From Social Networks and Web Mash-ups towards Mixed Reality

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Outline

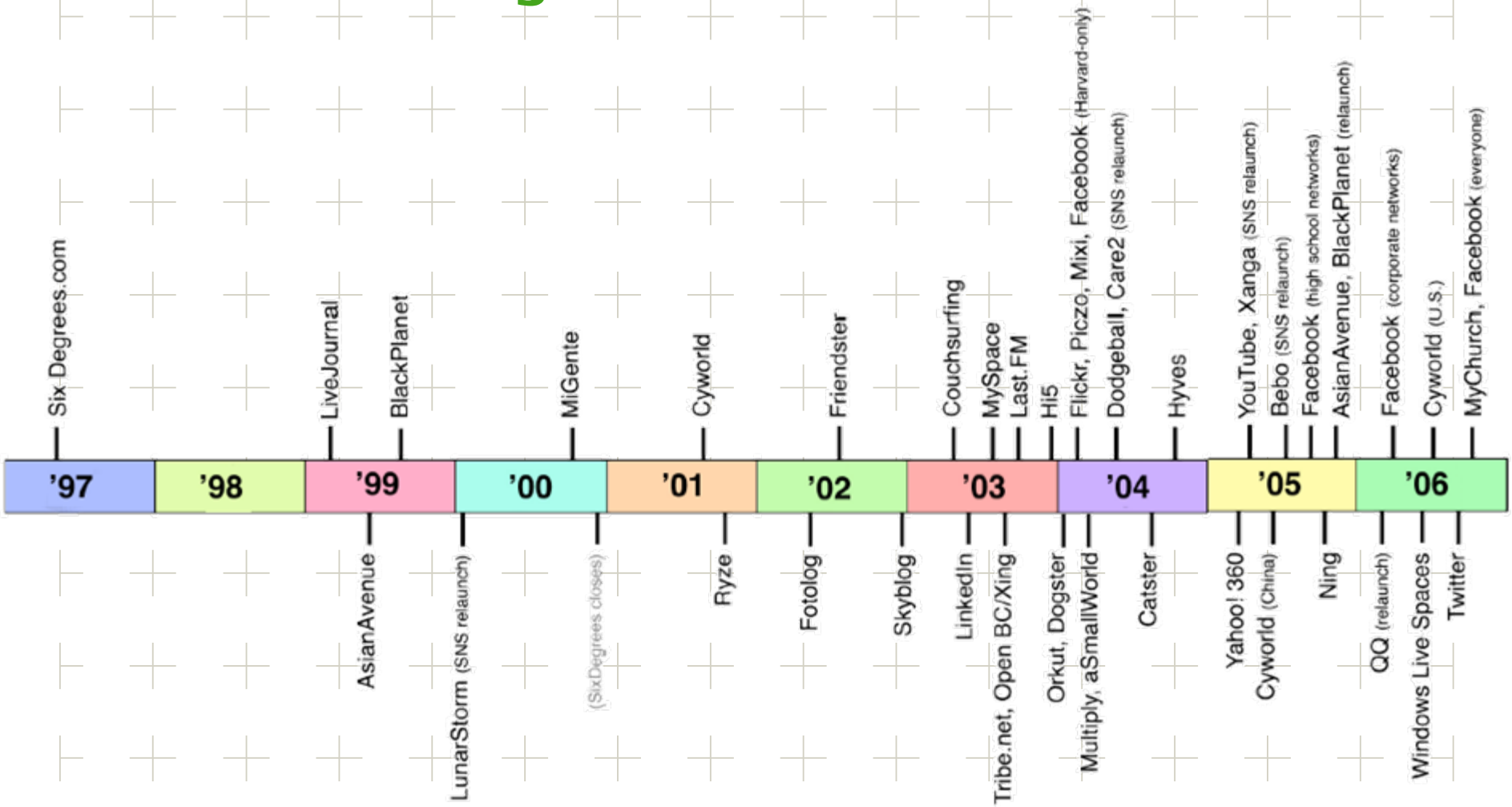
- Social Networks
  - What they are
  - Some background theory
  - How do current social networks handle privacy
- Web Mash-ups
  - What they are
  - Private information flow among different sites
  - Framework for protecting the user
- Mixed Reality
  - Fusion of the real & the digital world
  - The evolution of social networks & mash-ups
  - Privacy concerns

Social Networking Sites

- Social network sites are web-based services that allow individuals to
  - construct a public or semi-public profile within a bounded system
  - articulate a list of other users with whom they share a connection
  - view and traverse their list of connections and those made by others within the system



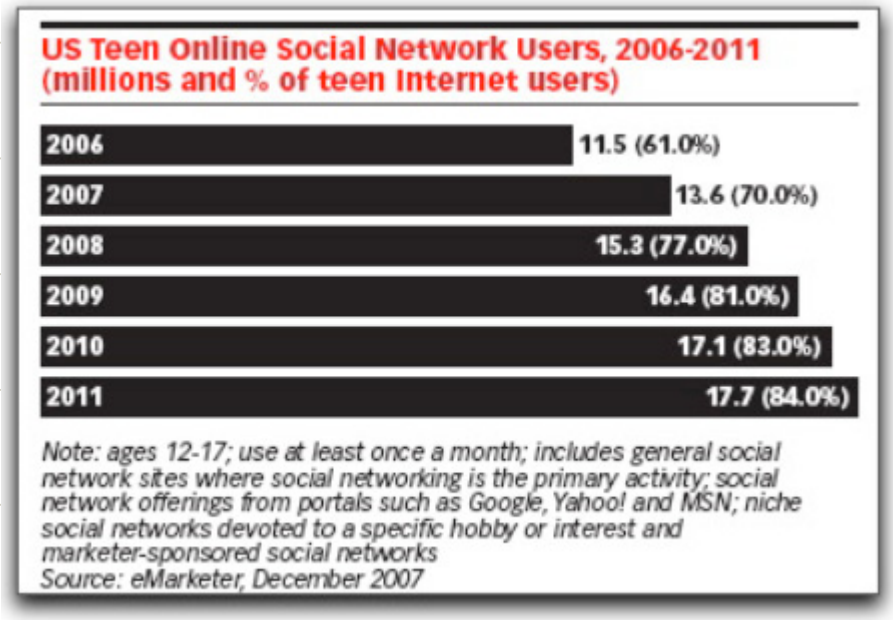
Social Networking Sites - Timeline



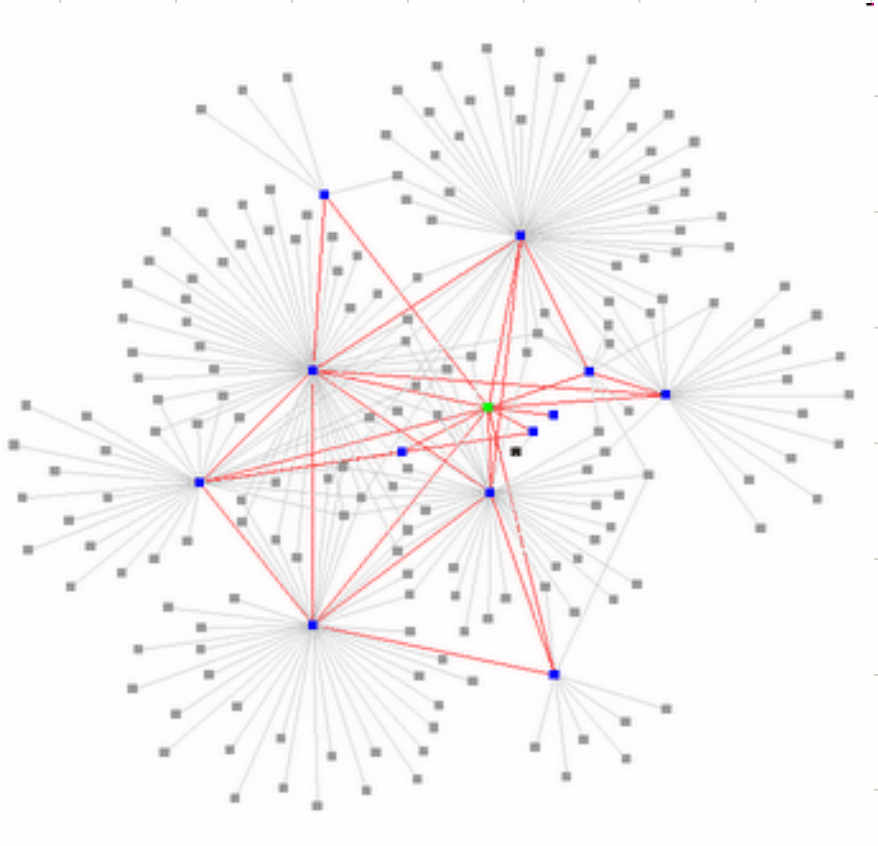
[d. boyd & N. Ellison, 2007]

Social Networking Sites

- Social networking sites have become a mainstream cultural phenomenon



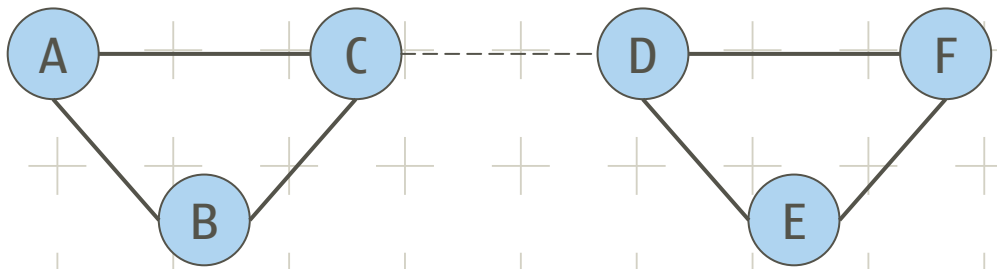
Social Networks – The theory



Strength of Weak Ties (Granovetter 1973)

People gain novel information from weaker ties than stronger ties

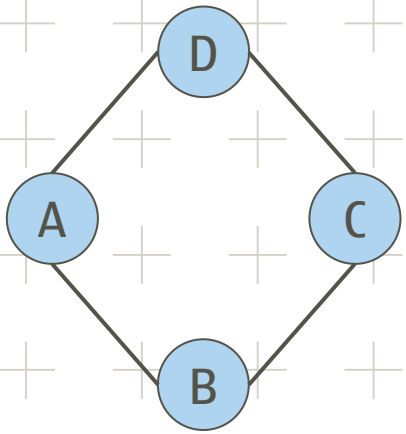
- people who are strongly connected share information directly, therefore they possess the same knowledge
- new information comes from external connections which are likely to be weak



Structural Equivalence (Burt 1987)

People who are identically positioned within a network use one another as a frame of reference & evaluation

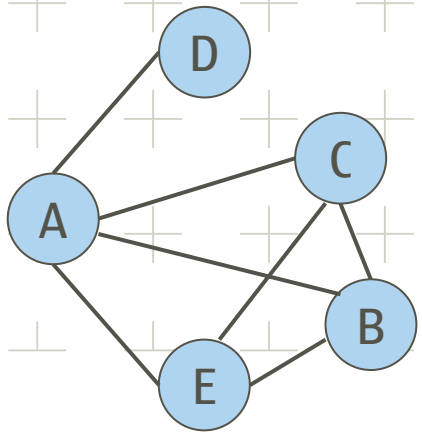
- people are not necessarily directly connected
- people are in competition with one another
- people who are in the same equivalence class (status) tend to adopt at the same time

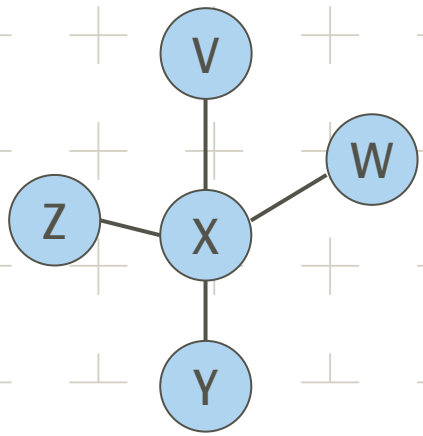


Structural Holes (Burt 1992)

An person is in a more advantageous position to gain and control novel information if s/he is connected to others who themselves are not directly connected to one another.

- Non-redundant sources of information allow efficiency with little constraint
- Developed to explain interpersonal communication in a competitive environment





Why people use social networking sites

- Discover people with common interests
- Reunite with old friends
- Discover professionals, via colleagues

- Share content
- Discuss
- Gossip

Typical steps to social networking sites

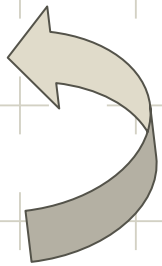
- (get invitation)
- Create account
- Enter personal data

- Discover friends
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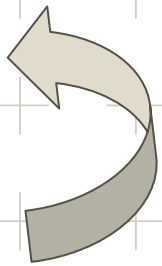
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Typical steps to social networking sites

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Privacy?

Privacy

- Many stories
  - Disclosure of embarrassing personal information to employers
  - Blackmail using photos found online
  - Social scams

- Misconception that privacy violations occur routinely because the users fundamentally do not care about privacy
- Most social network users DO express an interest in privacy

Things that have been known for some time

- Threats & risks associated with using social networking services
- Privacy issue arise from the graph of friendship itself
  - Social context has been shown to make phishing attacks much more successful
  - Getting even small amount of social information enables many other useful calculations/estimations to be made

A great recent study

- J. Bonneau & S. Preibush, University of Cambridge, 2009
- Compared 45 social networking sites, using 260 criteria, related to privacy and policies

The study

- 29 popular general-purpose sites of minimum 500,000 users
- 16 niche sites (e.g. Business-networking, media recommendation & reunion)

Site	Traffic Rank	Users (M)	Country	Category
Windows Live Spaces	4	120	USA	General-purpose
Facebook	5	175	USA	General-purpose
MySpace	7	250	USA	General-purpose
hi5	17	60	USA	General-purpose
SkyRock	43	13	France	General-purpose
Friendster	45	95	USA	General-purpose
NetLog	71	35	Belgium	General-purpose
Tagged	75	70	USA	General-purpose
Orkut	83	67	USA	General-purpose
LiveJournal	85	18	Russia	General-purpose
Bebo	119	40	USA	General-purpose
PerfSpot	124	20	USA	General-purpose
meinVZ	156	12	Germany	General-purpose
Multiply	161	12	USA	General-purpose
Badoo	168	19	UK	General-purpose
Sonico	183	33	Argentina	General-purpose
Ning	187	1	USA	General-purpose
CyWorld	315	20	South Korea	General-purpose
Xanga	346	40	USA	General-purpose
MyYearbook	406	15	USA	General-purpose
BlackPlanet	1021	18	USA	General-purpose
Piazo	1486	20	USA	General-purpose
MocoSpace	2582	2	USA	General-purpose
Hyves	4166	8	Netherlands	General-purpose
Impulse	4782	1	Bulgaria	General-purpose
Yonja	5142	4	USA	General-purpose
Bahu	9977	1	France	General-purpose
Nexopia	12109	1	Canada	General-purpose
Eons	17872	1	USA	General-purpose
LinkedIn	149	35	USA	Business-networking
Imeem	186	30	USA	Media recommendation
Last.fm	317	21	USA	Media recommendation
Twitter	338	6	USA	Micro-blogging
Classmates.com	519	40	USA	Reunion
Gaia Online	628	7	USA	Gaming
MyLife	796	58	USA	Reunion
BuzzNet	954	10	USA	Media recommendation
Flixster	975	62	USA	Media recommendation
XING	1023	7	Germany	Business-networking
Viadeo	3280	7	France	Business-networking
Habbo	3349	124	Finland	Gaming
CouchSurfing	4326	1	USA	Travel
Experience Project	8878	2	USA	Privacy-specific
Kaioo	120679	n/a	Germany	Privacy-specific
Imbee	248170	n/a	USA	Privacy-specific

Table 1: Evaluated Social Networks, $N = 45$. User count in millions, rounded.

[J. Bonneau & S. Preibush, 2009]

Privacy Policy Acknowledgement

- Signing up to a site is considered a legal acceptance to the Privacy Policy in every site. Out of the 29 general purpose sites:
  - Only 5 required actively checking a box to indicate acknowledgement of privacy policy
  - 17 of them mentioned the privacy policy on the sign-up page, but only 11 placed the privacy policy reminder on the user's critical path
  - Out of the 16 niche, 10 mentioned the privacy policy, only 4 put a reminder above the submission button

Privacy Policies

- A privacy policy should not be confused with the quality of data protection standards implemented by the site
- A policy should give a clear explanation of the practices, regardless of whether they are beneficial, or not, for the end user
  - A site that clearly states excessive data collection, usage and sharing with 3rd parties, has a better policy than a site with ambiguous text, not mentioning data sharing
- Length
  - Average length: 2633 words. 12 of them with more than 3000
- Only 10% of users claim to read the privacy policy
  - Server logs indicate that they might be less than 1%

Privacy Policies - Legal issues

- Lack of contractual information
  - 13 sites failed to provide a date on their policies
  - 15 did not provide a physical contact address
  - 7 did not provide any contact information at all
- Following nation's data protection laws
  - 20 did not specify which nation's law
  - 20 did not specify location of data storage and process
  - Only 17 specified both (info which is needed in a dispute)
- Only 21 (of the 45) explicitly grant users the right to delete their data
  - Legally required in the EU
- 32 explicitly reserved the right to share with 3rd parties
  - Only 8 promised no to

Seal Programs

- Basic Principle:
  - Publish a policy (any policy) and follow it
- Logo guarantees that site follows the policy
- Nowadays social networking sites might include much more complex functionality
  - in the study 7 sites used graphical privacy seal









P3P Policies

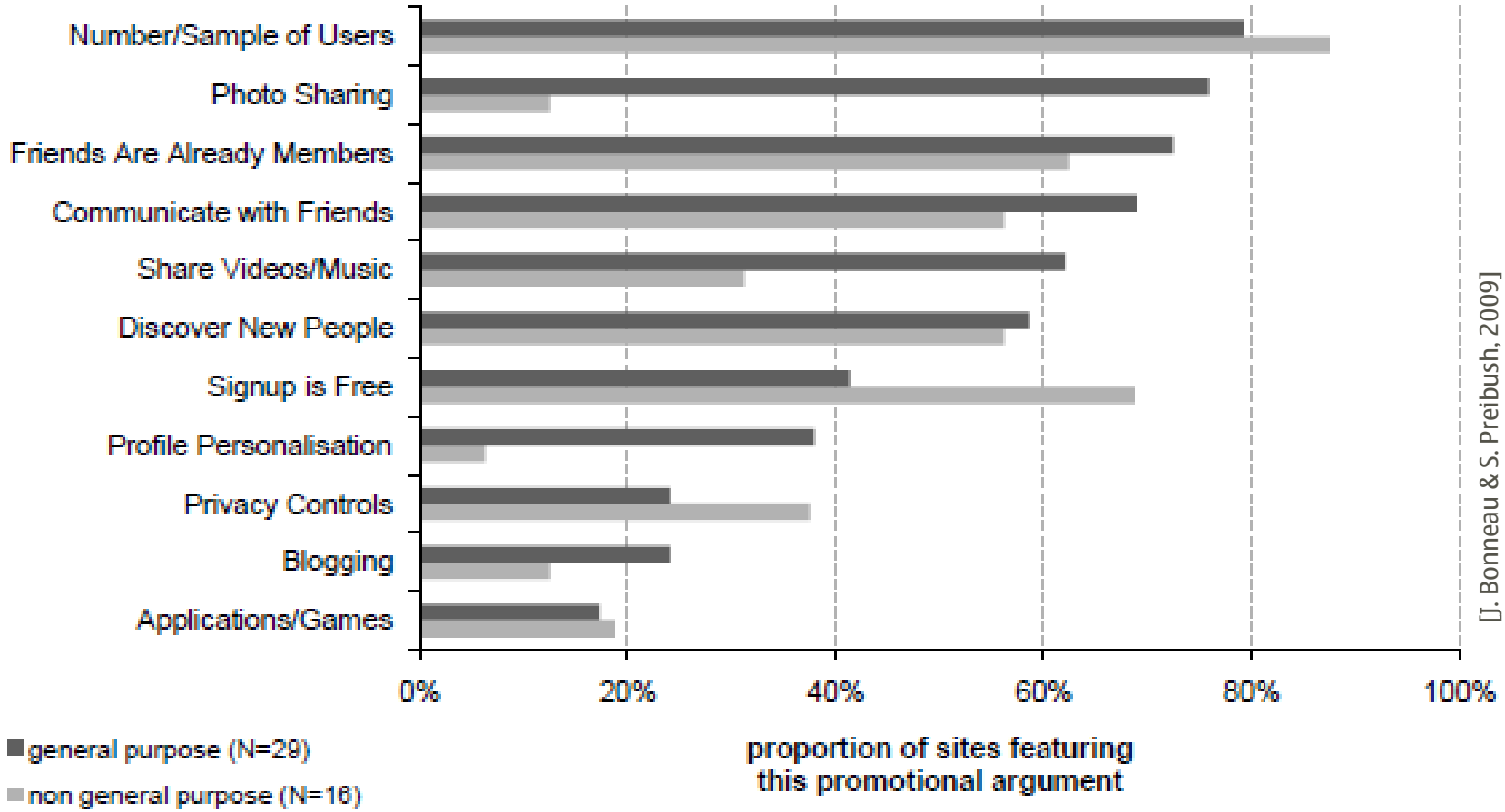
- Platform for Privacy Preference Project
  - By World Wide Web Consortium (W3C)
- A framework for automated privacy discussions
  - Web sites disclose their privacy practices in standard machine-readable formats (XML)
  - Web browsers automatically retrieve P3P privacy policies and compare them to users' privacy preferences

- In the recent study, 10 sites implemented a P3P policy, only 7 of them correctly

P3P data

- Who is collecting data?
- What data is collected?
- For what purpose will data be used?
- Is there an ability to change preferences about (opt-in or opt-out) of some data uses?
- Who are the data recipients (beyond the data collector)?
- What is the data retention policy?
- How will disputes about the policy be resolved?
- Where is the human-readable privacy policy?

Promotion of features



Reducing Privacy Salience

- Talking about privacy, even in a positive context, may have negative impact to the social networking site operator
  - Raises concerns to visitors
  - It increases the privacy salience
  - Providing strong privacy assurance can actually make people less likely to disclose information, than if no assurance would be provided [Loewenstein, 2007]
  - Other study found that users exposed to explicit privacy info had higher concerns afterwards [Gideon et al., 2006]

Data Collected During Sign-up (generic sites)

- Far more personal data is collected than needed
  - Gender was required by 20 sites, and requested by 4 others
  - Date of birth was required by 24 sites and requested by 2 others

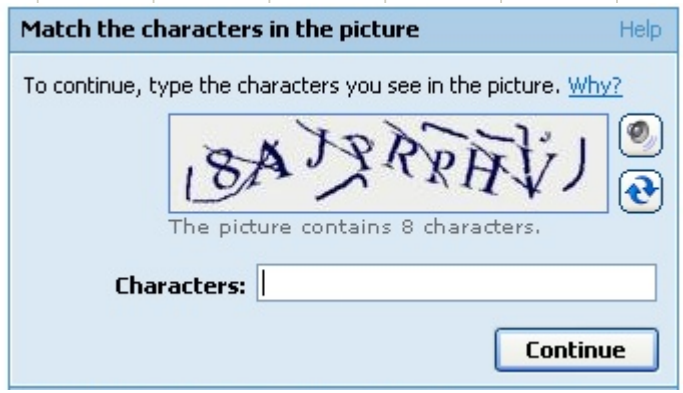
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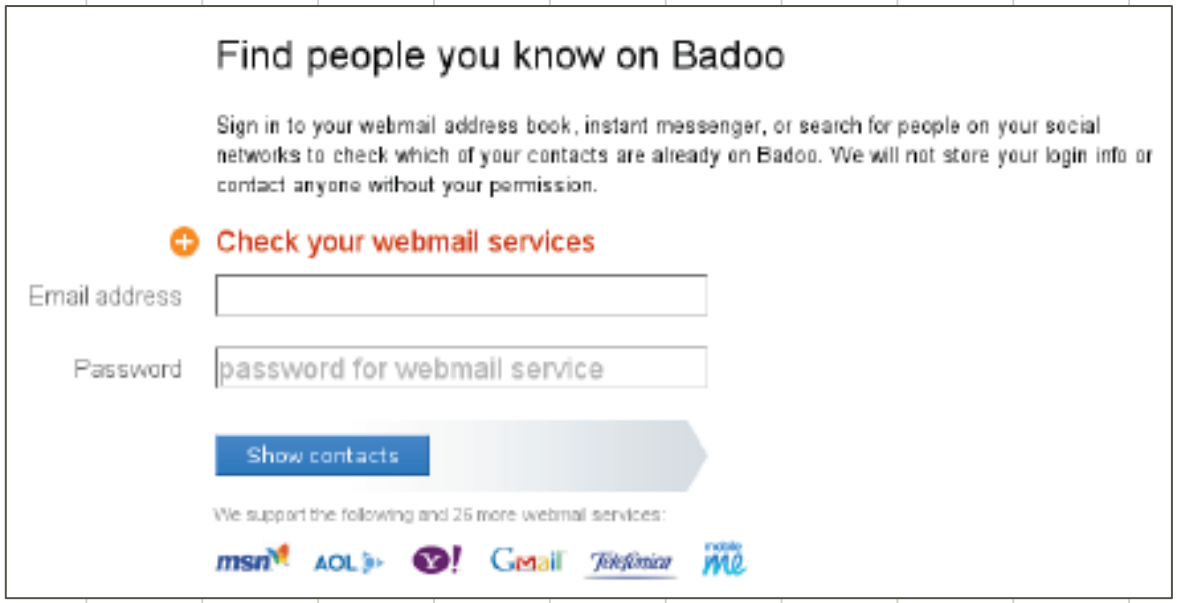
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Profile visibility (generic sites)

visibility level	default	optional	unavailable
public Internet	41%	-	59%
all site users	48%	28%	24%
sub-networks only	7%	17%	76%
friends of friends	-	24%	76%
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  - 2 sites offered useful “audience view”
  - 8 implemented abstraction to groups

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  - 8 implemented abstraction to groups
- Problem: Not lack of options, but open defaults
  - 80-99% of users found to never change their privacy settings
  - 26-30% are not even aware that privacy controls exist

Default privacy settings

- Leaving unnecessarily detailed data traces to others
  - “xxx uploaded a new photo”
  - “xxx changed his relationship status”
- … can be aggregated into temporal usage patterns, with serious privacy implications

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Page last updated at 14:36 GMT, Friday, 17 October 2008 15:36 UK

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Man killed wife in Facebook row

A man has been jailed for life for stabbing his wife to death over a posting she made on the social networking site Facebook.

Wayne Forrester, 34, told police he was devastated that his wife Emma, also 34, had changed her online profile to "single" days after he had moved out.

More stories...



More stories…

Phishing For Facebook

65 Comments

by **Michael Arrington** on January 2, 2008



I'm not sure what the bad guys want with a bunch of Facebook user account credentials, but **phishing** scams seem to be hitting the site. **Scott Fish** notes that some users are seeing Wall posts that contain links to phishing sites to gather Facebook credentials.

An example message is:

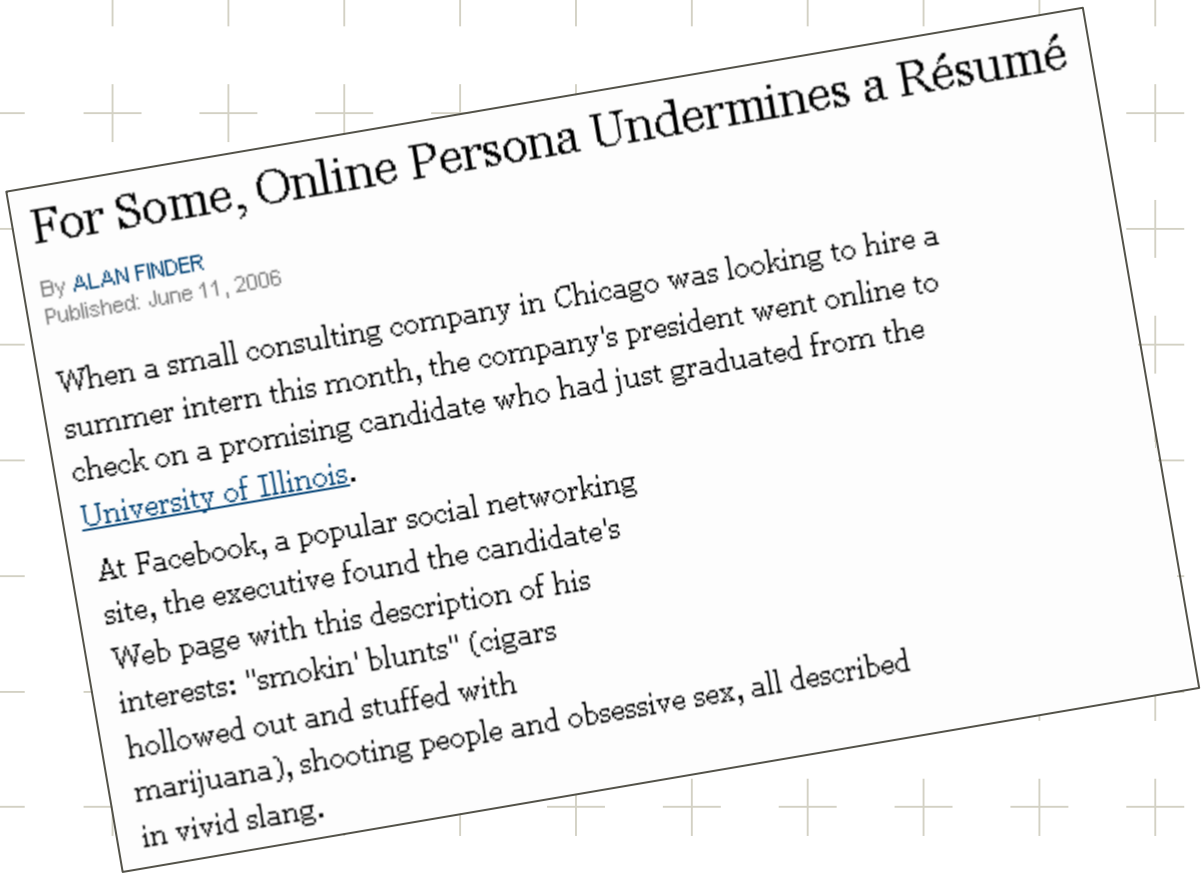
> lol i cant believe these pics got posted....its going to be BADDDD when her boyfriend sees these- http://www.facebook.com.profile.php.id.371233.cn

Note that the URL in the quote above, which leads to what looks like a Facebook sign in page, is not Facebook. So if you visit the site (don't), DO NOT enter your Facebook credentials or any other personal information.

Only your friends can add Wall posts on Facebook, so any posts linking to phishing sites are either from hacked accounts or else people have added the phishing guys as a friend.

This is a good candidate for **PhishTank**, an anti-phishing service created by **OpenDNS**.

More stories...



For Some, Online Persona Undermines a Résumé

By ALAN FINDER
Published: June 11, 2006

When a small consulting company in Chicago was looking to hire a summer intern this month, the company's president went online to check on a promising candidate who had just graduated from the University of Illinois.

At Facebook, a popular social networking site, the executive found the candidate's Web page with this description of his interests: "smokin' blunts" (cigars hollowed out and stuffed with marijuana), shooting people and obsessive sex, all described in vivid slang.

More stories...



FACEBOOK FIRED: 8% of US Companies Have Sacked Social Media Miscreants

August 10th, 2009 | by Adam Ostrow

40 Comments

893 tweets

retweet

post



There have been a number of cases where an employee's misuse of social media has lead to their dismissal. However, it appears that these aren't just outliers, but the result of a serious crackdown by corporate America on tracking their employee's online activities.

According to a new study by Proofpoint, an Internet security firm, of companies with 1,000 or more employees, 17 percent report having issues with employee's use of social media. And, 8 percent of those companies report having actually dismissed someone for their behavior on sites like Facebook =) and LinkedIn =). That's double from last year, where just 4 percent reported having to fire someone over social media misuse.

Social Networking – Wrap-up

- Current social networking market: inadequate privacy control
- Sites try to limit privacy salience
- Need to reduce privacy information asymmetry
  - "privacy nutrition labels" [Kelley et al., 2009]
  - P3P
- Need for clear privacy policies, increase privacy salience

Social Networking Sites:
Linking People

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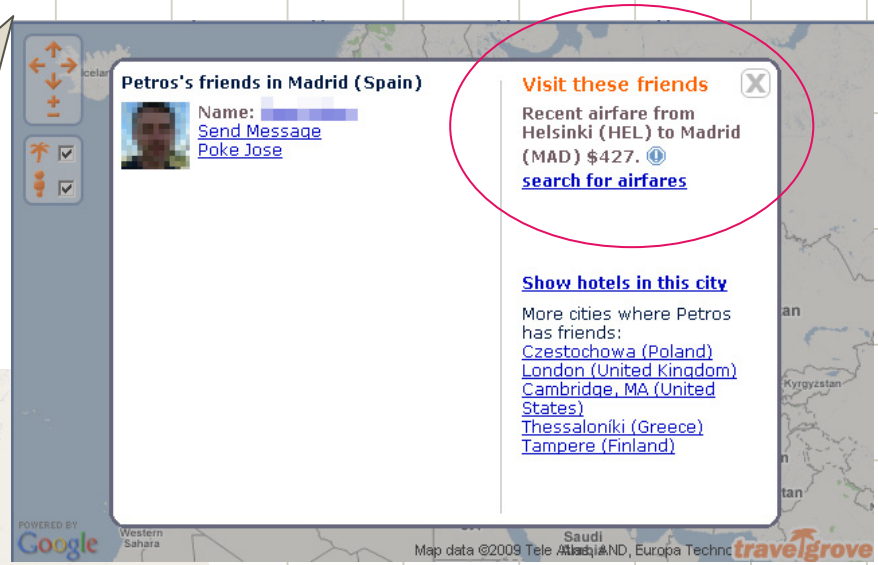
Web mash-ups

... a mashup is "a web page or application that combines **data** or **functionality** from two or more external sources to create a new service. The term mashup implies easy, fast integration, frequently using open APIs and data sources to produce results that were not the original reason for producing the raw source data". [wikipedia]

A good example

Maps from Google

Friends from Facebook





Hotels from agency

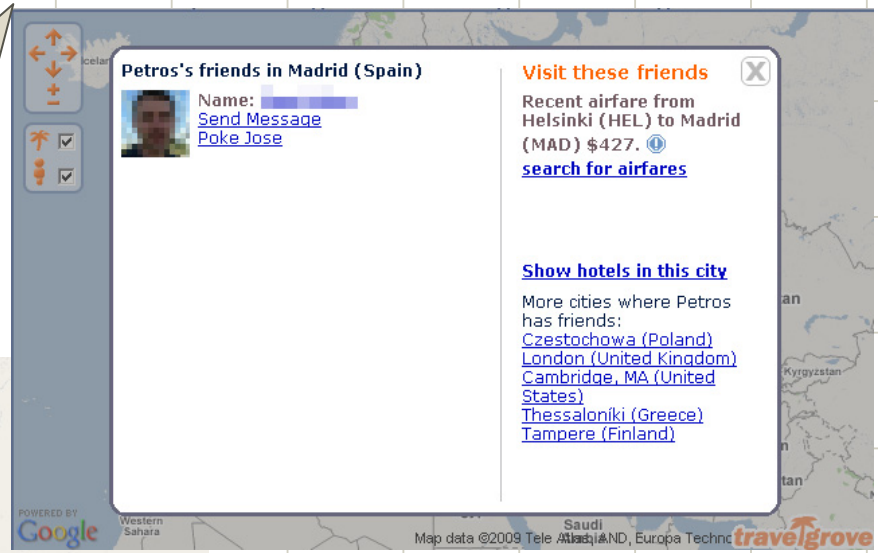
Airfare from airlines

A good example

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Private data

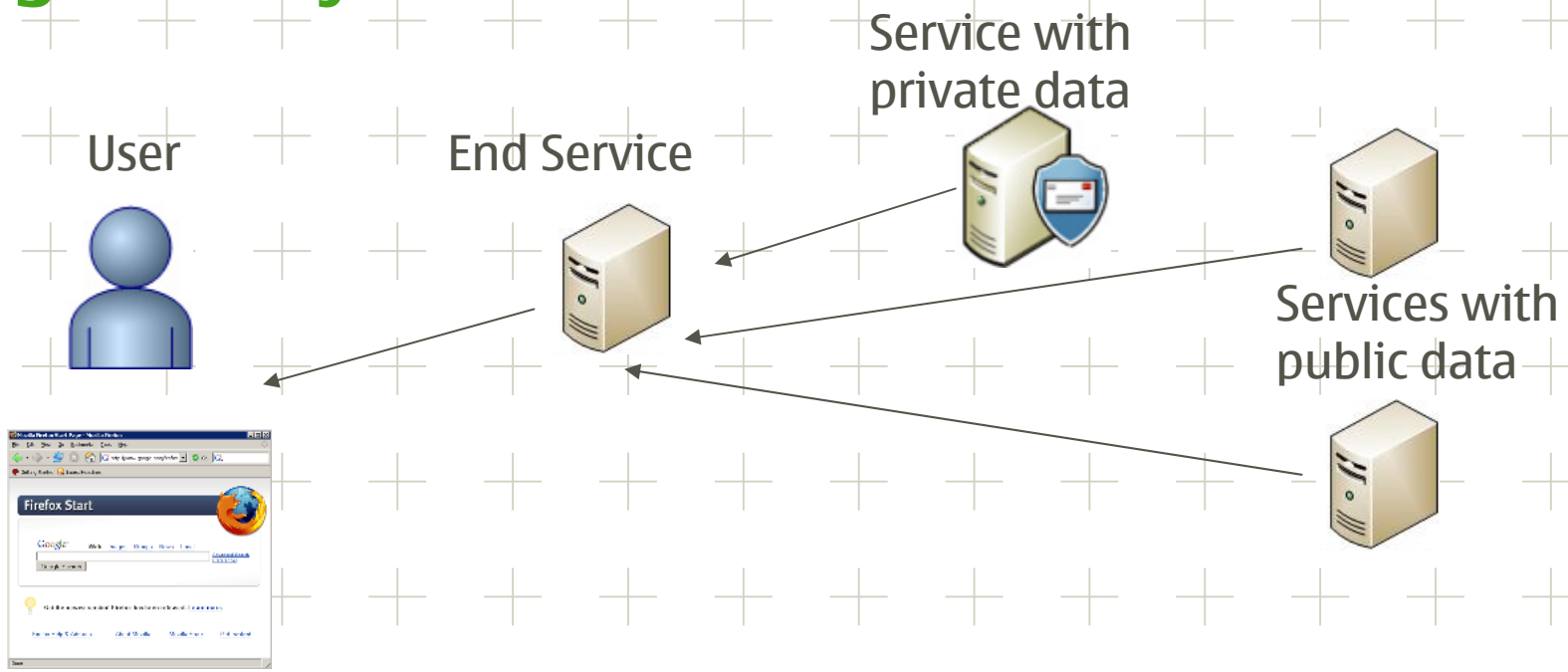




Hotels from agency

Airfare from airlines

High-level system view



How to give access to this private data?

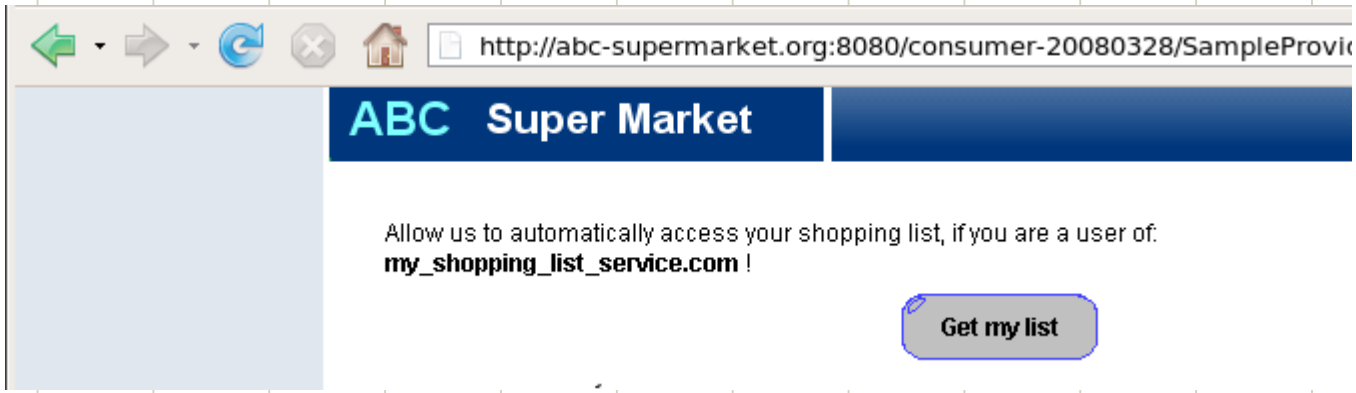
- Private data is hosted on some other service
- Give username & password?
  - NO!



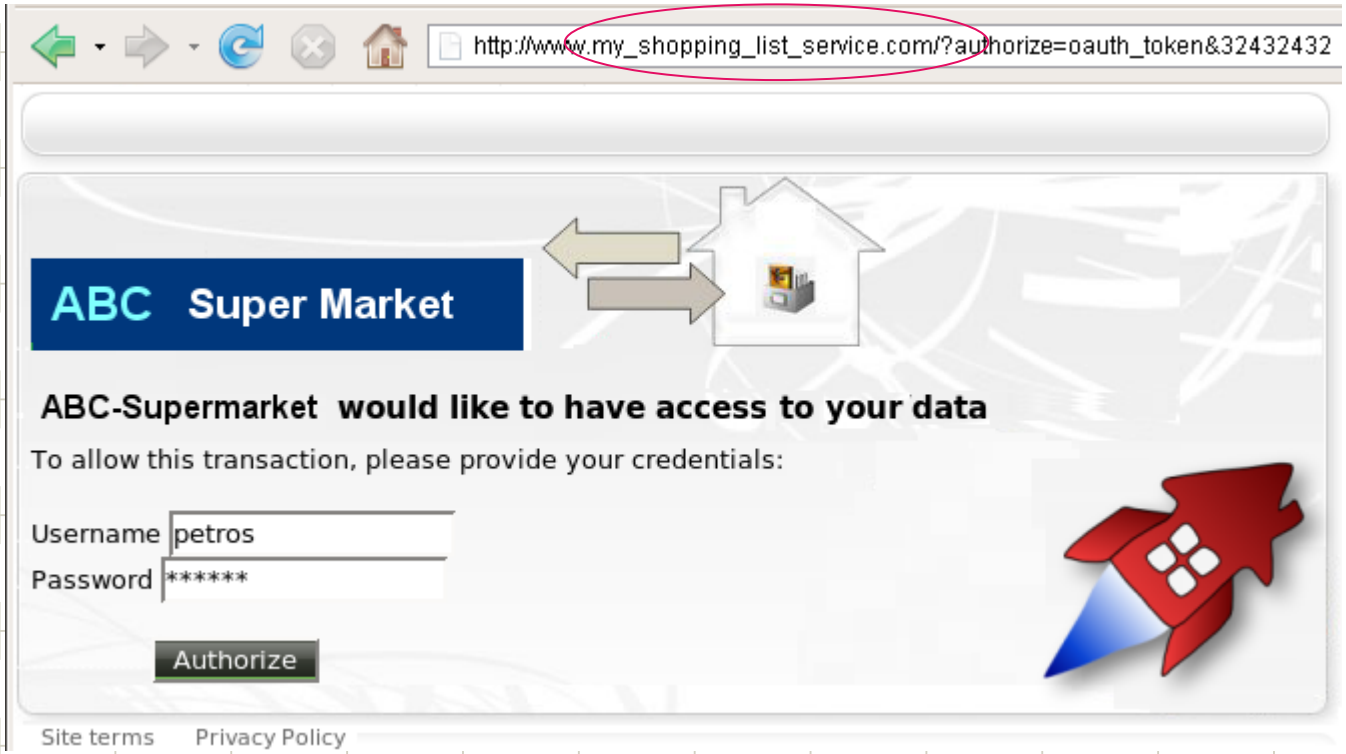
A nice solution – OAuth protocol

- "An open protocol to allow secure API authorization in a simple and standard method from desktop and web applications"
- Like giving a "valet key" of your car
- It allows the User to grant access to your private resources on one site (Service Provider), to another site (Consumer site). Giving access to your stuff without sharing your identity at all (or its secret parts).

OAuth – User Experience Example



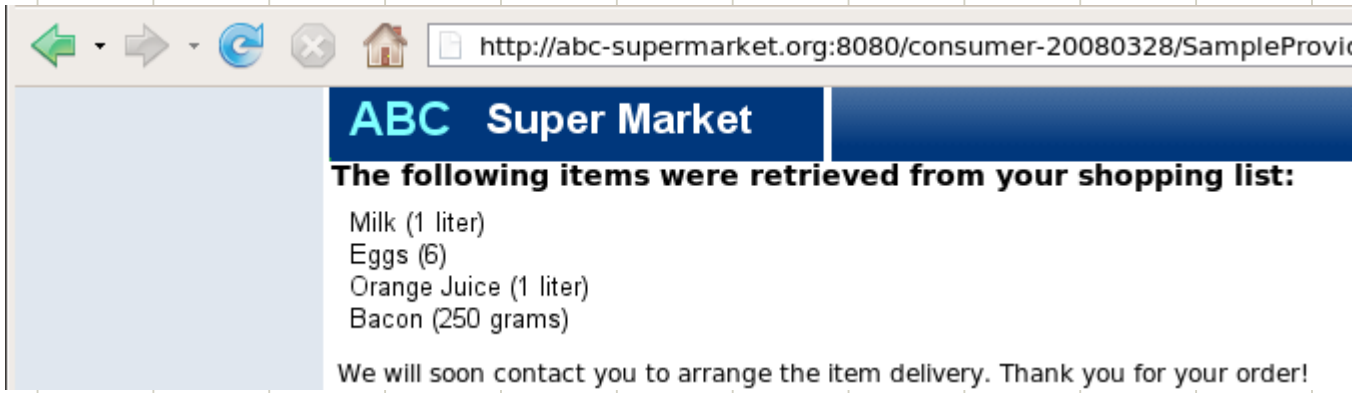
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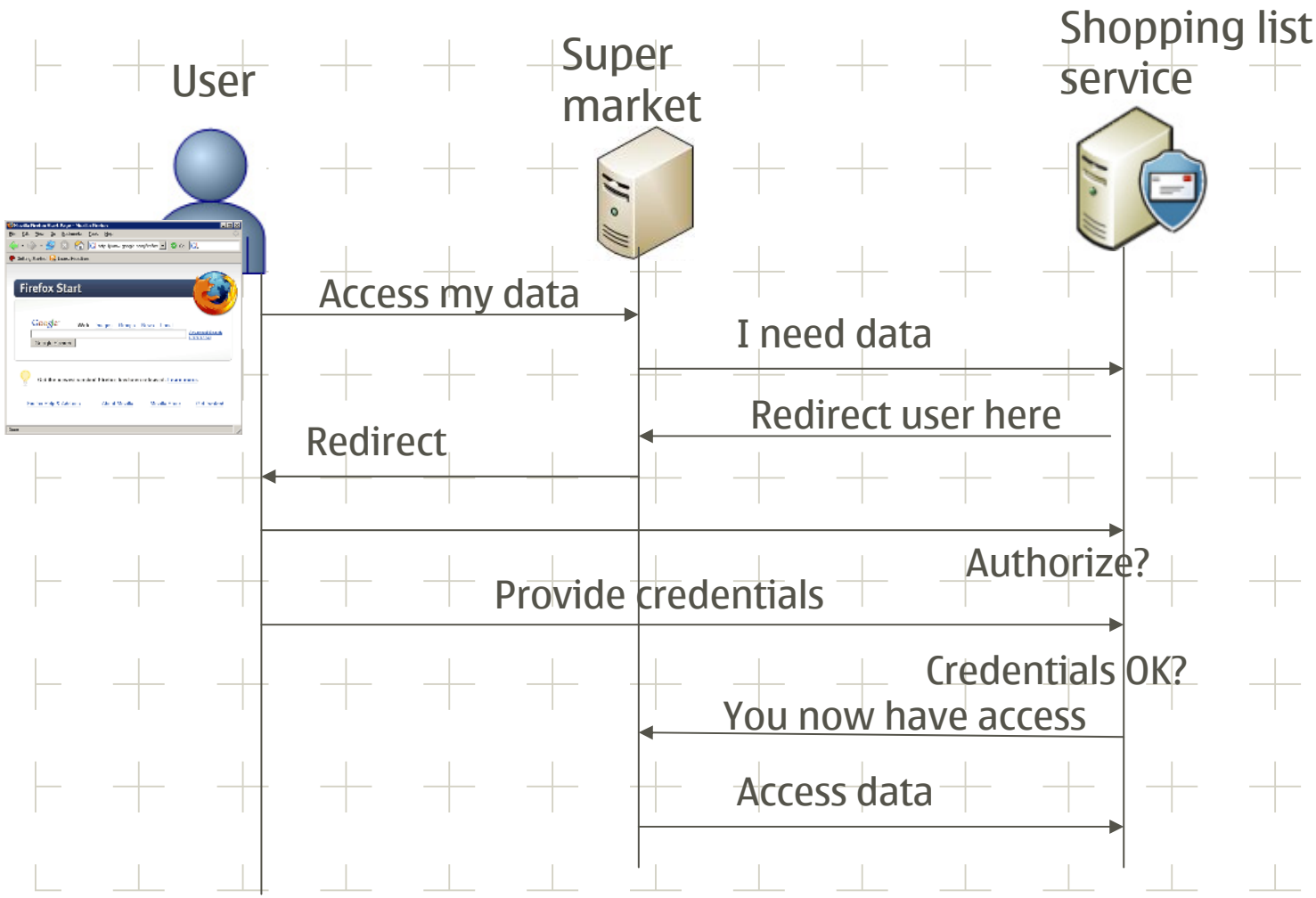
OAuth – User Experience Example



OAuth – User Experience Example



Sample background interactions (oversimplification)



Web Mash-ups – Wrap-up

- Reusing existing data, from multiple sources, in new ways
- Mechanisms exist for selectively opening up interfaces to others, in a secure and trusted way
  - Those mechanisms should be promoted
- Private data can flow outside core services

Web Mash-ups:
Linking Data

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Mixed Reality

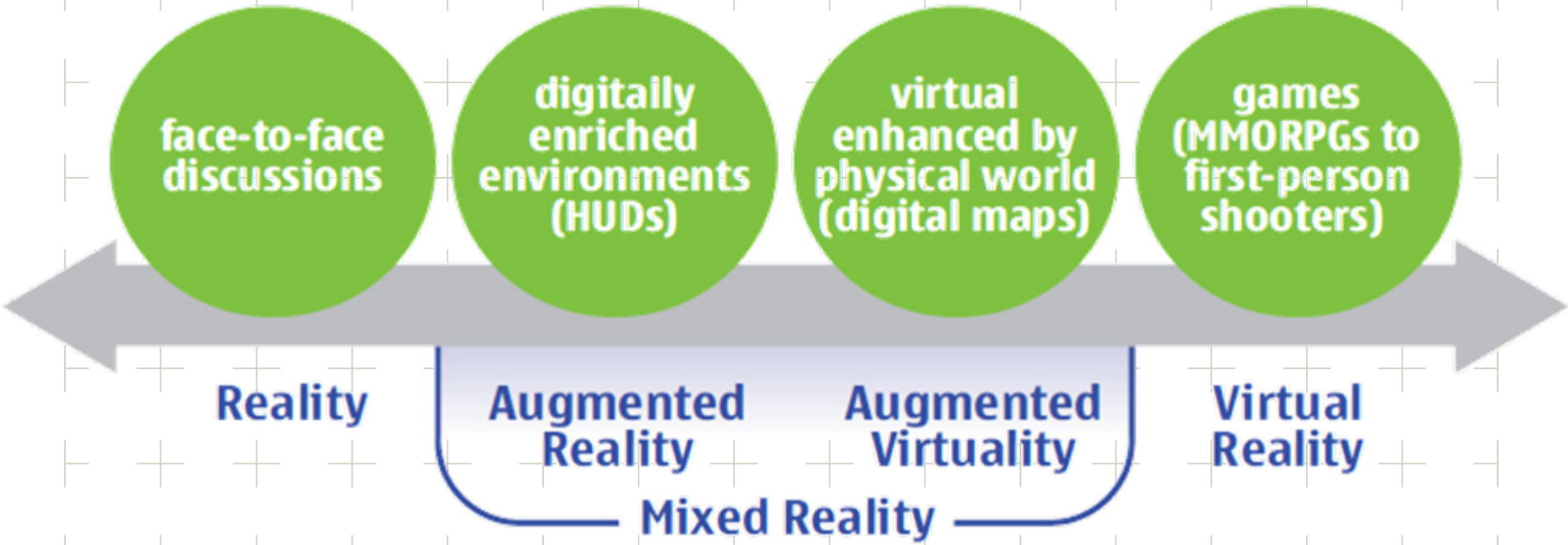
Mixed reality refers to the merging of the reality and virtuality to produce new environments and augmentations where physical and digital objects co-exist and interact.



Nokia Research Center

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Virtuality Continuum



Virtuality Continuum

face-to-face discussions

digitally enriched environments (HUDs)

virtual enhanced by physical world (digital maps)

games (MMORPGs to first-person shooters)

Reality

Augmented Reality

Augmented Virtuality

Virtual Reality

Mixed Reality





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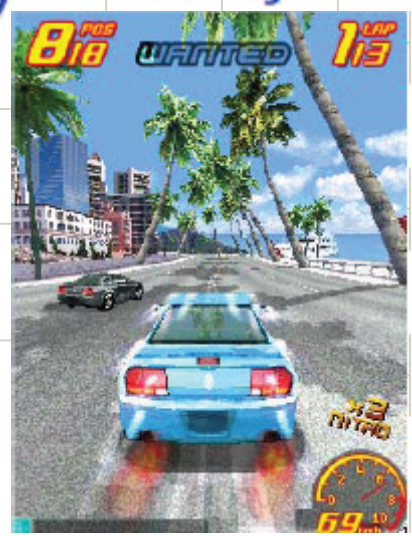
Reality

Augmented Reality

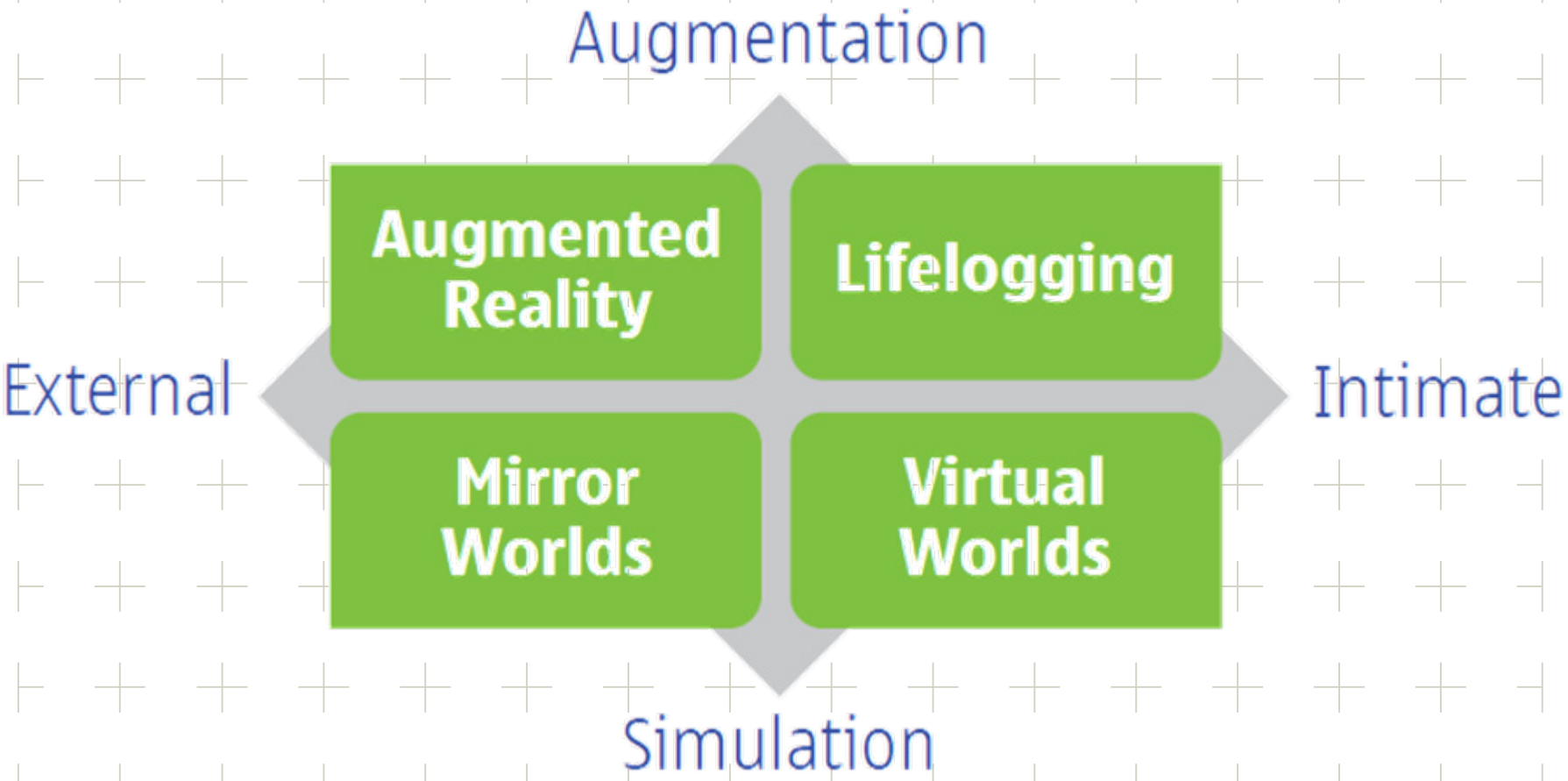
Augmented Virtuality

Virtual Reality

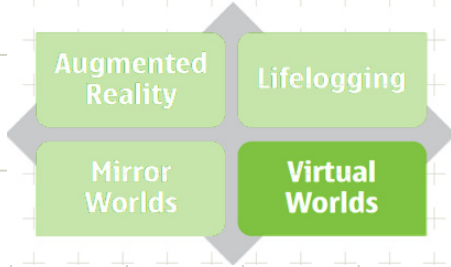
Mixed Reality



Components of Mixed Reality



Virtual Worlds



- Massively multiplayer online game (MMOGs) attracting large on-line communities for immersive game play
  - Goal-oriented, fantasy-realm, social interaction for task completion, capitalist economy
- Social VWs offer more open-ended user freedoms, creation of objects, economic and social interaction, and interpersonal networks
- Digital identities and avatars in every-day human on-line interaction
- People looking to communicate with each other in a more focused and immersive way



World of Warcraft as the largest MMOG with 10 M players

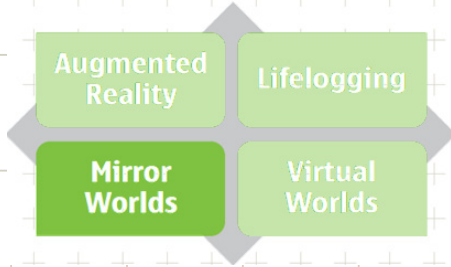


Second Life. Panel discussion with video, audio and chat.



[Mattila, 2009]

Mirror Worlds



- Mirror worlds are informationally-enhanced virtual models or “reflections” of the physical world
- New services to attach information and content to buildings and objects in interactive 3D spaces
- Navigable virtual worlds including context-specific content

[Mattila, 2009]



Google Street View to enable users to explore a few cities in the street level



UpNext is a synthetic 3D view of a few cities to link information to buildings and places

Mirror Worlds – Privacy stories

From Times Online

June 1, 2007

All-seeing Google Street View prompts privacy fears



Smile you are on Google. Has this man pictured in San Francisco by Google lost his keys or is he up to something worse?

Sam Knight

EXPLORE TECH & WEB

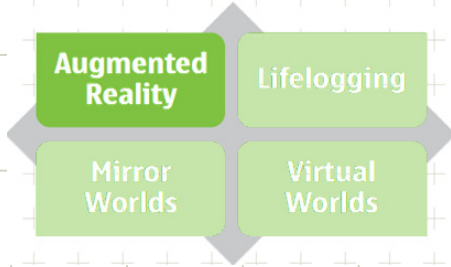
- PERSONAL TECH
- THE WEB
- GADGETS & GAMING

TECH CENTRAL

Latest posts on the blog

- Google Chrome OS - what does the internet say?
- Why are all film-based

Augmented Reality



- Augmentation of the physical world using mobile devices as creator of new value for both enjoyment and creation
- Physical world indexing: Database of real-world objects & context-specific search

[Mattila, 2009]



MARA – Mobile Augmented Reality Applications – platform
Point & Find to access information on the Internet by pointing a camera phone

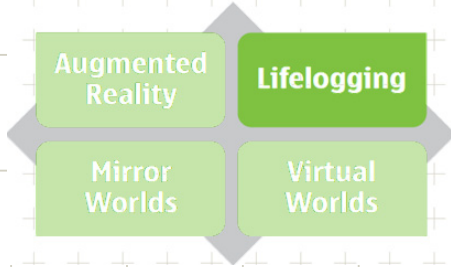
Demo video: MIT sixthsense

http://www.youtube.com/watch?v=ZfV4R4x2SK0



[MIT, 2009]

Life-Logging



- Lifelogging is the capture, storage and distribution of everyday experiences and information for objects and people
- Providing useful historical or current status information, sharing unusual moments with others and increasingly, as a kind of "backup memory“
- Presenting past experiences, be aware of the present time, provide guidance for the future

[Mattila, 2009]



Nike & iPod. Personal trainer, global running community.

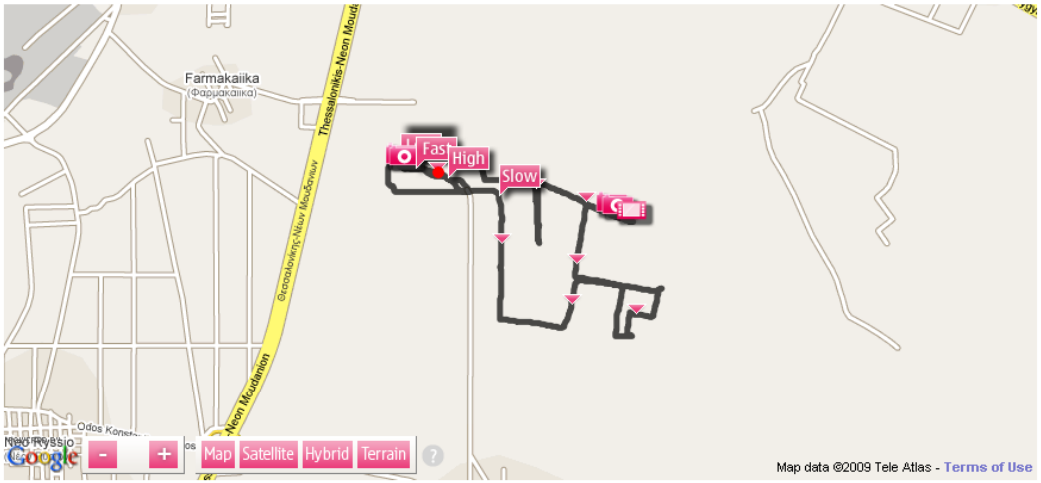


Nokia Sports Tracker upload and review your latest workouts, photos from the routes, and see summaries.

Workout 04/07/2009 17:40

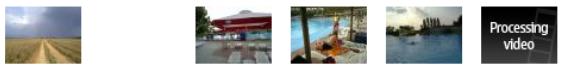
Add to favourites | Other options

Date	Views	Activity	Distance	Duration	Avg.speed	Max.speed	Avg.pace	Avg.heart rate	Step count	Calories burned
04.07.2009	1	Running	8.24 km	46 min 27 s	10.6 km/h	17.7 km/h	5 min 38 s per km	140	6799	662



Vote for this workout! Current votes: 0

Media (6) | Music

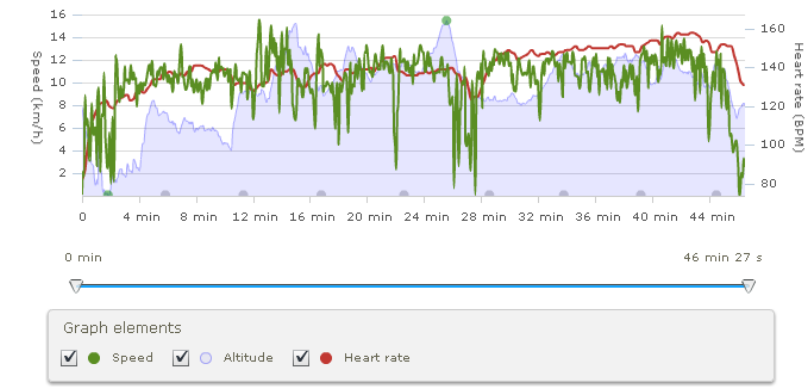


Comments

Add comment

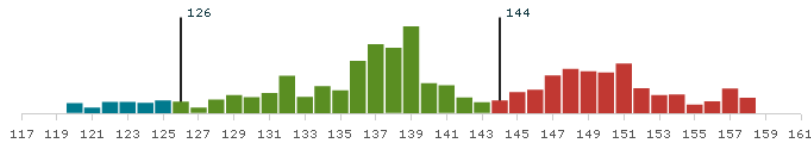
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Workout profile

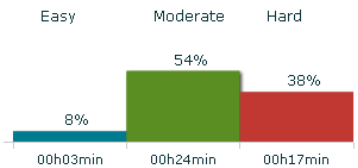


Heart rate

Show all



Heart rate intensity



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A near future example

Augmented Reality



A near future example

Augmented Reality + Social Networking



A near future example

Augmented Reality + Social Networking + Life-logging + Mashups



Privacy issues in Mixed Reality

- Life-logging beyond single user device
  - Opening up personal information & patterns to others
  - Very difficult to control with “settings” & “preferences”
- Mobile devices are personal devices
  - Typically no “user accounts” and settings linked to one person
- A lot of personal information transmitted over different types of networks
  - Trust any free and “open” wireless LAN?

Privacy issues in Mixed Reality

- Sharing of location is convenient and fun
  - But, this information can be easily misused
- People appearing in mirror worlds
  - The Internet never forgets, you were seen there…
- You will know much more for the people next to you (e.g. via AR?)
  - Will they know even more about you?

Mixed Reality – Wrap-up

- The real “freeware” version of the physical world is becoming enriched with layers of digital information
- Information is breaking the barriers of the PC & browser
  - The “real world web”
- Adding a whole new dimension in the privacy battle (location sharing, life patterns, etc.)

Mixed Reality:
Fusing the real with the digital world

Conclusions

- Social Networks
  - Linking People

- "privacy nutrition labels"
- P3P
- Need for clear privacy policies, increase privacy salience

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  - Linking People
- Web Mash-ups
  - Linking Data

- "privacy nutrition labels"
- P3P
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- Promote the mechanisms for selectively opening up interfaces to others, in a secure and trusted way

Conclusions

- Social Networks
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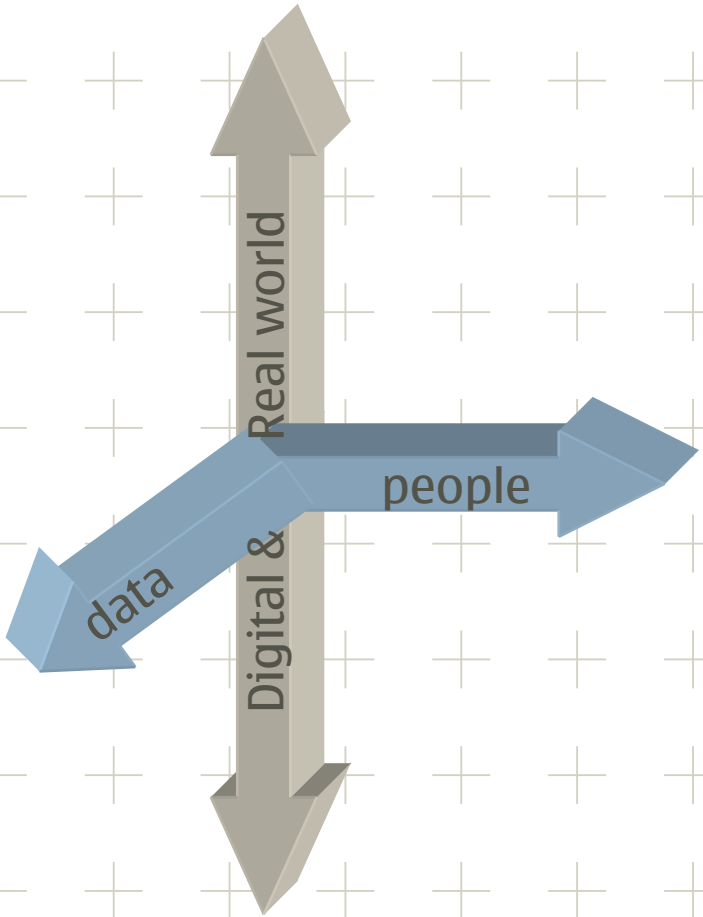
- Promote the mechanisms for selectively opening up interfaces to others, in a secure and trusted way

- Need for solutions beyond the typical privacy "settings" and "options"

Conclusions

Multi-dimension data flow

Multi-dimension privacy issues



Need to think beyond the typical “web” & “PC” paradigm, towards the real world web…

Thank you.



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