

Social Media, Usability, and Privacy

Thorsten Strufe, Thomas Paul, Daniel Puscher
Chair for Privacy and IT-Security

Padova, 06.09.2016





```

11:16 03/07/09 datavase BBS
Last On: 03/07/09 Node 1 Up 4 days 1
FirstOn: 31/01/08 Calls 822 of 278

List/Flag Files      File Area Selection      File Search
L List files in dir  J Jump to new file area  F Find text in descrip
N New file scan      * List directories      S Search for filename
E Extended file info /* List libraries

Upload/Download      { } # Select directory  Other Commands
D Download file      [ ] # Select library    & File scan config
U Upload file
/D Download from user R Remove/edit file
/U Upload to user
Z Upload to sysop
B Batch/Bi-dir xfers

Anytime | Ctrl-U Who's online
File 0:02:29 (2) Atari (13)
  
```

```

Legend of the Red Dragon ..
Lunatic..
Telnet...

FREE ACCESS to .. Tradewars 2002
Lord2...
FTP...

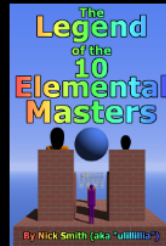
And Much More...

... FROGLAND BBS ...

Running On: Wildcat v5/winserver
Your Sysop: Frog Man
Telnet: bbs.frogland.net
WWW: http://www.frogland.net
Note: Check Out http://www.bbsd.com slashdot for BBS's!!!!!!
      [ Only One Account Per Person ]

Connected To node:2
Today's Date Is: 3/26/202
The Time Is: 4:47 PM

What is your user name? █
  
```



Major announcement

[My book is now on sale!](#) The page detailing about my book has been updated as well, now including the full size version of the front cover image.

Announcement

It's now official - my book is going into book stores. When you'll see it, that I don't know. Lulu states 6 to 8 weeks so this implies a time from April 13 to April circumstances - I couldn't order my second proof copy. **Updated Mar 3, 2010**

Ulimilla City Software logo - a space city drifts freely among the background stars with colorful 3D text in front

1 Welcome!

Welcome to Ulimilla City! In Ulimilla City, you'll find tips and tricks that'll help with math, computer operation, and a few others. I have free games you can make materials like dice or marbles. My extensive dream journal with over 750 entries is probably one of the largest online dream journals. From school and my game, I have some stories available. Along with that, I have two computer games I'm working on, "The Supernatural Olympics" and a 2D RPG game. Best website. The only ads, my own creations from 2002, are in one isolated area. My site is best viewed at 800x600 resolution at true color (24 or 32-bit color) 1024x768 is optimal.

Lost? Don't know how to navigate? I've explained [the basic design](#) of my site (needs to be updated) and how it's organized from page to page. The category

Note: My website is currently undergoing a redesign so some pages, especially those that haven't been updated in at least one year, will have a somewhat ending with ".html" are the very old documents not having been updated since July of 2005 at the latest.

2 News and latest updates

My blog contains the latest news and updates in more detail than described in this area and guests going back when I began it in late 2007. This area only



Lou's page

1995 Annual Report

- [Letter to Investors/Financials](#)
- [The Future of Computing](#)
- [1994 Annual Report Review](#)

Financial information

- [IBM stock quotation](#)
- [Quarterly results](#)
- [Stockholder services](#)

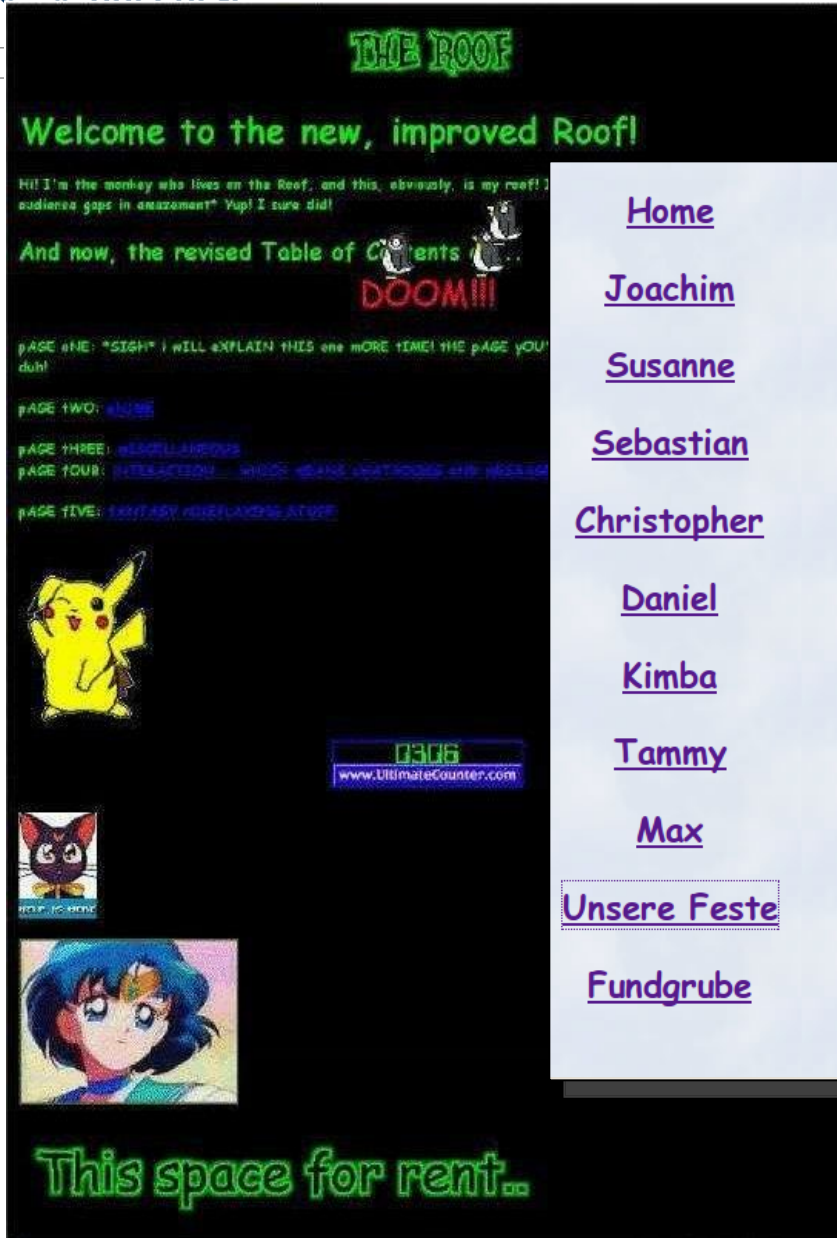
Employment

IBM Planetwide

Other corporate activities

- [IBM and the environment](#)
- [IBM and the Global Information Infrastructure](#)
- [Philanthropy](#)

[[IBM home page](#) | [Order](#) | [Search](#) | [Contact IBM](#) | [Help](#) | [\(C\)](#) | [\(TM\)](#)]



[Home](#)

[Joachim](#)

[Susanne](#)

[Sebastian](#)

[Christopher](#)

[Daniel](#)

[Kimba](#)

[Tammy](#)

[Max](#)

[Unsere Feste](#)

[Fundgrube](#)

Unsere Feste in Bildern ...

Da es sich hierbei um ganz private Feste handelt, sind diese Seiten nur für Familienmitglieder und Freunde zugänglich.

An alle Verwandten und Freunde!
Bitte schickt mir eine Mail, falls ihr eine
Zugangsberechtigung wollt.
Ich werde euch dann umgehend die Daten zumailen.

JA!!!

Ich will ein Passwort!!!

Momentan könnt ihr Bilder folgender Feste
betrachten:

Sebastian's Konfirmation

Joachim's 50 $\frac{1}{2}$ Geburtstag

Otto's 65. Geburtstag



World Wide Web

The WorldWideWeb (W3) is the universe of documents.

Everything there is online about this project. [Mailing lists](#), [Policy](#)

What's out there?

Pointers to the world's

Help

on the browser you are using

Software Products

A list of W3 project code

[Mail robot](#), [Library](#)

Technical

Details of protocols, for

Bibliography

Paper documentation of

People

A list of some people involved

History

A summary of the history of the

How can I help?

If you would like to support the

Getting code

Getting the code by [anonymous](#)

Welcome to

FIAT

Benvenuti sul Web-server FIAT !



Il server è attualmente in sviluppo: la [home-page](#) definitiva, per ora riservata ai gestori del server, sarà disponibile prossimamente. Per ulteriori informazioni Vi invitiamo a visitare il server di [ITS s.r.l.](#) oppure potete scrivere a webmaster@its.it

FIAT Copyright © 1995.

Take a look at a demo of one of our latest technologies, ProVision.

BBN ON THE WORLD WIDE WEB

We get the Internetworking for your business

Press Releases | Investor Relations | Jobs

Customer Connection ▶ Business Partners ▶ BBN Features

BBN PROVISION ALSO INSIDE



BBN Planet Customer Support Online!

[BBN Corporation 1996 Annual Meeting](#)

[BBN Planet Network Map](#)

Bandwidth On Demand

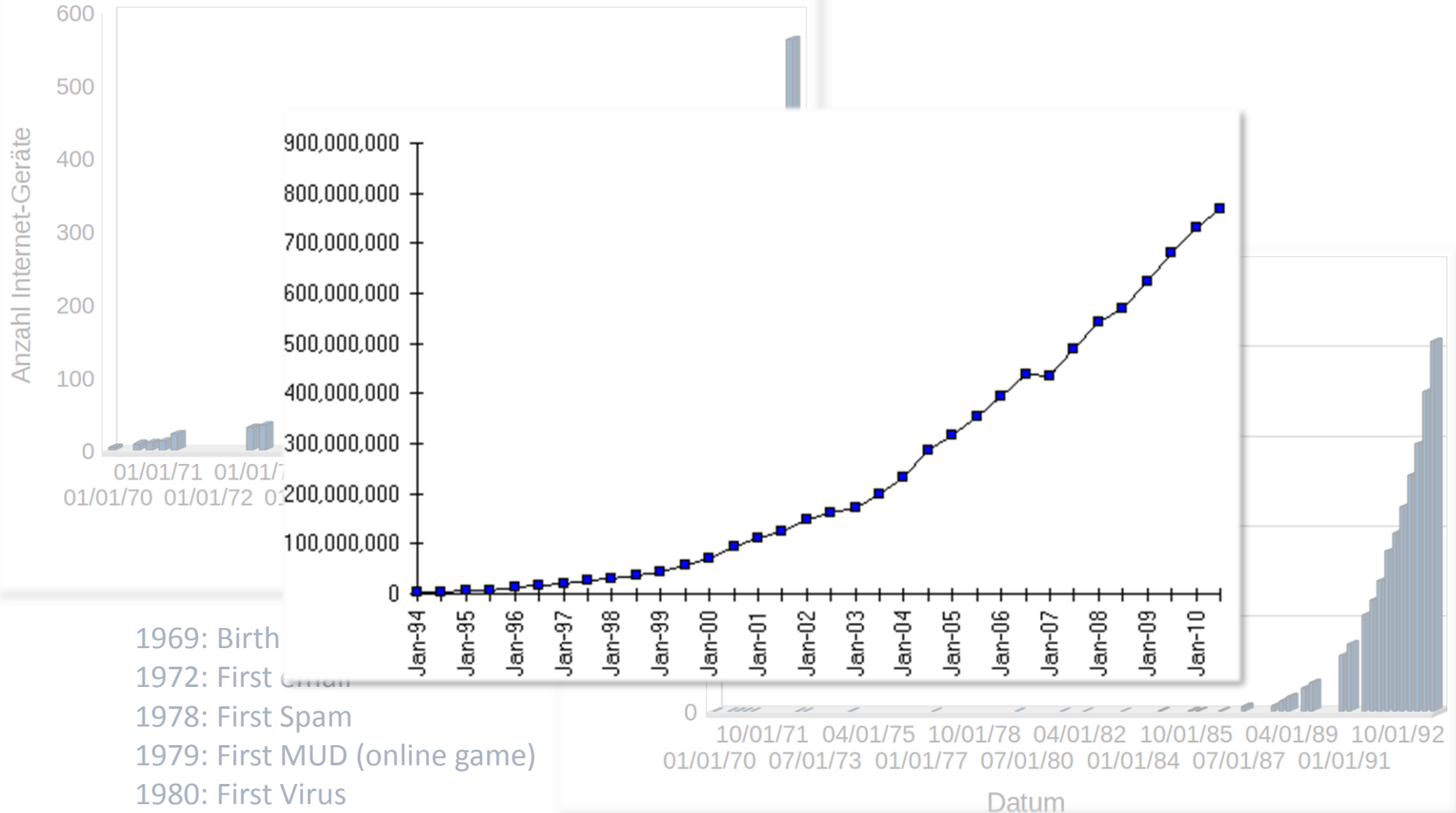
people would line up to look at old day at the museum-- course you ne world at the end (those'll be he 'Net.) SO the museum heads artwork, etc. Some of the old ad lines are priceless-- like "Drink Coca-Cola," an idea from '86 (that's 1886) that left no room for misinterpretation, and 1906's "The Great National Temperance Drink." What?



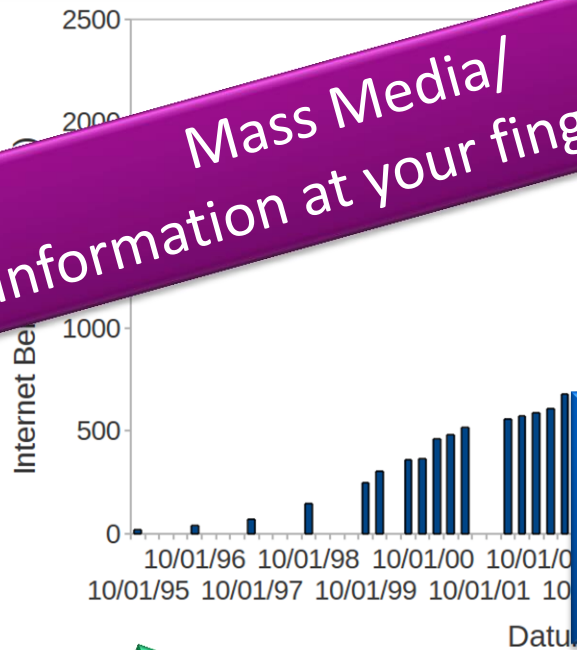
<http://www.fiat.it>

<http://www.cocacola.com>

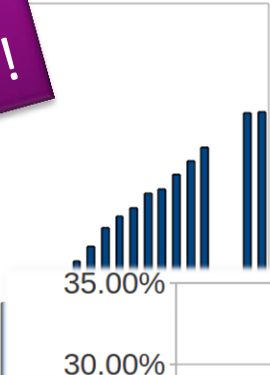
Growth of the Internet



- 1969: Birth
- 1972: First Email
- 1978: First Spam
- 1979: First MUD (online game)
- 1980: First Virus
- 1983: Introduction of TCP/IP
- 1991: WWW and first Web pages



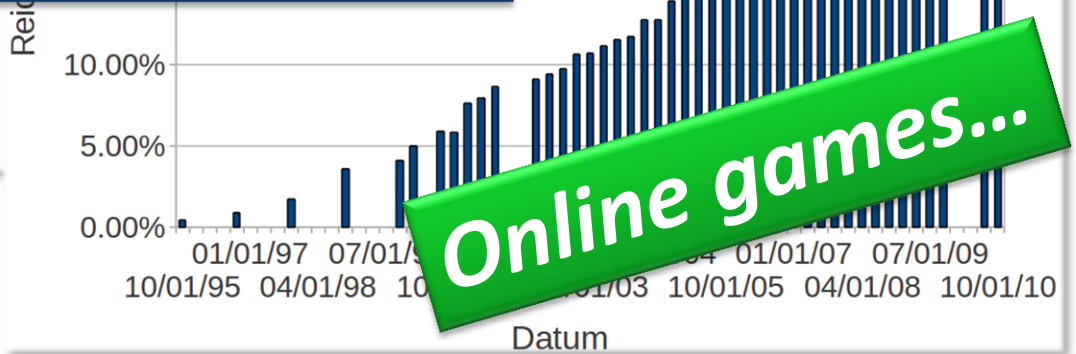
**Mass Media/
Information at your fingertips!**



**Communication:
Skype/VoIP!
chat, text, discussions, mail!**

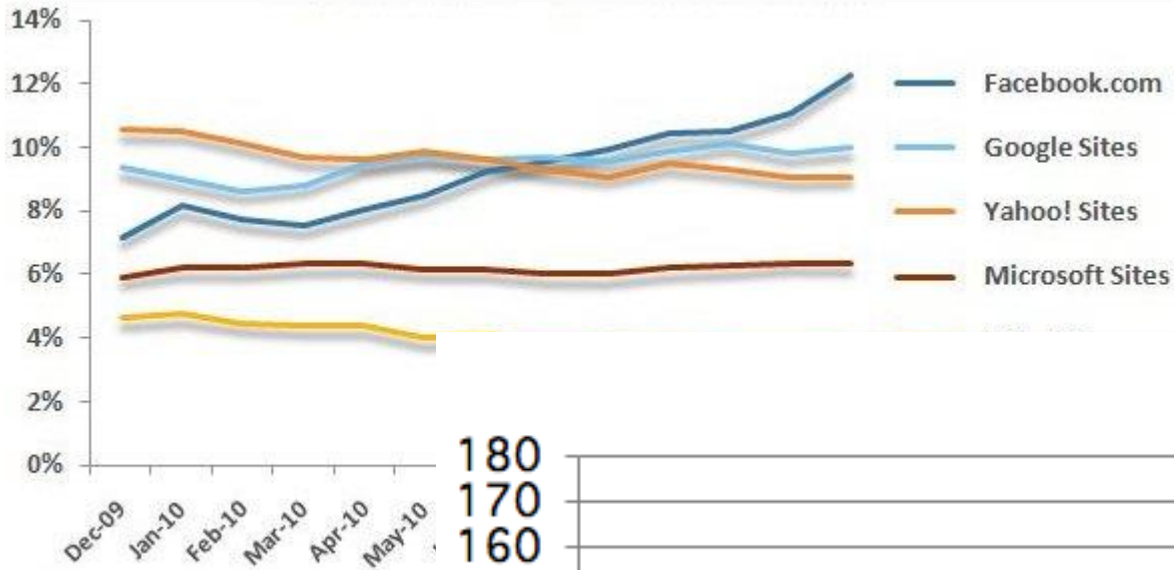
**User generated content,
live- and on demand
multimedia streaming**

**Shopping!
(around the world)**



Online games...

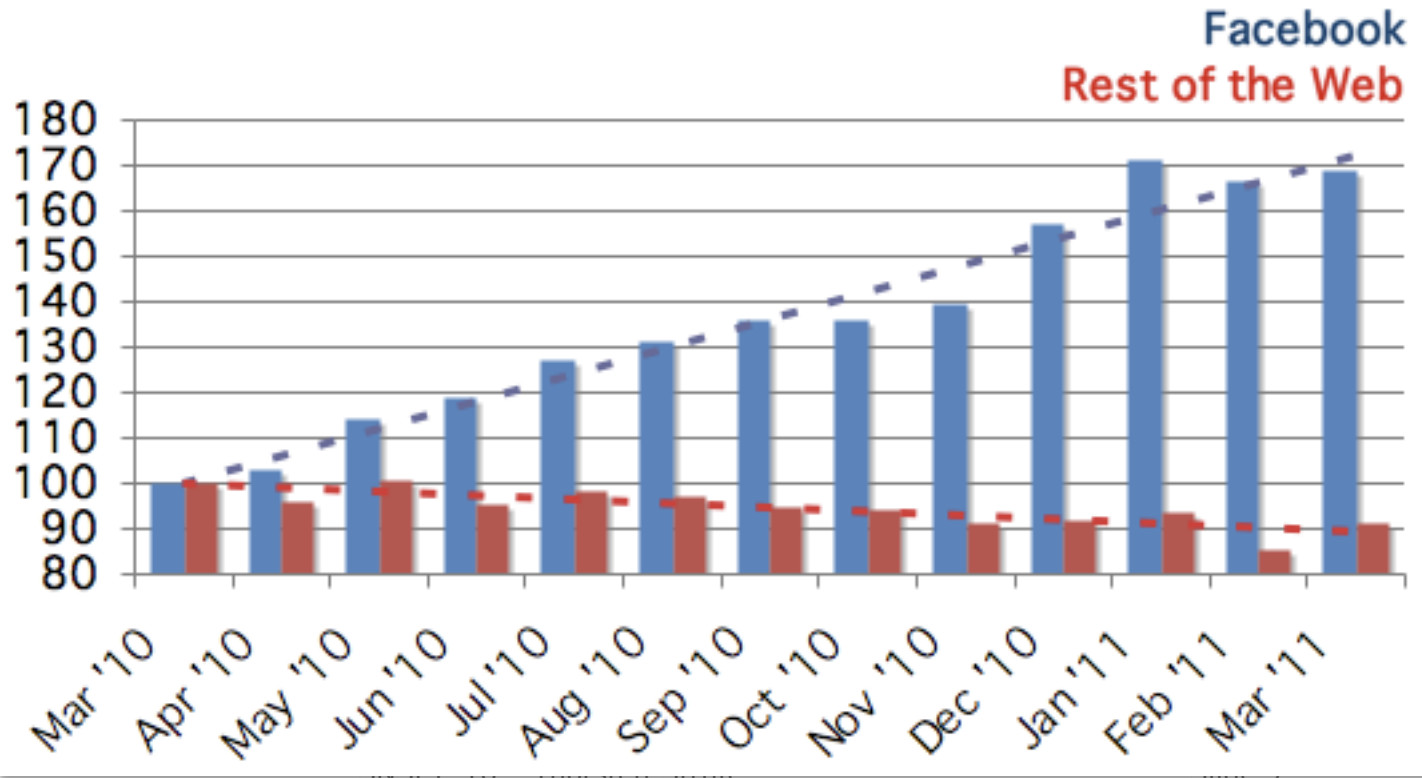
But What is it, That Moves all Those People on the Web?

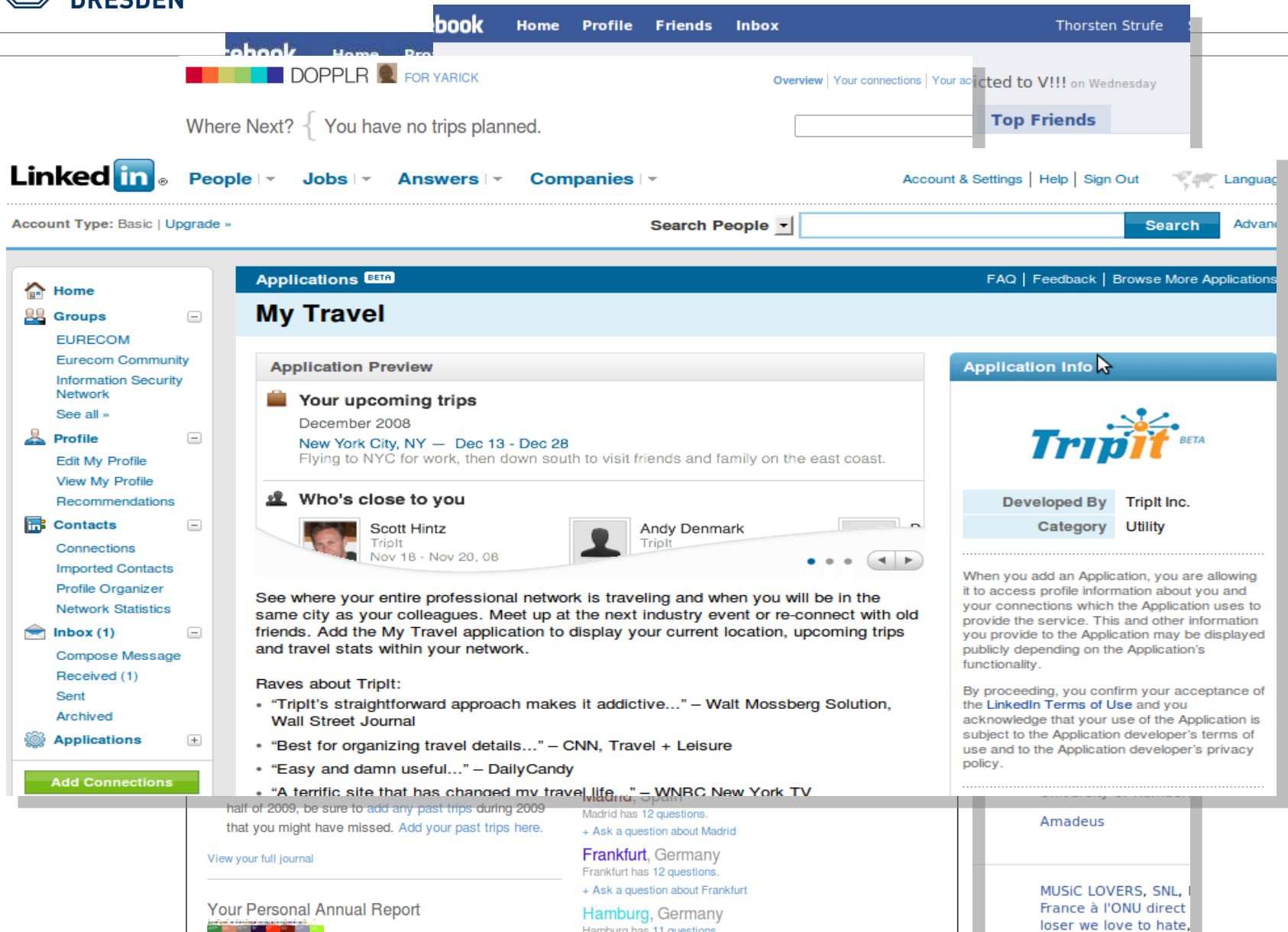


Facebook (Home and Work)		
Person	MOM UA % Change	MOM Time % Change

6	AOL Media Net
7	Wikipedia
8	Fox Interactive
9	Amazon
10	Ask Search Ne

Source: The Nielsen Cor





book Home Profile Friends Inbox Thorsten Strufe

DOPPLR FOR YARICK

Overview | Your connections | Your activity | You are invited to V!!! on Wednesday

Where Next? { You have no trips planned. **Top Friends**

LinkedIn People | Jobs | Answers | Companies Account & Settings | Help | Sign Out Language

Account Type: Basic | Upgrade » Search People Search Advanced

Applications BETA FAQ | Feedback | Browse More Applications

My Travel

Application Preview

Your upcoming trips
December 2008
New York City, NY — Dec 13 - Dec 28
Flying to NYC for work, then down south to visit friends and family on the east coast.

Who's close to you

Scott Hintz
Triplt
Nov 18 - Nov 20, 08

Andy Denmark
Triplt

See where your entire professional network is traveling and when you will be in the same city as your colleagues. Meet up at the next industry event or re-connect with old friends. Add the My Travel application to display your current location, upcoming trips and travel stats within your network.

Raves about Triplt:

- "Triplt's straightforward approach makes it addictive..." – Walt Mossberg Solution, Wall Street Journal
- "Best for organizing travel details..." – CNN, Travel + Leisure
- "Easy and damn useful..." – DailyCandy
- "A terrific site that has changed my travel life..." – WNBC New York TV

half of 2009, be sure to add any past trips during 2009 that you might have missed. [Add your past trips here.](#)

View your full journal

Your Personal Annual Report

Madrid, Spain
Madrid has 12 questions.
+ Ask a question about Madrid

Frankfurt, Germany
Frankfurt has 12 questions.
+ Ask a question about Frankfurt

Hamburg, Germany
Hamburg has 11 questions.

Application Info

Developed By Triplt Inc.

Category Utility

When you add an Application, you are allowing it to access profile information about you and your connections which the Application uses to provide the service. This and other information you provide to the Application may be displayed publicly depending on the Application's functionality.

By proceeding, you confirm your acceptance of the [LinkedIn Terms of Use](#) and you acknowledge that your use of the Application is subject to the Application developer's terms of use and to the Application developer's privacy policy.

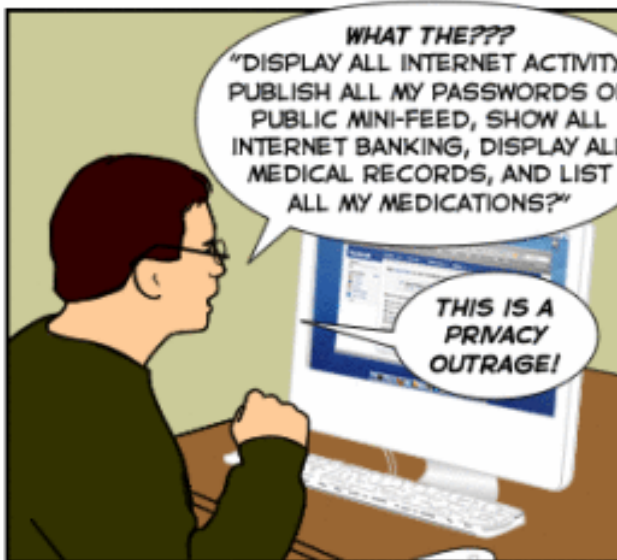
Amadeus

MUSIC LOVERS, SNL, France à l'ONU direct loser we love to hate,

...with calculated side effects...

The Joy of Tech™

by Nitrozac & Snaggy



joyoftech.com



3/26/facebook-robbery/

11/

robbery

ow you choose y reveal.
cent-seeming stat atment."
and called Fire De g was caught on c oked suspiciously
Friday's American

„Volkszählung“

Penultimate public census
Scheduled for 1981 (delayed
1983)

Significant public opposition

- Fear of a surveillance society
- The transparent citizen
- Bounty for discovered GDR
- Appeal for civil disobedience
- Finally accomplished in 1983
- Consequence: „25% international gap between East and West“
- (So let's just get a unified Germany)

VOLKSZÄHLUNG 1987
Personenbogen

Bitte so markieren

Bitte Gemeinde angeben:

1 Geburtsangaben

a) Geburtsjahr:

b) Geburtsmonat: 1. Januar bis 24. Mai, 25. Mai bis 31. Dez.

2 Geschlecht

männlich, weiblich

3 Familienstand

ledig, verheiratet, verwitwet, geschieden

4 Rechtliche Zugehörigkeit zu einer Religionsgesellschaft

Römisch-katholische Kirche, Evangelische Kirche, Evangelische Freikirche, Jüdische Religionsgesellschaft, Islamische Religionsgemeinschaft, andere Religionsgesellschaften, keiner Religionsgesellschaft rechtlich zugehörig

5 Welche Staatsangehörigkeit haben Sie ?

deutsch, griechisch, italienisch, übrige EG-Staaten, jugoslawisch, türkisch, sonstige/keine

6 Wird von Ihnen noch eine weitere Wohnung (Unterkunft/Zimmer) in der Bundesrepublik Deutschland einschließlich Berlin (West) bewohnt ?

nein, ja

Falls ja:

a) Für Verheiratete, die nicht dauernd getrennt leben: Ist die hiesige Wohnung die vorwiegend benutzte Wohnung der Familie? nein, ja

b) Für alle übrigen Personen: Ist die hiesige Wohnung die vorwiegend benutzte Wohnung? nein, ja

c) Außerdem für Erwerbstätige, Schüler/Studenten: Gehen Sie vorwiegend von der hiesigen Wohnung aus zur Arbeit oder Schule/Hochschule? nein, ja

7 Sind Sie erwerbstätig?

Vollzeit (über 36 Std. in der Woche), Teilzeit (bis zu 36 Std. in der Woche), arbeitslos, arbeitssuchend, nicht erwerbstätig

Mehrere Antworten möglich: 1) Auch Landwirte, mithelfende Familienangehörige, Auszubildende, Soldaten, Zivildienstleistende; 2) Maßgebend ist die normalerweise in der Woche geleistete Arbeitszeit

Hausfrau, Hausmann, Schüler(in), Student(in)

8 Leben Sie überwiegend von

Erwerbs-, Berufstätigkeit, Arbeitslosengeld, -hilfe, Rente, Pension, eigenem Vermögen, Vermietung, Verpachtung, Altenteil, Zuwendungen, Unterhalt durch Eltern, Ehegatten usw., sonstigen Unterstützungen (z. B. Sozialhilfe, BAföG)

FÜR ALLE PERSONEN

FÜR ERWERBSTÄTIGE UND SCHÜLER/STUDENTEN

FÜR ERWERBSTÄTIGE

NUR VOM STATISTISCHEN LANDESAMT AUSZUFÜLLEN

Geburtsjahr (1 a) 2., 3. u. 4. Stelle, Hauptfachrichtung (10 b), Erlernter Beruf (11 a), Dauer (11 b)

Arbeitsstätte, Schule/Hochschule (Pendler) Land (12) Gemeinde (12) Straße (12) Hausnummer (12)

Wirtschaftszweig (16), Ausgeübte Tätigkeit (17)

Rechtsgrundlage: Siehe Haushaltsmittelbogen oder Erläuterungsbild, die Bestandteile der Erhebungsvordrucke sind. Stichtag: 25. Mai 1987

9 Welchen höchsten allgemeinen Schulabschluss haben Sie ?

Volksschule, Hauptschule, Realschule/gleichwertiger Abschluß (z. B. Mittlere Reife), Hochschulreife (Abitur), Fachhochschulreife

10 a) Welchen höchsten Abschluss an einer berufsbildenden Schule oder Hochschule haben Sie ?

Berufsfachschule (ohne Berufsschule), Fachschule, Fachhochschule (Ing.-Schule, höhere Fachschule), Hochschule (einschließlich Lehrerausbildung)

b) Welche Hauptfachrichtung hat dieser Abschluß ?

11 Falls Sie eine praktische Berufsausbildung (z. B. Lehre) abgeschlossen haben:

a) Auf welchen Lehrberuf bezog sich diese Ausbildung?

b) Wie lange dauerte diese Ausbildung? Jahr(e):

12 Bitte Name und Anschrift Ihrer Arbeitsstätte oder Schule/Hochschule angeben.

Name:

Straße/Hausnummer:

PLZ: Gemeinde:

13 Welches Verkehrsmittel benutzen Sie hauptsächlich (längste Strecke) auf dem Hinweg zur Arbeit oder Schule/Hochschule ?

kein Verkehrsmittel (zu Fuß), Fahrrad, Pkw, U-Bahn, S-Bahn, Straßenbahn, Eisenbahn, Bus, sonst. öffentl. Verkehrsmittel, sonstiges (Motorrad, Moped, Mofa)

14 Wieviel Zeit benötigen Sie normalerweise für den Hinweg zur Arbeit oder Schule/Hochschule ?

entfällt, da auf gleichem Grundstück, unter 15 Minuten, 15 bis unter 30 Minuten, 30 bis unter 45 Minuten, 45 bis unter 60 Minuten, 60 Minuten und mehr

15 Sind Sie zur Zeit tätig als

Facharbeiter(in), sonstige(r) Arbeiter(in), Angestellte(r), Auszubildende(r), Beamter/Beamtin, Richter(in), Soldat, Zivildienst. (auch Beamtinnenanw.), Selbständige(r) mit bezahlten Beschäftigten, ohne bezahlte Beschäftigte, mithelfende(r) Familienangehörige(r)

16 Zu welchem Wirtschaftszweig (Branche, Behörde) gehört der Betrieb (Firma, Dienststelle), in dem Sie tätig sind ?

17 Welche Tätigkeit, welchen Beruf üben Sie aus ?

18 Falls Sie eine Nebenerwerbstätigkeit ausüben, handelt es sich um eine

landwirtschaftliche, nichtlandwirtschaftliche

Simplified, walled-garden version of „the Web“:

- Easy to set-up pages („**profiles**“) of **individuals** (... and companies...)
- Links reflecting **real-world relations** between individuals
- Possibility to share user generated content

...including messaging

- “Guest book” / “Wall” (asynchronous broadcast)
- Email (asynchronous unicast)
- Chat (~ synchronous unicast)

Collaborative applications / games

! Different target audience / application domain

- Private and personal OSN
- Public and professional OSN (business-oriented)

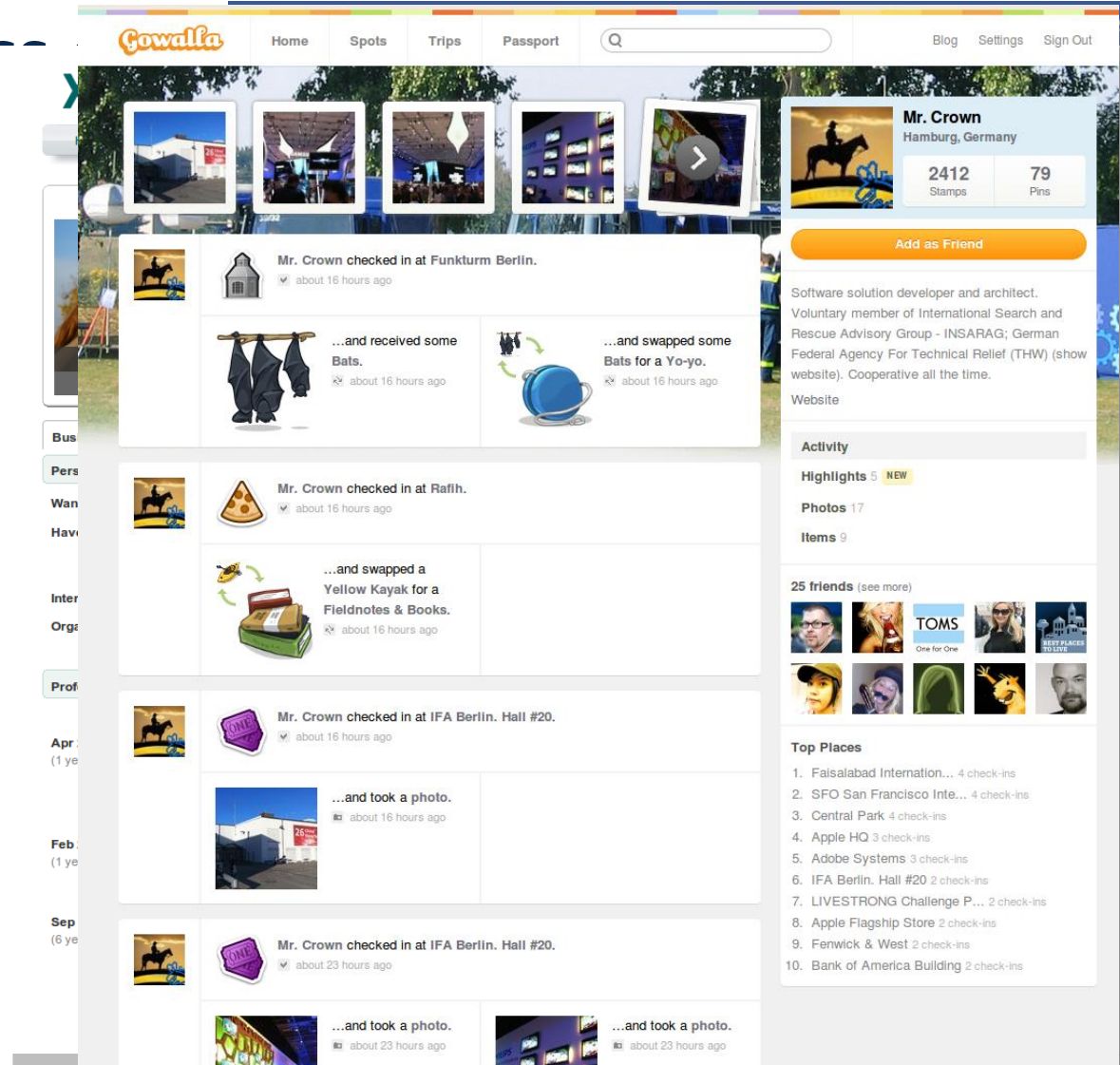


Professional business

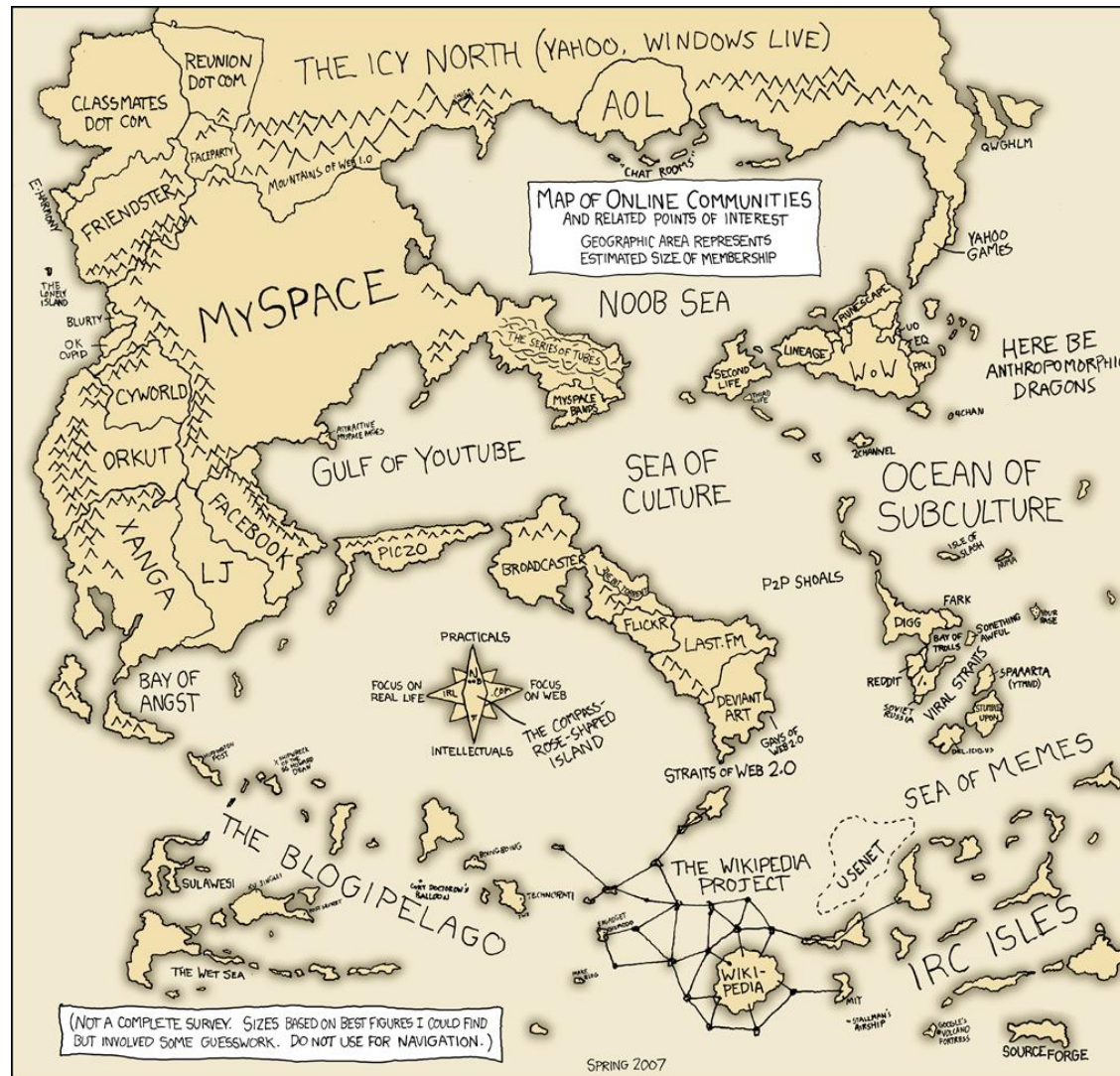
Private and personal

Other services

- "Micro blogging":
- Business trips and
- Location-based a gowalla



Map of Online Communities



Source: Randall Munroe, XKCD.

Two words on: *Information Sovereignty*

The Bible

Newspapers

Mass media

The Internet (1.0)

Web 2.0...



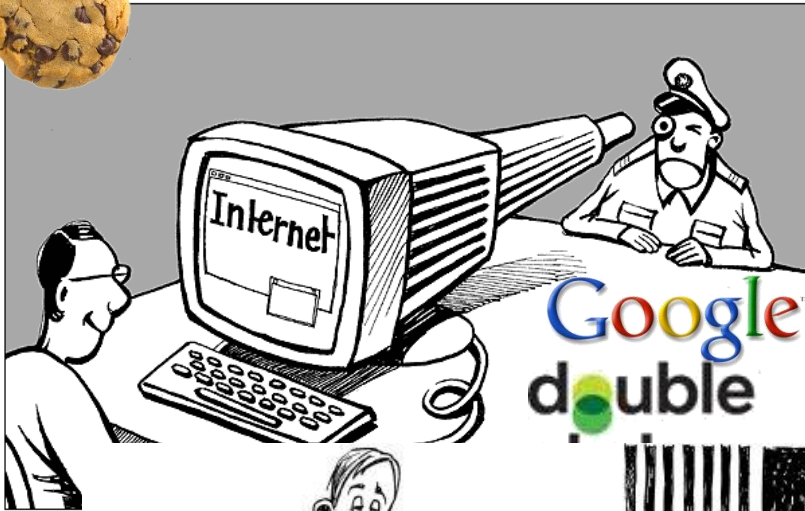
**i.o.w: to which effect? aka.
„Power to the people!“ (O RLY?)**

**So what do you do?
Go into the ammo business...**



The deer now have guns...

The Ammo Business...



„Don't be evil“

„Facebook is and will always be free.“
„At Facebook your data is yours.“



„Myspace, after failing to meet
the expected income,
starts selling their users' data.“

The Deer May have Guns, but...

it's known **who they are**
with **whom** they're **friends**
whom they're **talking to**
what they **think** and **want**



and specifically what they're **aiming** at

...and quite fortunately, their ammo can be removed,

should they fail to comply



Can it Get Worse? *(a little polemic)*

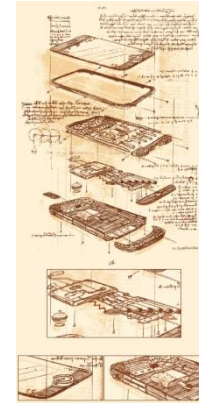


Homogeneity and control!

Provide their
Hardware

Operating System

„Applications“ (controlled, be the gatekeeper!



Just license them, don't give them any ownership

Control/surveil their music

Their movies

Their social network...

...their life...





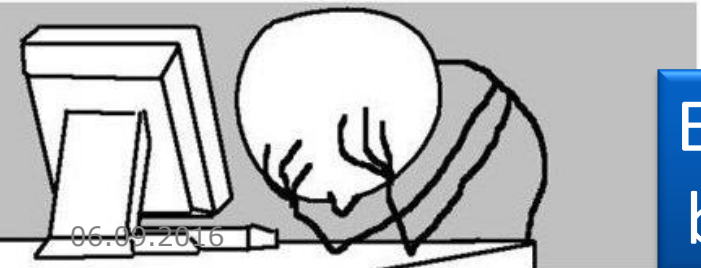
„And it's a Unix under the hood!“

„Yeah, they're so cool, no effort, no hassle!“

„Worst case: you can jailbreak...“



Think diffe



Enough polemics, back to the topic!



Let's try and understand the behavior of users in some OSN

Profile Popularity in a Business-oriented Online Social Network

Thorsten Strufe
P2P Networking Group TU Darmstadt
strufe[at]cs.tu-darmstadt.de

ABSTRACT

Analysing Online Social Networks (OSN), voluntarily maintained and automatically exploitable databases of electronic personal information, promises a wealth of insight into their users' behavior, interest, and utilization of these currently predominant services on the Internet. To understand popularity in OSN, we monitored a large sample of profiles from a highly popular network for three months, and analysed the relation between profile properties and their impression frequency. Evaluating the data indicates a strong relation between both the number of accepted contacts and the diligence of updating contacts versus the frequency of requests for a profile. Counter intuitively, the overall activity, gender, as well as participation span of users have no remarkable impact on their profile's popularity.

Categories and Subject Descriptors

J.4 [Computer Applications]: SOCIAL AND BEHAVIORAL SCIENCES

Keywords

Online Social Networks, Popularity, User Measurement, User Model, Behavior

1. INTRODUCTION

Social networking services (SNS) contain a wealth of information. Users voluntarily feed self-descriptive details into the Online Social Network (OSN) and their utilization behavior is completely observable by the OSN provider. Analysing this complex data facilitates understanding of the psychological and sociological properties of online social networks and their users. Understanding how users navigate online social networks, e.g., offers insight into how people browse the presented profiles. It consequently allows for the identification of relations between selected profile characteristics and their request frequency. We will call this frequency *popularity* (π) for the remainder of this paper, which we will

measure as the number of impressions of a profile P (the number of times it has been viewed by another user) per time t (or: $\pi_t(P)$).

Identifying key properties of users and their profiles, which allow for the prediction of their popularity, however, is not only interesting for social scientists. Especially system designers and developers of social networking services may capitalize on the extracted knowledge. In case of centralized, server based systems, like facebook¹, LinkedIn¹, or twitter¹, the user experience may be enhanced. Being able to predict the popularity helps suggesting timing constraints for different profiles. Designers hence are able to decide, which profiles need to be presented with very low delay under normal circumstances. The possibility to identify properties of profiles that may tolerate higher response times is an additional, beneficial effect. It additionally yields information, which profiles may more frequently tolerate temporary in-availabilities without causing a significant deterioration of the service experience.

Knowledge on the popularity of profiles may prove being even more valuable for the development of decentralized architectures [1, 2], for the parametrization of this entirely deviating approach to providing social networking services.

Rough, intuitive beliefs about the profile popularity are abundant. Unverified rumours frequently have it that profiles of women are more often visited than profiles of men, that providing a profile picture will drastically increase the number of impressions of a profile, or that the unfortunate possession of a last name late in the alphabet, will inevitably condemn a user's profile to eternal lack of popularity.

This work aims at exploring these conceptions. It analyzes data from a large, central European OSN with a main focus on professional- and business centered utilization. The main contributions are

- to corroborate the fact that correlations between properties of profiles and their popularity do exist, and
- to expose, which properties of profiles have a considerable effect on their popularity, and which properties have less, or no effect at all.

A large set of profiles from the selected OSN are monitored for this purpose, and traces that were gathered over a period of three months in this course have been analysed. Mann Whitney U tests have been used to identify significant differences in the popularity of profiles of different groups, and correlations between parametric variables and the profiles'

¹<http://www.facebook|linkedin|twitter.com>

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SNS'10, April 13, 2010, Paris, France.
Copyright 2010 ACM 978-1-4503-0080-3 ..\$10.00.

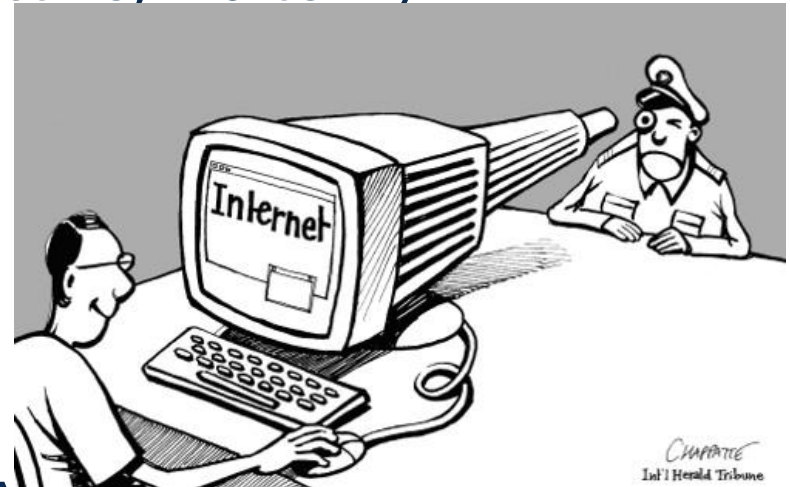
Understanding the behavior of users in OSN

Why?

- It's interesting! 😊
- Plus: we need to know to build better (P2P) OSN...

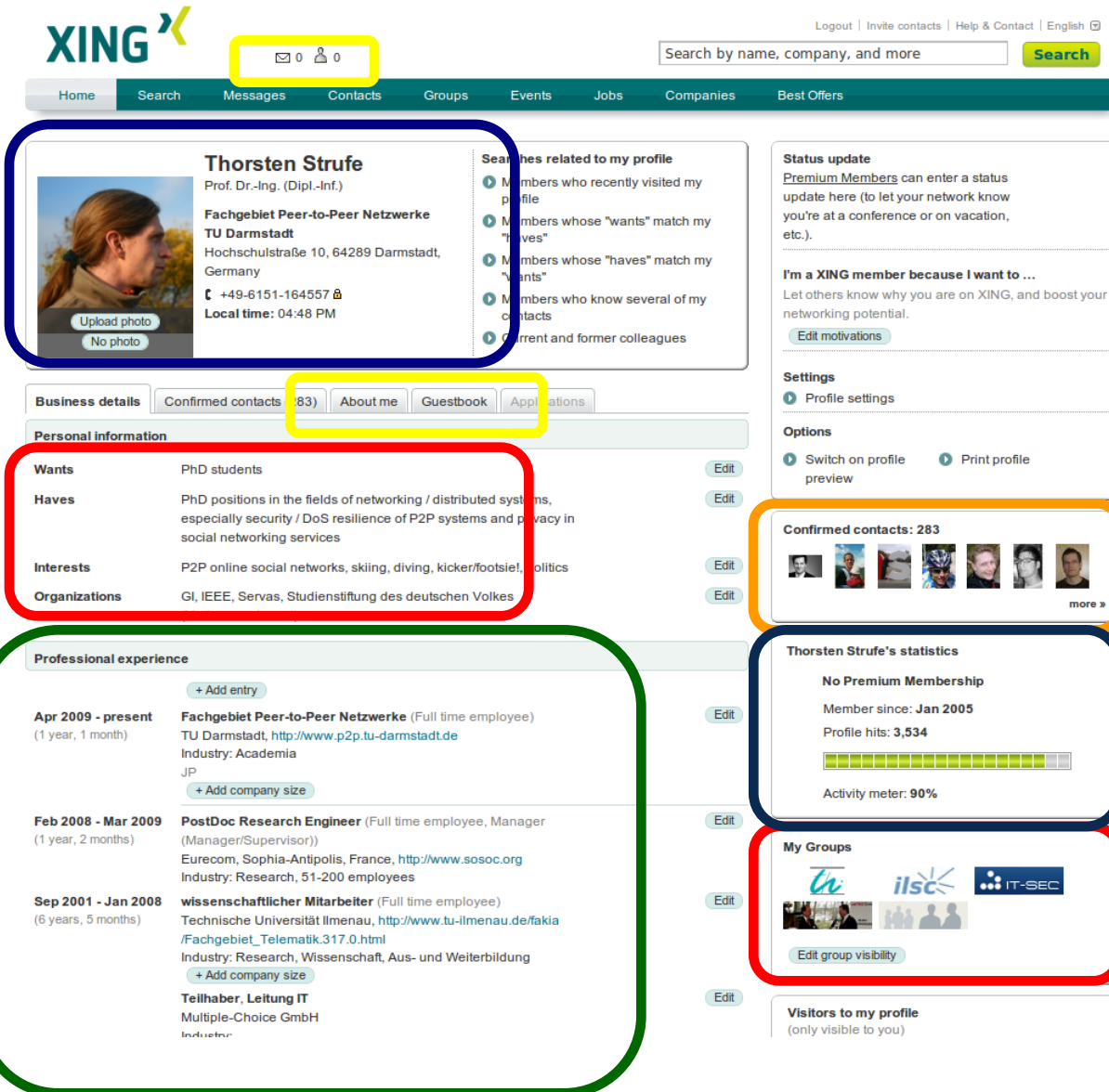
Questions of interest

- Sessions (when, how long, - active, - often?)
- Preferences / services used
- Popularity of content / pages
- Scope of access / reciprocity?



Here: focus on profile popularity...

What's in a "Professional" Profile



XING Logout | Invite contacts | Help & Contact | English

Search by name, company, and more Search

Home Search Messages **Contacts** Groups Events Jobs Companies Best Offers

Thorsten Strufe
Prof. Dr.-Ing. (Dipl.-Inf.)
Fachgebiet Peer-to-Peer Netzwerke
TU Darmstadt
Hochschulstraße 10, 64289 Darmstadt, Germany
+49-6151-164557
Local time: 04:48 PM

Searches related to my profile

- Members who recently visited my profile
- Members whose "wants" match my "wants"
- Members whose "haves" match my "wants"
- Members who know several of my contacts
- Current and former colleagues

Status update
Premium Members can enter a status update here (to let your network know you're at a conference or on vacation, etc.).

I'm a XING member because I want to ...
Let others know why you are on XING, and boost your networking potential.
[Edit motivations](#)

Settings
Profile settings

Options
Switch on profile preview | Print profile

Business details Confirmed contacts (83) **About me** Guestbook Applications

Personal information

- Wants** PhD students [Edit](#)
- Haves** PhD positions in the fields of networking / distributed systems, especially security / DoS resilience of P2P systems and privacy in social networking services [Edit](#)
- Interests** P2P online social networks, skiing, diving, kicker/foosball, politics [Edit](#)
- Organizations** GI, IEEE, Servas, Studienstiftung des deutschen Volkes [Edit](#)

Confirmed contacts: 283

Thorsten Strufe's statistics

- No Premium Membership
- Member since: Jan 2005
- Profile hits: 3,534
- Activity meter: 90%

My Groups

- [Edit group visibility](#)

Visitors to my profile
(only visible to you)

Professional experience

- Apr 2009 - present** (1 year, 1 month)
Fachgebiet Peer-to-Peer Netzwerke (Full time employee)
TU Darmstadt, <http://www.p2p.tu-darmstadt.de>
Industry: Academia
JP
[+ Add company size](#)
- Feb 2008 - Mar 2009** (1 year, 2 months)
PostDoc Research Engineer (Full time employee, Manager (Manager/Supervisor))
Eurecom, Sophia-Antipolis, France, <http://www.sosoc.org>
Industry: Research, 51-200 employees
- Sep 2001 - Jan 2008** (6 years, 5 months)
wissenschaftlicher Mitarbeiter (Full time employee)
Technische Universität Ilmenau, http://www.tu-ilmenau.de/fakia/Fachgebiet_Telematik.317.0.html
Industry: Research, Wissenschaft, Aus- und Weiterbildung
[+ Add company size](#)
Teilhaber, Leitung IT
Multiple-Choice GmbH
Industry:

- Identifying info
 - Name
 - Photo
 - Address...
- CV
 - Current/prev. employments
 - Educational track
- Interests
 - Personal/professional
 - Wants/haves
 - Interest Groups
- Personal contacts
- Messaging
- Statistics

Which profiles are “popular”?

- Measured in frequency of requests
- Possible to correlate to properties of user/profile?
- Which profiles do we have to keep available (and by which means?) ;-(

Why?

Common beliefs...

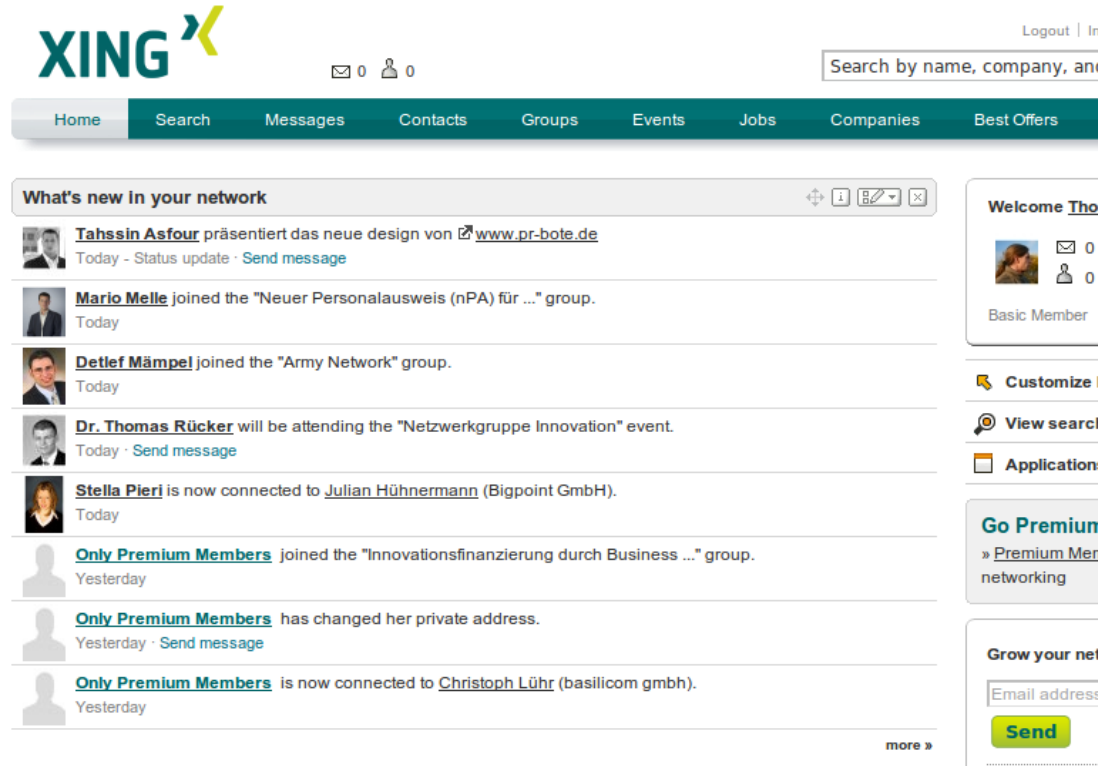
- *“Profile of women are much more often visited than profile of men”*
- *“Profiles with pictures are more interesting than profiles without”*
- *“Old/experienced profiles attract more views”*
- *“The profiles of active users are more attractive”*
- *“Users with many friends are sought and viewed more often”*
- *“Last name starting with a letter late in the alphabet sucks...” (c/list pages...)*

Reflecting: how are users lead?

- Assuming the users generally follow links (rather than searching for content)
- What do they see as “home” – the front page of the OSN?

“Home page” (after login) usually almost identical

- Info on profile owner
- Updates from the provider (and advertisement)
- Feed of news from “f



The screenshot shows the XING homepage. At the top, there is a navigation bar with links for Home, Search, Messages, Contacts, Groups, Events, Jobs, Companies, and Best Offers. Below the navigation bar is a section titled "What's new in your network" which contains a list of activity updates:

- Tahssin Asfour** präsentiert das neue design von www.pr-bote.de
Today - Status update · [Send message](#)
- Mario Melle** joined the "Neuer Personalausweis (nPA) für ..." group.
Today
- Detlef Mämpel** joined the "Army Network" group.
Today
- Dr. Thomas Rücker** will be attending the "Netzwerkgruppe Innovation" event.
Today · [Send message](#)
- Stella Pieri** is now connected to [Julian Hühnermann](#) (Bigpoint GmbH).
Today
- Only Premium Members** joined the "Innovationsfinanzierung durch Business ..." group.
Yesterday
- Only Premium Members** has changed her private address.
Yesterday · [Send message](#)
- Only Premium Members** is now connected to [Christoph Lühr](#) (basilicom gmbh).
Yesterday

On the right side of the page, there are sections for "Welcome Tho...", "Customize", "View search", "Application", "Go Premium", and "Grow your net...".

Activity in the news feed

- Changes to profile
- Status updates
- Birthdays
- Contact list maintenance (adding friends)

Note: having many friends leads to broad dissemination...

How can we gather the data?

- Access to server logs (**Ha!**)
- Surveys & Interviews (problems of scale)
- Traffic logging (problems of scope)
- **Crawling**/API access (problems of scale, incompleteness of information, sampling)

Crawls gather only limited data

- Does **not** sufficiently allow inference on **sessions**
- Mainly comprises of plain, static **profile info** and **social graph**
- Generally does **not** include data about **popularity**

Regular monitoring:

- Collect changes to profiles
- Frequent, regular measurements over long period of time needed

“xing” selected for the study

- Business/professional OSN, similar to LinkedIn
- 8 Mio users, mainly from central Europe (now: 13.8; 6.7 from DACH)
- xing profiles include
 - Registration date
 - **activity meter**
 - **hit counter** (number of profile impressions for popularity)
 - Weak privacy settings (professional profiles are there to be seen)
- Visitors to profile visible (to paying users – no stalking, unlike LinkedIn, facebook)

Crawling / monitoring the **complete** OSN is **infeasible**

- 8mio profiles, most >15 pages of contact lists (up to 160k contacts!, 10 per page)
- Access per page takes ~ .5s, complete crawl takes > 275 h (if all goes well)
- each page > 150 KB, > 17 TB in total
- Providers don't like this much... (rate control, disabled accounts, blocked IPs)

Large, **random** sample needed for meaningful results

Random sampling

- Conducted random walks (25k, 5k, ~1k)
- Aim of the crawls:
 - Diverse graphs without overlap
 - Collect “john does” (no outliers, no abandoned profiles)
- Covered over 2Mio unique profiles in total
- Starting at diverse “edges” (AUS,DE,PL,RUS,TR,UK,US)
- all converged to D.A.CH

Selected sub graph without overlap

- 31.643 unique profiles (25k, 5k, 1.6k random walks)
- Gender automatically derived via website on international first names

Subsequently frequently monitored for a long period of time

- Since Nov 2009
- At least twice daily
- Only core data needed (no pictures, friend list not regularly since # on profile)

Identifying Data

- Name, Image, Gender

CV

- Current employment, universities attended, claimed spoken languages

Interests

- Interests as stated
- Number of subscribed groups, subscribed groups, number of members in groups, number of messages in respective groups, languages of group

Contact list information

- Number of contacts
- Complete list of contacts gathered infrequently

Statistics

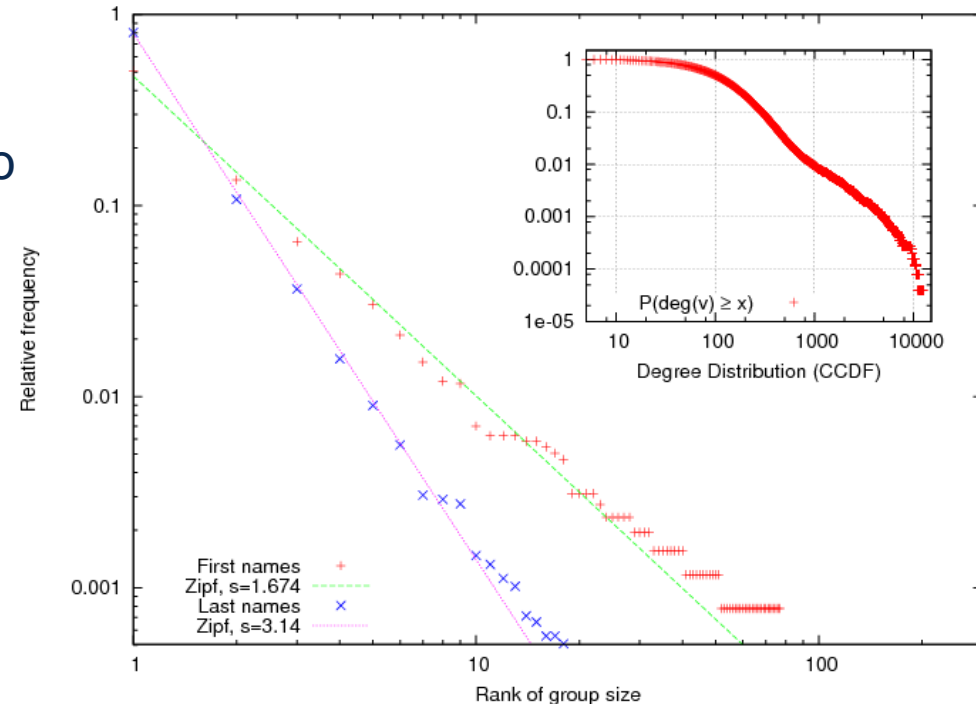
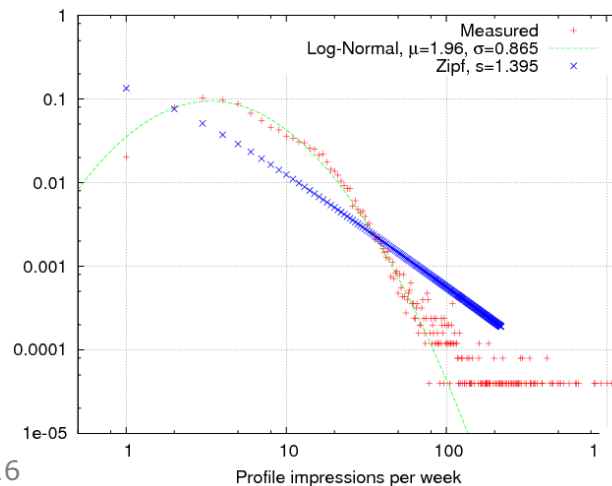
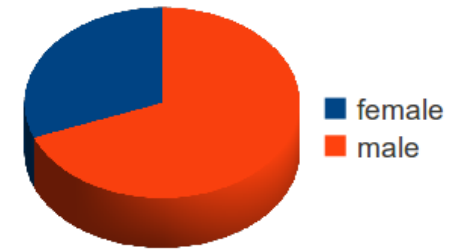
- Registration date, number of profile impressions, activity meter
- Timestamp of crawl

3 months section of monitoring data analyzed (Nov '09 – Jan '10)

Some profiles removed (celebrities, abandoned profiles)

Remaining sample

- 25.274 (7.824 / 17.450) (31% vs. 34%)
- Degree dist. (\sim PL, min 5, max 12.332)
- Name frequency follows Zipf
 - First names: $s = 1.67$
 - Last names: $s = 3.14$
- Binned popularity dist. log-no



Activity

- “Activity meter” in profiles very coarse grained
- Derived “profile alteration frequency” as alternative
- Men are slightly more active than women (to both metrics)
- Profiles without image belong to inactive users

Membership in Groups

- Wide range of group membership
- Max 511, Mdn 3
- >5k profiles are not registered to any group

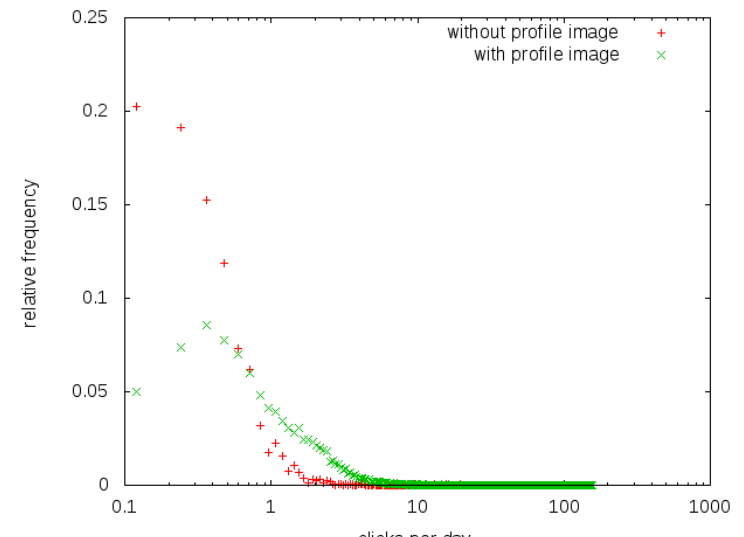
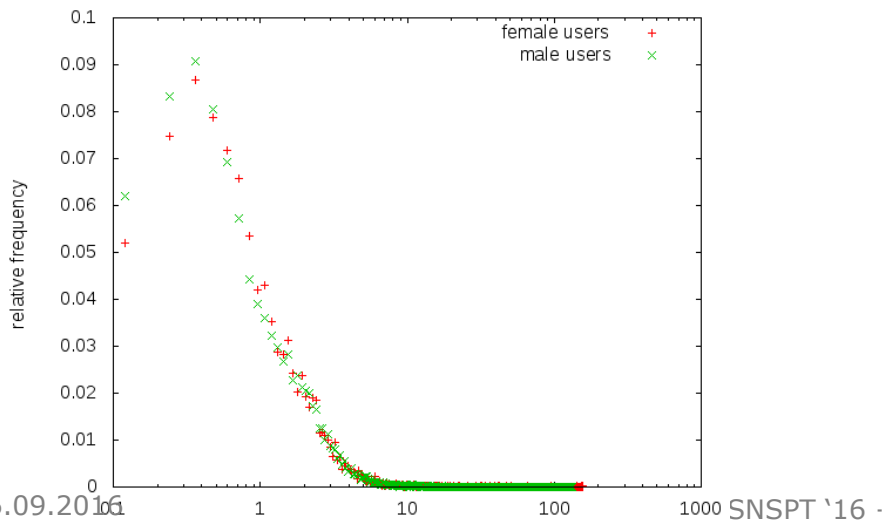
Testing popularity between groups (nominal data, *Mann-Whitney U*)

"Profile of women are much more often visited than profile of men"

- Male vs. female: 0.039 vs. 0.041 (*Mdn*)
- No significant difference

"Profiles with pictures are more interesting than profiles without"

- With picture significantly higher popularity (0.5 pi / d)



"The profiles of active users are more attractive"

- Activity (parametric: interval) as given on the profiles ("**activity meter**")
 - $r \approx 0.17$, no noteworthy correlation
 - Activity (parametric: ratio) measured in **group memberships**
 - $r \approx 0.37$ (higher for men, lower for women)
 - Activity meter is very coarse grained
 - Activity measured in **profile alterations**
 - $r \approx 0.62$ ($0.61 < r < 0.63$) **high correlation**
- Popularity correlates with activity of users (profile alterations/group activity)

"Users with many friends are sought and viewed more often"

- Correlating popularity to the degree of profiles
- $r \approx 0.75$, **high correlation**
- Stronger for women: $0.81 < r < 0.83$ vs. men: $0.74 < r \leq 0.75$

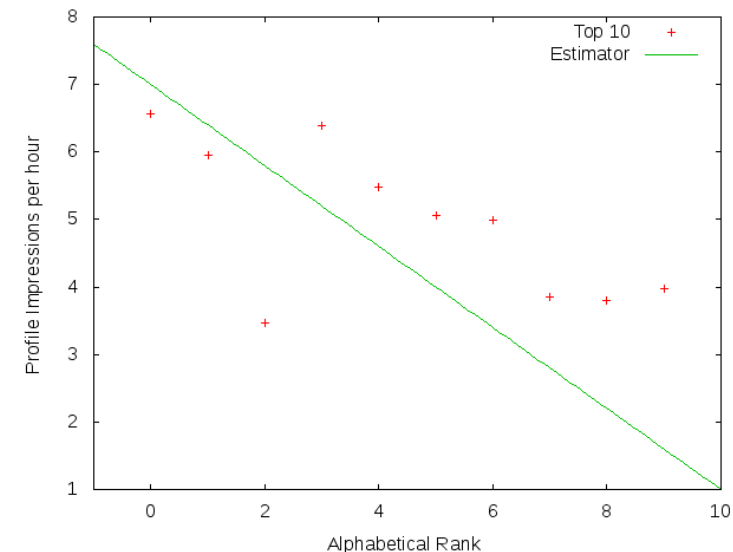
In retrospective: Combination somewhat unsurprising: changes are published at friend's profiles...

"Old/experienced profiles are viewed more frequently"

- Preferential attachment / experience could lead to higher popularity
- H_0 rejected, but $r \approx 0.11$, **no noteworthy correlation**

"Last name starting with a letter late in the alphabet sucks..."

- H_0 not rejected, there is no correlation.
- Taking the "rich-club", however...
- Top 5% profiles: $r \approx -0.09$
(the better..)
- Top 2‰ profiles: $r \approx -0.22$
- Top 1 ‰ profiles: $r \approx -0.29$
- Top 10 profiles: $r \approx -0.9$!!



Selected large sample of profiles in business oriented OSN
Monitored profile properties and popularity (in pi/h)

Profile Popularity can be predicted. Relates to

- Providing image
- Activity (diligence of maintaining profile)
- Number of friends and contacts

What we take away (P2P OSN)

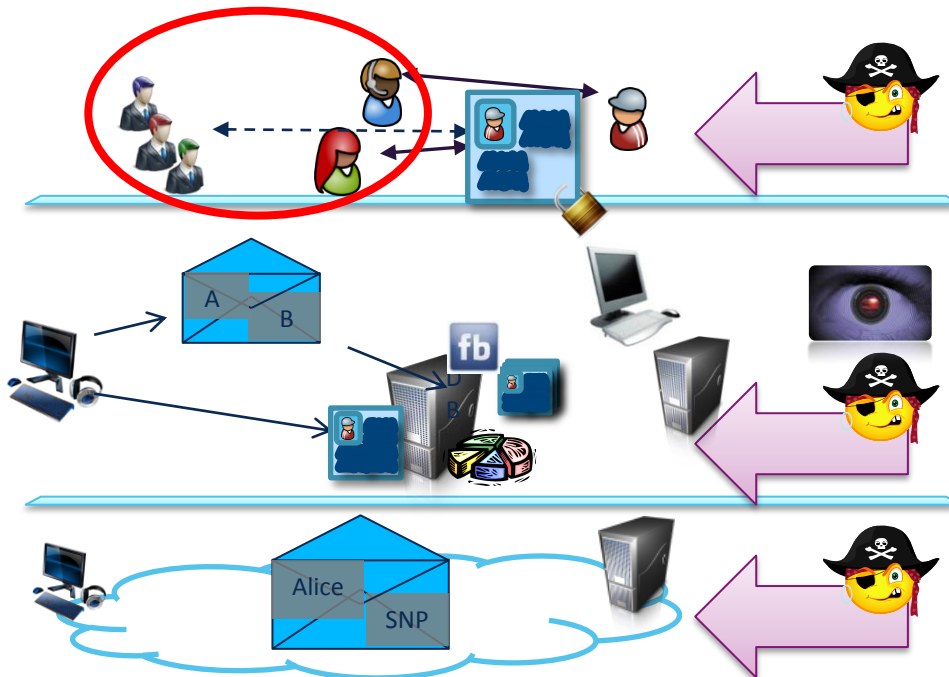
- Nice correlation with activity/friends (P2P & replicating at friends...)

Future Work

- Kept monitoring, but results quite stable...
- Analyze data from DB and server access logs "spi" (fb-like personal osn)
 - Are profile requests "local" (viewing friends...)?
 - Is interest mutual?
 - Can we learn more on the sessions?
- Struggle to get/analyze more data!

Shameless plug:
FPA

So what about these privacy settings?



C4PS - Helping Facebookers Manage their Privacy Settings

Thomas Paul, Martin Stopczynski, Daniel Puscher, Melanie Volkamer, Thorsten Strufe

CASED, Technische Universität Darmstadt

Abstract

The ever increasing popularity of Online Social Networks has left a wealth of personal data on the web, accessible for broad and automatic retrieval. Protection from undesired recipients and harvesting by crawlers is implemented by access control, manually configured by the user in his privacy settings. Privacy unfriendly default settings and the user unfriendly privacy setting interfaces cause an unnoticed over-sharing. We propose *C4PS - Colors for Privacy Settings*, a concept for future privacy setting interfaces. We developed a mockup for privacy settings in Facebook as a proof of concept, applying color coding for different privacy visibilities, providing easy access to the privacy settings, and generally following common, well known practices. We evaluated this mockup in a lab study and show in the results that the new approach increases the usability significantly. Based on the results we provide a Firefox plug-in implementing C4PS for the new Facebook interface.

1 Introduction

Over 850 million users allegedly share personal information, private photos, videos, opinions and discussions on Facebook. The shared personal information include their age, gender, sexual preferences, taste and hobbies. All this data stored in Facebook or any other Online Social Network (OSN) can be linked to the relating individual by their real names published in their profiles.

Access to all this information is controlled by the OSN service provider, based on the user's privacy settings. Several studies have shown that despite increasing awareness [17], users due to the intricacy of the task are incapable of configuring their intended settings, and indeed do not understand their activities' implications [23]. However, the fact that Facebook and other OSNs have modified the default privacy settings to be more and more open with each update, makes it very important that users can easily grasp and change their privacy settings.

Consequences of this situation span unintended over sharing, and more serious threats, arising as scraping and harvesting [21,25], automated social engineering [5,6], social phishing [15] as well as various further attacks. In face of this perilous incomprehensibility, [17,110] go as far as proposing to abandon

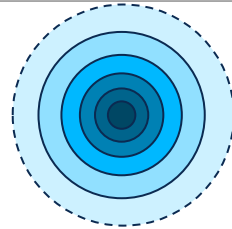
Increasing awareness due to greater press coverage
Young people share more, but manage privacy better!

Changes to Privacy Settings	2005 ^[1]	2009 ^[2]	2010 ^[2]
single change at least	30%	91%	98%
3 or more changes	/	24%	51%

[1] T Govani et al. Student Awareness of the Privacy Implications When Using Facebook, 2005 & Ralph Gross et al. Information Revelation and Privacy in Online Social Networks, 2005 & Harvey Jones et al. Facebook: Threats to Privacy, 2005

[2] Danah M Boyd and Eszter Hargittai. Facebook privacy settings: Who cares?, 2010

User 



Grantable

- specific contact(s)
- contacts
- contacts of contacts
- service subscribers
- public



Implicit

- SNP



Everything the installing user can see

- Affiliates

- Extenders
- Advertisers



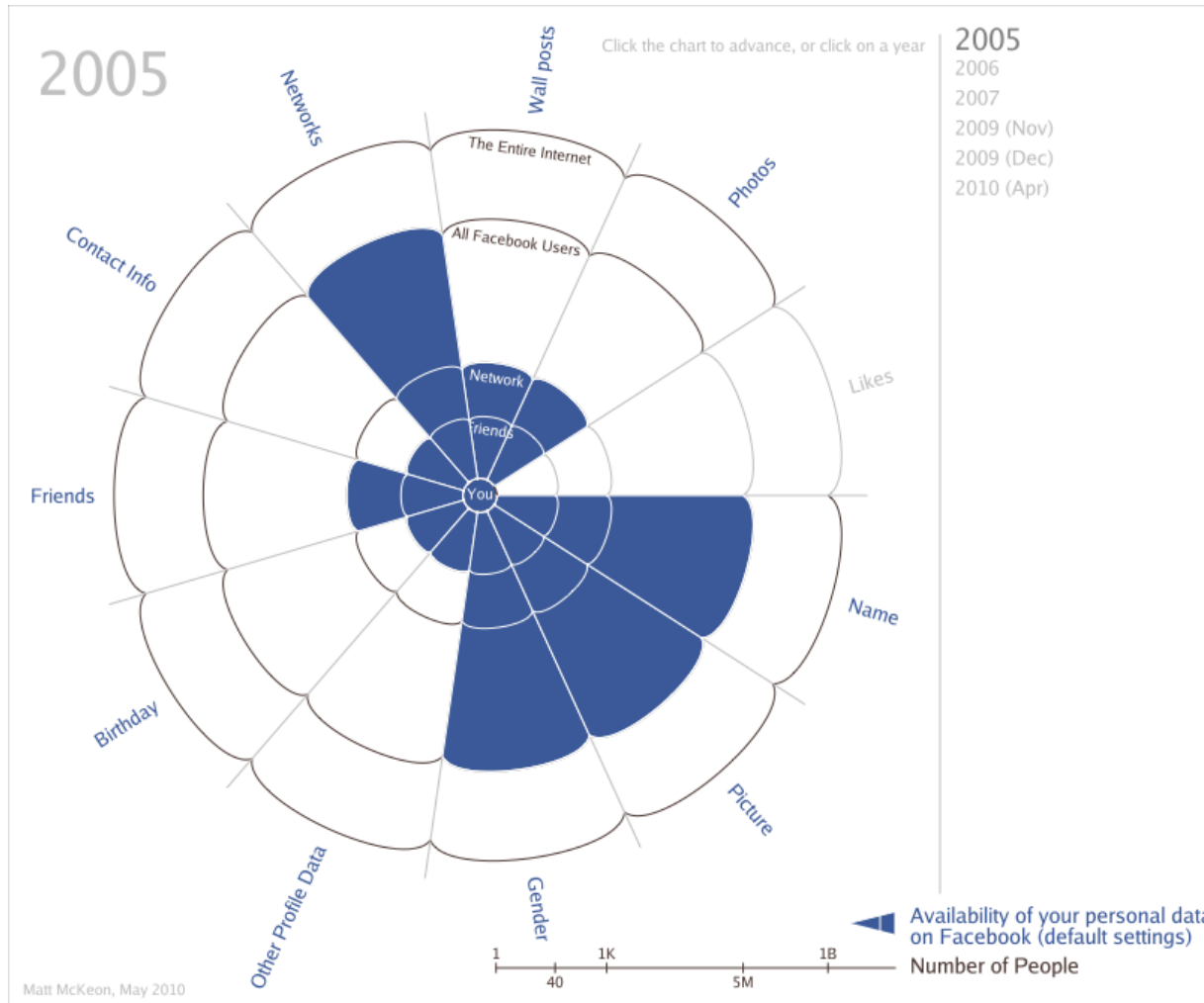
Not much (aggregates) Unless they pay really well

- ISP



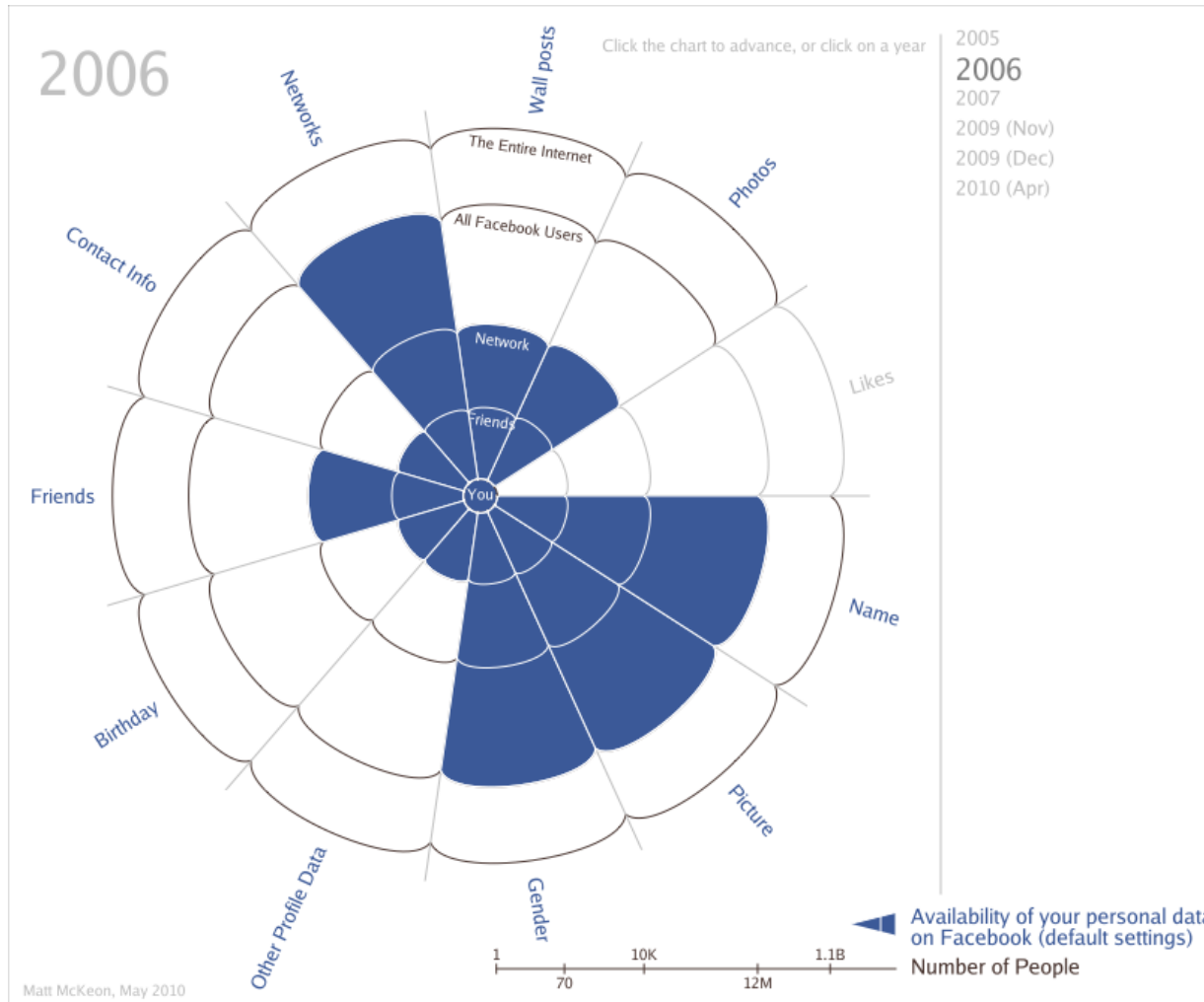
Everything their subscribers see/write (until Nov 21st '12)

Facebook's Privacy Evolution (2005)

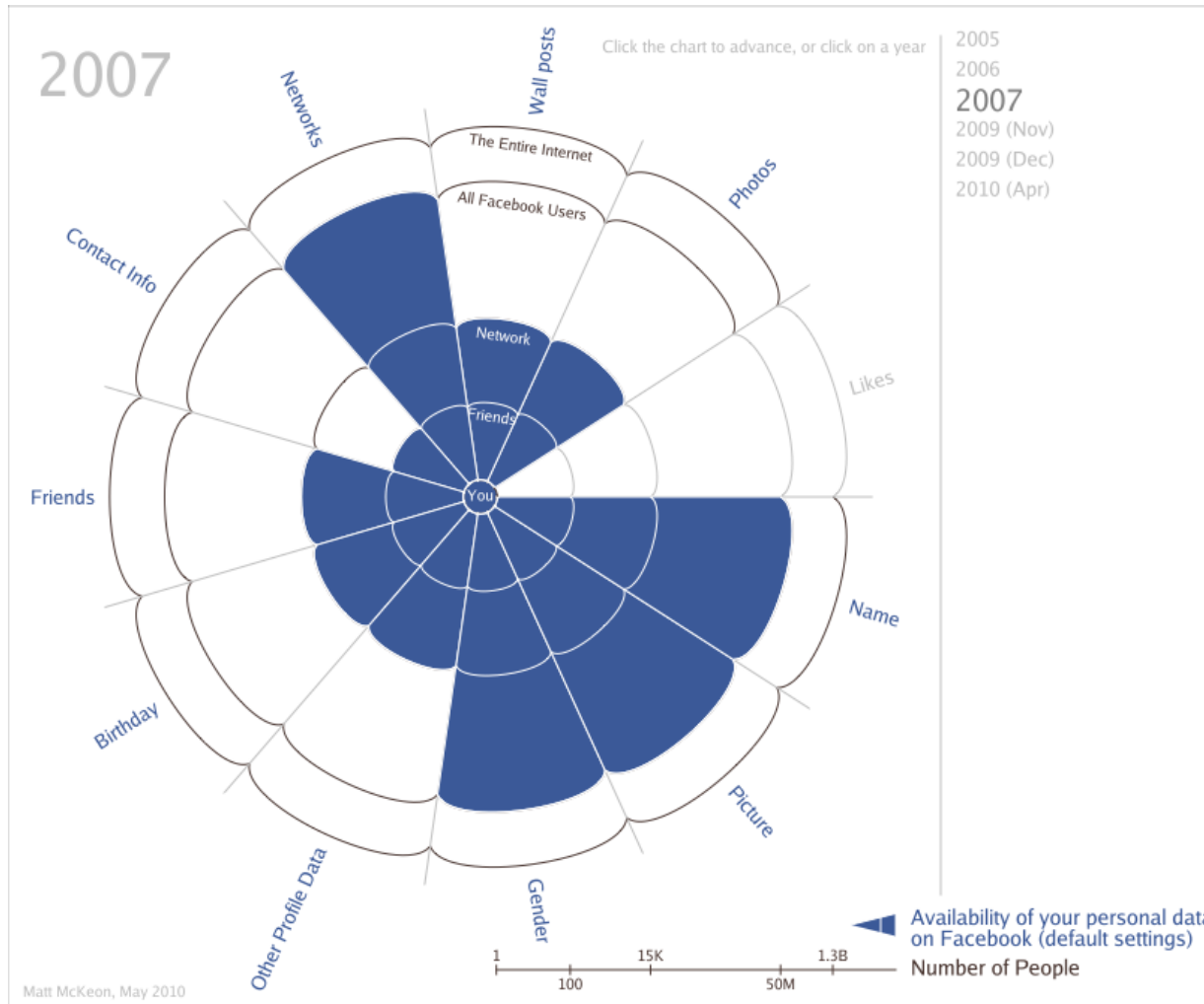


Source: Matt McKeon

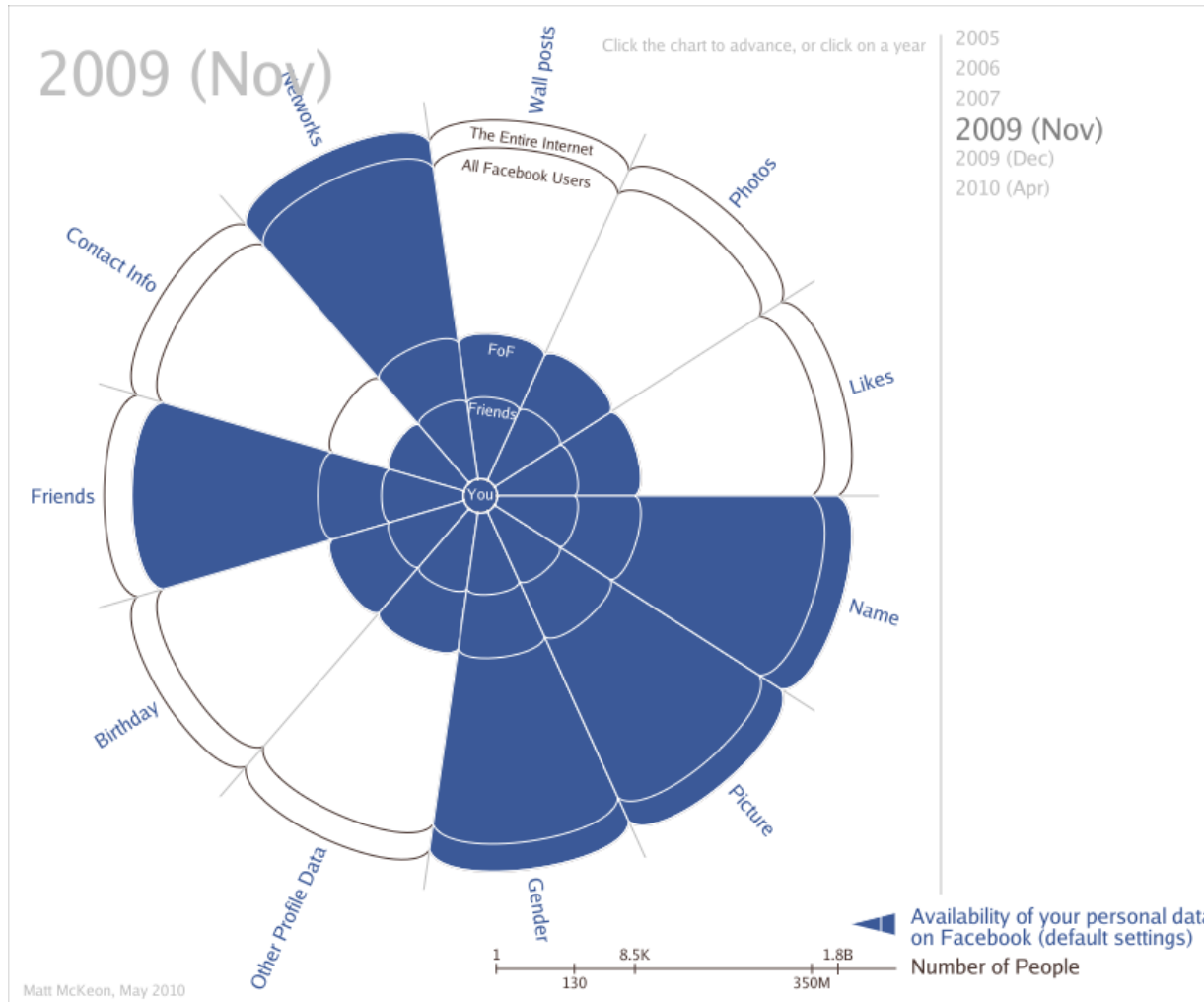
Facebook's Evolution: 2006



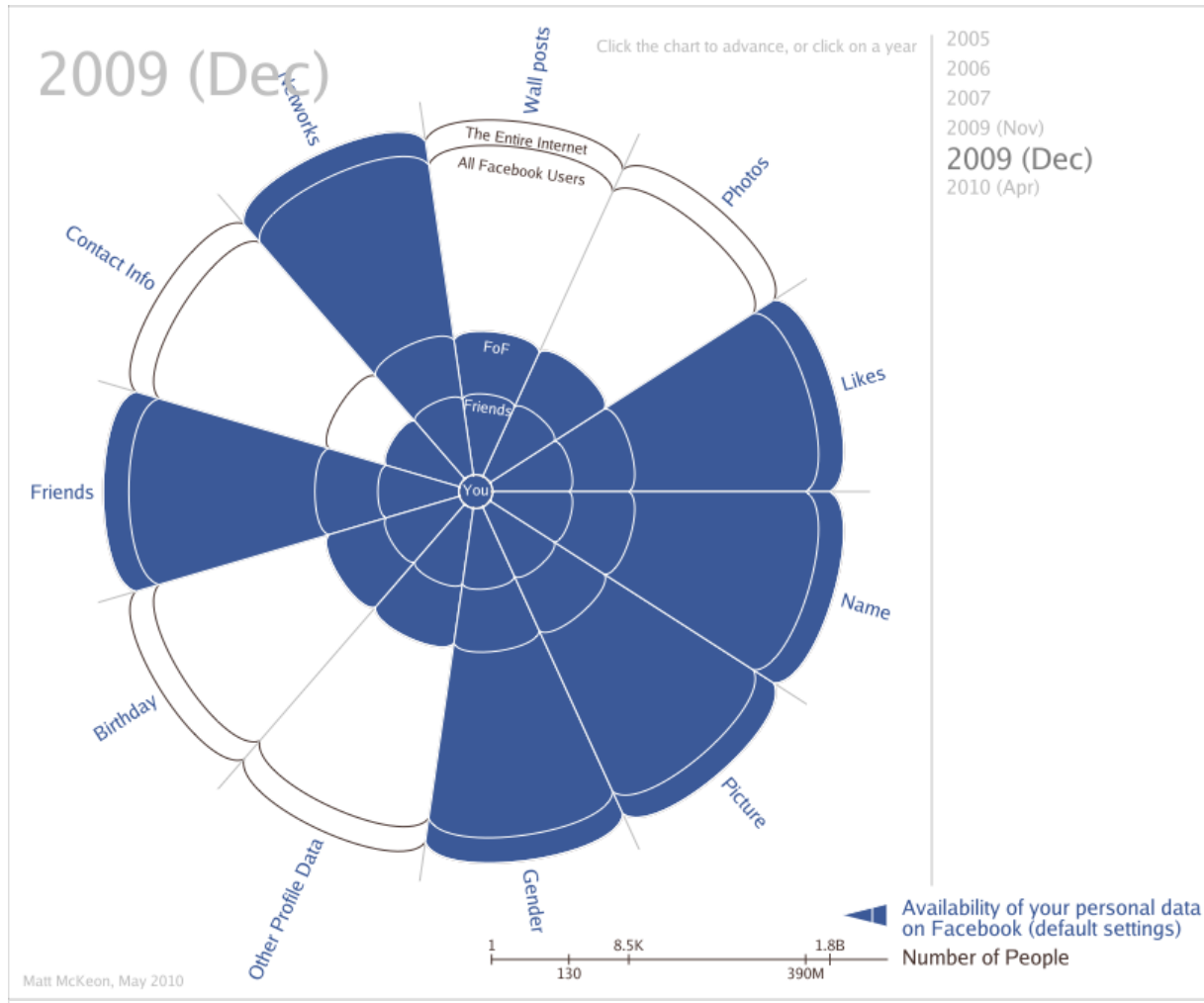
Facebook's Evolution: 2007



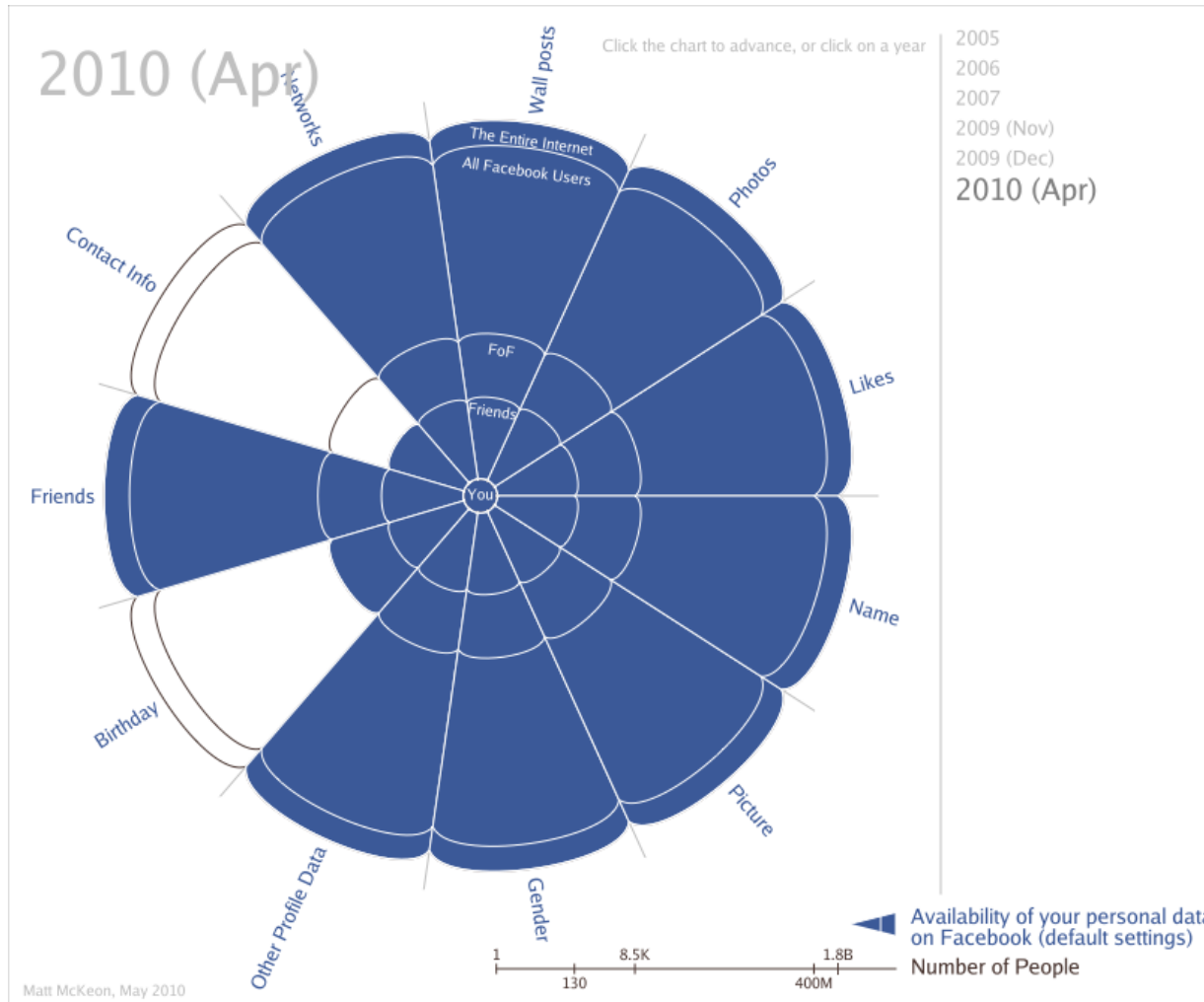
Facebook's Evolution: 2009



Facebook's Evolution: 2009



Facebook's Evolution: 2010



Help users manage their privacy settings

- Apply well known control methods
- Proximity between controls and data / decrease overhead

Help them understand what they've done!

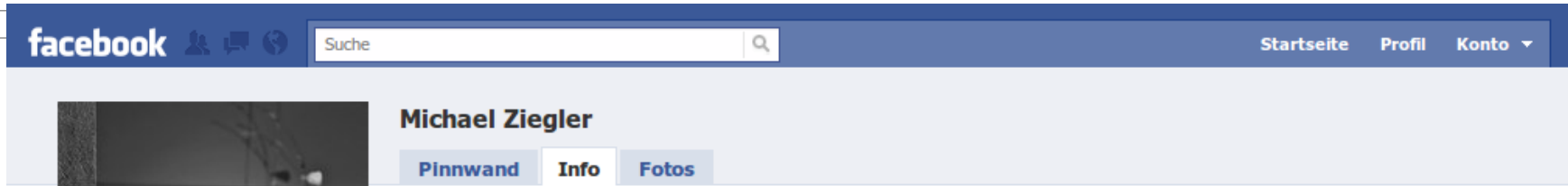
- Display settings directly
- Color coding helps humans understand a situation better

Quick walk through the concepts...

The screenshot shows a Facebook profile for Michael Ziegler. The top navigation bar includes the Facebook logo, a search bar, and links for 'Startseite', 'Profil', and 'Konto'. The profile header shows the name 'Michael Ziegler' and tabs for 'Pinnwand', 'Info', and 'Fotos'. A 'Privatsphäre-Einstellungen' (Privacy Settings) dialog box is open, with a red arrow pointing to the 'So sehen andere dein Profil' button. The dialog contains two sections: 'Die Hintergrundfarbe eines Eintrags zeigt dir an, wer ihn alles sehen kann:' and 'Mit den farbigen Buttons...'. The first section shows 'Geburtstag' with three color-coded options: red (selected), blue, and green. The second section shows 'Mit den farbigen Buttons' with four color-coded options: red, blue, yellow, and green. Below the dialog, the 'Über mich' (About) section is visible, with a red arrow pointing to the 'Beziehungsstatus' (Relationship Status) field, which is set to 'Verlobt' (Engaged). The 'Allgemeines' (Basic) section shows fields for 'Geschlecht' (Male), 'Geburtstag' (22. November 1978), 'Beziehungsstatus' (Verlobt), 'Interessiert an' (Frauen), 'Auf der Suche nach' (Freundschaft), 'Derzeitiger Wohnort' (Hamburg, Germany), 'Politische Einstellung' (Sozialdemokratische Partei Deutschlands (SPD)), and 'Religiöse Ansichten' (Christlich - katholisch). The left sidebar shows 'Mein Profil bearbeiten', 'Bearbeiten der Privatsphäre beenden', and 'Gruppen bearbeiten'. The right sidebar shows advertisements for 'JETZT NEU' and 'RoseBikes'.

Settings reached easily via centrally-mounted buttons

Settings integrated directly in profile, can be changed with a single click



Mein Profil bearbeiten

Bearbeiten der Privatsphäre beenden

Michael Ziegler

Pinnwand Info Fotos

Privatsphäre-Einstellungen

So sehen andere dein Profil

Speichern + Verlassen

Die Hintergrundfarbe eines Eintrags zeigt dir an, wer ihn alles sehen kann:

Geburtstag: 21. Fe	Nur du	Geburtstag: 21. Fe	Ausgewählte Freunde
Geburtstag: 21. Fe	Alle Freunde	Geburtstag: 21. Fe	Jeder

Mit den farbigen Buttons an der rechten Seite kannst du die Einstellungen ändern:

Nur du |
 Ausgewählte Freunde |
 Alle Freunde |
 Jeder

Wenn die Sichtbarkeit auf "Ausgewählte Freunde" eingestellt wurde, kannst du mit diesem Button einstellen, welche Freunde/Gruppen den jeweiligen Eintrag sehen dürfen.

Background colors indicate visibility of the entries

Help and explanations

Informationen

Beziehungsstatus:
Verlobt

Geburtstag:
22. November 1978

Derzeitiger Wohnort:
Hamburg, germany

Freunde

19 Freunde

Geschlecht:	Männlich	
Geburtstag:	22. November 1978	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Beziehungsstatus:	Verlobt	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Interessiert an:	Frauen	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Auf der Suche nach:	Freundschaft Kontakte knüpfen	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Derzeitiger Wohnort:	Hamburg, germany	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Heimatstadt:	Dortmund, Germany	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Politische Einstellung:	Sozialdemokratische Partei Deutschlands (SPD)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Religiöse Ansichten:	Christlich - katholisch	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Werbeanzeige erstellen

Jetzt neu



Aufsteckbürsten von Oral-B. Die nächste Generation in Reinigungsleistung und Sanftheit! Jetzt mit 29% mehr Borsten.

RoseBikes



Werde Freund von Rose, Europas größtem Radsport Spezialversender und erhalte einen 10€ Gutschein!

Gefällt mir

Ring-Paare.de



Mehr Zeit für das

Sichtbarkeit für "Beziehungsstatus" einstellen

Gruppen: Alle Freunde: Wer darf "Beziehungsstatus" sehen?

- + Schulfreunde +
- + Arbeitskollegen +

Andrea Schwelzer +

Anja Mayer +

Christian König +

Christina Kuhn +

Claudia Bauer +

Drag n' Drop

Schließen

Sichtb **Inactive elements greyed out**

Gruppen: **Schulfreunde** **Arbeitskollegen**

Alle Freunde: Wer darf "Beziehungsstatus" sehen?

Andrea Schweißer **+**

Anja Mayer **+**

Christian König

Christina Kuhn **+**

Claudia Bauer **+**

Christian König **x**

Schließen

Help! (tooltips)

Für alle Freunde sichtbar machen

Sichtbarkeit für "Beziehungsstatus" einstellen

Gruppen: Alle Freunde: Wer darf "Beziehungsstatus" sehen?

Gruppen:	Alle Freunde:	Wer darf "Beziehungsstatus" sehen?
<input type="checkbox"/> Schulfreunde	 Andrea Schweitzer <input type="checkbox"/>	<input type="checkbox"/> Schulfreunde <input type="checkbox"/>
<input checked="" type="checkbox"/> Arbeitskollegen <input type="checkbox"/>	 Anja Mayer <input type="checkbox"/>	 Marco Hartmann <input type="checkbox"/>
	 Christian König <input type="checkbox"/>	
	 Christina Kuhn <input type="checkbox"/>	
	 Claudia Bauer <input type="checkbox"/>	

Schließen

Properties to evaluate, hypotheses to test

1. *Is it easier to find out **who can see what?** (setting)*
2. *Can the user easily find out how an **arbitrary other sees** her? (visibility)*
3. *Do **groups** make life easier, faster, more precise? (groups)*
4. *Is the entire new interface more **effective** than facebook? (effectivity)*

Experiment

- Controlled in-depth user study with 20 (18) participants
 - General questions
 - Extensive set of tasks to solve (alternating order of systems)
 - Standardized satisfaction scores
- Metrics: **precision**, **overhead** (clicks), **time** needed

Expectation: advantage of our interface, especially for laypeople

67% visit social networks *daily*

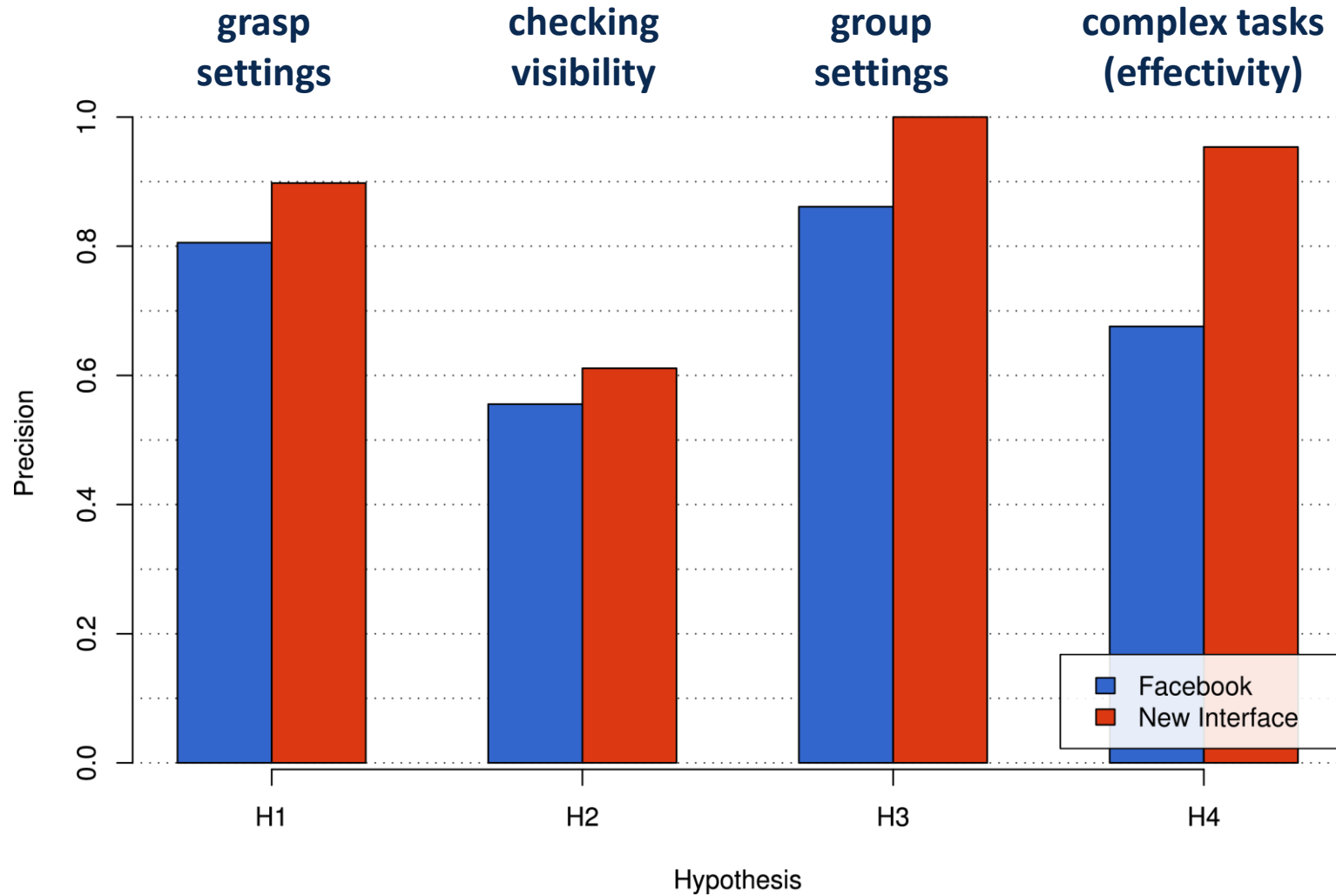
67% were *Facebook users*

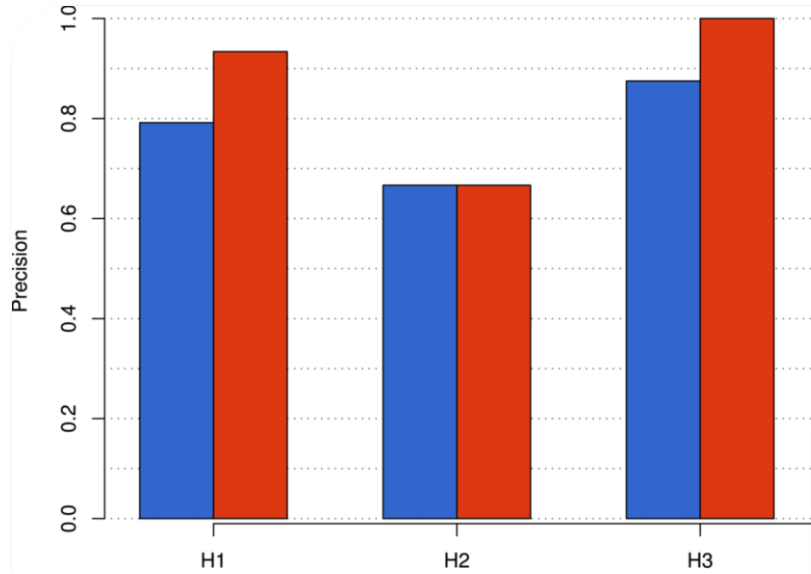
94% have *already changed* their privacy settings

76% found the settings to be *confusing*

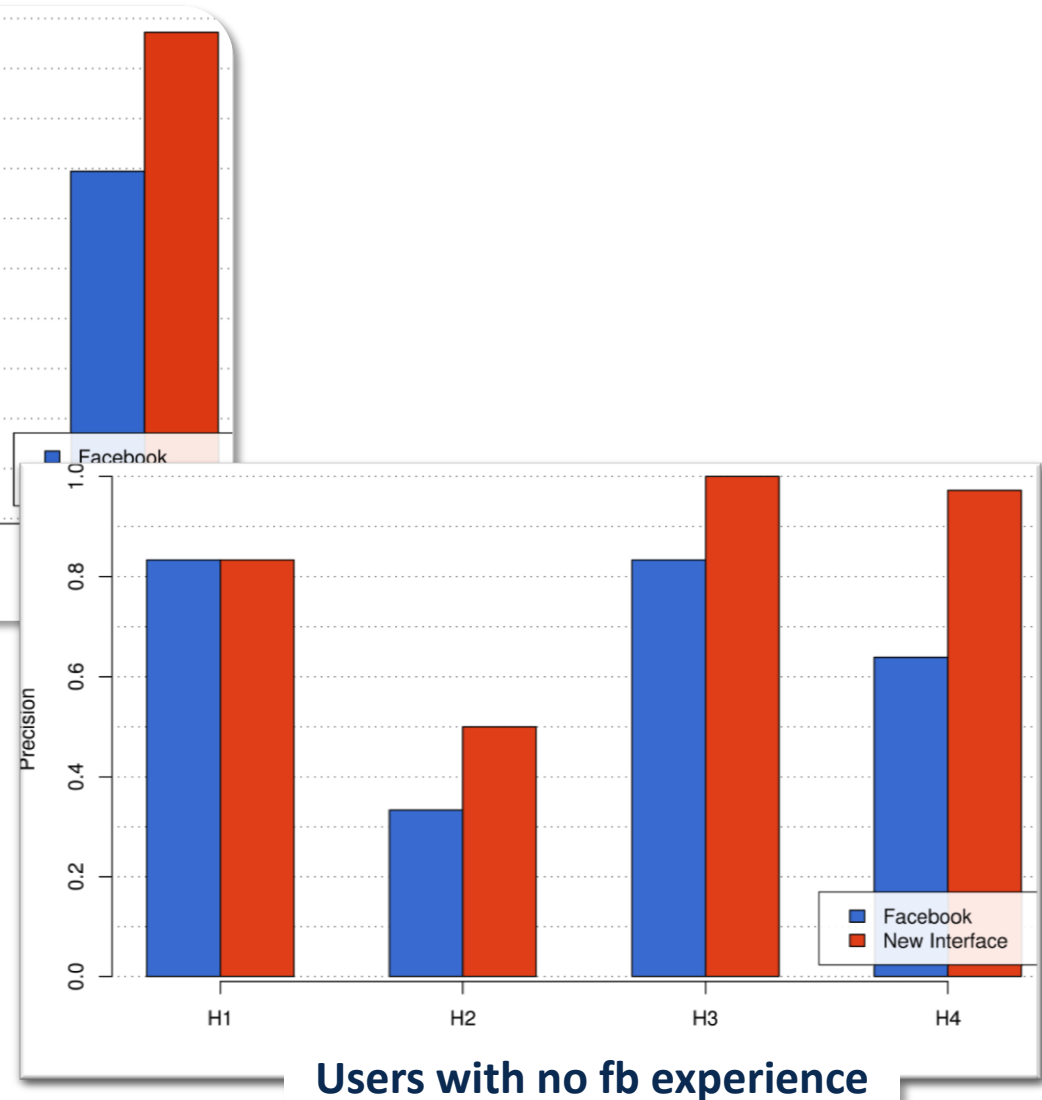
22% *create groups* of friends

22% *do not know* exactly what parts of *data* they have shared

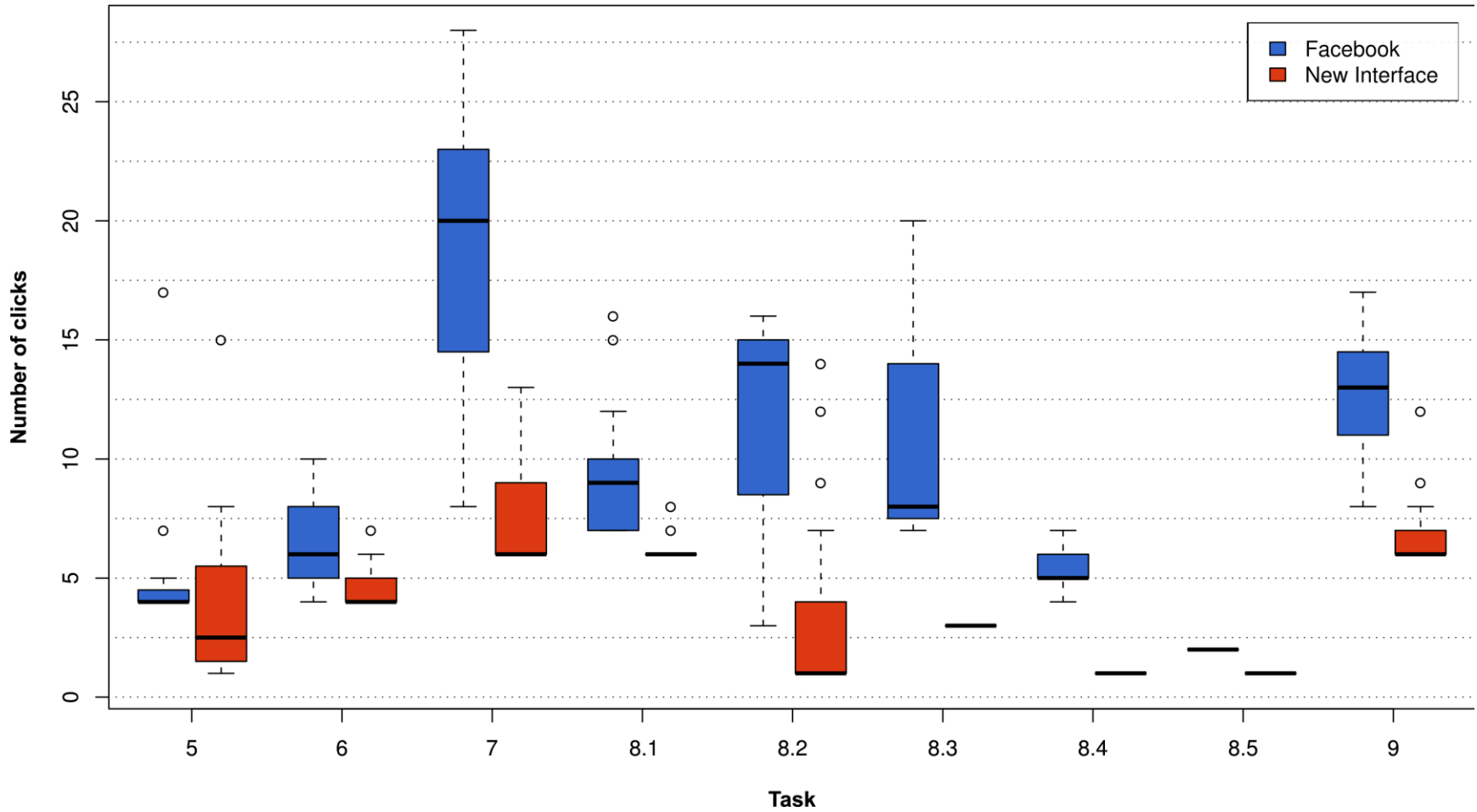


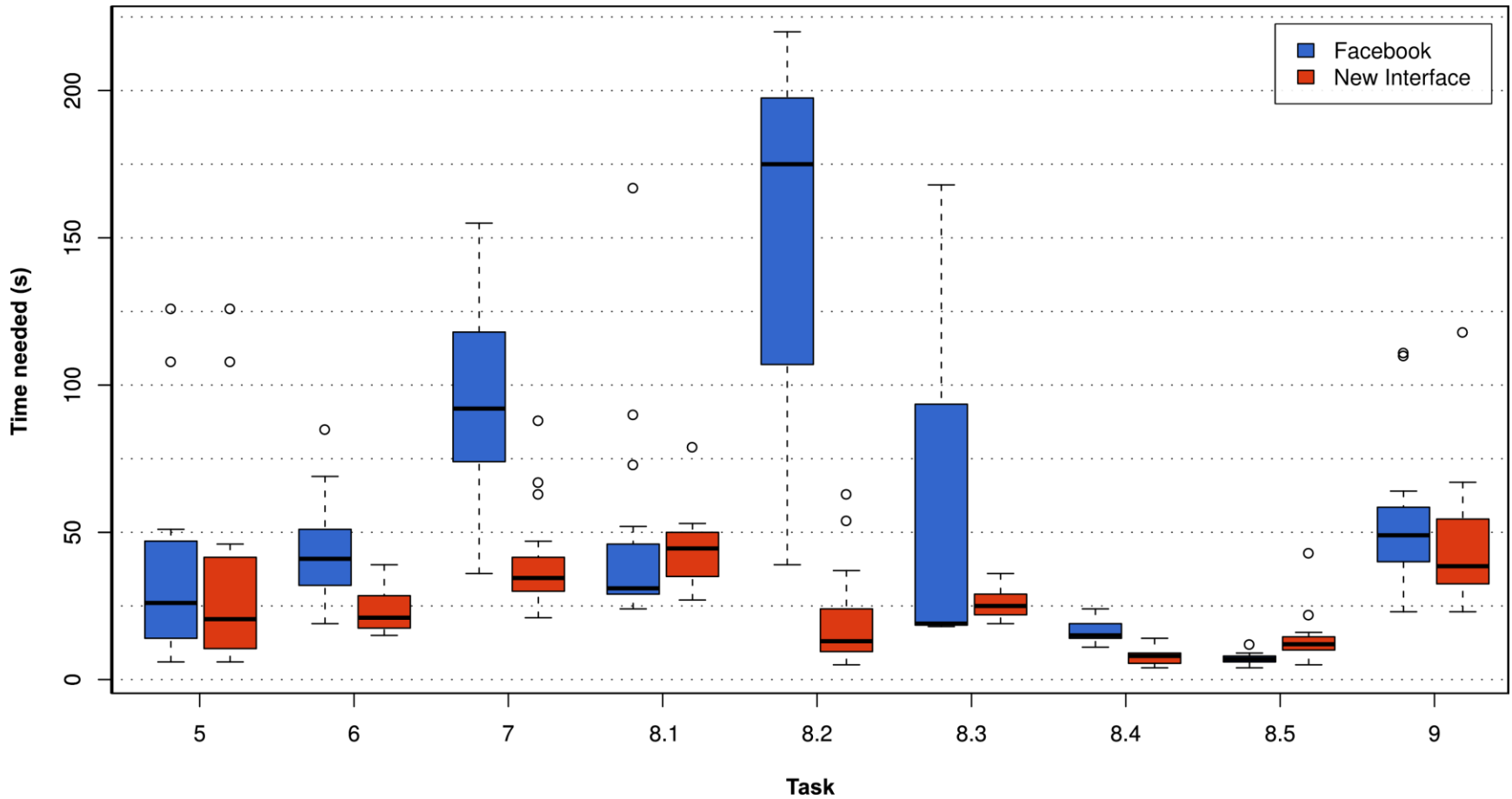


Facebook users

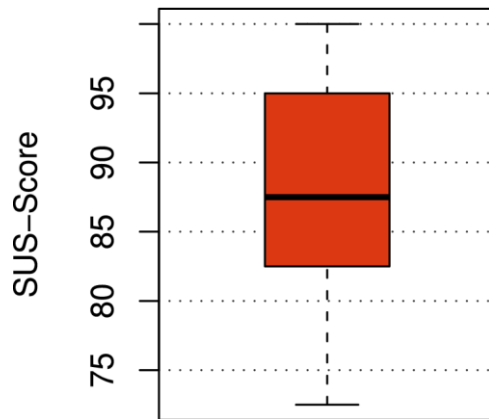


Users with no fb experience





System Usability Scale:



94% found Facebook settings confusing
89% rated new solution as "much better"
100% rated coloring „good“ to „very good“

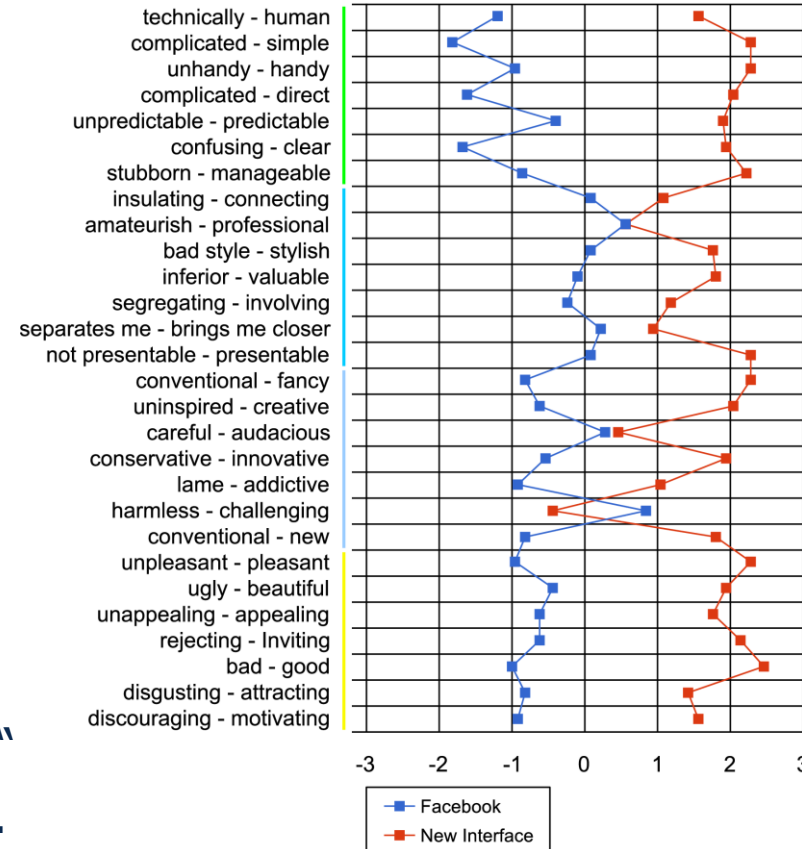
82% think chosen colors are useful / clear.

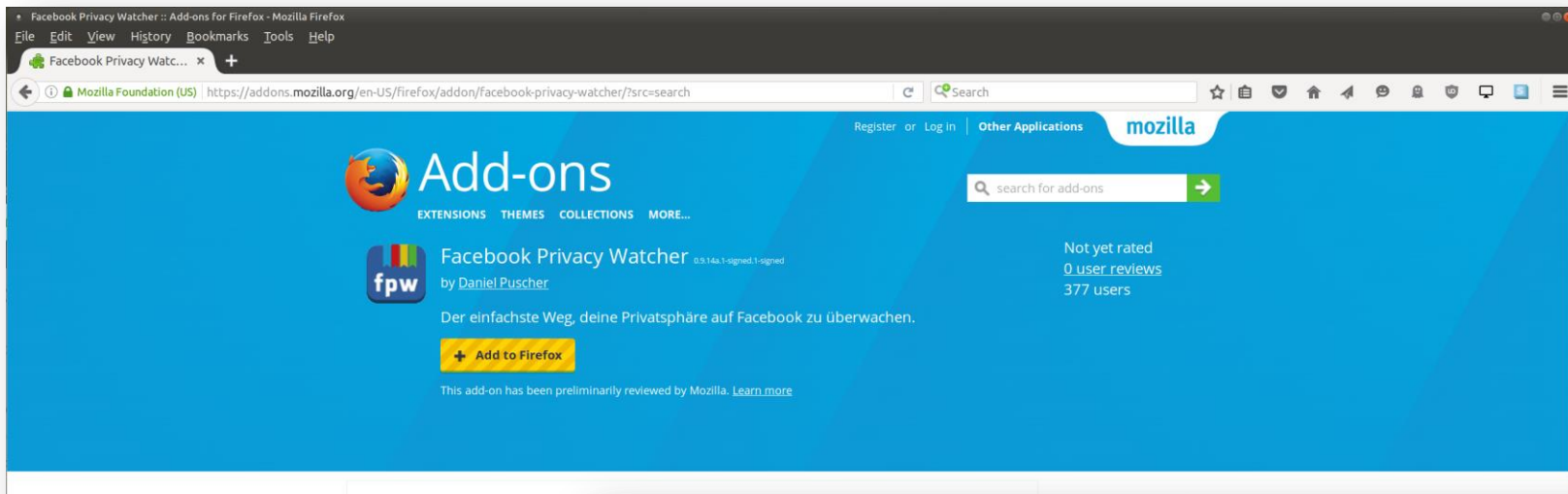
Some issues with the choice of colors

Profile preview not found

Notion of "Selected Friends" somehow difficult to grasp

AttrakDiff™:





Facebook Privacy Watcher :: Add-ons For Firefox - Mozilla Firefox
 File Edit View History Bookmarks Tools Help
 Mozilla Foundation (US) | https://addons.mozilla.org/en-US/firefox/addon/facebook-privacy-watcher/?src=search
 Register or Log In | Other Applications | mozilla
 Add-ons
 EXTENSIONS THEMES COLLECTIONS MORE...
 Search for add-ons
Facebook Privacy Watcher 0.5.14a.1-signed.1-signed
 by Daniel Puscher
 Not yet rated
 0 user reviews
 377 users
 Der einfachste Weg, deine Privatsphäre auf Facebook zu überwachen.
 + Add to Firefox
 This add-on has been preliminarily reviewed by Mozilla. [Learn more](#)

About this Add-on

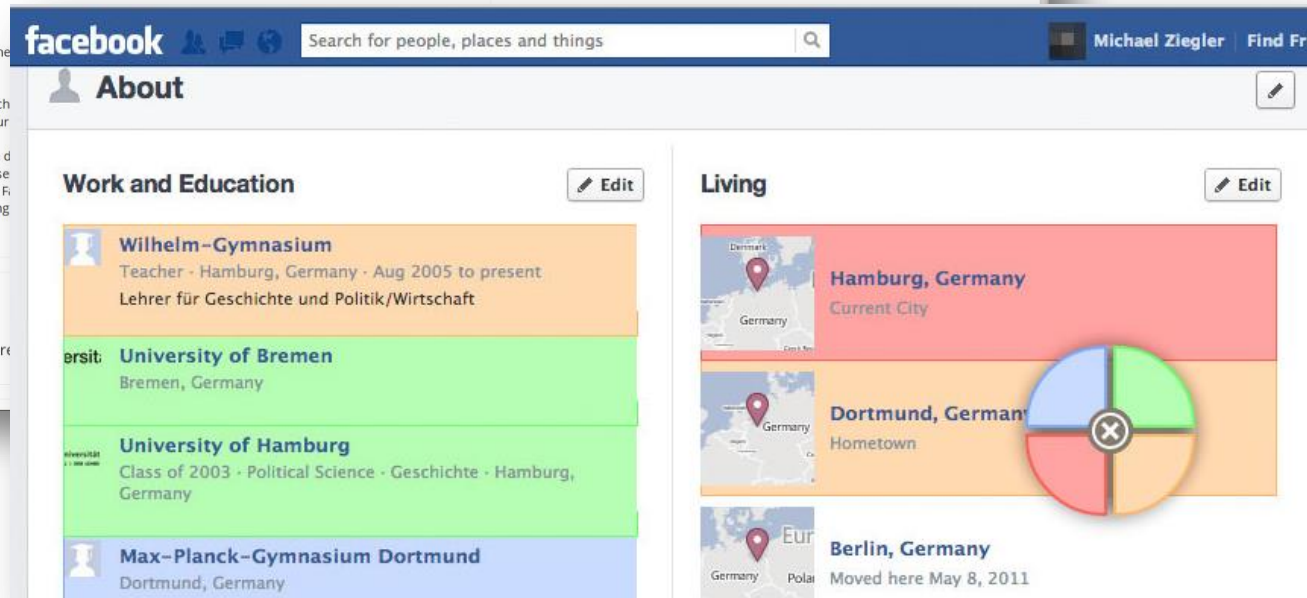
Facebook Privacy Watcher bietet eine einfache Möglichkeit, die Privatsphäre auf Facebook zu verwalten.

Die Idee von Facebook Privacy Watcher ist es, die Privatsphäre auf Facebook zu verwalten. So dauert es nur wenige Minuten, um die Privatsphäre einzufärben. So dauert es nur wenige Minuten, um die Privatsphäre einzufärben.

Genau so einfach wie das Erkennen der Privatsphäre auf Facebook, hast du ein Element gefunden, dessen Farbe auf dem du einfach nur die Farbe ändern. Augenblicke später ist die Einstellung geändert.

Reviews

This add-on has not yet been reviewed.

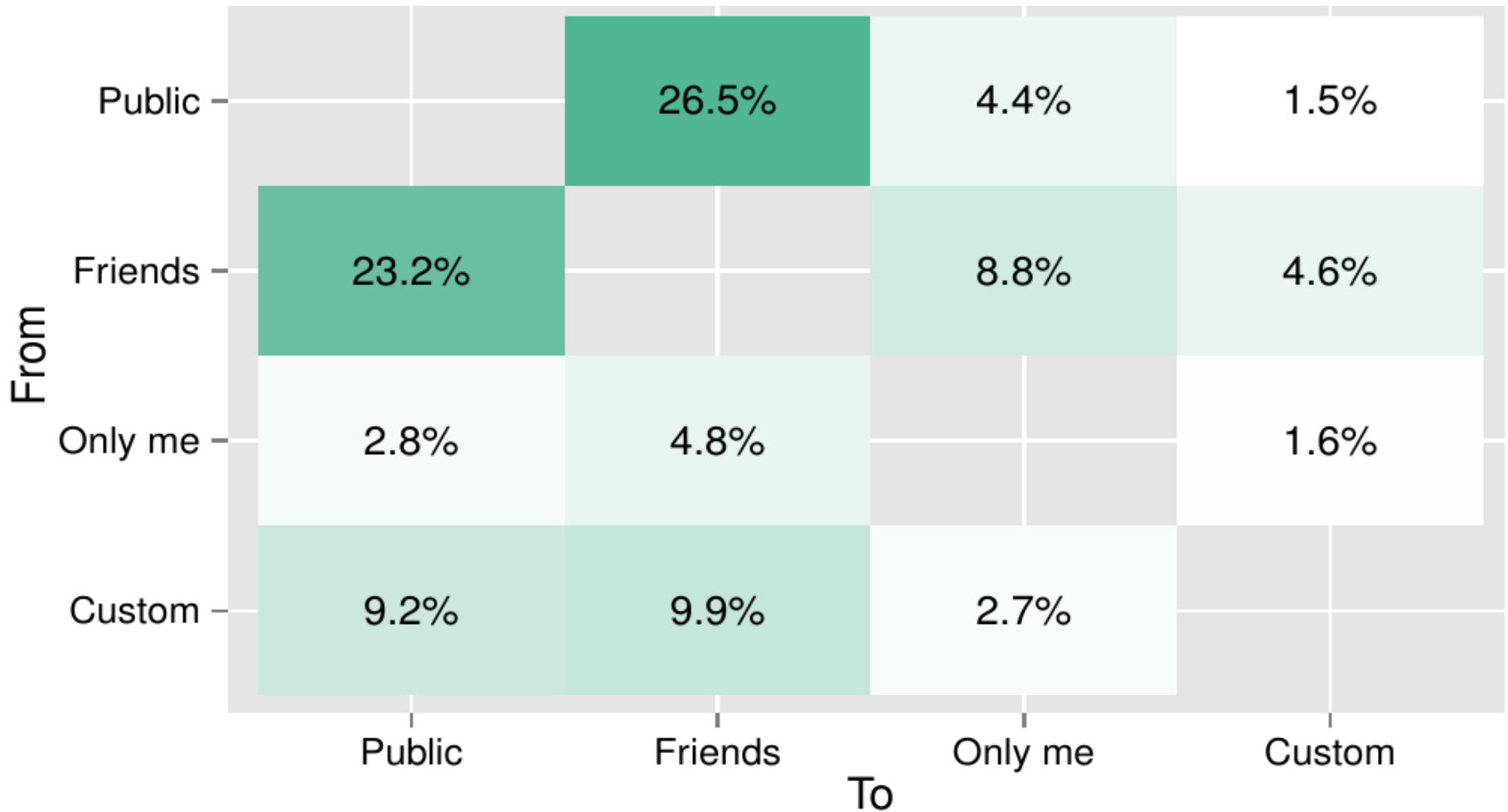


facebook Search for people, places and things Michael Ziegler Find Friends
About
Work and Education Edit
 Wilhelm-Gymnasium
 Teacher · Hamburg, Germany · Aug 2005 to present
 Lehrer für Geschichte und Politik/Wirtschaft
 University of Bremen
 Bremen, Germany
 University of Hamburg
 Class of 2003 · Political Science · Geschichte · Hamburg, Germany
 Max-Planck-Gymnasium Dortmund
 Dortmund, Germany
Living Edit
 Hamburg, Germany
 Current City
 Dortmund, Germany
 Hometown
 Berlin, Germany
 Moved here May 8, 2011

- Browser extension (plug-in) for Firefox and Chrome
- More than 44,800 downloads from 102 countries
- Based on data, embedded in feedback requests (***informed consent!***)
- Collected data:
 - User Demographics
 - Completeness of profile fields
 - Friend lists (hashed)
 - Visibility of profile fields
 - Privacy changes that have been made with the FPW
 - Number of plug-in activations

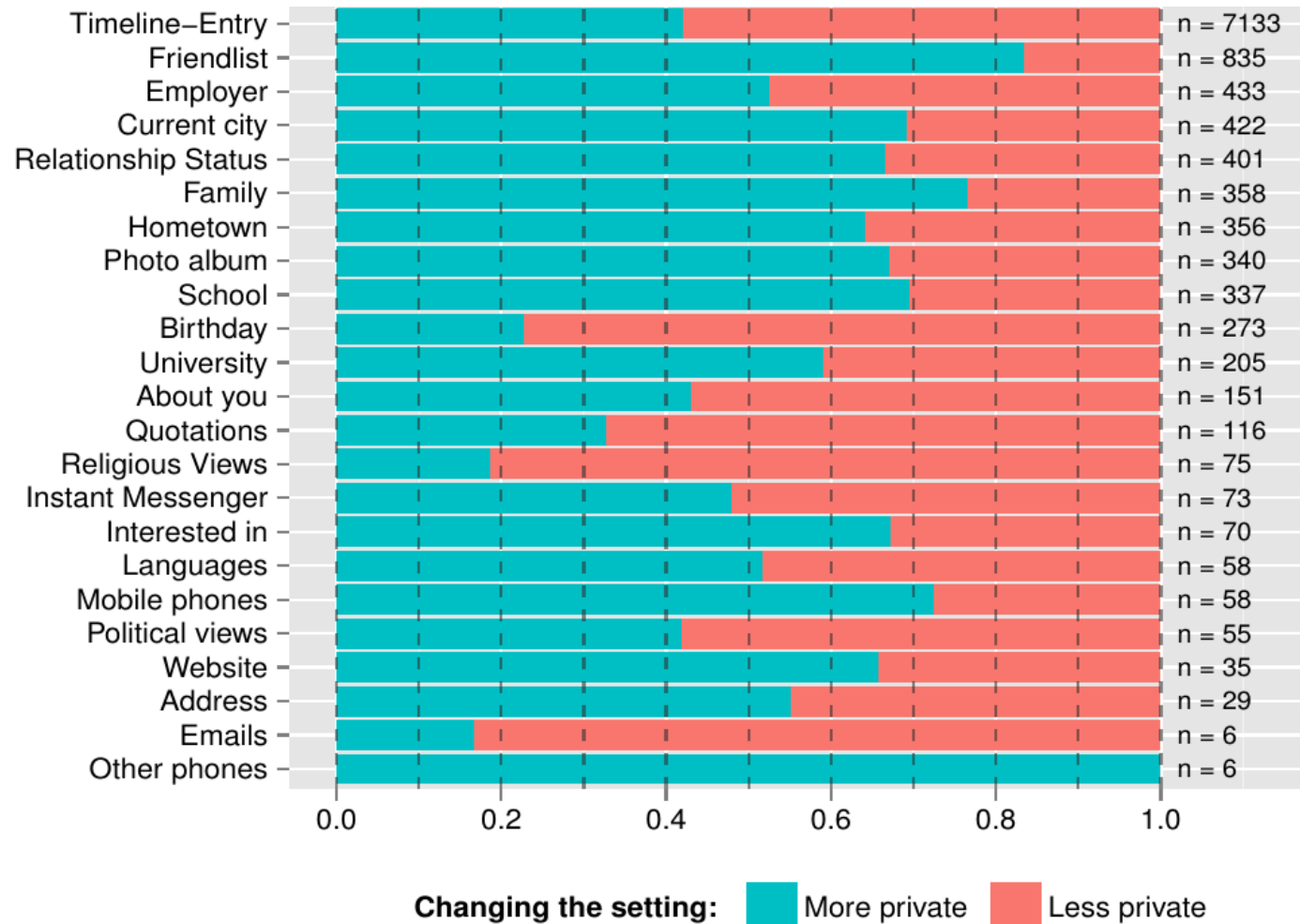
Country	# Feedback responses
Germany	7,581
Egypt	272
Austria	218
United States	150
Switzerland	147
France	94
Spain	72
Netherlands	62

Facebook Privacy Watcher Alteration Matrix

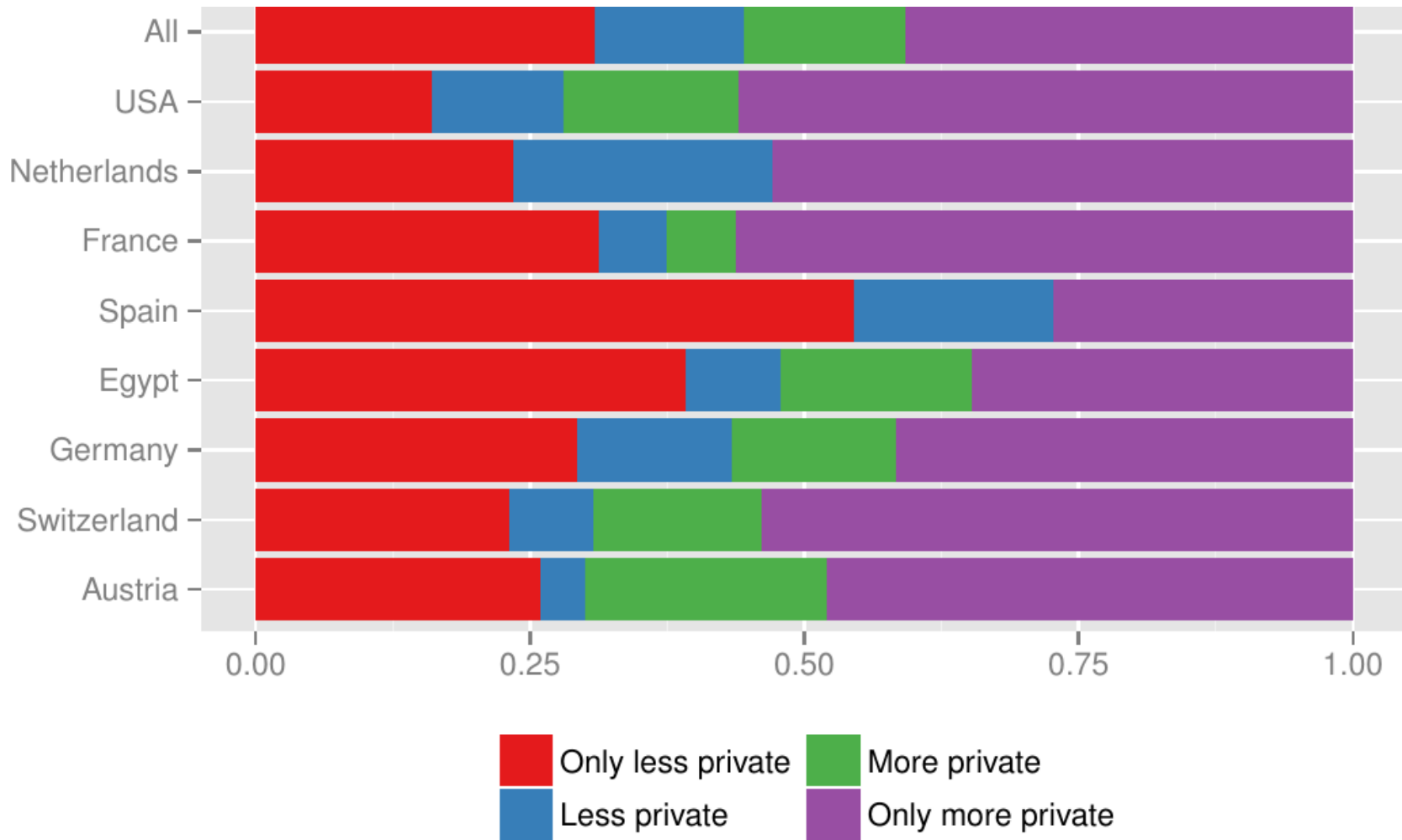


Facebook Privacy Watcher

Re-Authorizing Specific Attributes



Facebook Privacy Watcher Change Direction Clusters



- Sampling was not unbiased. But:
 - Not everybody wants **more** privacy
 - Users distinguish between types of attributes
- Facebook is an international system. But:
 - Extreme cultural differences in authorizations
- By far not satisfying data
 - We need more, to understand better.

Statistiken **Zeiten** Newsfeed Aktionen Seiten Vergleich Weitersagen Teilen Zeitspanne

Aktivitäten der letzten 30 Tage:

Aktivitäts-Zeiten

Wann und wie lange bist du auf Facebook aktiv?

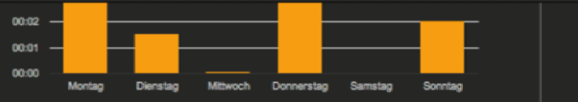
Aktive Zeit auf Facebook: **00:24**

Aktivitäts-Übersicht nach Tag:

01.12.2013	
02.12.2013	
03.12.2013	
04.12.2013	
05.12.2013	
07.12.2013	
12.12.2013	
17.12.2013	
18.12.2013	
19.12.2013	

Statistiken **Zeiten** Newsfeed Aktionen Seiten Vergleich Weitersagen Teilen Zeitspanne

Donnerstag	00:04:47
Samstag	00:00:00
Sonntag	00:02:03



Uhrzeiten der Aktivitäten:

01.12.2013	
02.12.2013	
03.12.2013	
04.12.2013	
05.12.2013	
07.12.2013	
12.12.2013	

Statistiken Zeiten Newsfeed **Aktionen** Seiten Vergleich Weitersagen Teilen Zeitspanne

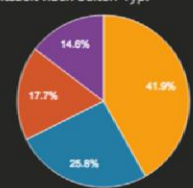
Seiten

Auf welchen Seiten hältst du dich auf?

Aufenthaltszeit nach Seiten-Typ:

Foto	00:03:24
Newsfeed	00:02:06
Eigenes Profil	00:01:26
Fremdes Profil	00:01:11

Aufenthaltszeit nach Seiten-Typ:



Vergleich
Vergleiche deine Facebook-Nutzung mit deinen Freunden.

Browser extension for Firefox and Chrome
Endowed with user's access rights

Observation on users' own devices and own user profiles

Observation period:

- 123 days; started on 1st of January 2014
- Flexible start and end → average observation period: 34 days

Participants: 2071 (with informed consent!)

Collected data:

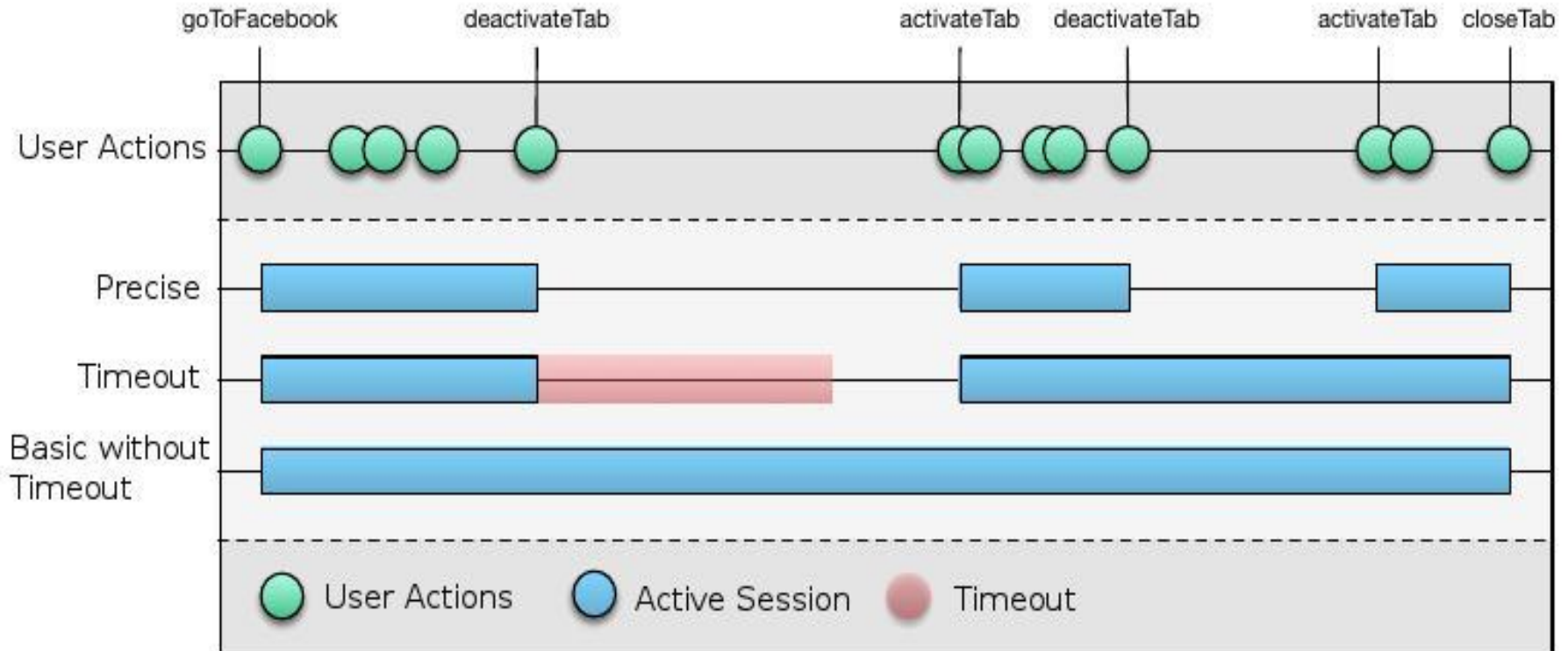
- User Demographics
- Performed actions
- Friend lists (hashed)
- Activity logs

Temporal properties:

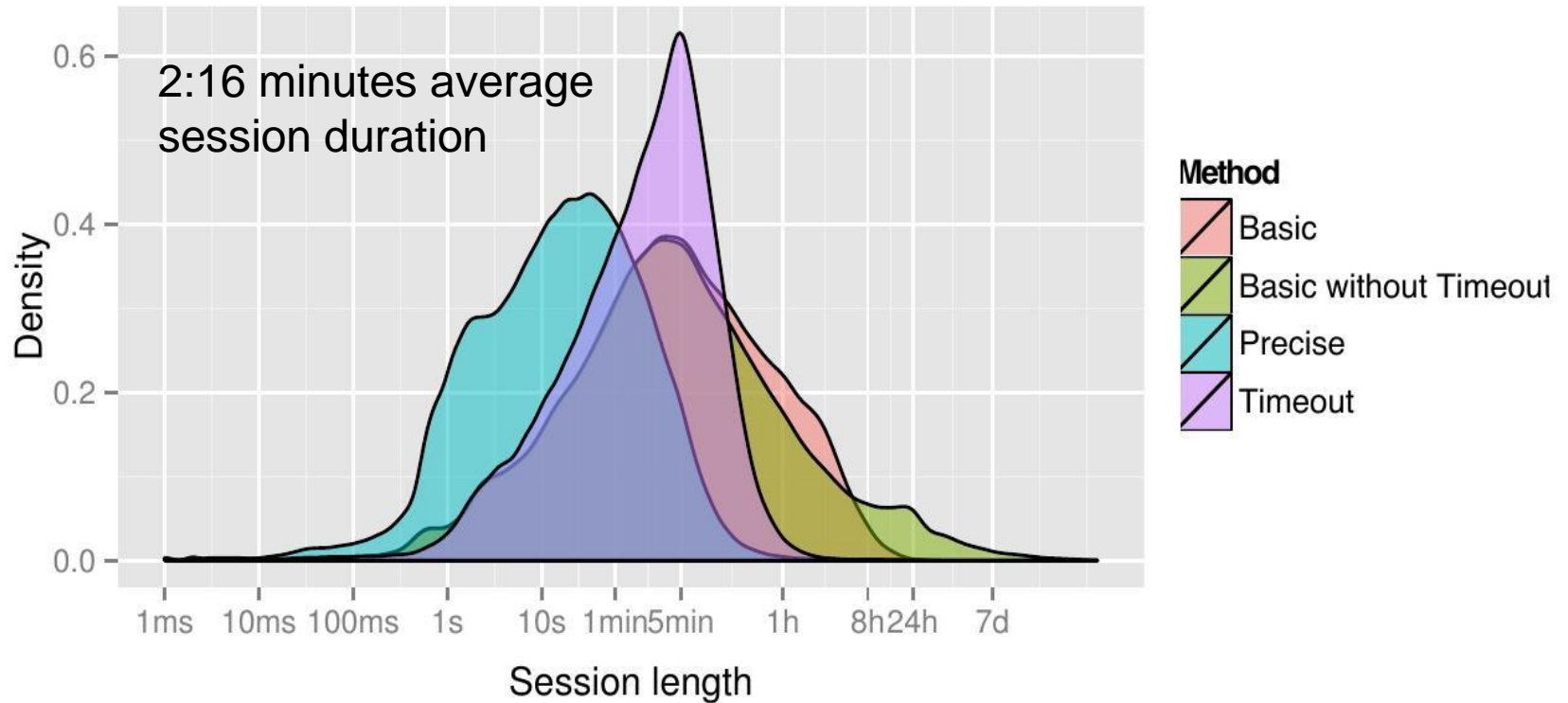
- When are users active
- What are the churn models

Interaction with content:

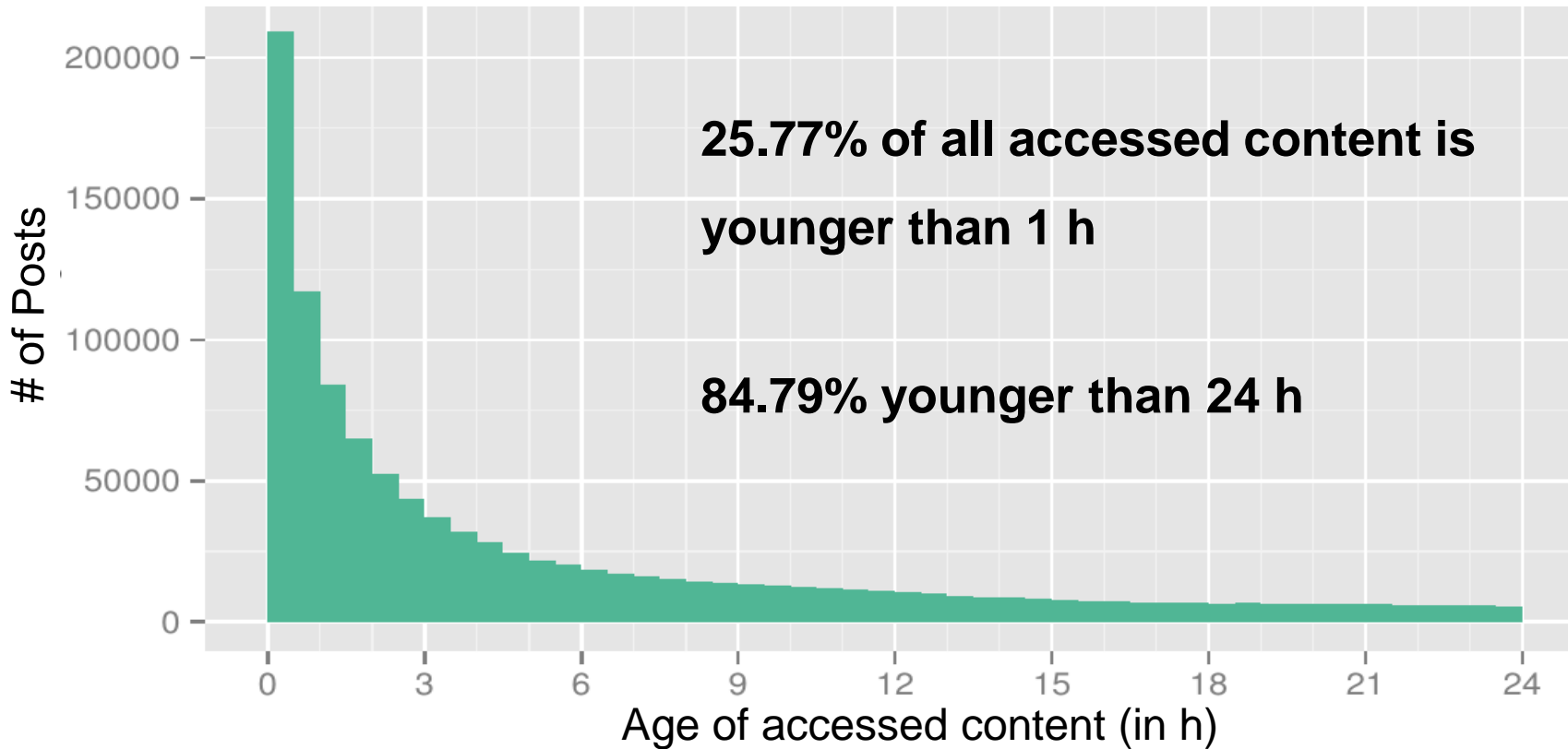
- What are the properties of content users interact with? (Where do they stay?)



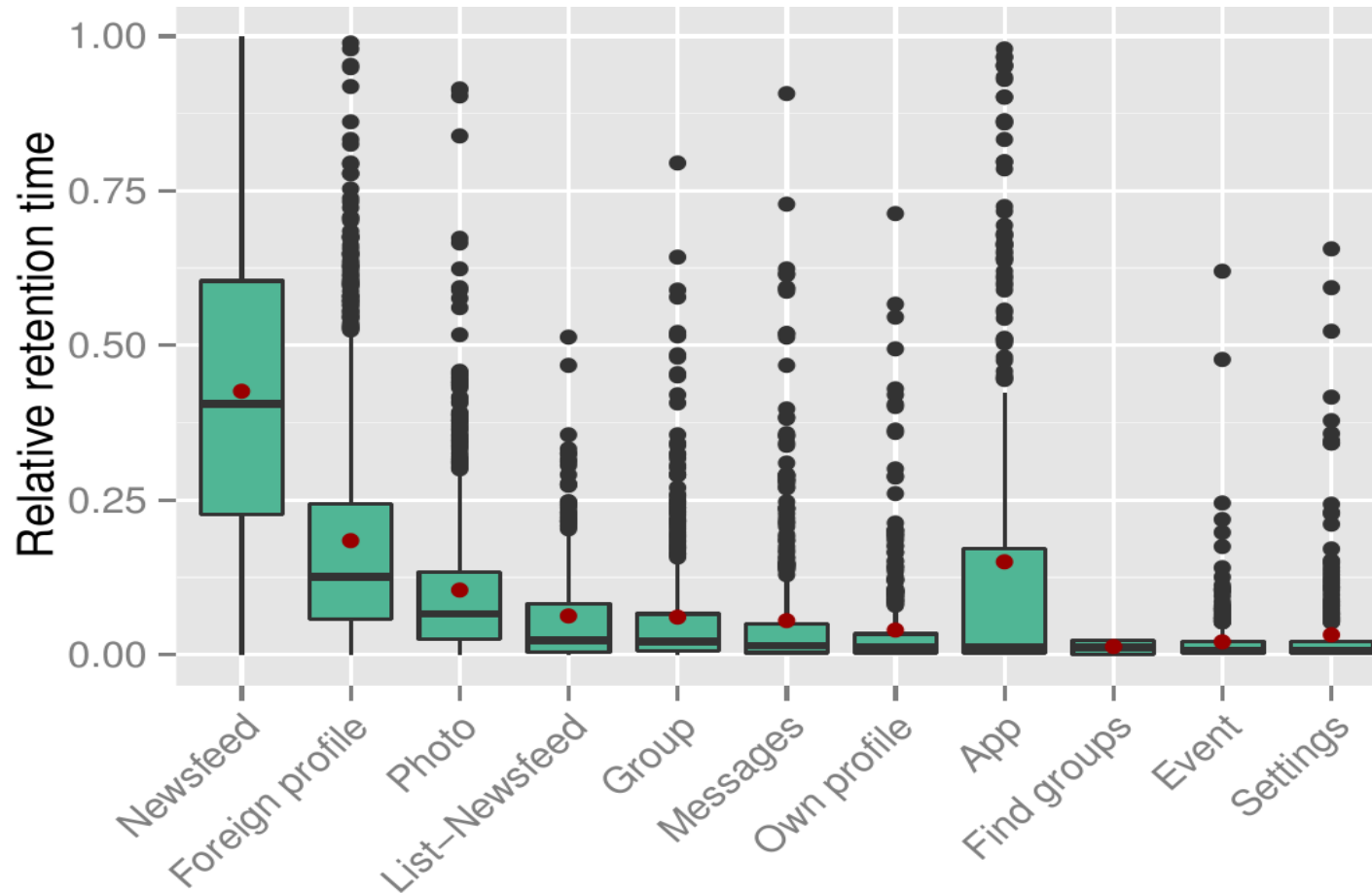
Precise measurement reflects user attention better



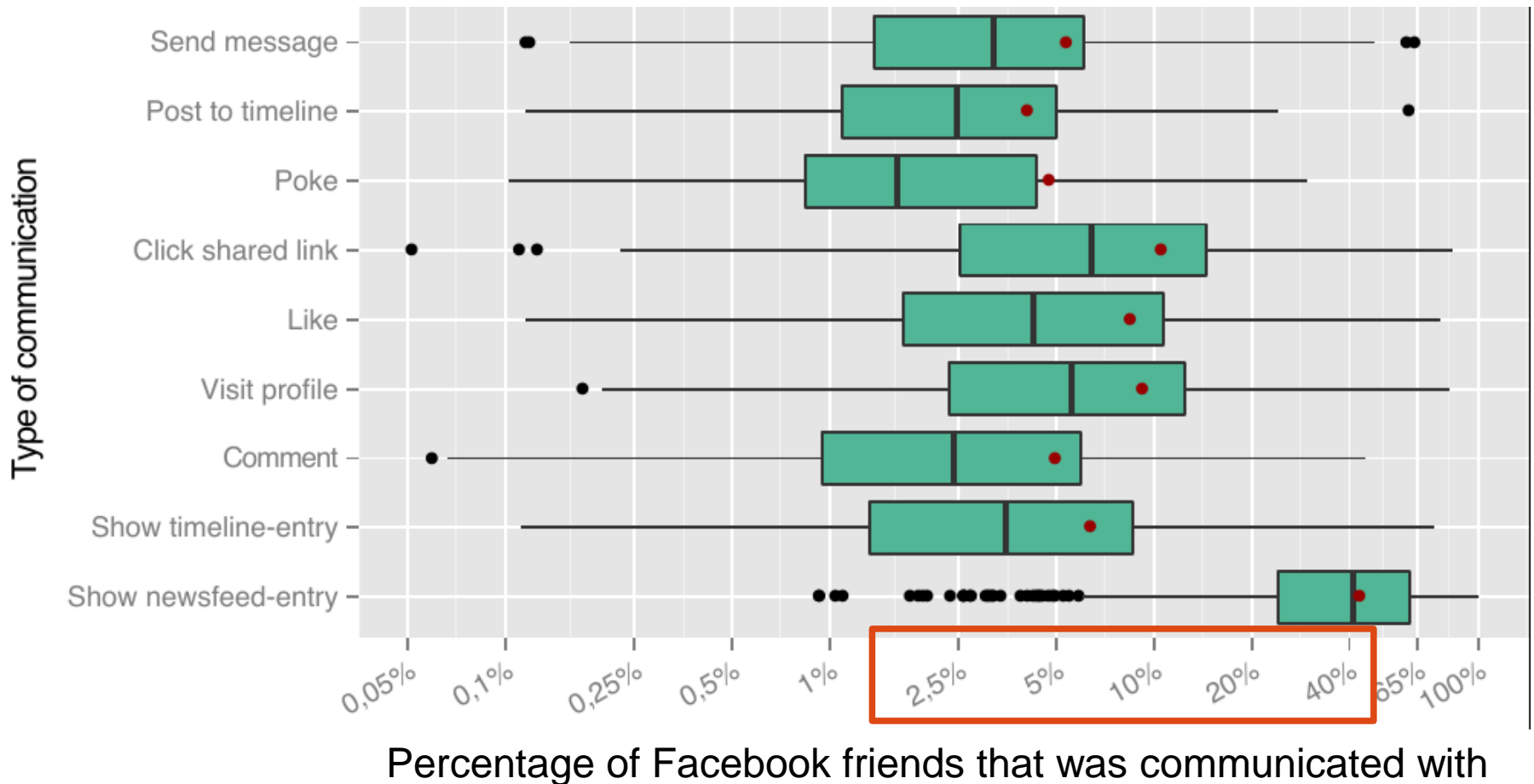
Facebook sessions are much shorter than assumed in the literature!



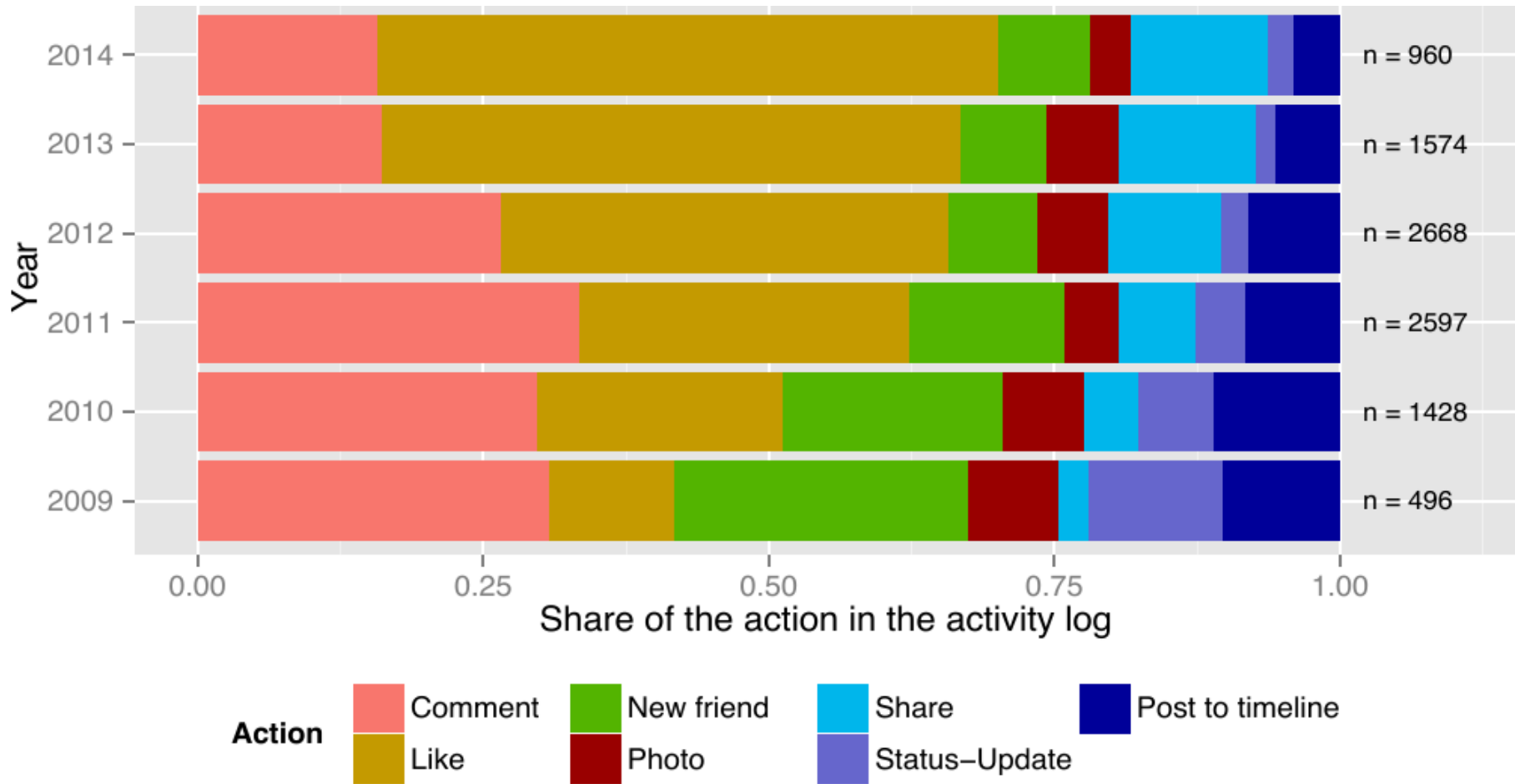
Accessed content is very fresh



Users communicate only with a minor subset of their friends



Stale user models become obsolete



Dozens of additional analyses...

General findings:

- Facebook is a mature OSN
- Users find less new friends
- Fraction of low effort actions (likes, shares) rises; the fraction of high effort actions decreases (e.g. comments, status updates)

And...

- By far not satisfying data
 - We need more, to understand better.

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Roos, Stefanie, et al. "Anonymous Addresses for Efficient and Resilient Routing in F2F Overlays." In IEEE INFOCOM, 2016

Roos, Stefanie and Strufe, Thorsten. "On the impossibility of efficient self-stabilization in virtual overlays with churn." In IEEE INFOCOM, 2015

Schulz, Stephan, and Thorsten Strufe. "d² Deleting Diaspora: Practical attacks for profile discovery and deletion." 2013 IEEE International Conference on Communications (ICC). IEEE, 2013.

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