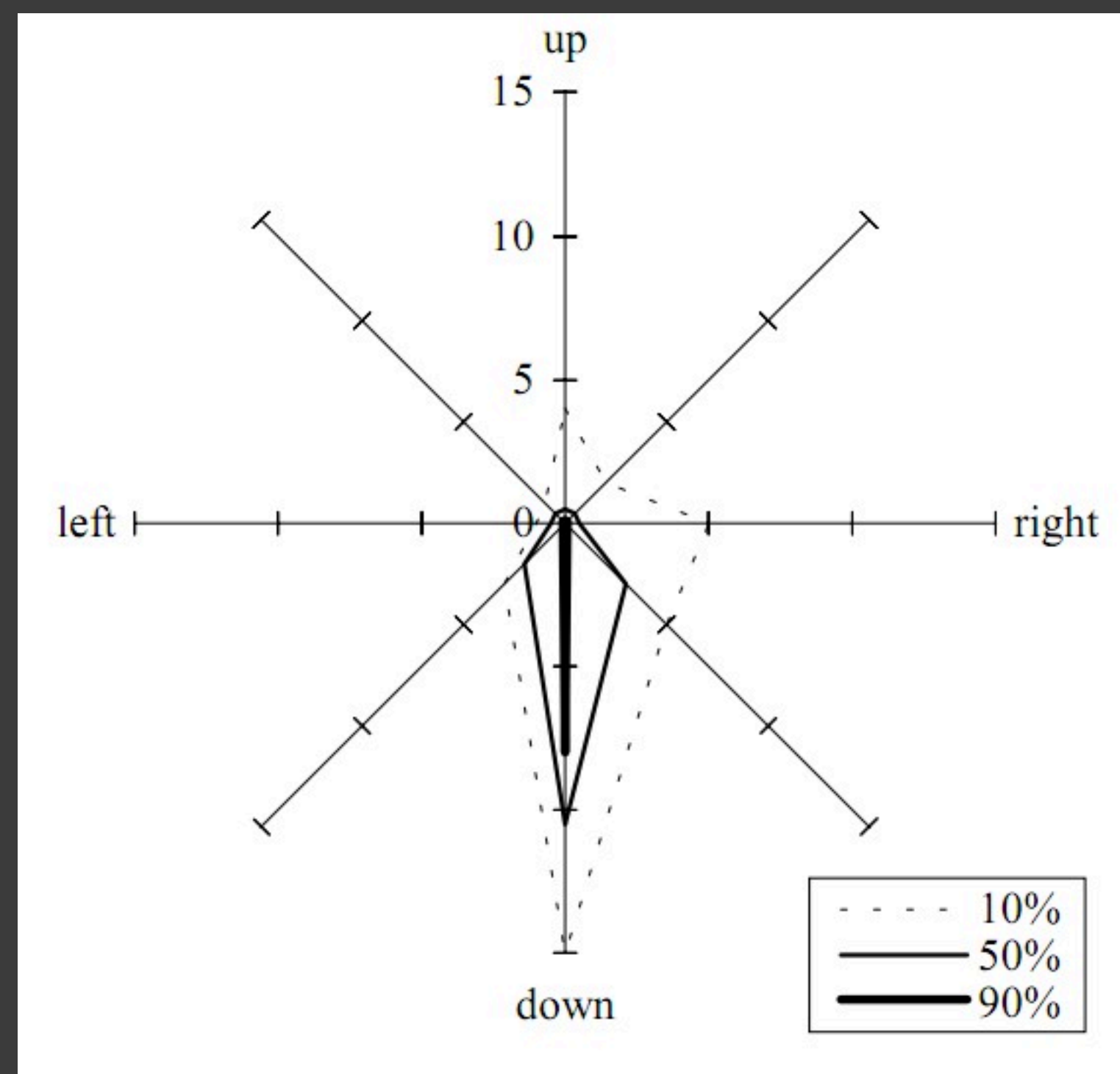
Share this

Tweet this



# Gaze Parallax

- “we are an order of magnitude less sensitive to eye contact when people look below our eyes than when they look to the left, right, or above our eyes.” --Milton Chen







# Business value of HP Halo

Nice communication tool	Effective global collaboration tool	Greatest competitive advantage
Expressive like-view images and no delay in communication "It's like being there"	Geographically dispersed workforce can work together "Effective meetings without traveling"	Collaborative decision-making and problem-solving in a virtual space "Faster decisions, better problem-solving"
Experience	Productivity gains	Strategic options



# Always-On: Portholes and Media Spaces



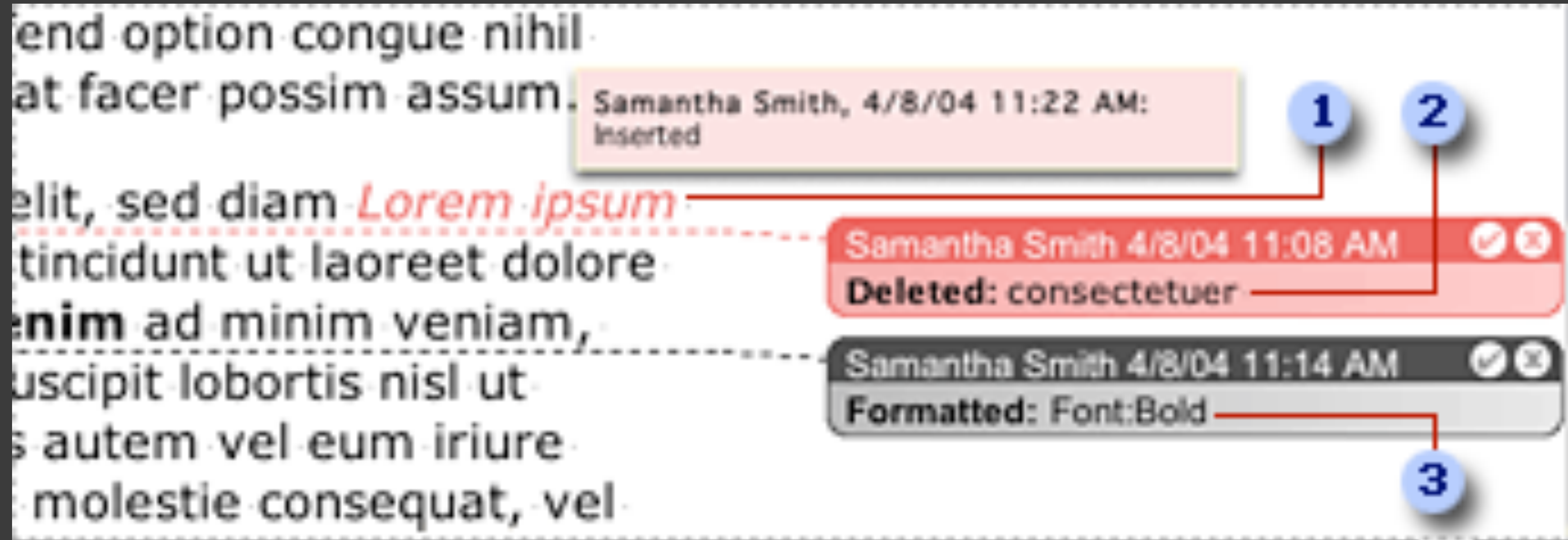
# Calling While Driving



# Different time / different place

- Communication + Coordination
  - Wiki
  - Blogs
  - Workflow
  - Version Control
- 
- Shared participation over time
  - Geographically world wide

# Document Collaboration: Track Changes





# Challenges to Successful Collaborative Software



File Edit View Go Tools Actions Help

Type a question for help

New X Type a contact to find Go to Today

Calendar

All Calendar Folders

All Calendar Items

My Calendars

Calendar in Rob Young

People's Calendars

Mark Hassall

Dennis Bye

Roan Kang

Other calendars

TeamSite-team calendar

Calendar Actions

Open a Shared Calendar...

Browse Calendars Online

Share My Calendar...

Send Calendar via E-mail...

Add New Group

Mail

Calendar

Contacts

Tasks

Day

Week

Month

Work week

Full week



October 31-November 04, 2005

Search...



Calendar

TeamSite-team calendar

31 Monday

1 Tuesday

2 Wednesday

3 Thursday

4 Friday

8 am

From Oct 27

Halloween; United States

Halloween; United States

Elena visit

Election Day; United States

9 00

Sales update

36/2078

Budget review

Updated: 16/3043

Jeff Smith

Research Review -- Tim

Conf Room 36/2013 (14) A

Guy Bilbert

10 00

FW: Weekly WSS Updat

16/3043

Burke Fewel

11 00

Design Checkpoint: Ren

Conf Room 16/2369 (16) A

Florian Voss

FW: Progress update

16/3043

Luis Sousa

1-1; Jeff's office; Rob Yo

12 pm

1 00

Outlook Beta 1 Team 36/401; Ric Gray

Outlook Beta 1 Team 36/401; Ric Gray

Go over

Go over

Outlook Beta 1 Team 36/401; Ric Gray

Outlook Beta 1 Team 36/401; Chris Gray

Finalize Liz Keys

Sales Team Meeting 1 LOCAT CHANG 36/337

Sales Team Meeting 1 LOCAT CHANG 36/337

Design Office Hours 16/Atrium (under the stairs) Jeff Teper

Budget Review for Marketing team, 36/4013

Chris Gray

Outlook Beta 1 Team 36/401; Chr

FW: Tez Lun TBD Aan

Outlook Beta 1 Team 36/401; Chr

Off 36/401; Nicle

Off 36/401; Nicle

2 00

3 00

New Outlook Chrome: W

Rob's office

Josh Edwards

Mike's 1:1

Rob's Office

Rob Young

Marketing PM Meeting 36/1339

Leads Meeting

Design Lab

Joe Andreshak

FW: Office 36/1339

Joe Andres

FW: Office 36/1339

Joe Andres

4 00

5 00

Updated: 0

Conf Room 3

Giovanni M

Common n

Sales meeting McKinley

Employee Meeting 33

Mike's soccer game

Pick up



# Challenges

- Disparity of Work and Benefit  
Groupware applications often require additional work from individuals who do not perceive a direct benefit from the use of the application

# Challenges

- Disruption of Social Processes  
Groupware can lead to activity that violates social taboos, threatens existing political structures, or otherwise demotivates users crucial to its success

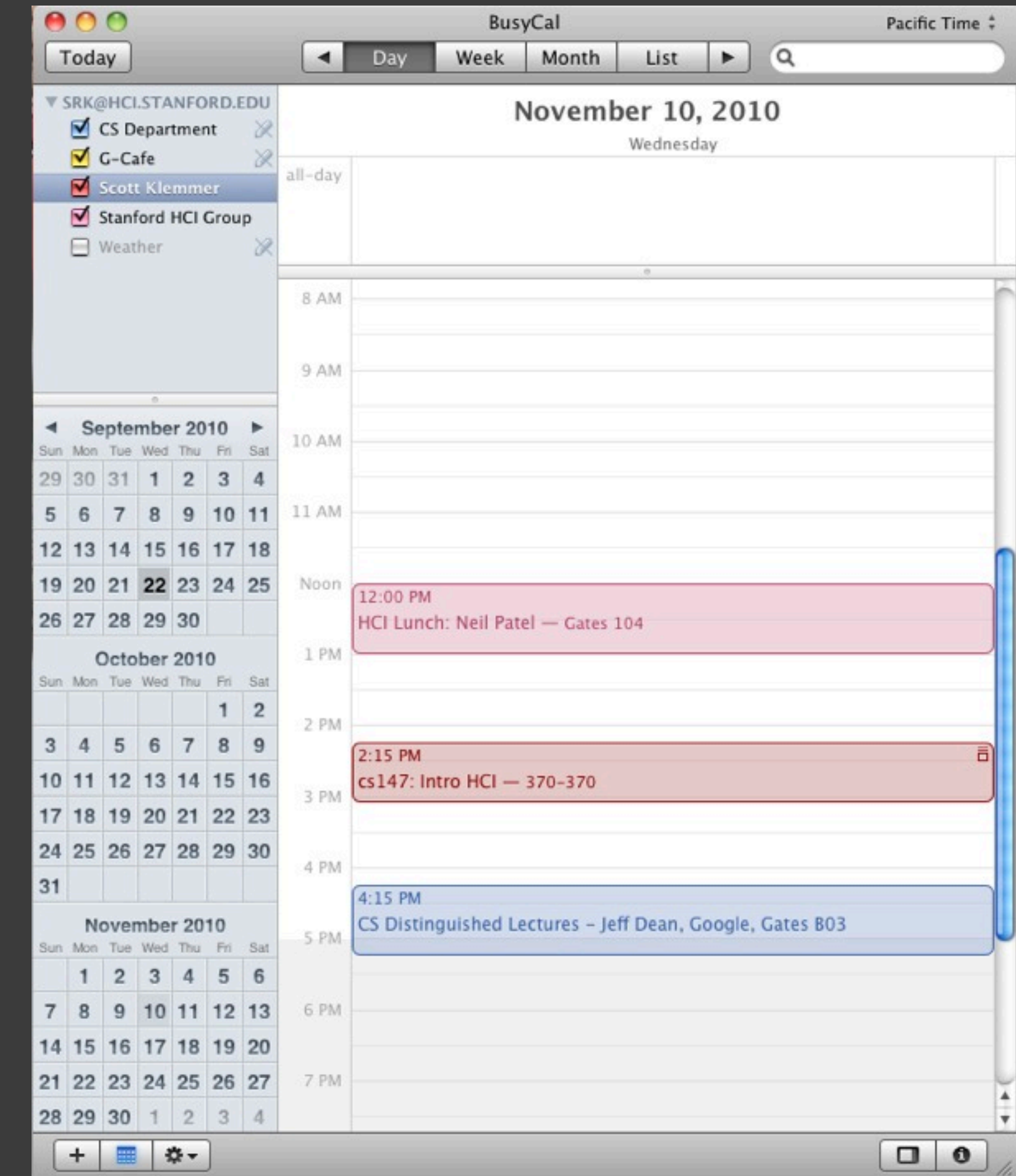
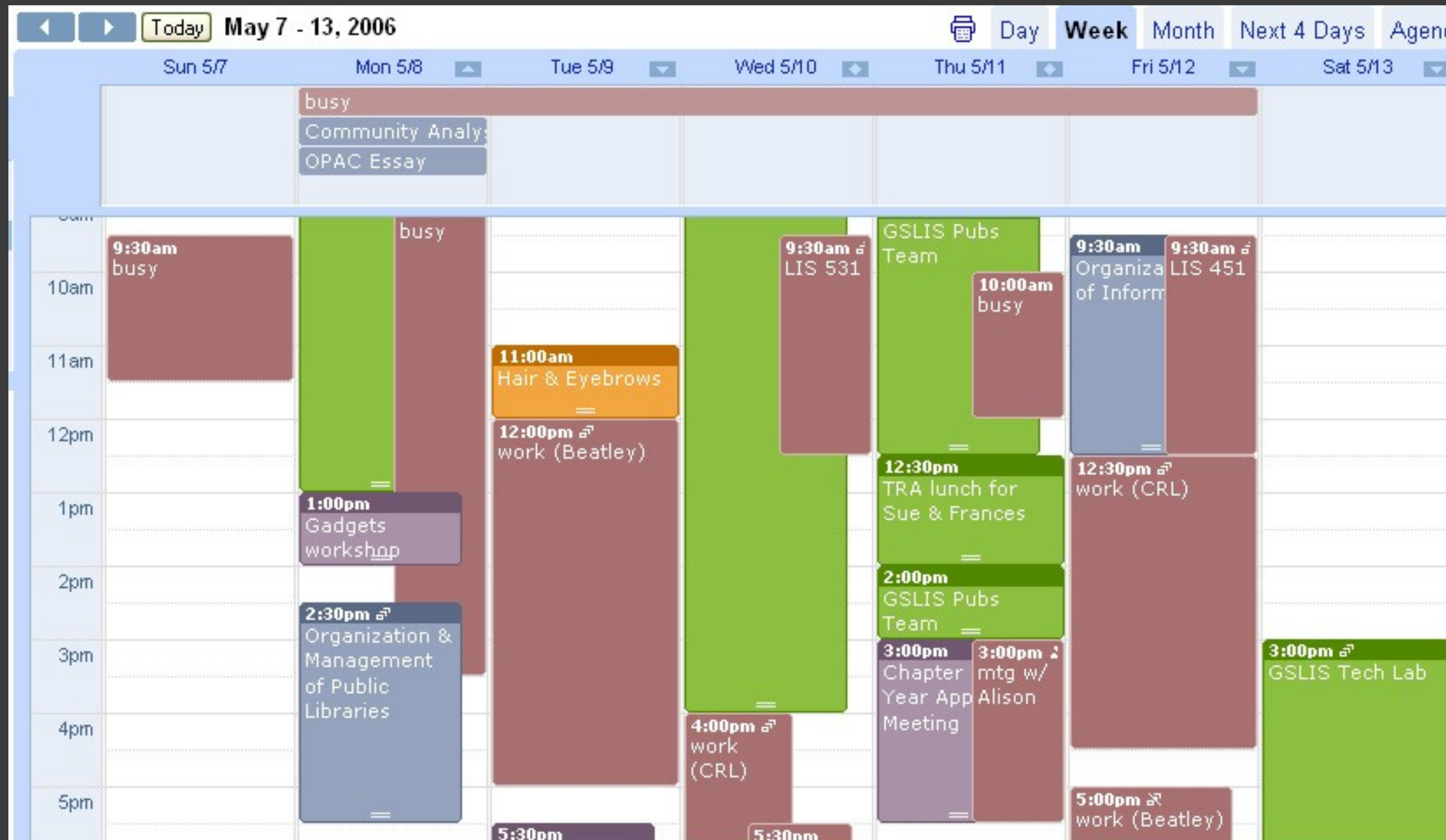


# Challenges

- Critical Mass and Prisoner's Dilemma  
Groupware may not enlist the “critical mass” of users required to be useful, or can fail because it is never to any one individual's advantage to use it



# Example: Google Calendar (and BusyCal)





# Integrating Calendar and Email

Search Mail  Search the Web [Show search options](#)  
[Create a filter](#)

[Back to Inbox](#) [Archive](#) [Report spam](#) [Delete](#) [Move to ▼](#) [Labels ▼](#) [More actions ▼](#)

**Discuss future of input** [Inbox | X](#)

☆ **Ame Elliott** to srk, David

[show details](#) 12:49 PM (4 minutes ago) [Reply](#)

Title: **Discuss future of input**

When: Fri Dec 11 6am – 7am (PST)

Where: Scott's office @ Stanford

Who: daycan@ideo.com, srk@stanford.edu, aelliott@ideo.com\*

[Add to calendar »](#)

**Your Agenda for Fri Dec 11, 2009**

No earlier events

6am **Discuss future of input**

9:30am [Pair Program w/Joel](#)

12pm [SymSys Committee Meeting](#)

[view my calendar »](#)

2:00 PM - 3:00 PM December 11, 2009

Location: Scott's office @ Stanford

Scott,

Fabulous. Thanks very much. We would like to meet you next Friday at 2:00. Right now things look good for us to come to the students' final presentations too. My colleague David and I look forward to seeing you next week.

Thanks!

Ame

[Reply](#) [Reply to all](#) [Forward](#)

Title: **HCI Study Design 2 Meeting**

When: Fri Jan 22 3:30pm – 4:30pm (PST)

Where: 4th Floor Wallenberg, Union Pacific

Who: acholonu@gmail.com, daniel.schwartz@stanford.edu, spdow@stanford.edu, srk@cs.stanford.edu...

[Add to calendar »](#)

**Your Agenda for Fri Jan 22, 2010**

12pm [Lunch w/HCI Seminar Speaker](#)

2:05pm [Carrie Armel](#)

2:30pm [Ranjitha, Juho, Pao, Salman, Brie](#)

3:30pm [HCI Study Design 2 Meeting](#)

3:30pm **HCI Study Design 2 Meeting**

8:45pm [ragi dindial show](#)

[view my calendar »](#)

**The following meeting has been modified:**

**Subject:** HCI Study Design 2 Meeting

**Organizer:** "Ugochi Cynthia Acholonu" <[acholonu@stanford.edu](mailto:acholonu@stanford.edu)>

**Location:** 4th Floor Wallenberg, Union Pacific [MODIFIED]

**Time:** Friday, January 22, 2010, 3:30:00 PM - 4:30:00 PM GMT -08:00 US/Canada Pacific

**Invitees:** "Dan Schwartz" ; "Scott R Klemmer" ; "Steven Paul Dow" ; [acholonu@gmail.com](mailto:acholonu@gmail.com)



# Challenges

- Exception Handling  
Groupware may not accommodate the wide range of exception handling and improvisation that characterizes much group activity







# 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



# 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)

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



# Cummings & Kiesler (2005; 2007)

## Study of Large NSF Projects

- Two studies of the outcomes of large NSF funding initiatives
  - 71 Knowledge & Distributed Intelligence projects 1998/99
  - 491 Information Technology Research Projects, 2001-2003
- PIs complete questionnaires describing
  - Collaboration composition
  - Coordination techniques used
  - Scientific & educational success

- Multi-university projects were less successful than single-university projects
- More successful projects used a variety of specific coordination mechanisms
- Multi-university projects used fewer coordination mechanisms than single-university projects
- Reduced use of coordination mechanisms mediated the relationship between # of university and performance

