

Usable Privacy Technologies

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My son Tolga (who wants to be a farmer when he grows up)

Privacy

How can we **help users**
to **balance** the **benefits** and **risks** of information
disclosure
in a **user-friendly** manner,
so that they can make **good** privacy **decisions**?

Outline

Show that existing solutions to make privacy technologies more usable do not work

Argue that we must either design for elaboration...

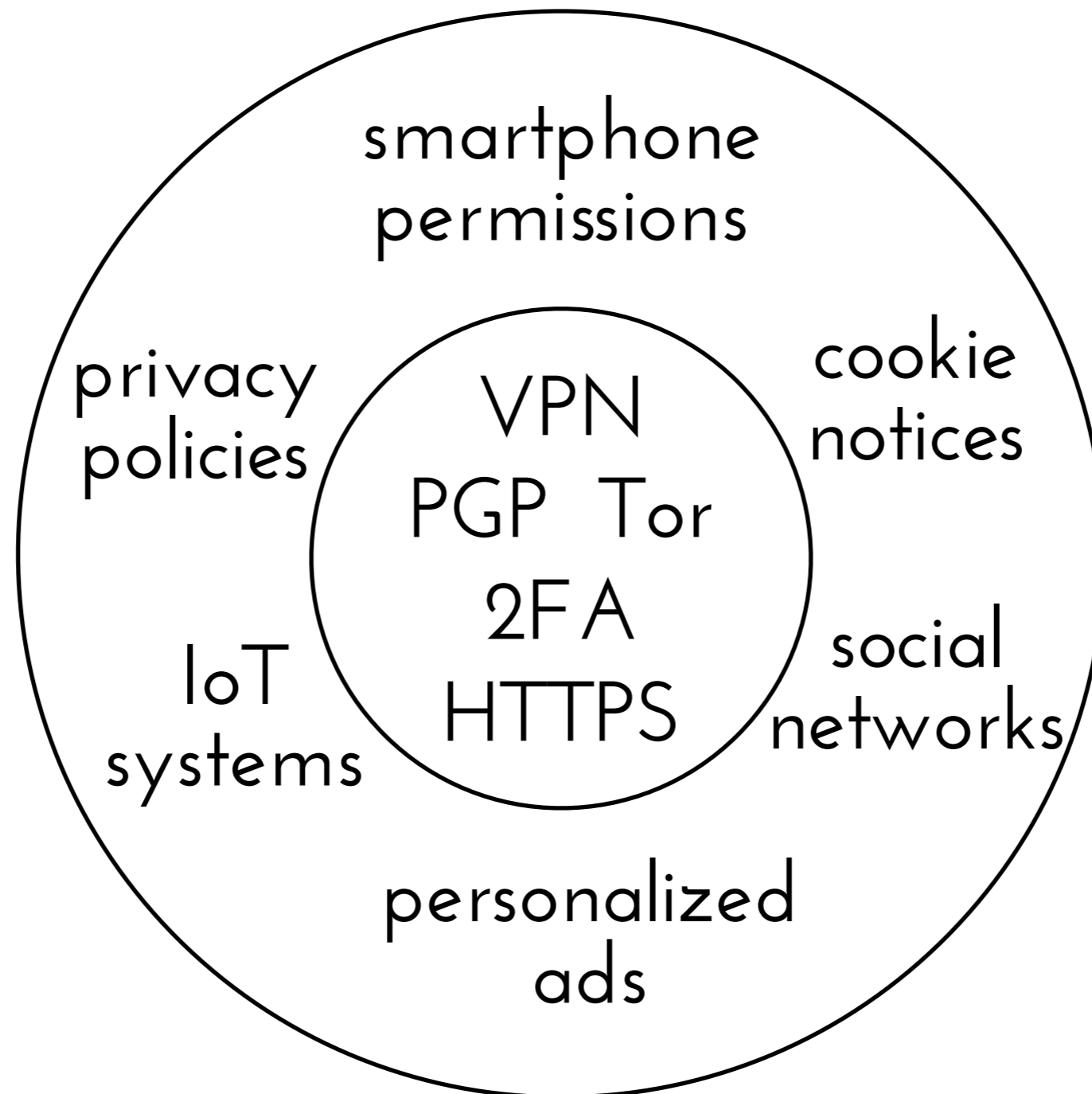
...and/or design personalized privacy decision support



Usable Privacy Technologies

A tale of **transparency** and **control**

What are privacy technologies?



Seasons (2022) "Privacy-Enhancing Technologies"

Making privacy

Early work: Why are privacy technologies not usable?

Whitten & Tygar (1996) "Why Johnny Can't Encrypt – A Usability Evaluation of PGP 5.0"

A slew of "Johnny papers" followed

[Why Johnny Can't Encrypt: A Usability Evaluation of PGP 5.0.](#)

[Search within citing articles](#)

[Teaching Johnny not to fall for phish](#)

[P.Kumaraguru, S. Sheng, A. Acquisti, L.F. Cranor...](#) - ACM Transactions on ..., 2010 - dl.acm.org

Phishing attacks, in which criminals lure Internet users to Web sites that spoof legitimate Web sites, are occurring with increasing frequency and are causing considerable harm to victims...

[☆ Save](#) [📄 Cite](#) Cited by 468 [Related articles](#) [All 19 versions](#)

[Why Johnny still, still can't encrypt: Evaluating the usability of a modern PGP client](#)

[S. Rucil, J. Anderson, D. Zappala, K. Seamans](#) - arXiv preprint arXiv ..., 2016 - arxiv.org

... Our results show that more than a decade and a half after *Why Johnny Can't Encrypt*, ...] our results show that *Johnny* has still not gotten any closer to encrypt his email using PGP. ...

[☆ Save](#) [📄 Cite](#) Cited by 108 [Related articles](#) [All 7 versions](#) [📄](#)

[Helping Johnny 2.0 to encrypt his Facebook conversations](#)

[S. Fahl, M. Harbach, T. Maders, M. Smith...](#) - Proceedings of the eighth ..., 2012 - dl.acm.org

... and Miller's *Johnny 2* study [10] and the re-evaluation of the original *Johnny* study using PGP9 ... [20] conducted a follow-up pilot study to Whitten and Tygar's *Johnny* study with six novice ...

[☆ Save](#) [📄 Cite](#) Cited by 84 [Related articles](#) [All 11 versions](#)

[paper Why johnny still can't encrypt: evaluating the usability of email encryption software](#)

[S. Sheng, L. Broderick, CA Korenda...](#) - Symposium on usable ..., 2008 - cups.cs.cmu.edu

Our research seeks to understand the current usability situation of email encryption software, particularly PGP 9 in comparison to previous studies of PGP 5. We designed a pilot study to ...

[☆ Save](#) [📄 Cite](#) Cited by 228 [Related articles](#) [All 6 versions](#) [📄](#)

[Johnny 2: a user test of key continuity management with S/MIME and Outlook Express](#)

[S.L. Garfinkel, R.C. Miller](#) - Proceedings of the 2005 symposium on Usable ..., 2005 - dl.acm.org

... paper, *Johnny 2*, is based on a radical reinterpretation of Whitten and Tygar's *Johnny* results: ... Our original goal was to replicate the *Johnny* experiment as closely as possible using the ...

[☆ Save](#) [📄 Cite](#) Cited by 266 [Related articles](#) [All 14 versions](#)

[Confused Johnny: when automatic encryption leads to confusion and mistakes](#)

[S. Rucil, N. Kim, B. Burgon, T. Van Der Horst...](#) - Proceedings of the ..., 2013 - dl.acm.org

A common approach to designing usable security is to hide as many security details as possible from the user to reduce the amount of information and actions a user must encounter. ...

[☆ Save](#) [📄 Cite](#) Cited by 135 [Related articles](#) [All 8 versions](#)

[Leading Johnny to water: Designing for usability and trust](#)

[E. Atanasiu, C. Bocovich, U. Hengartner, E. Lank...](#) - Proceedings of the ..., 2015 - dl.acm.org

Although the means and the motivation for securing private messages and emails with strong end-to-end encryption exist, we have yet to see the widespread adoption of existing ...

[☆ Save](#) [📄 Cite](#) Cited by 61 [Related articles](#)

[Why Won't Johnny Encrypt?](#)

[H. Orman](#) - IEEE Internet Computing, 2015 - ieeexplore.ieee.org

Very little Internet communication is truly private, even if it is encrypted. The original concept for email privacy dates back a few decades and was meant to provide end-to-end privacy. ...

[☆ Save](#) [📄 Cite](#) Cited by 10 [Related articles](#) [All 6 versions](#)

[Can Johnny finally encrypt? Evaluating E2E-encryption in popular IM applications](#)

[A. Herzberg, H. Leibowitz](#) - Proceedings of the 6th Workshop on Socio ..., 2016 - dl.acm.org

... The goal of usable encryption is to give every standard user (aka "Johnny") the ability to securely ... the seminal paper "Why Johnny Can't Encrypt" [28], showing that PGP encryption is not ...

[☆ Save](#) [📄 Cite](#) Cited by 62 [Related articles](#) [All 2 versions](#)

[Why Johnny doesn't use two factor a two-phase usability study of the FIDO U2F security key](#)

[S. Das, A. Dingman, L.J. Camp](#) - ... Nieuwpoort, Curaçao, February 26–March 2 ..., 2018 - Springer

Why do individuals choose to use (or not use) Two Factor Authentication (2FA)? We sought to answer this by implementing a two-phase study of the Yubico Security Key. We analyzed ...

[☆ Save](#) [📄 Cite](#) Cited by 112 [Related articles](#) [All 6 versions](#)

Making privacy usable?

Nowadays: several conferences / tracks that cover usable privacy

Symposium On Usable Privacy and Security (SOUPS)

Privacy Enhancing Technologies Symposium (PETS)

Privacy track at the ACM conference on Human Factors in Computing Systems (CHI) and the ACM conference on Computer-Supported Collaborative Work and Social Computing (CSCW)

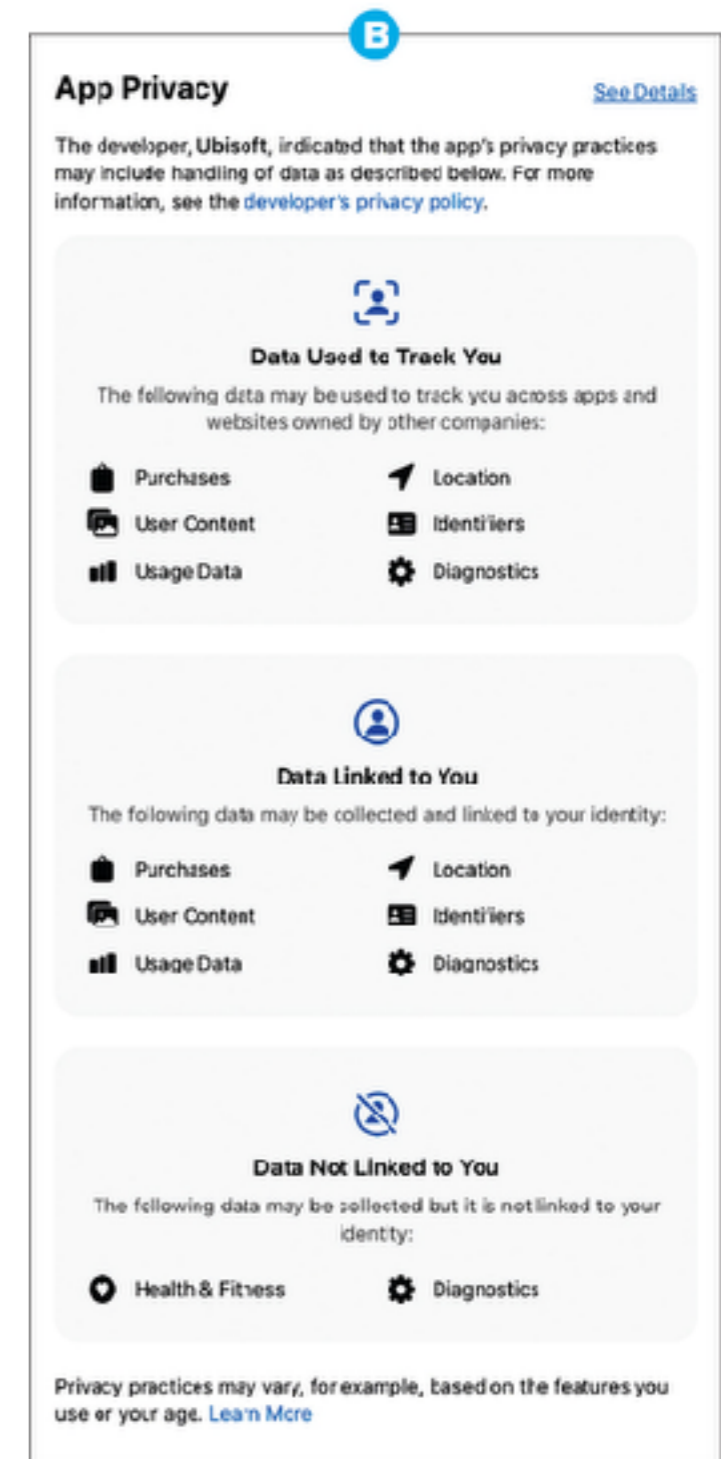
Ex 1: privacy nutrition labels

Early academic work:

Kelly et al. (2009) "A "Nutrition Label" for Privacy"

Implementation in iOS and Android in 2020 rather disappointing:

Cranor (2022) "Mobile-App Privacy Nutrition Labels Missing Key Ingredients for Success"



Ex. 2: privacy policy comics



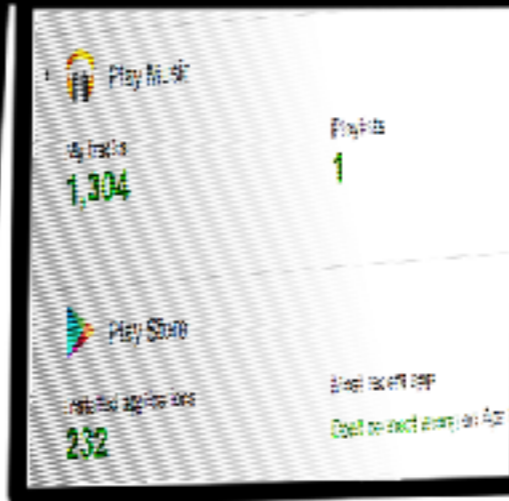
OR UNLINK AN OLD APP... A VERY OLD APP...



OH NO... TH... THIS CAN'T BE REAL...

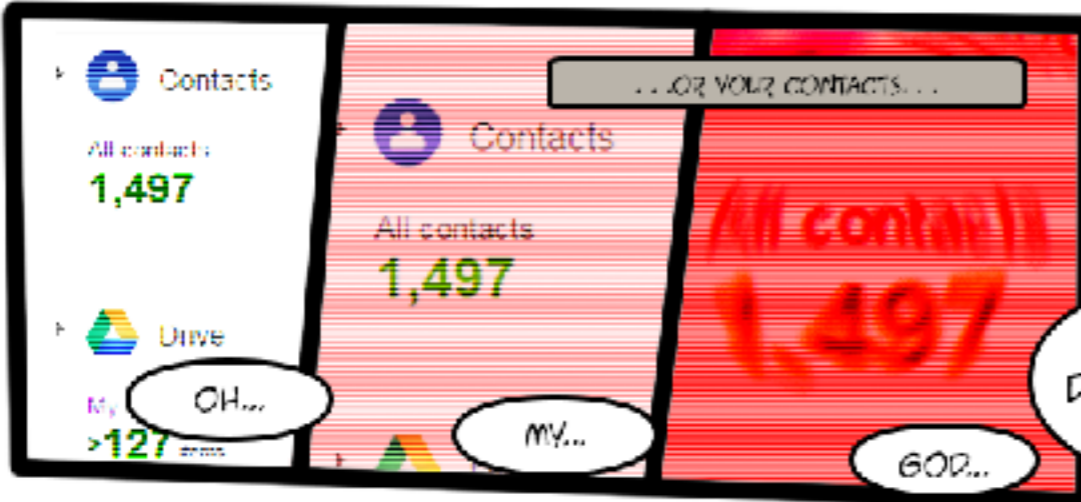
THAT THE WORLD HAS FORGOTTEN...

NO ONE USES MYSPACE ANYMORE!!!!



ON THE GOOGLE DASHBOARD PAGE, YOU CAN VIEW AND CHANGE MULTIPLE SETTINGS OF DEVICES AND APPS TIED TO YOUR ACCOUNT.

YOU CAN ALSO SEE OTHER SYNCHRONIZED INFORMATION! SUCH AS YOUR GOOGLE CHROME BROWSER BOOKMARKS...



...OR YOUR CONTACTS...

OH...

MY...

GOD...

1,000+ CONTACTS?! I DON'T EVEN KNOW HALF OF THESE PEOPLE!

NEITHER DO I.



IT ALSO SHOWS THE NUMBER OF CONVERSATIONS YOU'VE HAD THROUGH GMAIL.

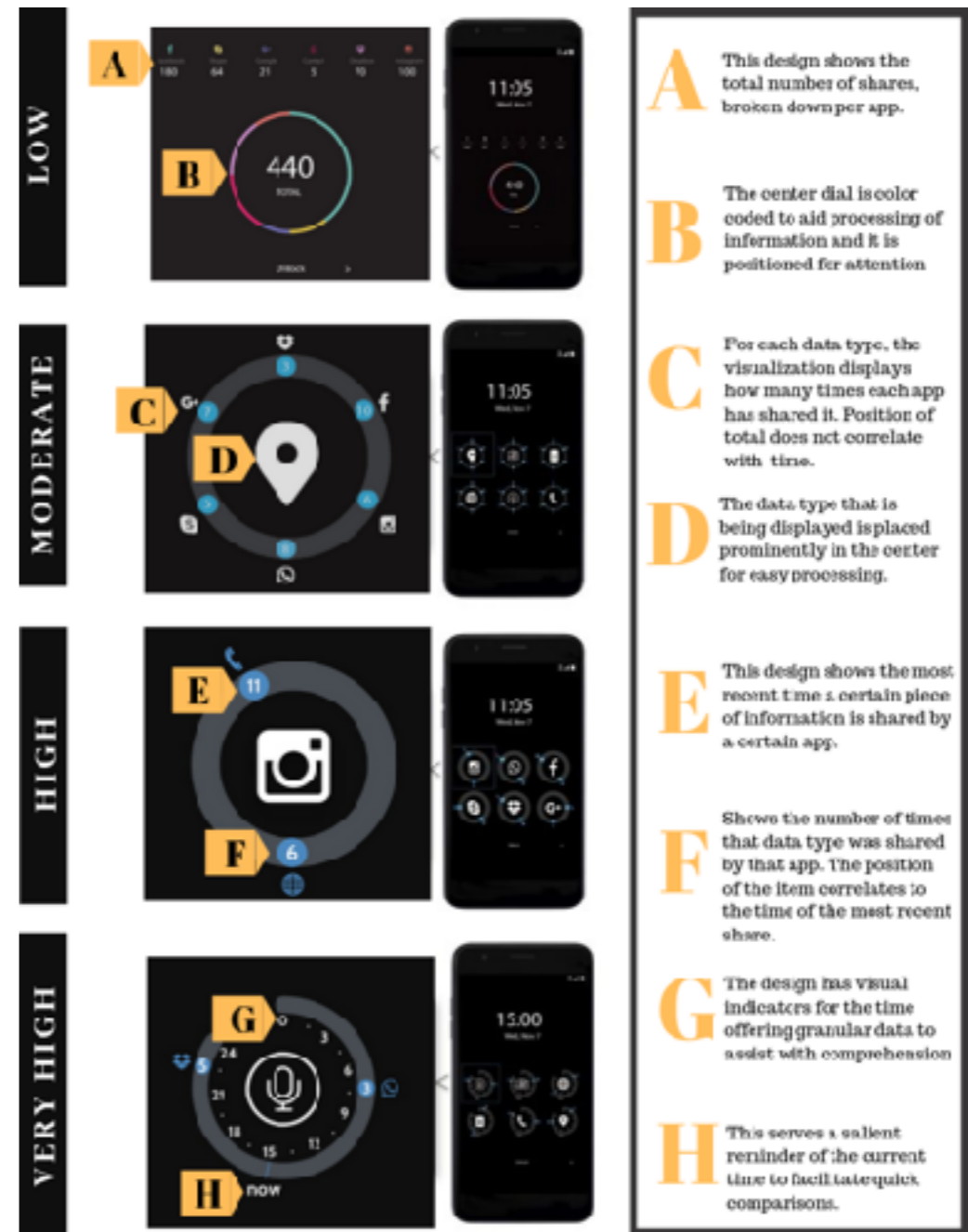
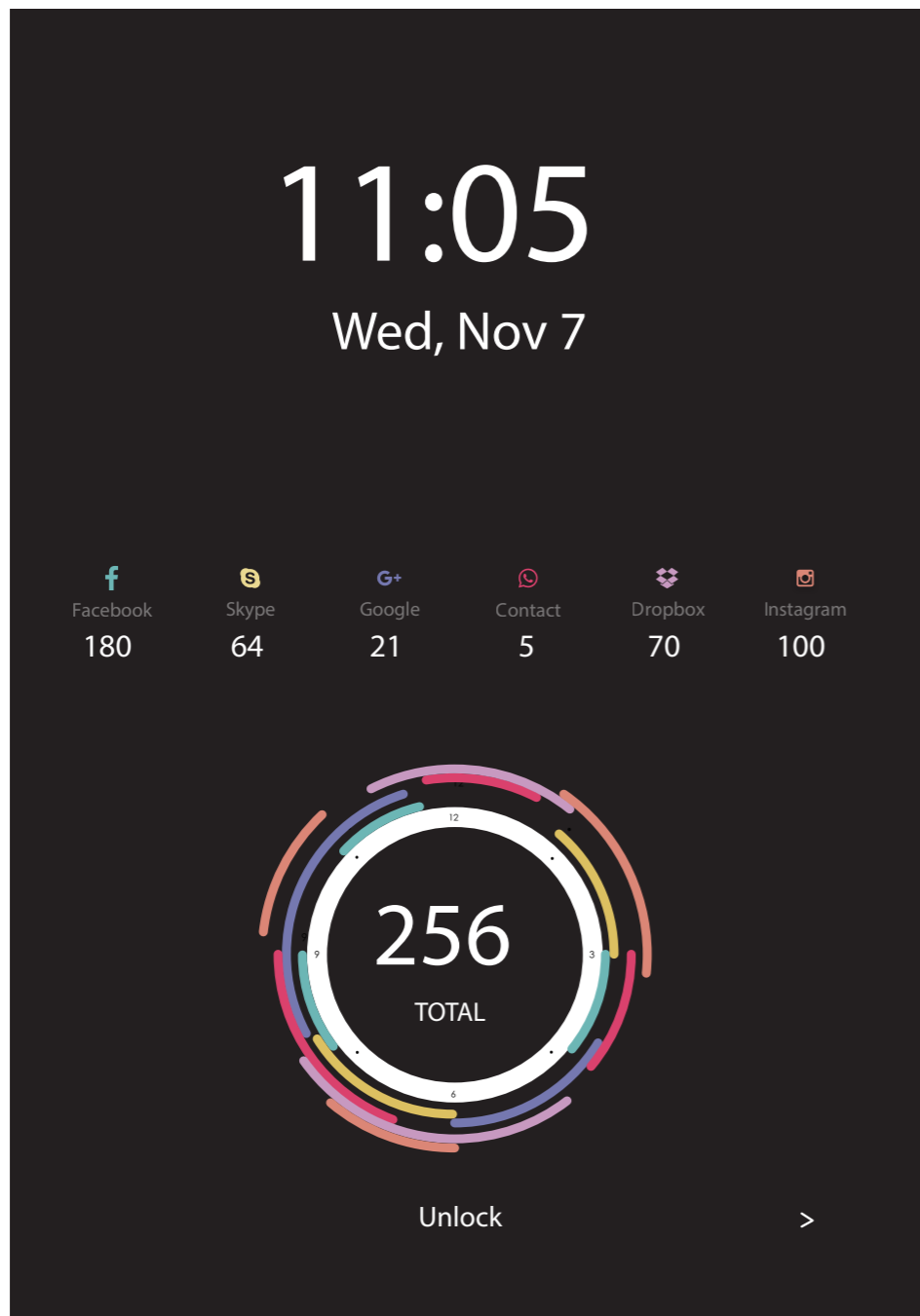
WELL, I DID HAVE GMAIL FOR A WHILE NOW...

ON THE DASHBOARD, YOU CAN MANAGE THESE THINGS (AND MORE), CHANGE THEIR SETTINGS OR REMOVE THEM FROM YOUR ACCOUNT!!

LET'S GET RID OF ALL OF THE APPS I DON'T USE ANYMORE.



Privacy screensavers



Wilkinson et al. (2020) "Privacy at a Glance"

Ex 4: social circles

Most social networks allow you to define “circles” and share selectively

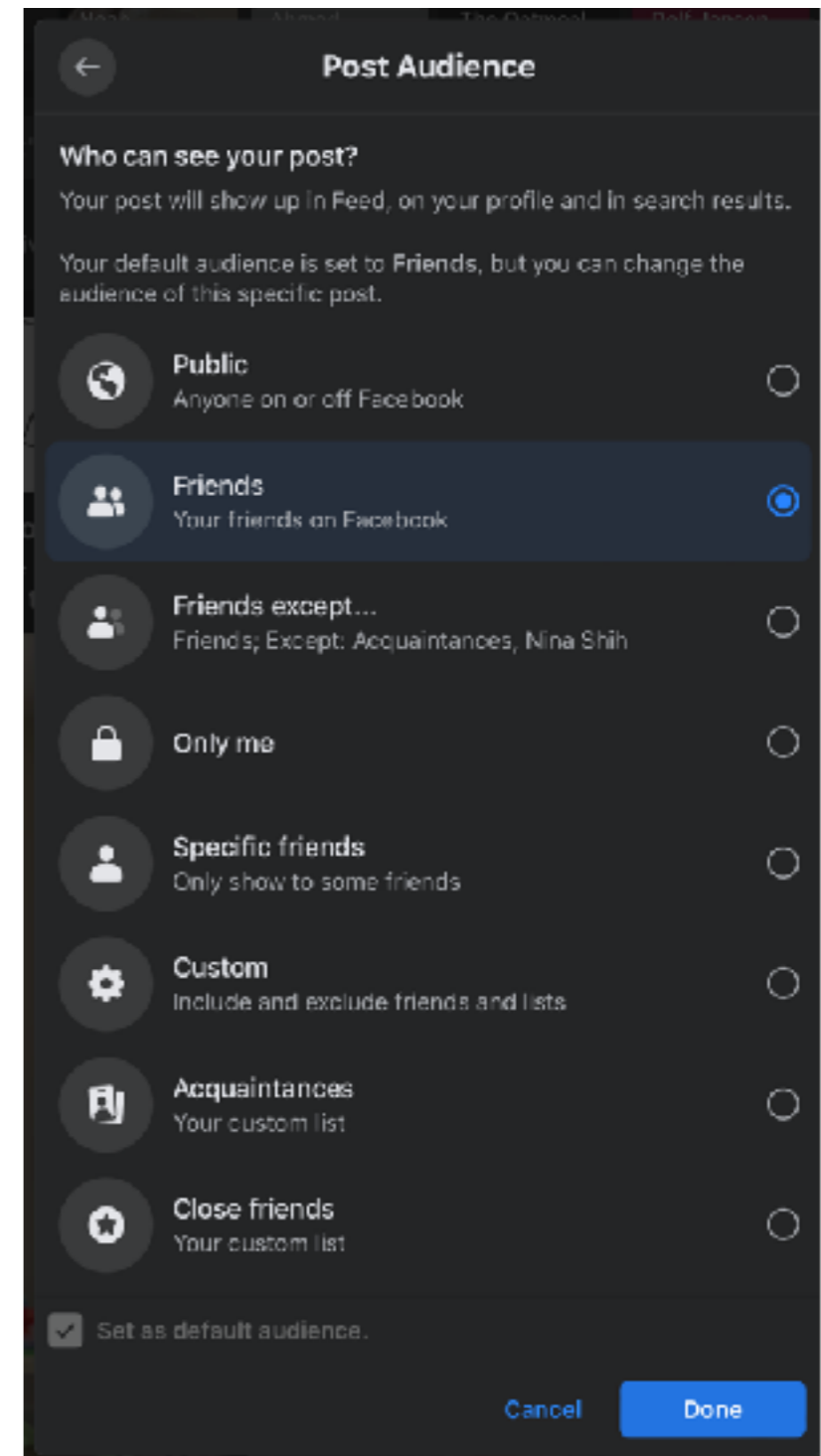
Most people don't do this

Strater & Lipford (2008) “Strategies and struggles with privacy in an online social networking community”

Watson et al. (2012) “+Your circles: sharing behavior on Google+”

Doesn't reduce threat of oversharing

Knijnenburg & Kobsa (2014) “Increasing Sharing Tendency Without Reducing Satisfaction”



From the U.S. Privacy directive

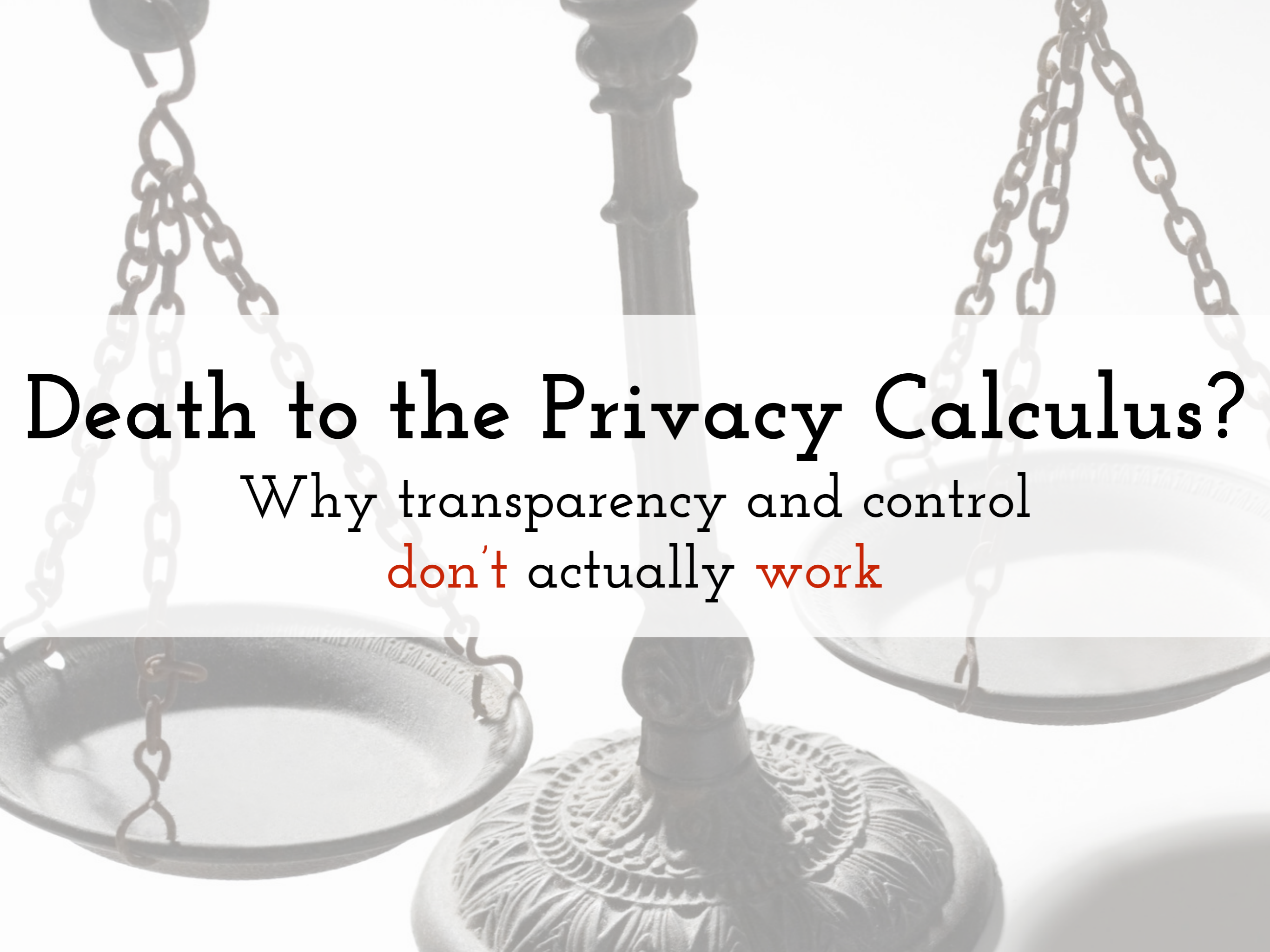
Transparency (consent)

“companies should provide clear descriptions of [...] why they need the data, how they will use it”

Control (empowerment)

“companies should offer consumers clear and simple choices [...] about personal data collection, use, and disclosure”





Death to the Privacy Calculus?

Why transparency and control
don't actually **work**

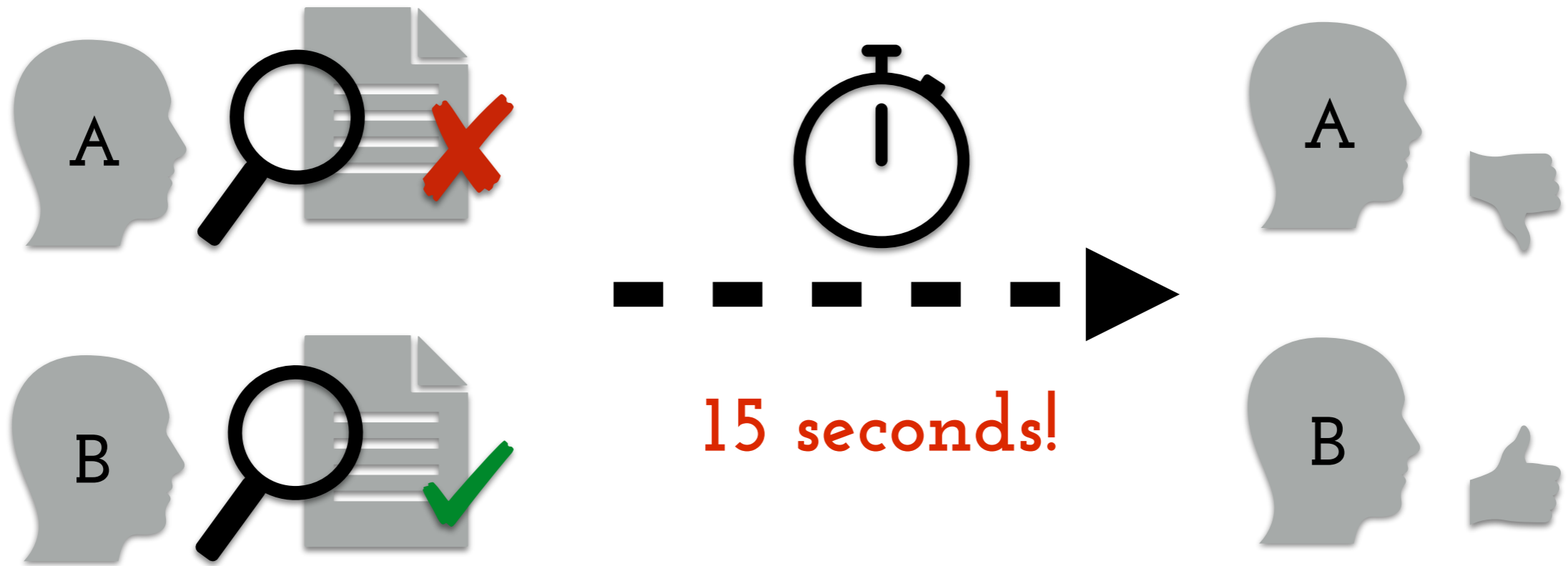
Transparency and control

Privacy Calculus: People weigh the risks and benefits of disclosure

Prerequisites of privacy calculus are:

- being able to **control** the decision;
- having adequate **information** about the decision.

Transparency and control **empower** users to regulate their privacy at the desired level.



Quiz #1

After what length of time is the privacy policy no longer taken into account?

VERSION A **-12.8%**

vs.

VERSION B

First Name:*

Last Name:*

Email:*

ZIP/Postal Code:*

Primary Telephone:*



submit

First Name:*

Last Name:*

Email:*

ZIP/Postal Code:*

Primary Telephone:*

submit

Quiz #2

Which version leads to more submitted forms?
With TRUSTe logo to without logo?

A	<input type="checkbox"/>	Please send me Vortex Newsletters and information.	25%
B	<input type="checkbox"/>	Please do not send me Vortex Newsletters and information.	37%
C	<input checked="" type="checkbox"/>	Please send me Vortex Newsletters and information.	53%
D	<input checked="" type="checkbox"/>	Please do not send me Vortex Newsletters and information.	0%

Figure 4: Subjects were assigned one of the following conditions in the registration page.

Quiz #3

Which version leads to more newsletter subscriptions?
Opt-in or opt-out? Negative or positive framing?

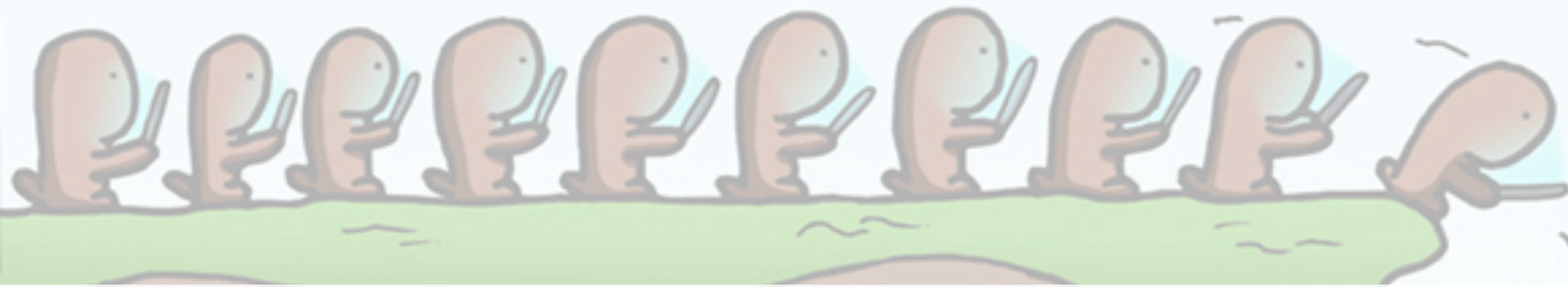
Why is this happening?

Transparency paradox (Nissenbaum, 2011):

Privacy notices that are sufficiently detailed to have an impact are often too long for people to read

Control paradox (Compañó and Lusoli, 2010):

While users claim to want full control over their data, they avoid the hassle of actually exploiting this control



Privacy Nudging

An **alternative** solution
(that also doesn't really work)



We can influence people!

Justification nudge

A succinct reason to disclose (or not disclose) information

Order nudge

Change request order to increase disclosure (foot-in-the-door, door-in-the-face)

Default/framing nudge

Set the default and/or framing in such a way that it increases or decreases disclosure

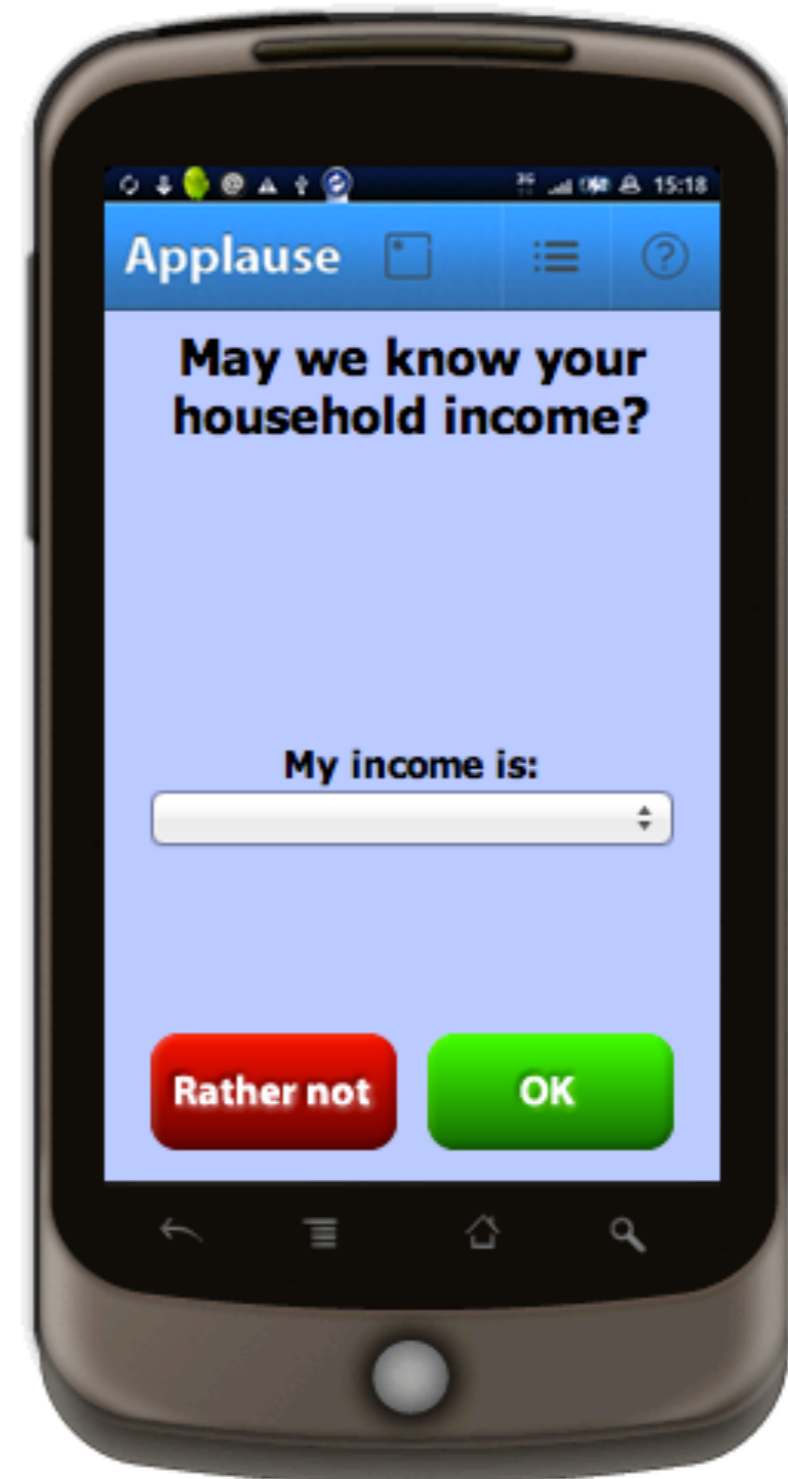
Nudge 1: justification

Mobile app recommender

Asks 31 questions
(12 context, 19
demographics)

Gives recommendations
based on users' answers

Users are allowed to
withhold information



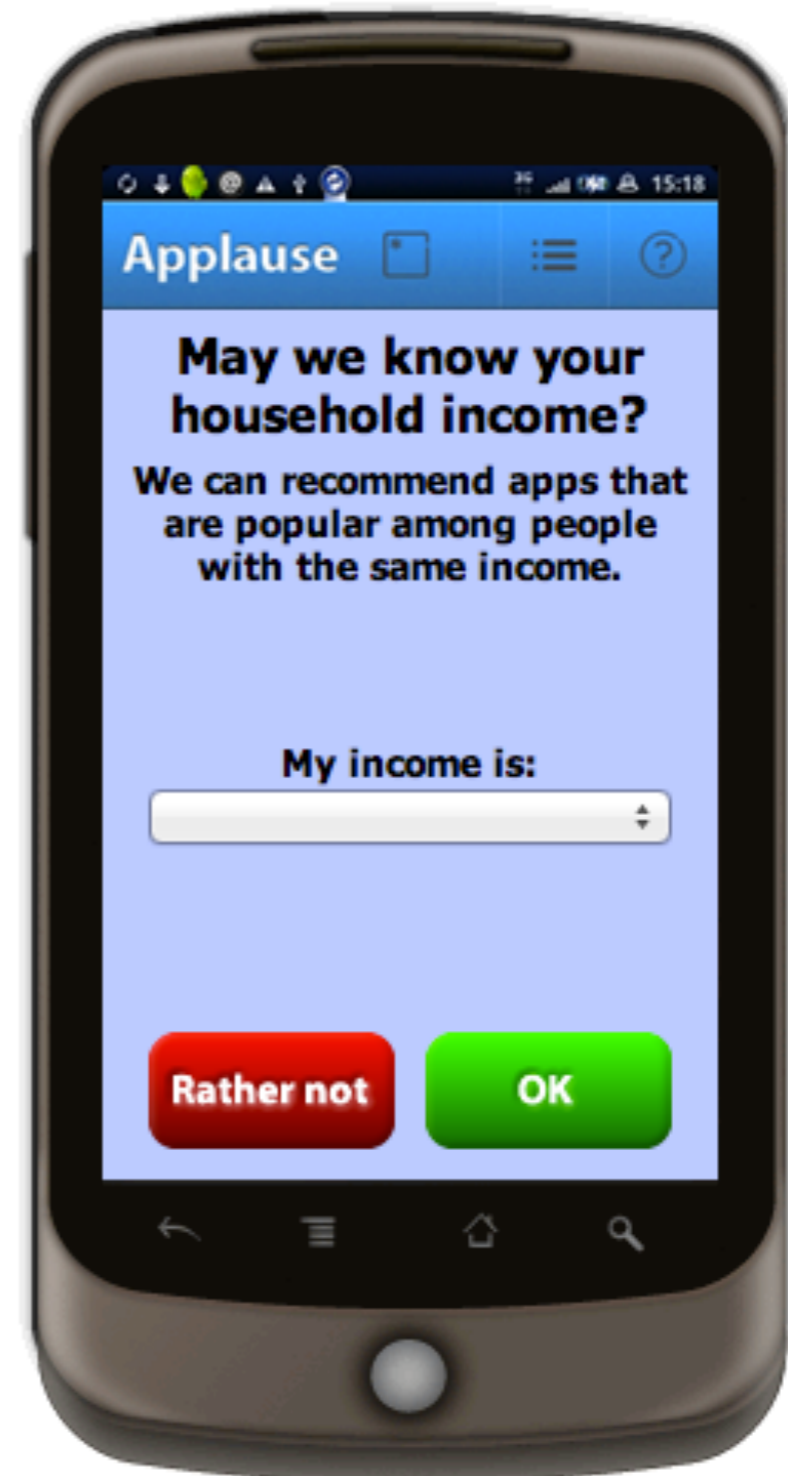
Nudge 1: justification

How useful is this for me?

How many others are disclosing this?

How useful was it for them?

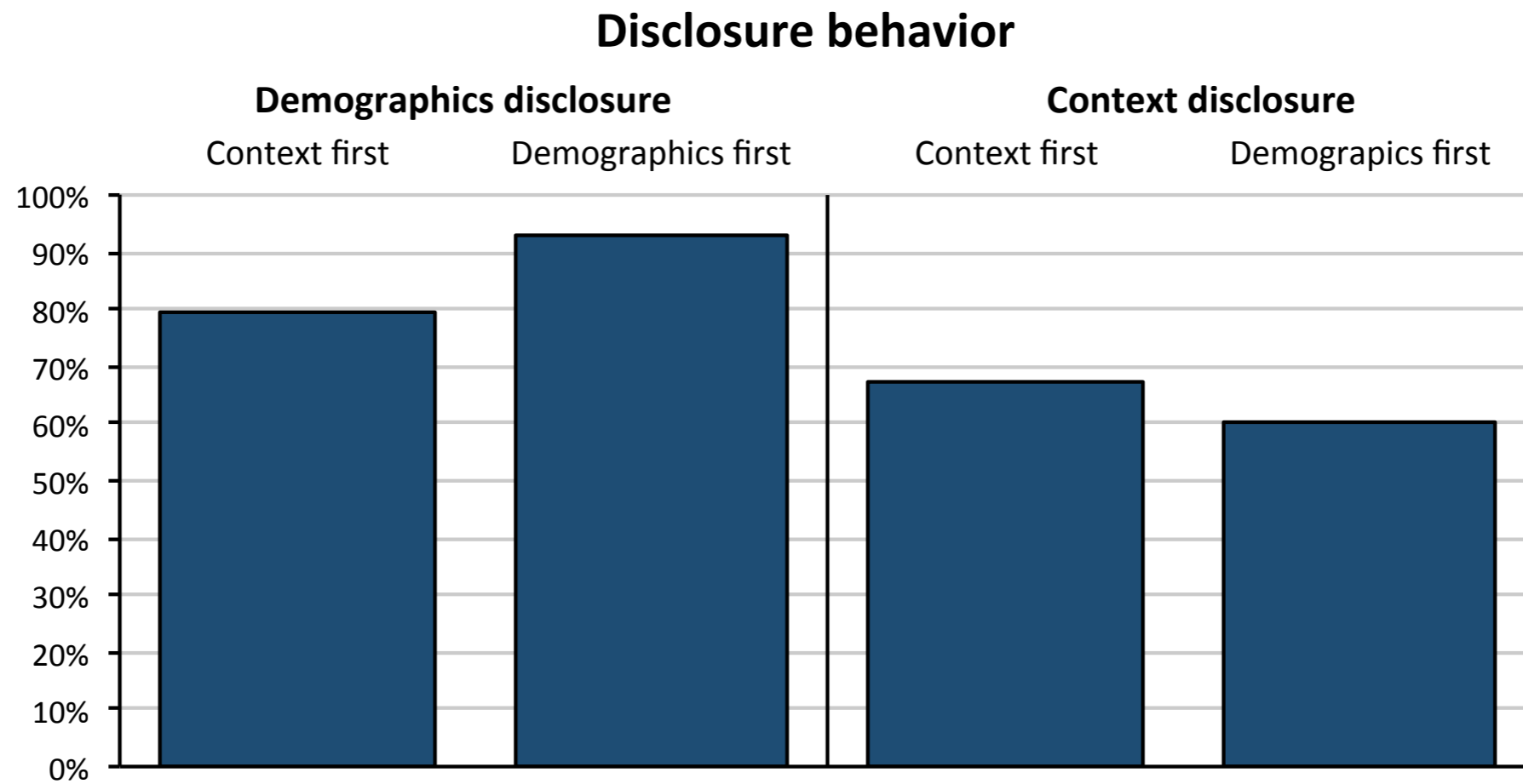
What are you gonna do with it?



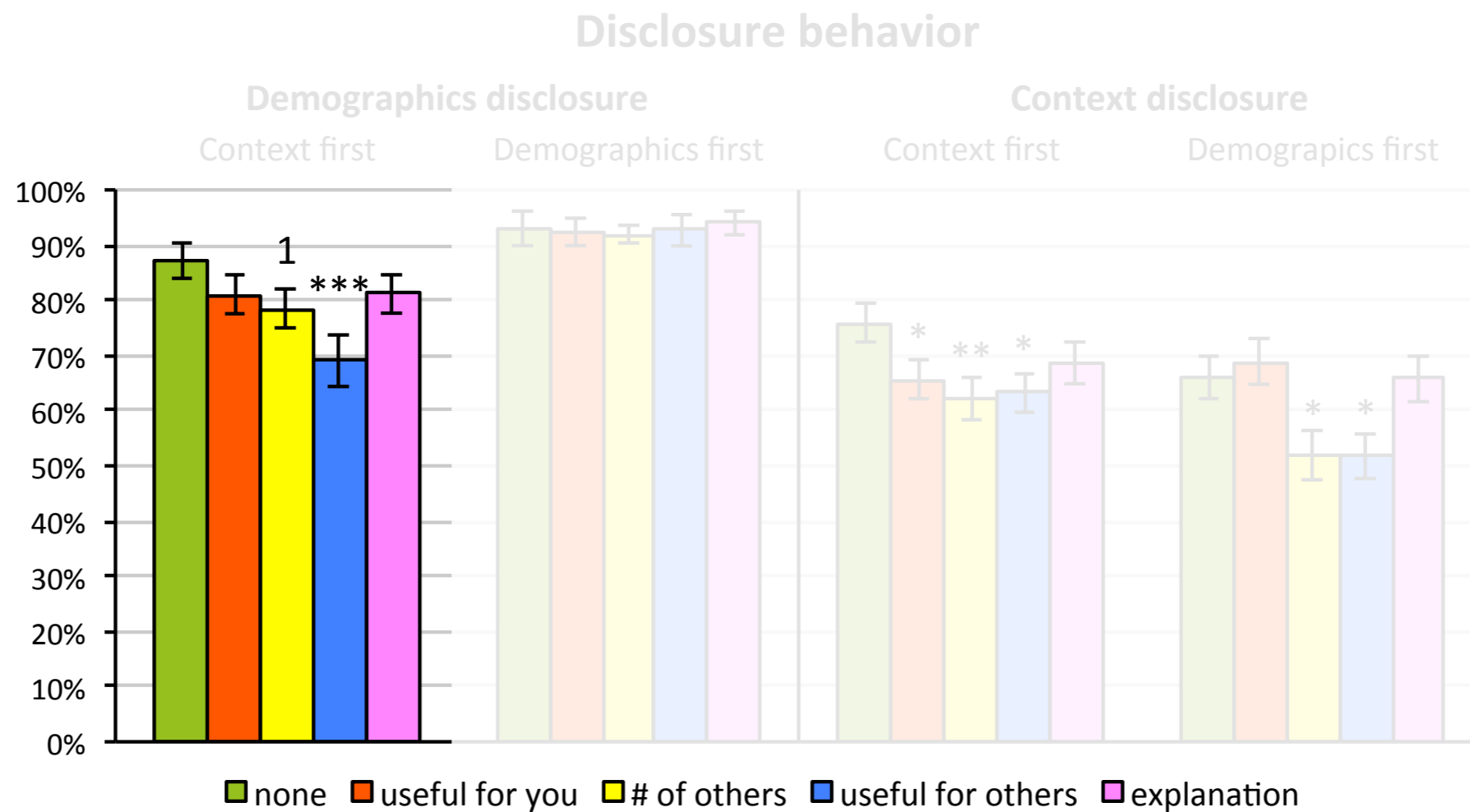
Nudge 2: Request order



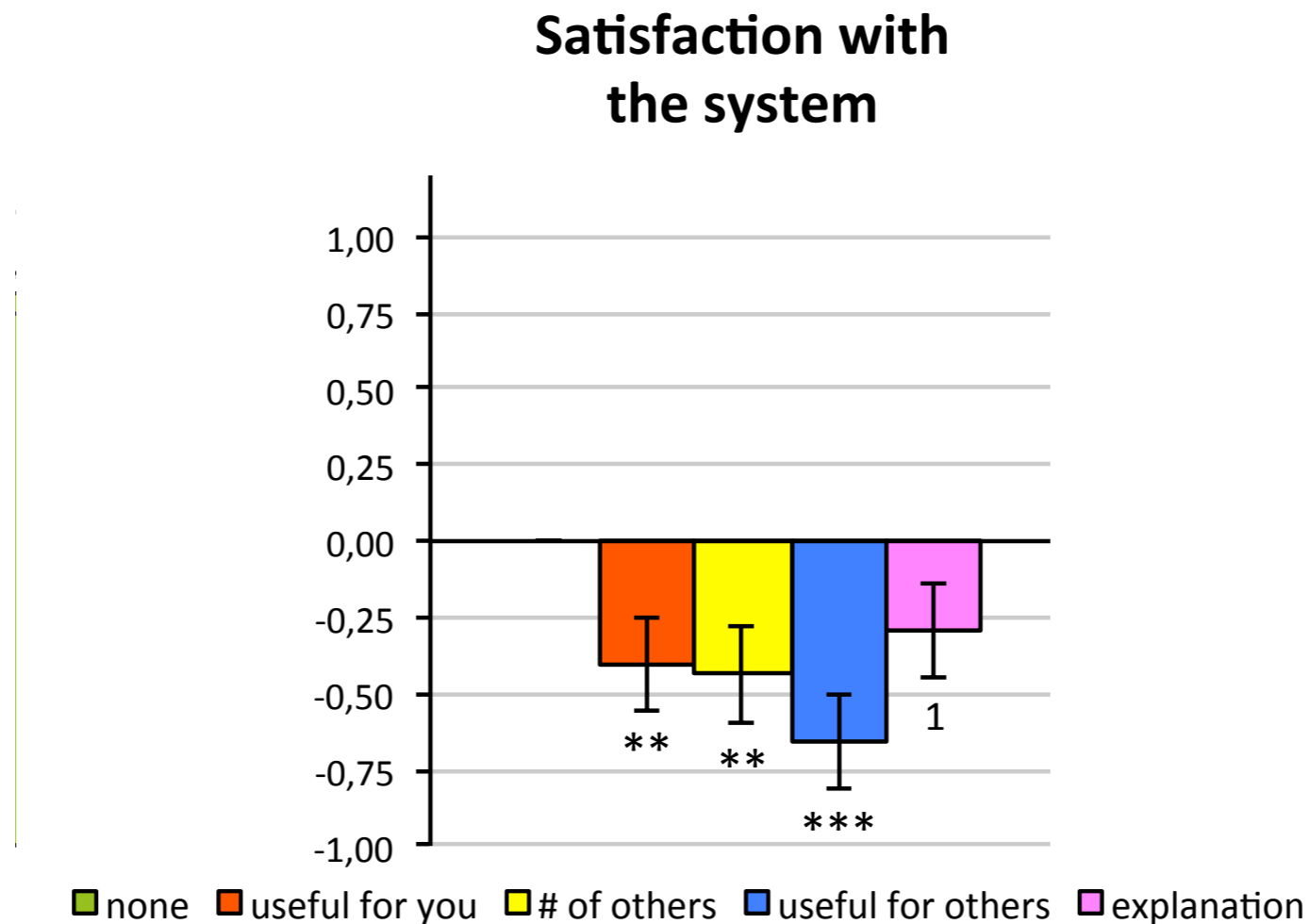
Asked first = more disclosure



Justifications don't work



Justifications don't work



Knijnenburg & Kobsa (2013) "Making Decisions About Privacy"

Nudge 3: Defaults/framing

Data: 14,729 household IoT-related scenarios + decisions from 1133 participants

Manipulate scenarios along 5 dimensions

Example scenario: “Your smart TV (Who) uses a camera (What) to give you timely alerts (Purpose), the data is stored locally (Storage) and used to optimize the service (Action).”

Nudge 3: Defaults/framing

Behavior: Allow/reject decision (see next slide)

Attitudes:

How expected/unexpected is this scenario?

How risky or safe is this scenario?

How useful/useless is this scenario to you?

How comfortable/uncomfortable do you feel about this scenario?

How appropriate/inappropriate do you consider this situation?

Nudge 3: Defaults/framing

Framing:

None: What would you do with this feature? (enable/disable)

Pos: Would you enable this feature? (yes/no)

Neg: Would you disable this feature? (no/yes)

Default option:

None: enable disable

Pos: enable disable

None: enable disable

Disclosure can be influenced

Defaults influence disclosure!

Negative default: 1.37 times less likely to enable ($p = .006$)

Positive default: 2.57 times more likely to enable ($p < .001$)

Framing too (but less)

Negative framing: 1.31 times more likely to enable ($p = .0205$)

No significant decrease for positive framing

Decision process deteriorates

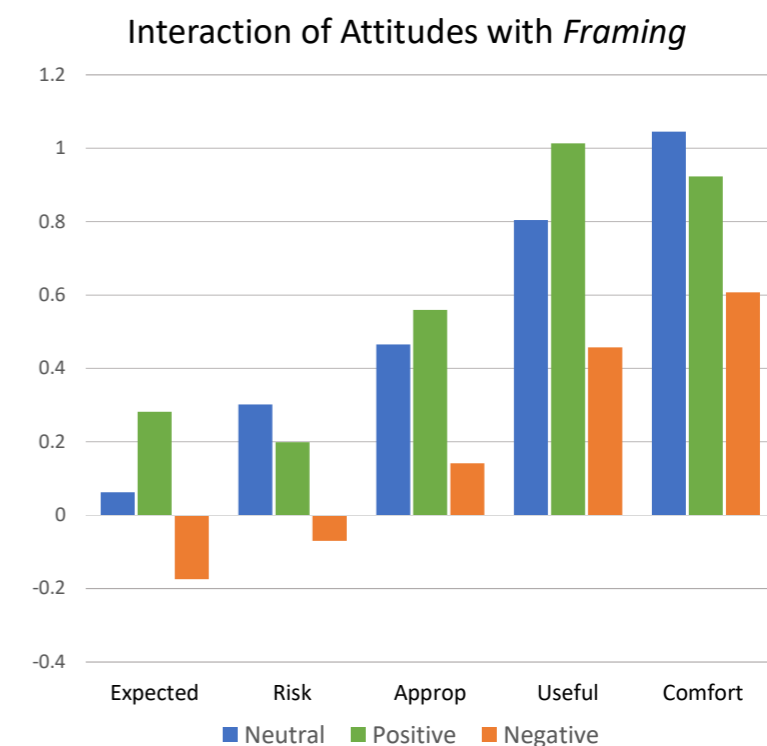
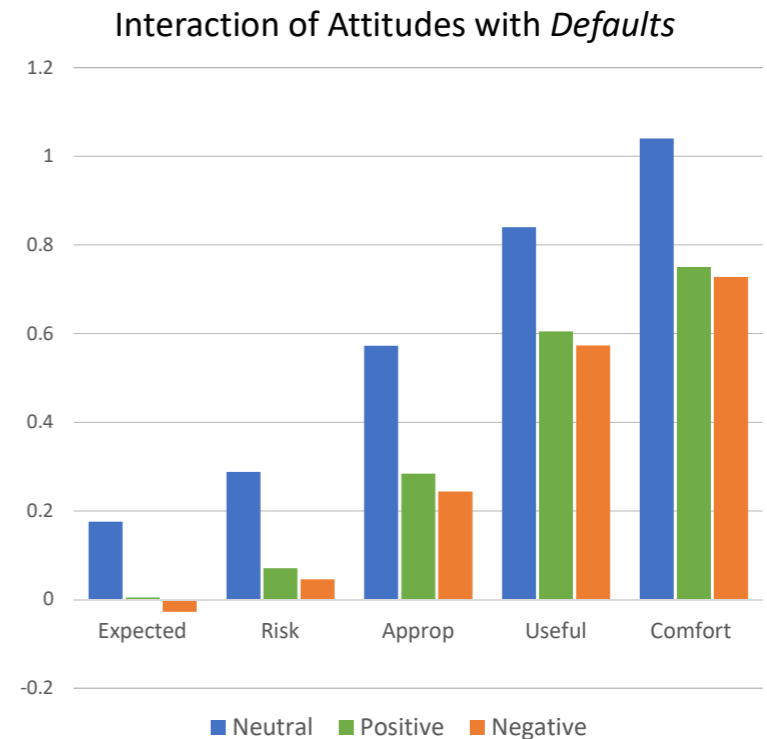
However, they also **make people's decisions less nuanced!**

Defaults reduce the effect of attitudes on disclosure


Framing also (kind of)

Negative framing reduces the effect of attitudes

Positive framing: certain attitudes have a stronger effect, others have a weaker effect



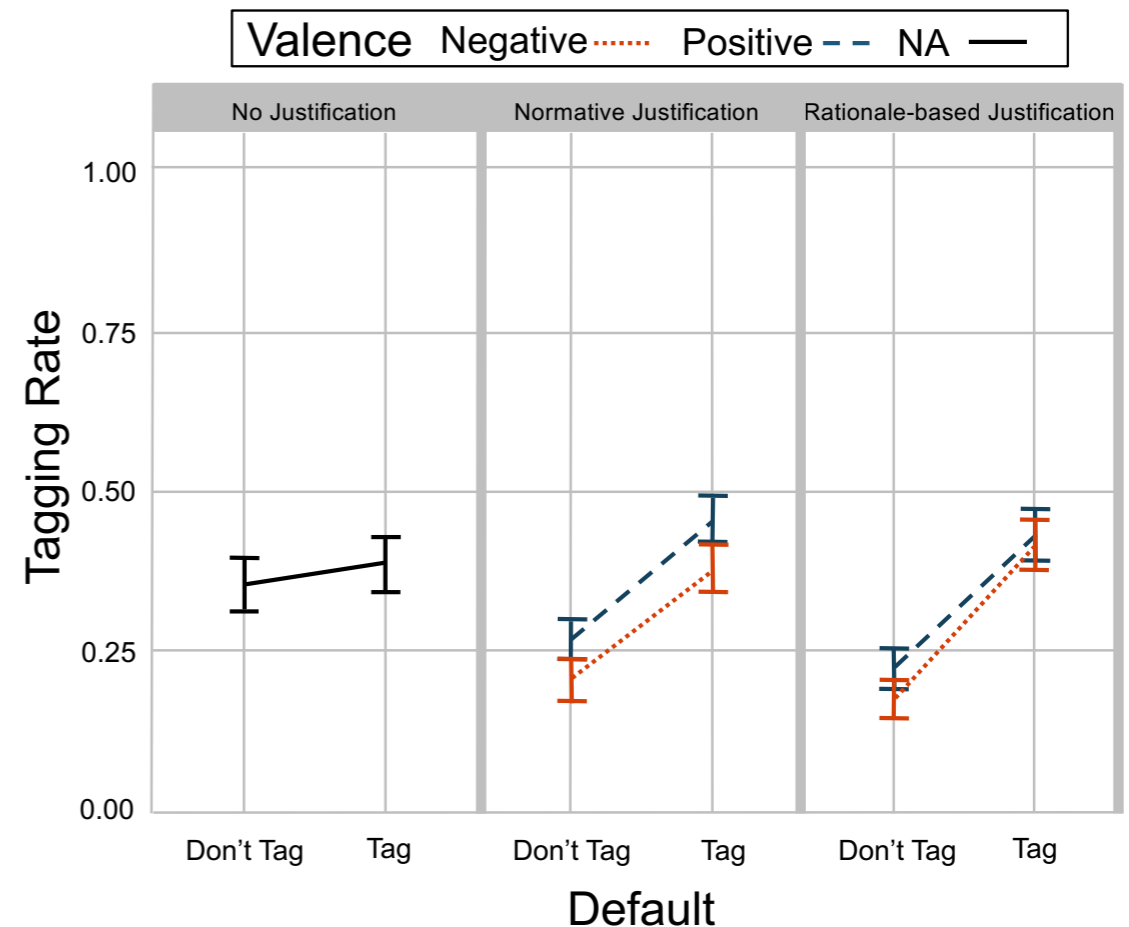
Combining them?

Face-tagger found that  has **5 photos of you** that you have never opened.

Automatically tag **me** in **those pictures** (**Note:** Auto-tagged photos will show up on your wall, where your friends can see them. Beware that you may not want others (family, boss) to see some of these photos, because they could be embarrassing!)

Adding justifications to defaults and framing exacerbates their effect!

In other words: justifications make people elaborate **even less**



Nudging does not work!

Conclusion: Nudges have unwanted side-effects

People are either annoyed by them...

...or they influence the decision process in unwanted ways.

Also, **how** should we nudge people?

Towards more privacy?

Towards more benefits?

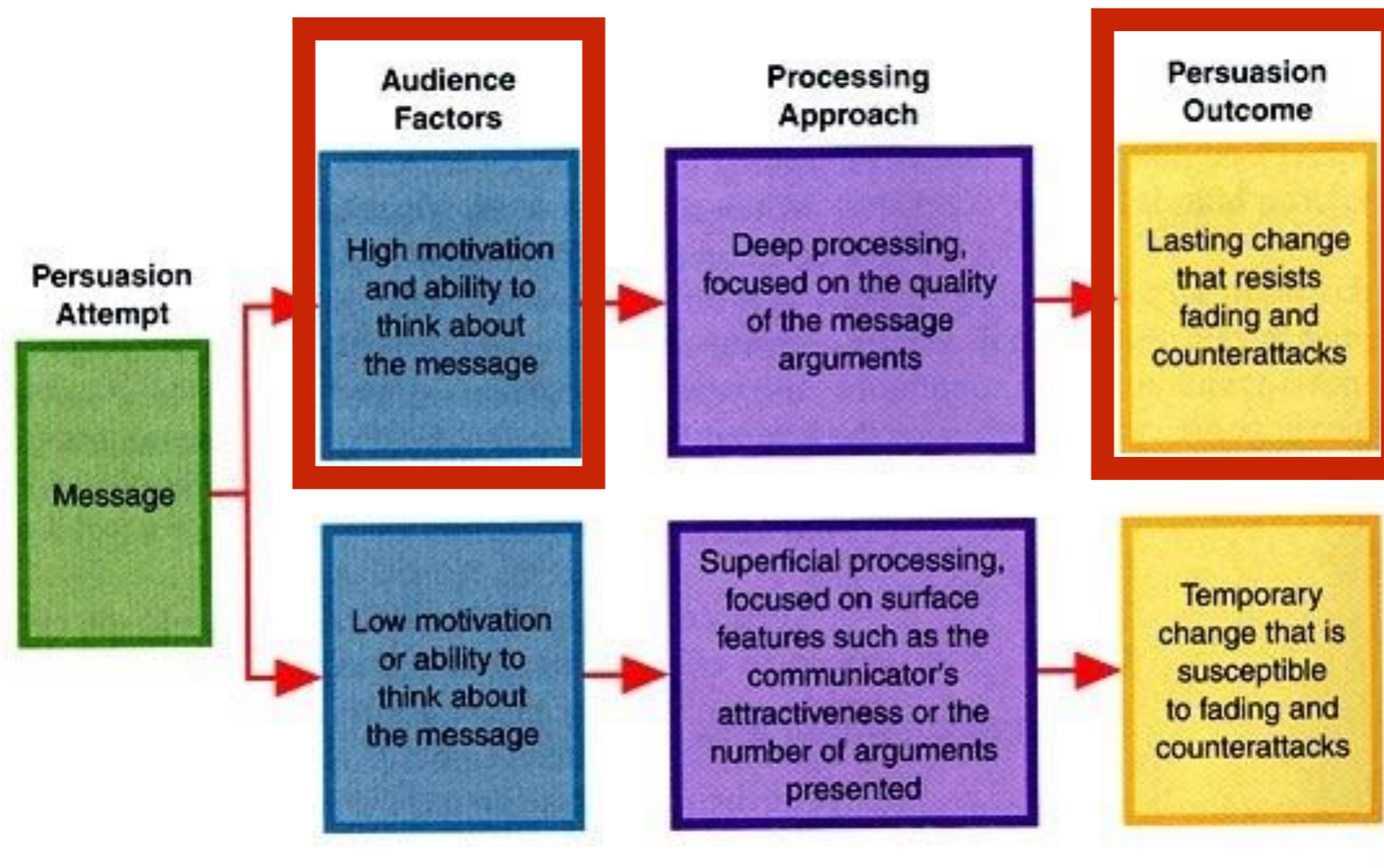
The answer depends on the person and the context!

An illustration of a person with brown hair sitting at a desk, looking at a computer monitor. The person is wearing a light-colored, long-sleeved shirt. The background features a blue wall with a pattern of pink raspberries and green leaves. A large, detailed illustration of a human eye with a green iris is overlaid on the right side of the image, appearing to look directly at the viewer. The overall style is soft and painterly.

Design for elaboration

Making people **think** about privacy.

Dual-route processing



Kahneman (2013) "Thinking, fast and slow"

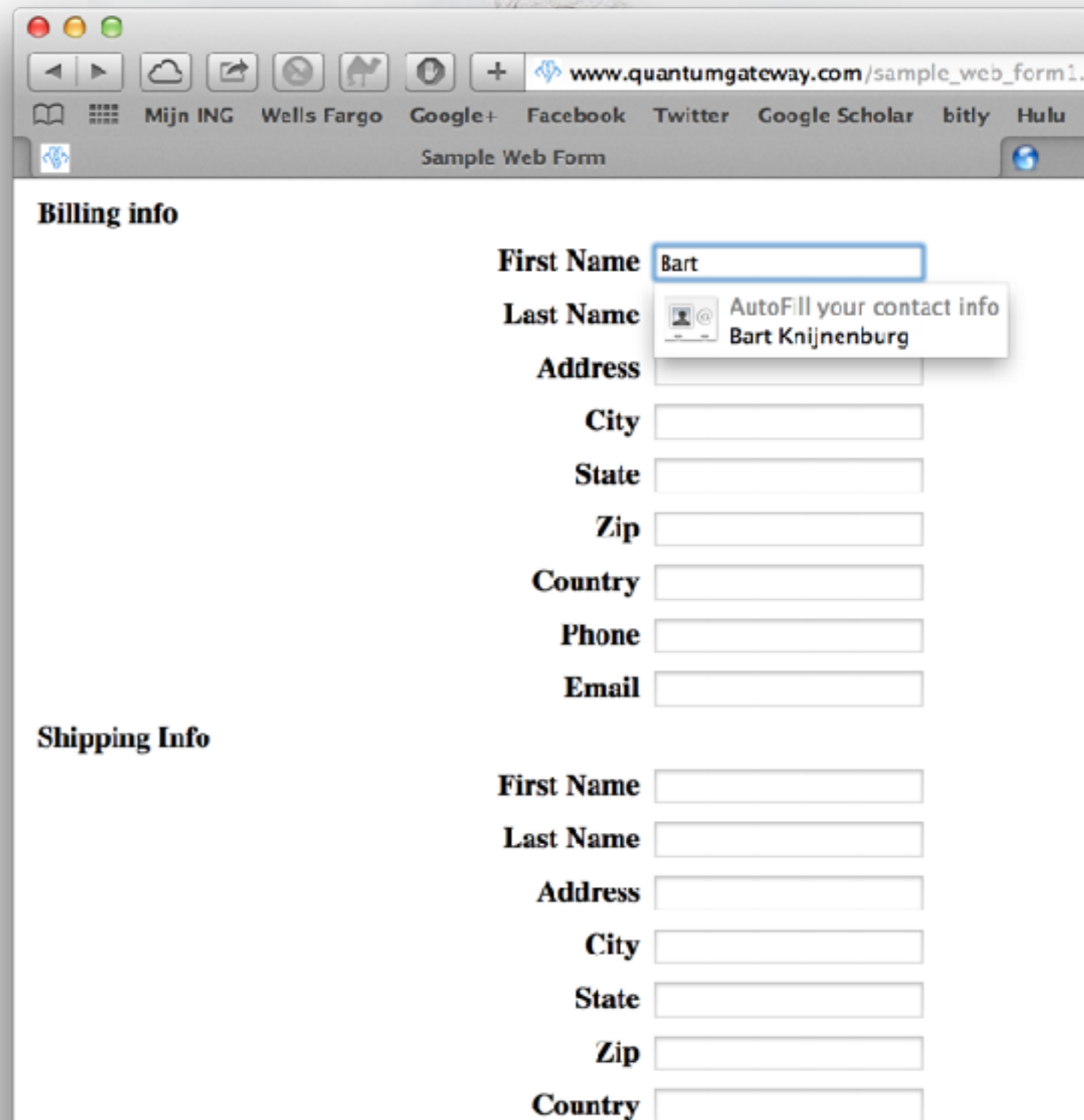
If we want lasting change, we must improve motivation and self-efficacy

Design for elaboration

Modern browsers offer an **auto-completion feature** that reduces the effort of filling out web forms

These tools may cause users to **complete more fields** than they intended

They make it so easy to submit a fully completed form that users may **skip weighing benefits and risk**



The screenshot shows a web browser window with the address bar displaying 'www.quantumgateway.com/sample_web_form1'. The browser's toolbar includes navigation buttons and a search bar. Below the toolbar, there are several social media and utility links: 'Mijn ING', 'Wells Fargo', 'Google+', 'Facebook', 'Twitter', 'Google Scholar', 'bitly', and 'Hulu'. The main content area is titled 'Sample Web Form' and contains two sections: 'Billing info' and 'Shipping Info'. The 'Billing info' section has several input fields: 'First Name' (filled with 'Bart'), 'Last Name' (with an auto-completion popup showing 'AutoFill your contact info Bart Knijnenburg'), 'Address', 'City', 'State', 'Zip', 'Country', 'Phone', and 'Email'. The 'Shipping Info' section has input fields for 'First Name', 'Last Name', 'Address', 'City', 'State', 'Zip', and 'Country'.



Create a Profile

Please create your profile by entering your information below.

Note that FormFiller will store the information locally on your device, and only for the duration of this study. We will never submit any forms automatically or disclose this information to others without your active involvement.

About you:

First name: Last name:

Gender:

Age:

Address:

City: State: Zip:

E-mail:

About you:

First name:

Last name:

Gender:

Age:

Address:

City:

State:

Zip:

E-mail:

Phone:

Tastes and Preferences:

Favorite movie:

Favorite band/artist:

Favorite food:

Favorite weekend
pastime:

Last holiday location:

Political views:

Work and education:

Current/previous job:

Sector:

Employment status:

Work experience (yrs):

Income level:

Highest completed degree:

Computer skills

Health and lifestyle:

Overall health:

Dietary restrictions:

Number of doctor visits last month:

Weight (lbs):

Birth control usage (you or your partner):

Medical conditions:

Diabetes

Hypertension

Respiratory (COPD etc.)

High cholesterol

Overweight

Heart attack / heart failure

Study Procedures



Create a Profile

Please create your profile by entering your information below.
Note that FormFiller will store the information locally on your device, and only for the duration of this study. We will never submit any forms automatically or disclose this information to others without your active involvement.

About you:

First name: Last name:

Gender:

Age:

Address:

City: State: Zip:

E-mail:

Phone:

Tastes and Preferences:

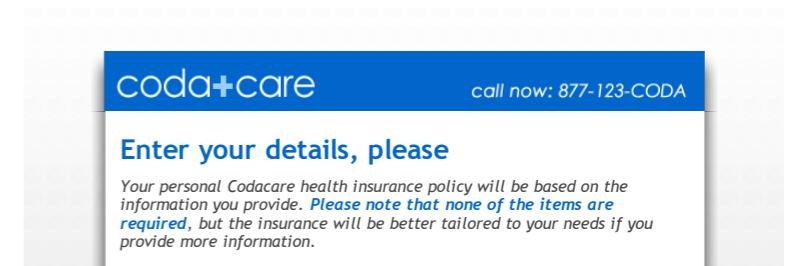
Favorite movie:

Favorite band/artist:

Favorite food:

Favorite weekend pastime:

Last holiday location:



Study Procedures

Each site corresponds to a particular type of info:

blogging community = personal interest items

job search website = job skills items

health insurer = health record items

They requested all the info, not just the relevant stuff!

BlogHeroes conquer the web with your blogging-guild!

leader board log in

Please tell us more about yourself

BlogHeroes will assign a "guild" to you based on the information you provide below. **Note that none of the fields are required**, but our classification will be better if you provide more information.

General info about me

Please provide some background info to get our matching process started.

Name (first):	John	(last):	Smith		
E-mail address:	john@smith.com				
Gender:	Male				
Age (years):	23				
Address:	123 Main St.				
City:	New York	State:	NY	Zip:	12345

What I do for a living

I@WRK "The first job search site that truly cares about work-life balance" - Financial Times

> For employers
> For Investors
> Contact
> About us

Please enter your information

I@WRK will find jobs based on the information you enter on this form. **None of the items on the form are required**, but if you provide more information the jobs will be a better match.

GENERAL AND CONTACT INFO

General and contact information

FIRST NAME	LAST NAME		
John	Smith	clear	
AGE			
23		clear	
GENDER			
Male		clear	
E-MAIL ADDRESS			
john@smith.com		clear	
ADDRESS	CITY	STATE	ZIP

coda+care call now: 877-123-CODA

Enter your details, please

Your personal Codacare health insurance policy will be based on the information you provide. **Please note that none of the items are required**, but the insurance will be better tailored to your needs if you provide more information.

General information

Please provide your general information.

Name (first): (last):

Address:

City: State: Zip:

Gender:

Age:

E-mail:

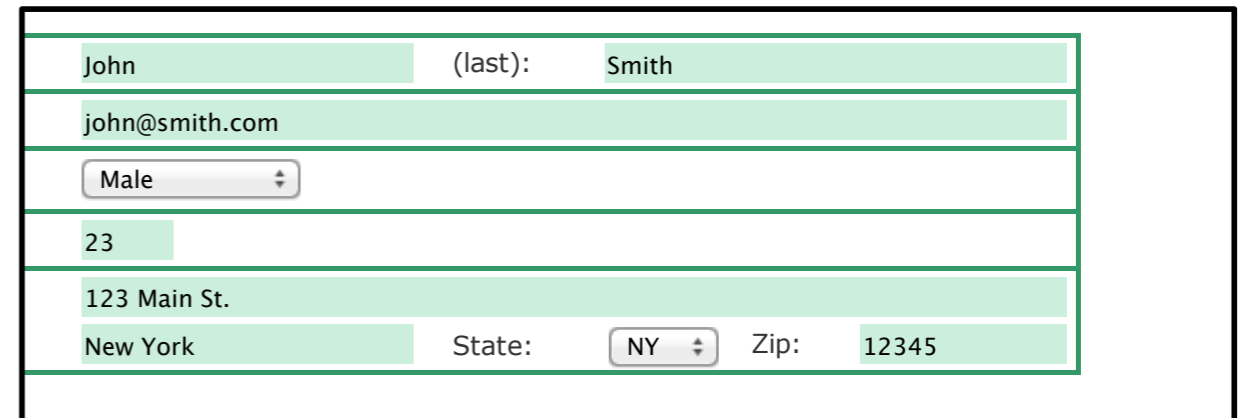
Health

Research outline

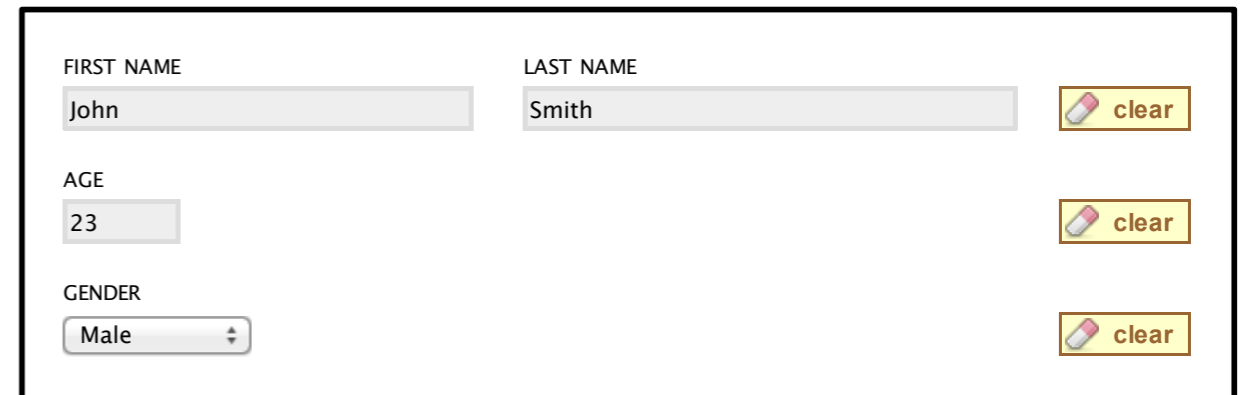
We introduce **two new efficacy-increasing designs**

We compare three tools:

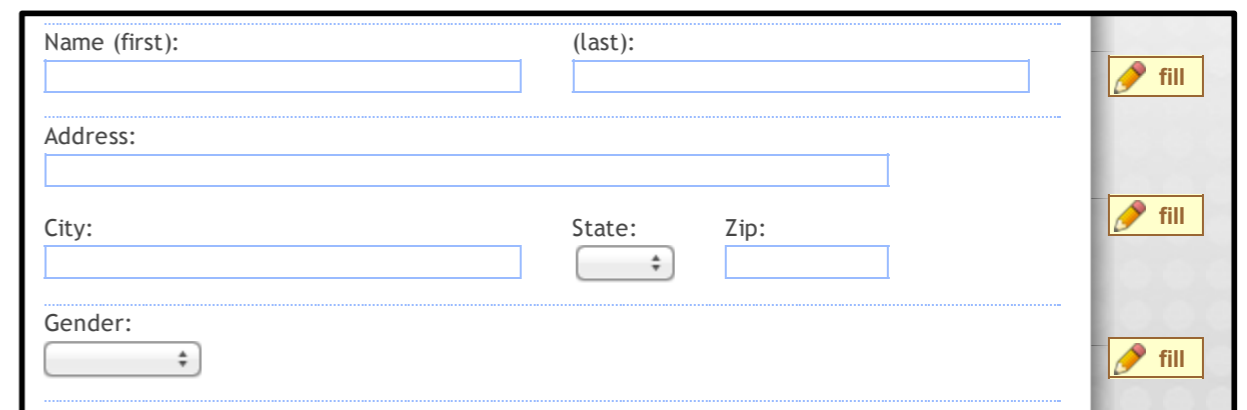
- **Auto FormFiller:** auto-fills fields, users can remove manually
- **Remove FormFiller:** click to remove each field
- **Add FormFiller:** click to fill each field



A screenshot of a form with green highlights around the input fields. The fields contain the following information: First Name: John, Last Name: Smith, Email: john@smith.com, Gender: Male, Age: 23, Address: 123 Main St., City: New York, State: NY, Zip: 12345.



A screenshot of a form with labels and input fields. The fields contain the following information: FIRST NAME: John, LAST NAME: Smith, AGE: 23, GENDER: Male. Each field has a 'clear' button next to it.

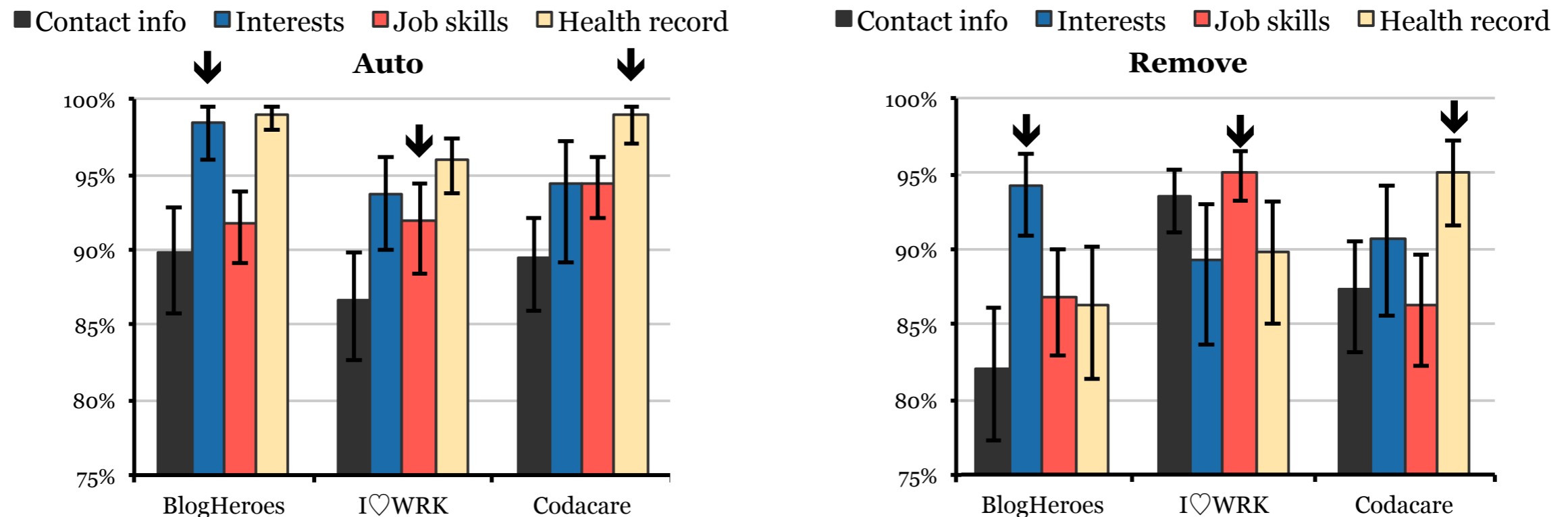


A screenshot of a form with labels and empty input fields. The fields are: Name (first):, (last):, Address:, City:, State:, Zip:, Gender:. Each field has a 'fill' button next to it.

Design for elaboration

Disclosure was **not purpose-specific** for users of the **Auto FormFiller**

Disclosure was **purpose-specific** for users of the **Remove and Add FormFillers**.



Knijnenburg et al. (2013) "Counteracting the Negative Effect of Form Auto-completion on the Privacy Calculus"

Privacy decisions are too hard!

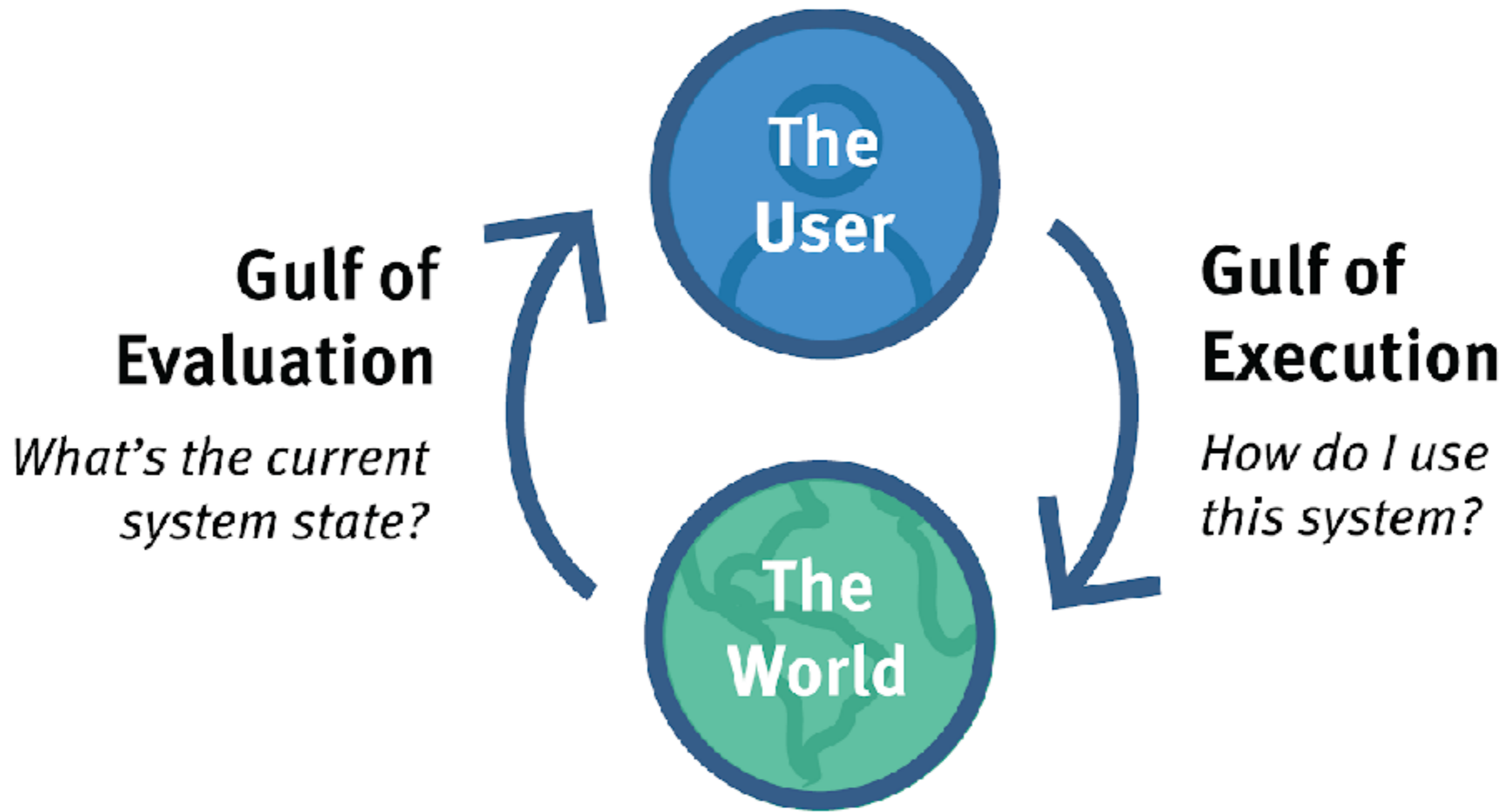
Problem: Most systems are much too complex

Privacy policies are increasing in length

Facebook's privacy controls are "Labyrinthian"

It's easy to fall back on heuristic decision-making practices

Which makes us fall prey to external influences such as defaults and framing



A diagram consisting of two overlapping circles. The top circle is light blue and contains the text 'The User'. The bottom circle is light green and contains the text 'The World'. The two circles overlap in the center, creating a 'gulf' between them. A large, faint, light blue arrow curves from the top circle down to the bottom circle, pointing from the user towards the world.

The
User

The Two UX Gulfs

(Hutchins, Hollan & Norman 1986)

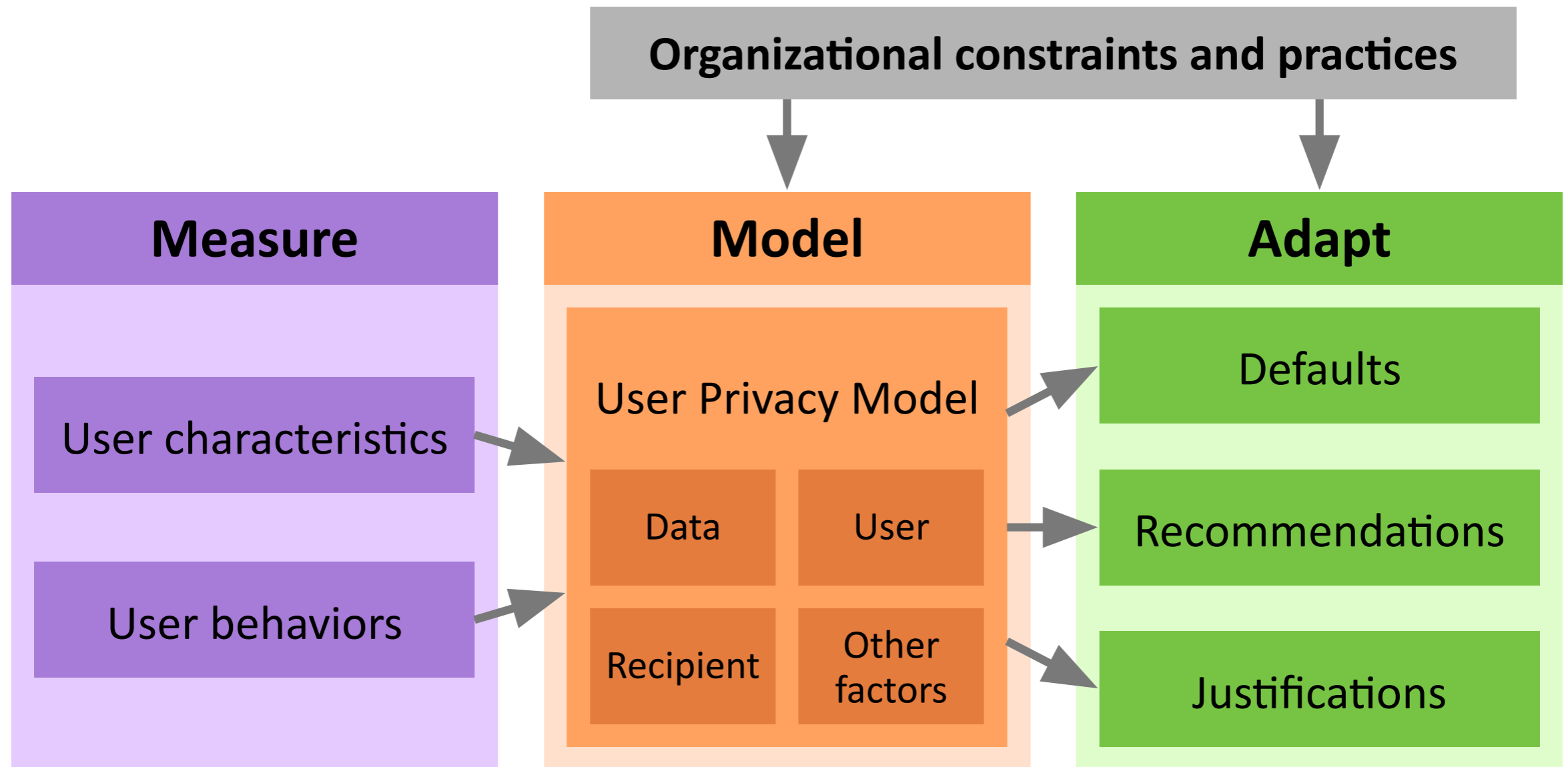
*Users have difficulties translating their **goals** (desired privacy) into **actions** (settings).*

A man with a mustache is shown from the chest up, wearing a white t-shirt. He is pointing his right index finger towards the screen of a laptop. The laptop screen displays a video call with the same man. The laptop is silver and has an Intel logo and a Windows logo on the bottom right. The background is a plain wall with a chair and some items on a shelf.

User-Tailored Privacy

Privacy **recommendations**: Figure out what people want, then **help them** do that.

User-Tailored Privacy



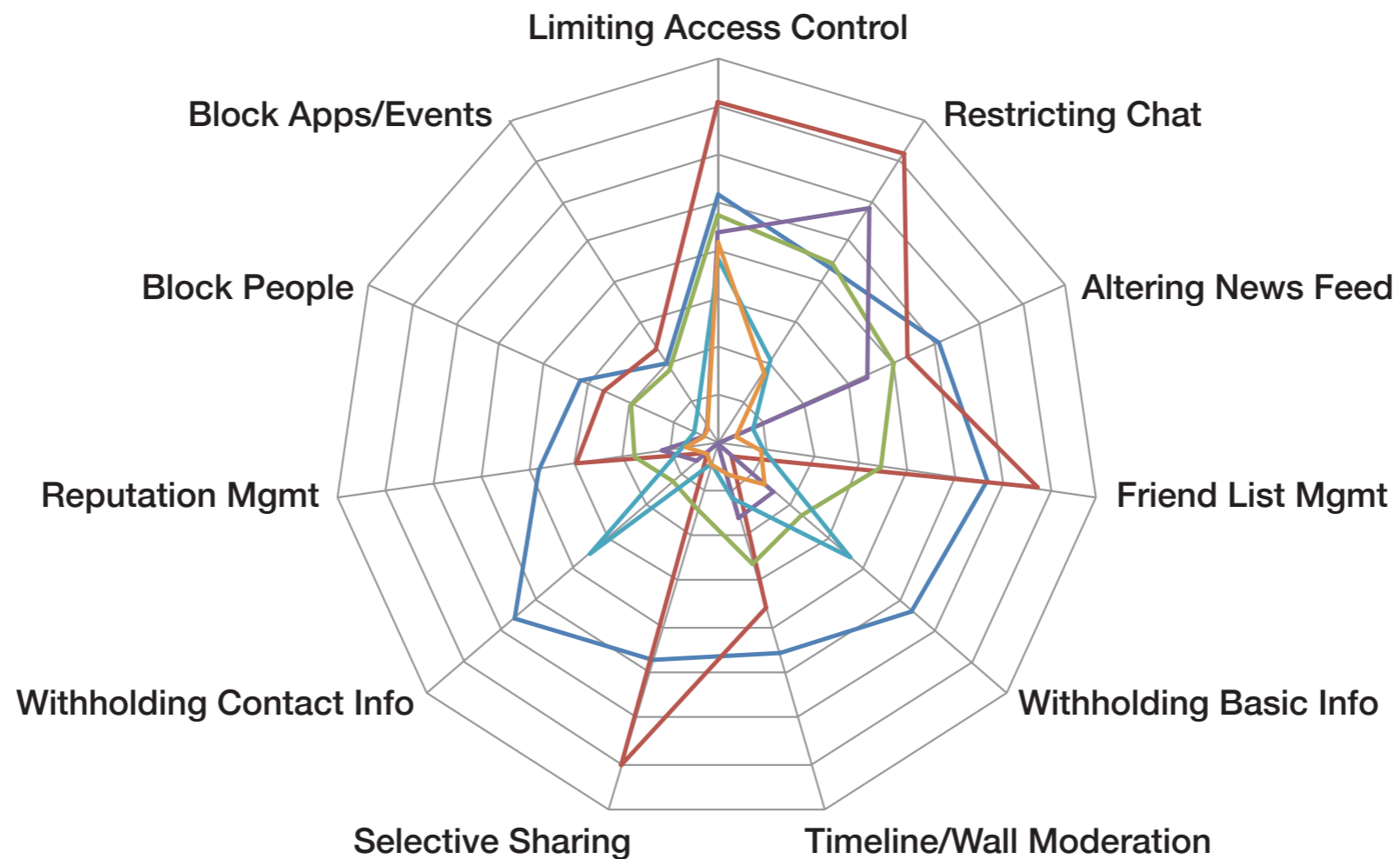
Knijnenburg et al. (2022) "User-Tailored Privacy"

Use case:

Facebook privacy management practices
32 individual **privacy behaviors** that Facebook users
could perform using the native Facebook interface

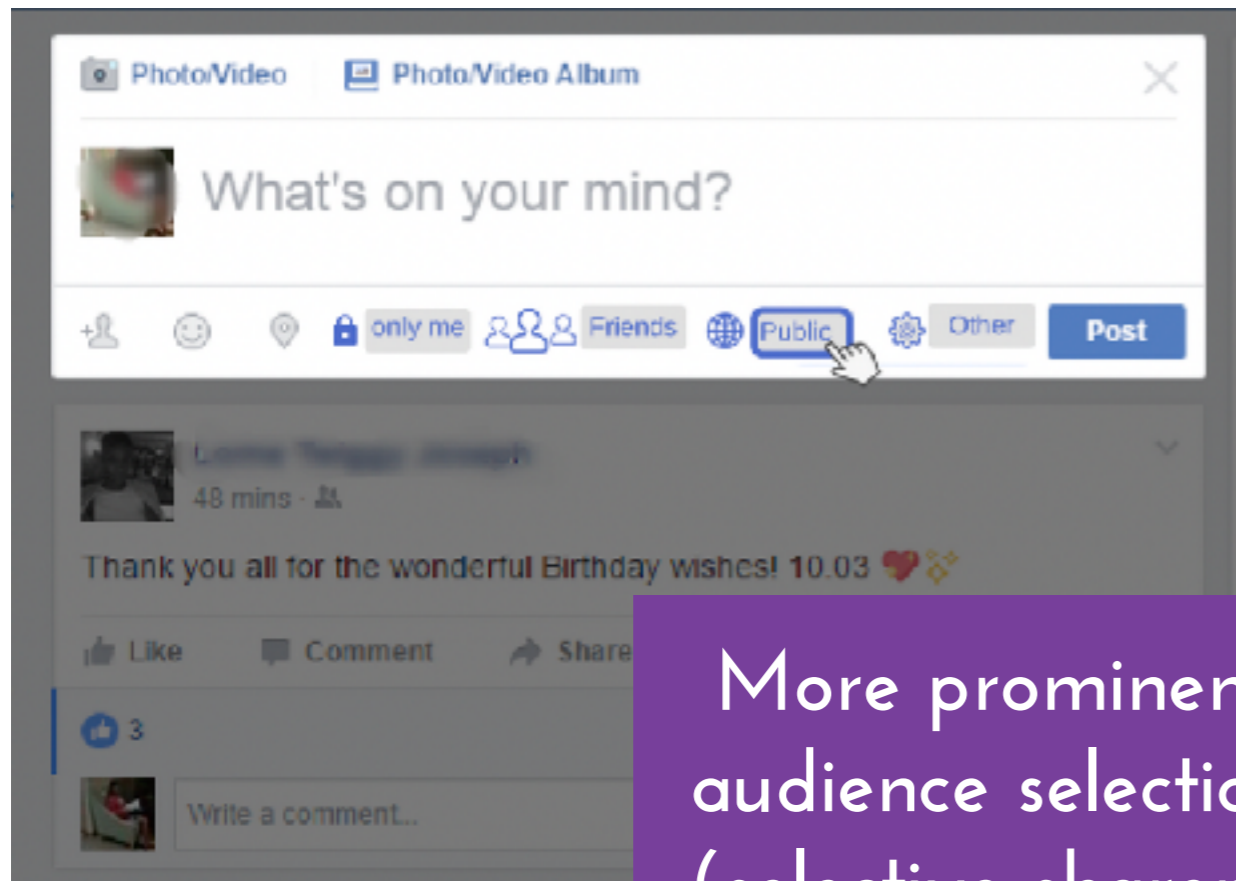
Create privacy profiles

Privacy Maximizers Selective Sharers Privacy Balancers Time Savers/Consumers Self-Censors Privacy Minimalists

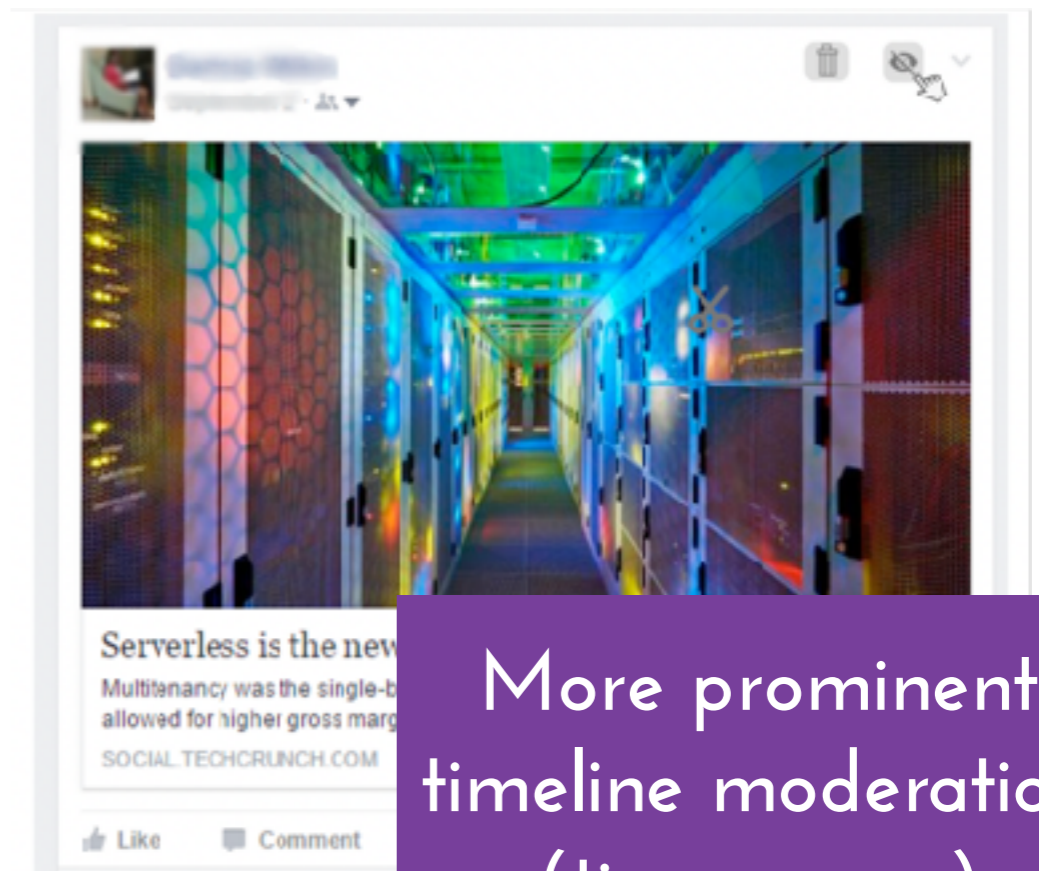


Wisniewski et al. (2017) "Making Privacy Personal"
see www.usabart.nl/chart

Adapt the interface



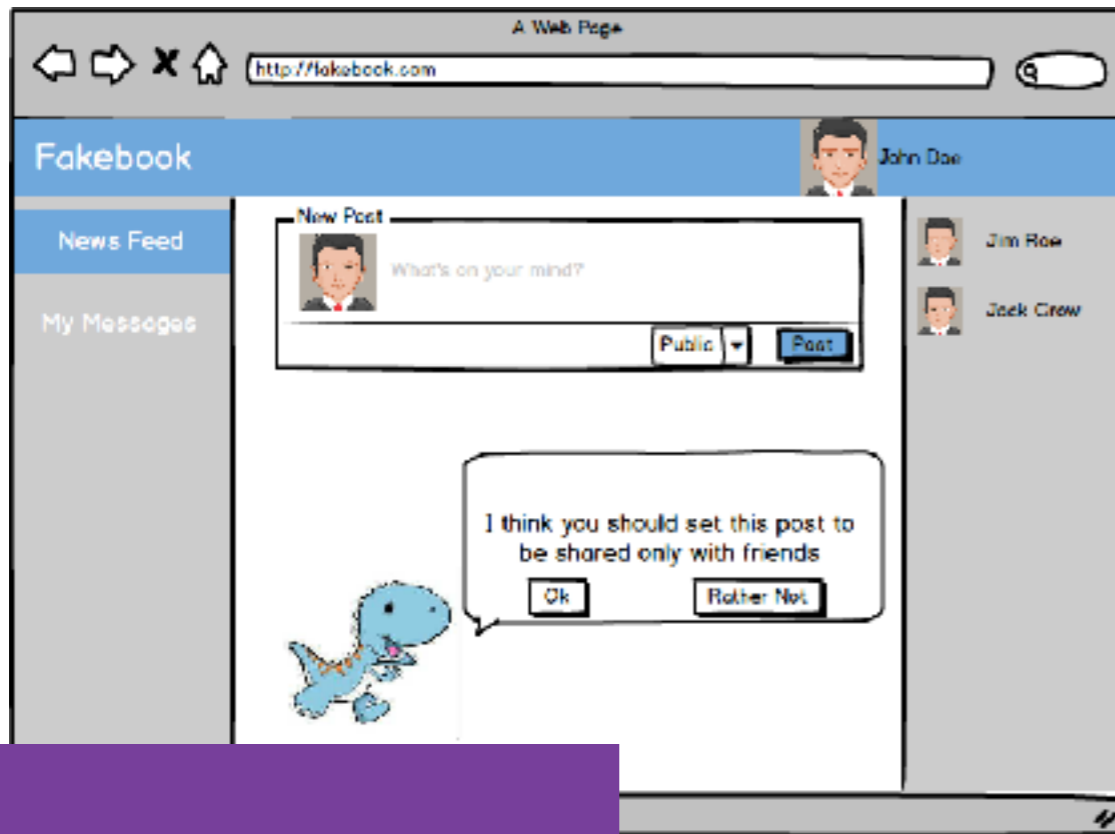
More prominent
audience selection
(selective sharers)



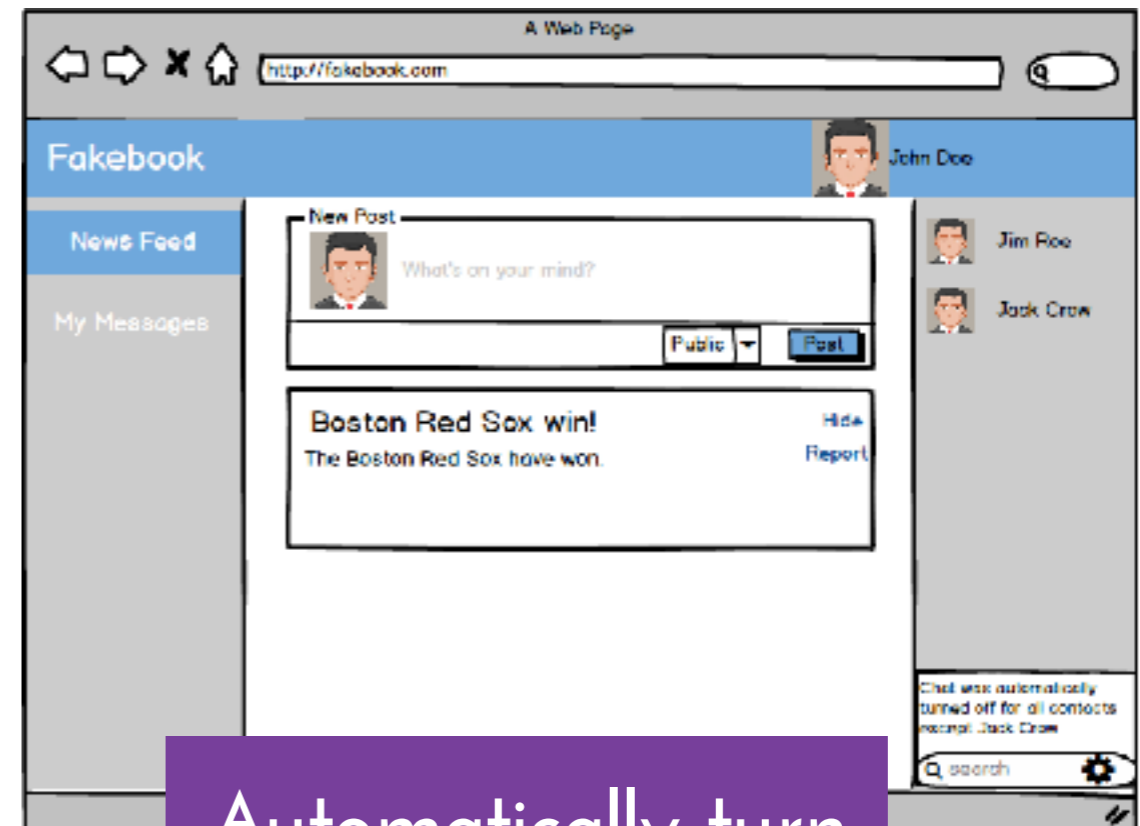
More prominent
timeline moderation
(time savers)

Wilkinson et al. (2017) "User-Tailored Privacy by Design"

Give recommendations



Audience suggestion
(selective sharers)



Automatically turn
off chat
(time savers)

Namara et al. (2018) "The Potential for User-Tailored Privacy on Facebook"

Namara et al. (2022) "The Effectiveness of Adaptation Methods in Improving User Engagement and Privacy Protection on Social Network Sites"

Other adaptations

Adapt the nudge

Adapt the available options

Adapt the order of requests

Knijnenburg and Kobsa (2013)

“Helping users with information disclosure decisions: potential for adaptation”



Other adaptations

Adapt the nudge

Adapt the available options

Adapt the order of requests

Knijnenburg and Jin (2013)
“The persuasive effect of privacy recommendations for location sharing services”



Other adaptations

Adapt the nudge

Adapt the available options

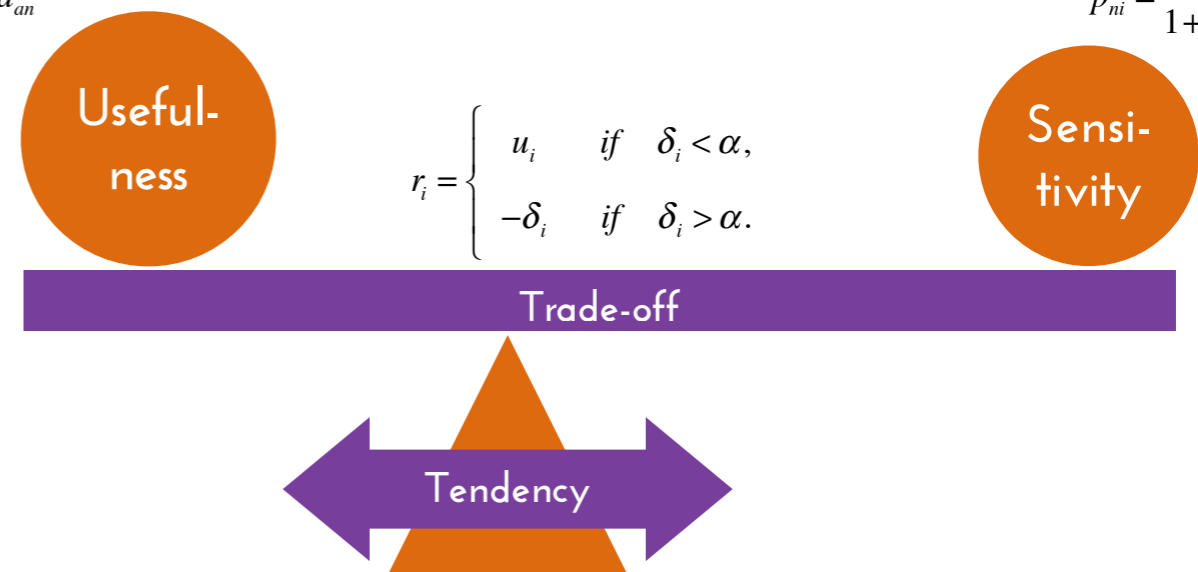
Adapt the order of requests



Knijnenburg (2015) "A user-tailored approach to privacy decision support"

$$u_o = \sum_{r_{oa}} \frac{v_r}{d_{an}} \quad \text{where} \quad d_{an} = \text{abs}(w_{an} - \bar{w}_n) + .0001$$

$$p_{ni} = \frac{e^{\beta_n - \delta_i}}{1 + e^{\beta_n - \delta_i}}$$



$$r_i = \begin{cases} u_i & \text{if } \delta_i < \alpha, \\ -\delta_i & \text{if } \delta_i > \alpha. \end{cases}$$

$$\beta_n = \text{mean}_n(\delta) + \sqrt{1 + \text{var}_n(\delta)/2.9} * \ln\left(\frac{|D_n|}{|L_n| - |D_n|}\right) \quad \text{and} \quad \alpha_n^H = \beta_n - 1.5$$



IoT privacy

An example of user-tailored privacy to inspire
interface design and *smart profiles*.

Use case:

2,800 public IoT-related scenarios + decisions from
200 participants

Manipulate scenarios along 5 dimensions

Example: “A device of a friend (**who**) records your video to detect your presence (**what**). This happens continuously (**when**), while you are at someone else’s place (**where**), for your safety (**why**).”

Choice to allow or reject this scenario

Results

Let's say we create a **layered** settings interface

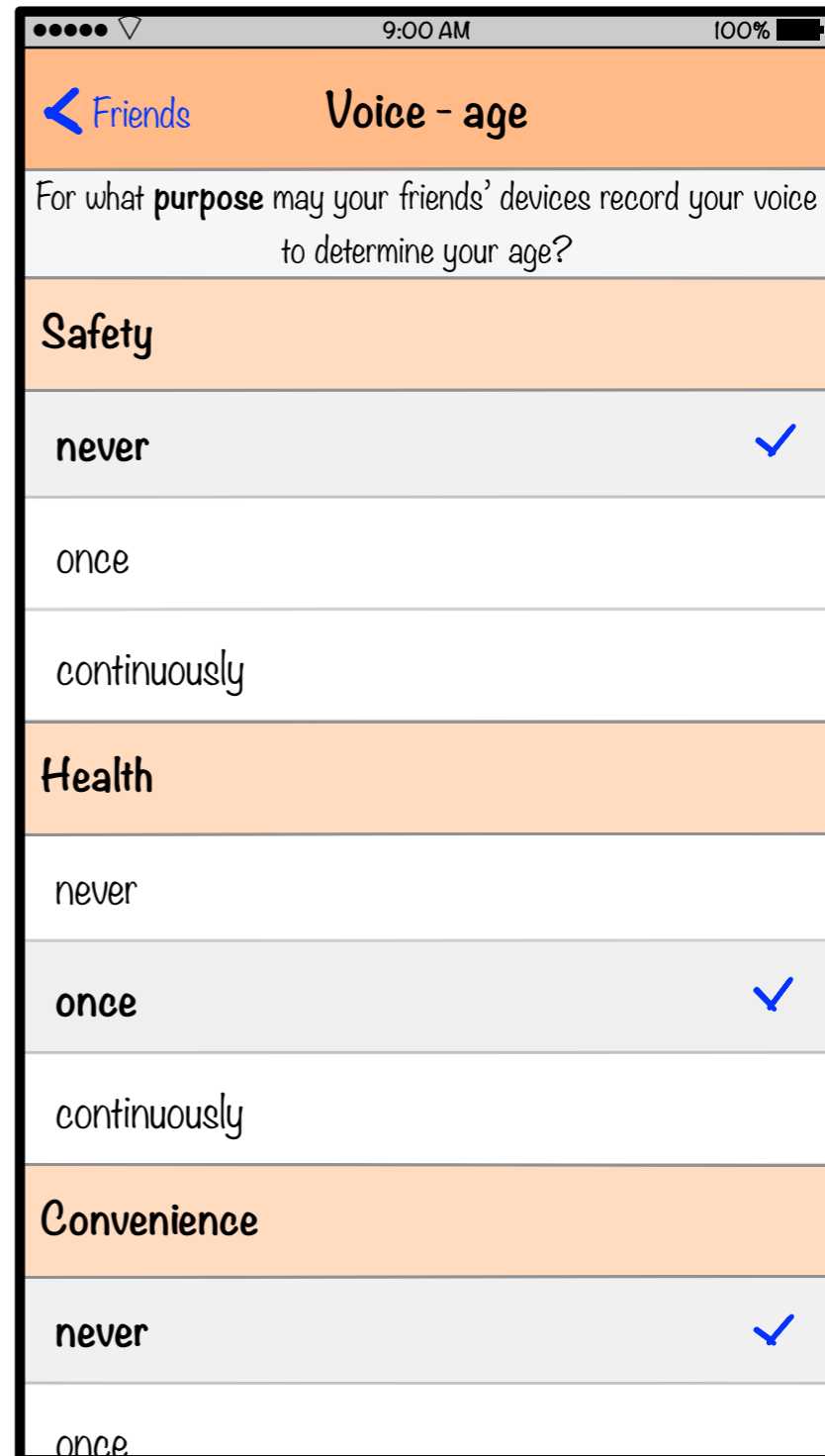
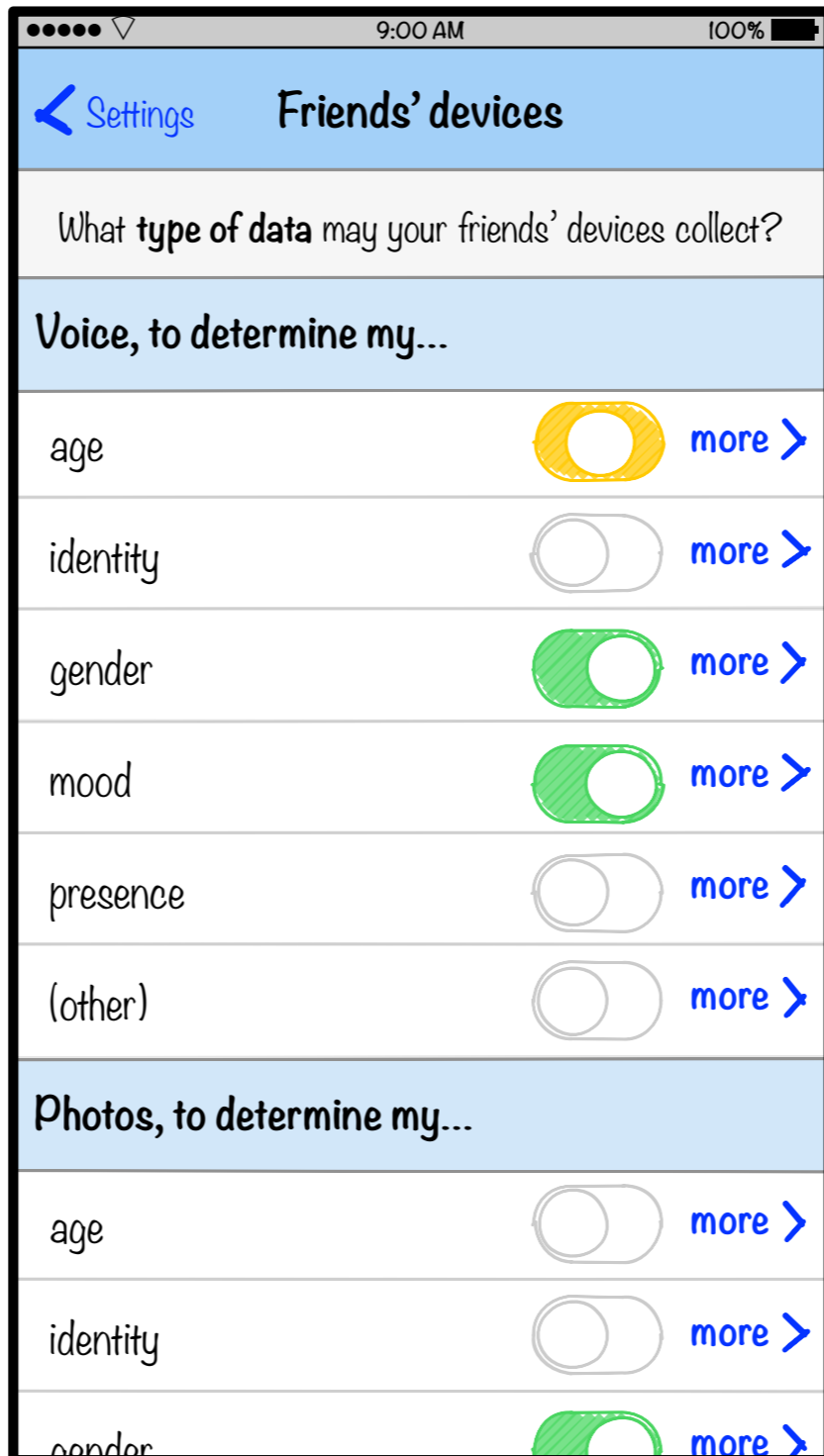
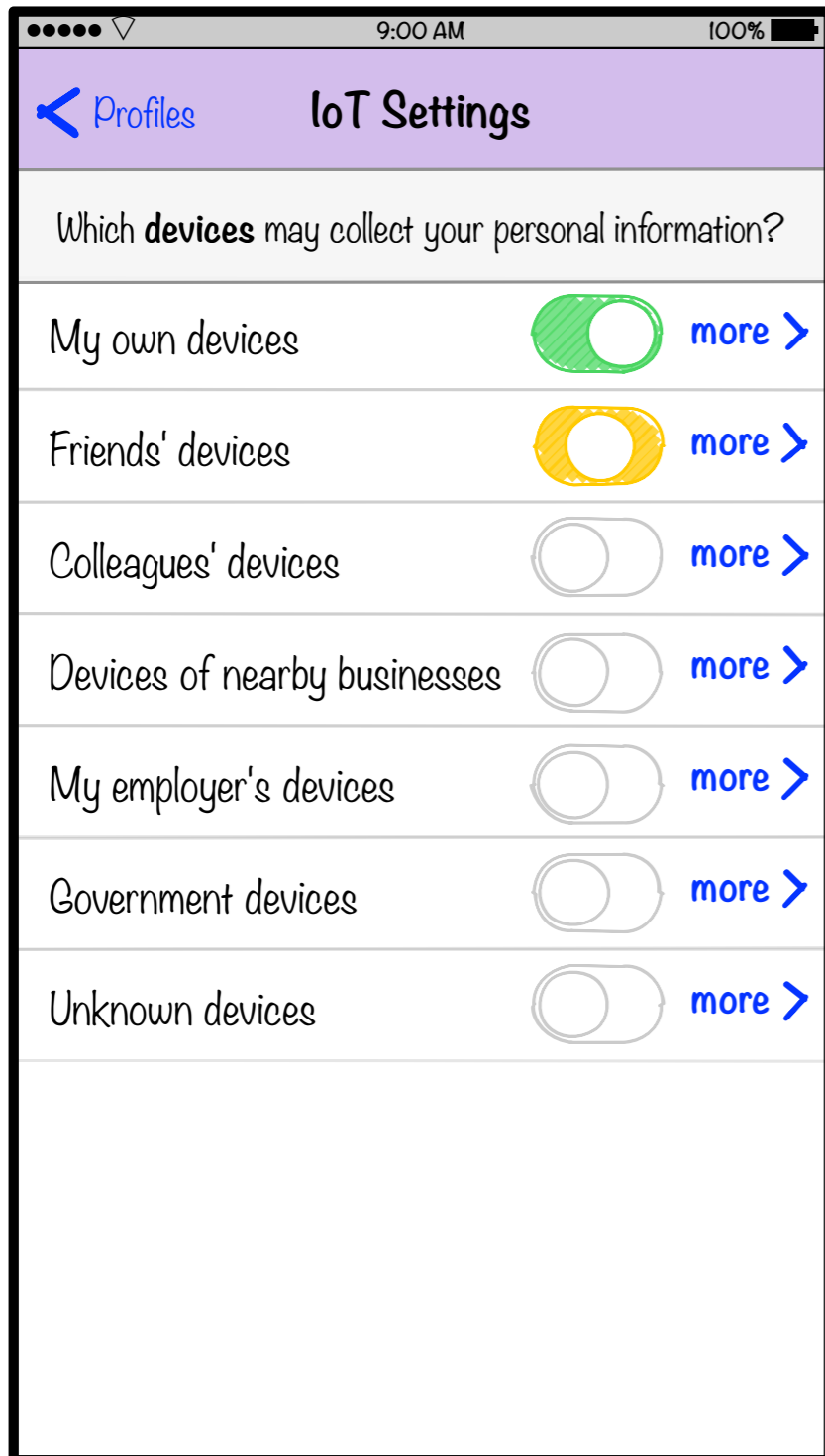
What parameter should be at the **top**?

What has the **most influence** on the user's decision?

Regression modeling to determine parameter order

Result: who > what > why > when > ~~where~~

Bahirat et al. (2018) "A data-driven approach to developing IoT privacy-setting interfaces"



Results

What about the **default setting**?

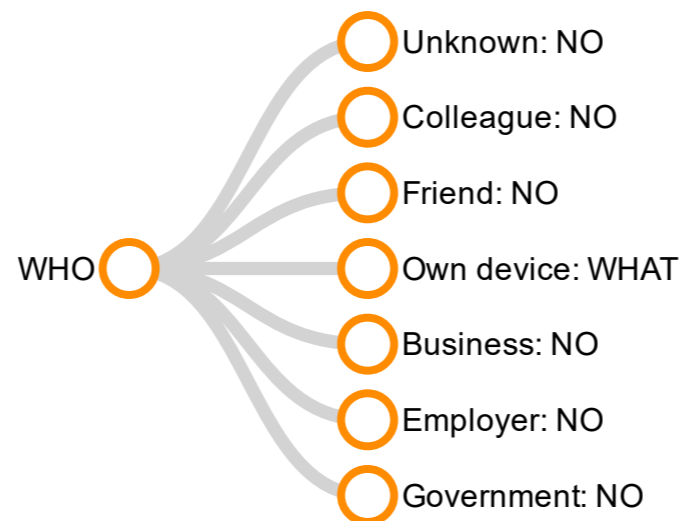
Everything **on** by default: 28% correct

Everything **off** by default: 72% correct

What if we make our **best guess**?

Predict based on who, what, where, when, why:

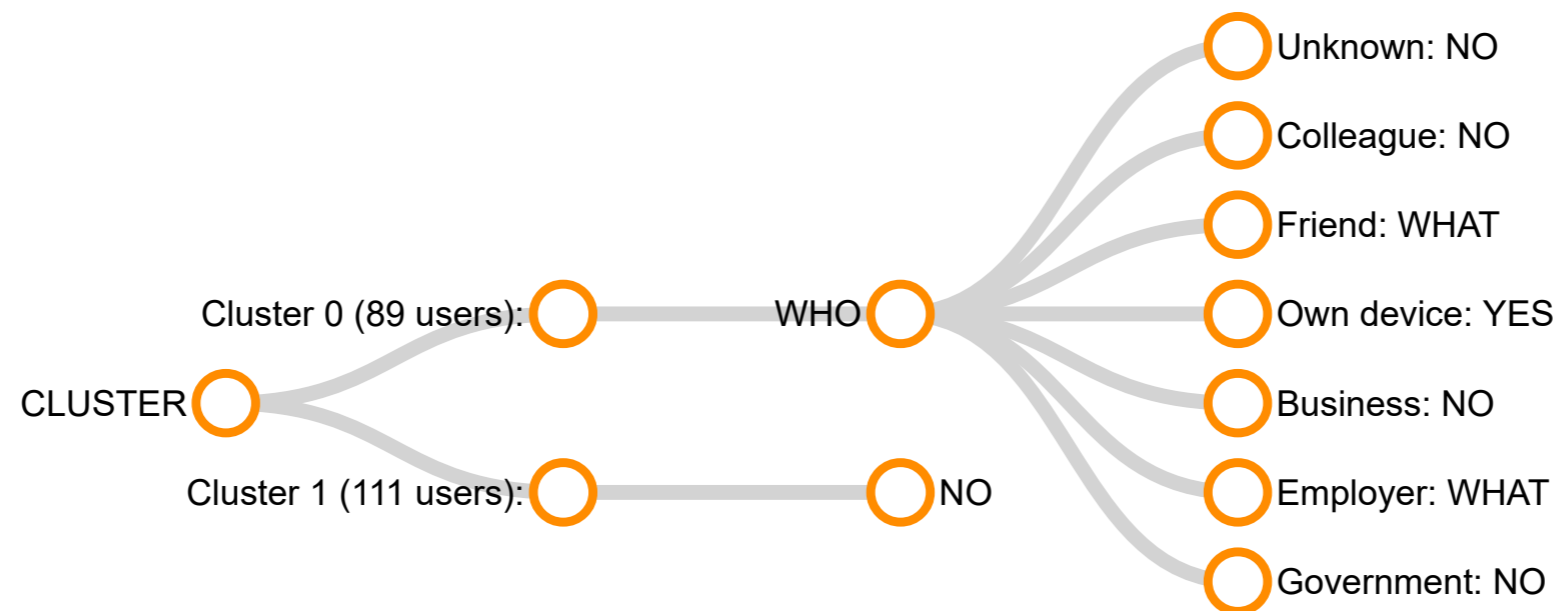
75% correct



Results

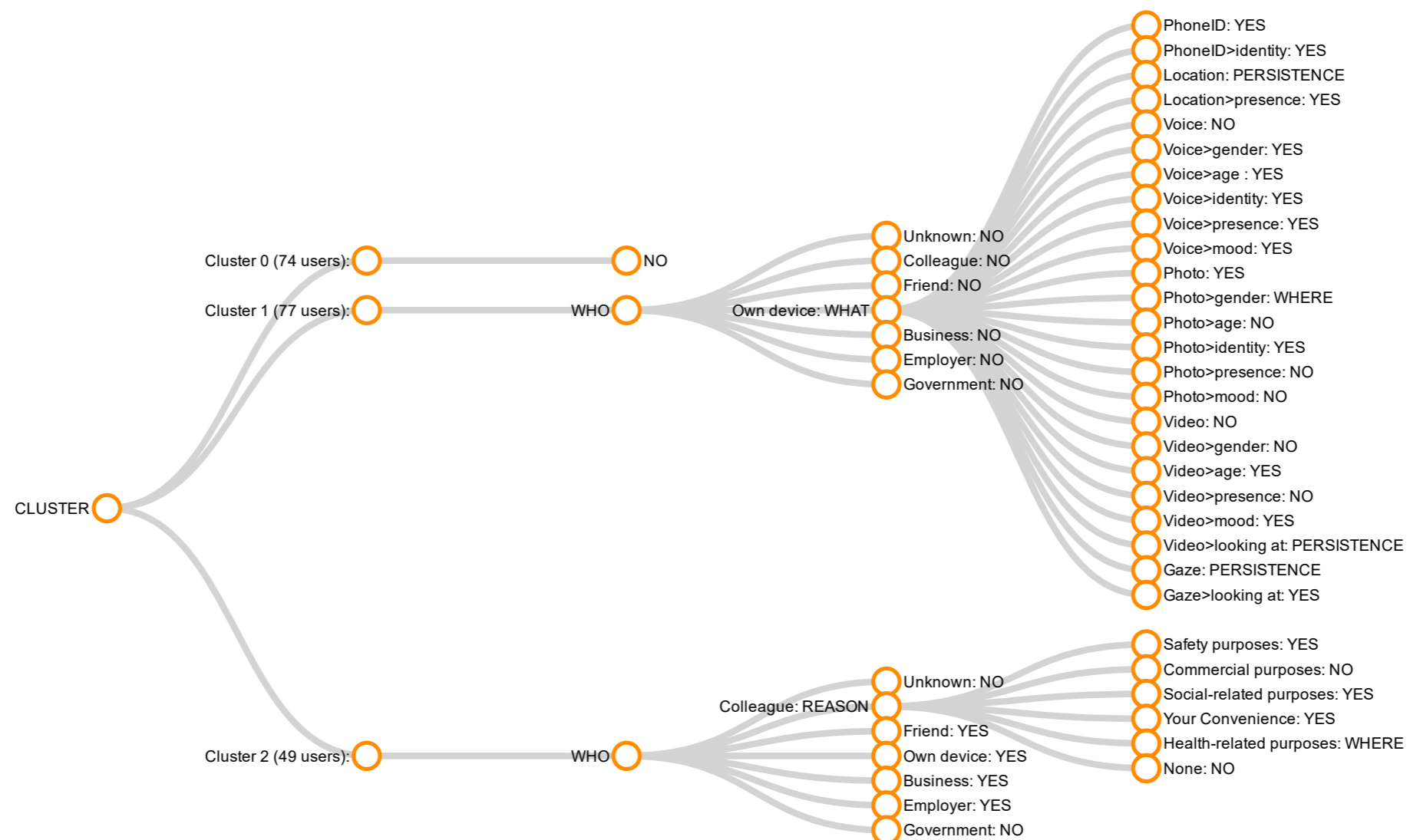
Divide participants based on overall attitudes?

Two profiles: Correct 77% of the time!



Results

What if we divide participants **on the fly**?
Three profiles: Correct 82% of the time!



Step 1: choose a profile

Default profiles

Please select a profile
(you can change individual settings on the next screen)

Limited collection ✓

This profile allows the collection of:

- any data by the your own devices, your friends' devices, your employer/school's devices, and devices of nearby businesses
- any data by your colleagues' devices, but only for certain reasons

[learn more...](#)

Limited collection, personal devices only

This profile allows the collection of:

- certain types of data by the your own devices

No collection

This profile prevents the collection of any data

[next >](#)

IoT Settings

Which devices may collect your personal information?

My own devices	<input checked="" type="checkbox"/>	more >
Friends' devices	<input type="checkbox"/>	more >
Colleagues' devices	<input type="checkbox"/>	more >
Devices of nearby businesses	<input type="checkbox"/>	more >
My employer's devices	<input type="checkbox"/>	more >
Government devices	<input type="checkbox"/>	more >
Unknown devices	<input type="checkbox"/>	more >

Friends' devices

What type of data may your friends' devices collect?

Voice, to determine my...

age	<input type="checkbox"/>	more >
identity	<input type="checkbox"/>	more >
gender	<input checked="" type="checkbox"/>	more >
mood	<input checked="" type="checkbox"/>	more >
presence	<input type="checkbox"/>	more >
(other)	<input type="checkbox"/>	more >

Photos, to determine my...

age	<input type="checkbox"/>	more >
identity	<input type="checkbox"/>	more >
	<input checked="" type="checkbox"/>	more >

Voice - age

For what purpose may your friends' devices record your voice to determine your age?

Safety

never	✓
once	
continuously	

Health

never	
once	✓
continuously	

Convenience

never	✓
once	

Step 2: adjust the default settings

A group of approximately 12 diverse individuals, including men and women of various ethnicities, are smiling and posing for a group photo. They are standing in front of a modern house with light-colored siding and a dark door. The group is arranged in several rows, with some individuals in the foreground looking directly at the camera. The overall atmosphere is positive and collaborative.

Conclusion

Next steps in usable privacy research.

My contribution

I argued that privacy scholars need to move beyond the “one-size-fits-all” approach to privacy

I presented the idea of “**design for elaboration**”, which:

Aims to increase **motivation** and **self-efficacy**, thereby encouraging people to **think slow**

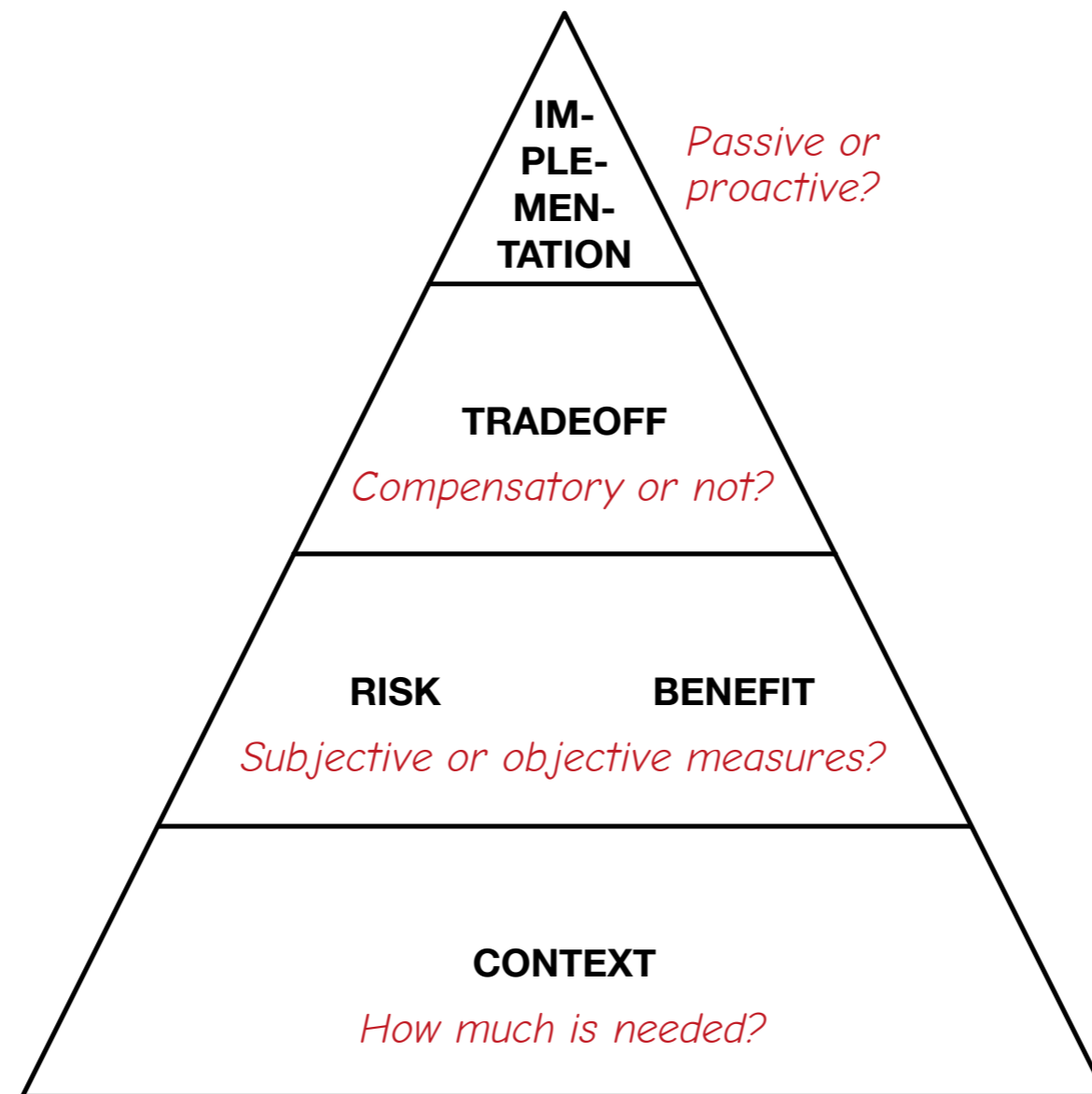
Nudges people to take control of their own privacy

I presented the idea of “**user-tailored privacy**”, which:

Provides **realistic empowerment** by relieving some of the burden of controlling privacy, while at the same time respecting each individual’s preferences

Refrains from making moral judgments about what the “right” level of privacy should be

Future research questions



Knijnenburg et al. (2017) "Death to the Privacy Calculus"