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# Human Factors in Big Data Privacy

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If you are not paying

you are the product



Mobile Computing



Social Networking



# Many Interested Parties





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in

1

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by **Chris Brook**

September 9, 2014, 1:17 pm



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## 12 Most Abused Android App Permissions

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PRIVACY & DATA PROTECTION

### Free mobile apps a threat to privacy, study finds

Warwick Ashford  
Wednesday 31 October 2012  
11:04



- Just in the last two years the number of photos uploaded to Facebook per month has risen from **2 billion to over 6 billion**
  - While one's own media is uploaded consciously,
  - the flood of media uploaded by others is so huge that it is almost impossible to stay aware of all media
  - **and most isn't relevant anyway.**
- 
- We have a Big Data privacy problem
    - on the users side
    - not on the provider side.





- Microsoft's Scott Charney offered a very good example during his Keynote speech at the RSA Conference 2012:

*If a friend takes a picture of me during a volleyball game, shares this picture with other friends and one of them uploads the picture to the web, my insurance company can find and use that picture against me.*





- There have been reports that insurance companies are looking for just such information which could raise premiums or even deny claims.<sup>1</sup>
- The same is true for banks and credit rating companies.<sup>2</sup>



1 <http://abclocal.go.com/kabc/story?section=news/consumer&id=8422388>

2 <http://www.betabeat.com/2011/12/13/as-banks-start-nosing-around-facebook-and-twitter-the-wrong-friends-might-just-sink-your-credit/>



# Data & Meta-Data



1. Associate photo to person
  - Non-technical: person is recognizable on photo
  - **Technical: image metadata contains link (name, unique**



- Metadata increasingly is automatically added and users may not be **aware of embedded metadata.**



**Molly the Cat via iPhone 2** 800x600 Pixel | image/jpeg | 181 kByte



People

Location

**EXIF**

Lat: 41.99317  
Lng: -88.17817



Date & Time

Date/Time Digitized  
2009:01:20 22:23:13

Date/Time  
2009:01:21 10:20:18

Content

Modell  
iPhone



flickr

Sie

Ich folge

Communities

Entdecken



2012-06-16b - Zara top

2012-06-16b - Zara top



Kommentar hinzufügen



Complexity is the worst enemy of security

- Systems are getting ever more complex

We have the technology to make – almost – everything secure

- We just don't have the people to do it properly

We have two options:

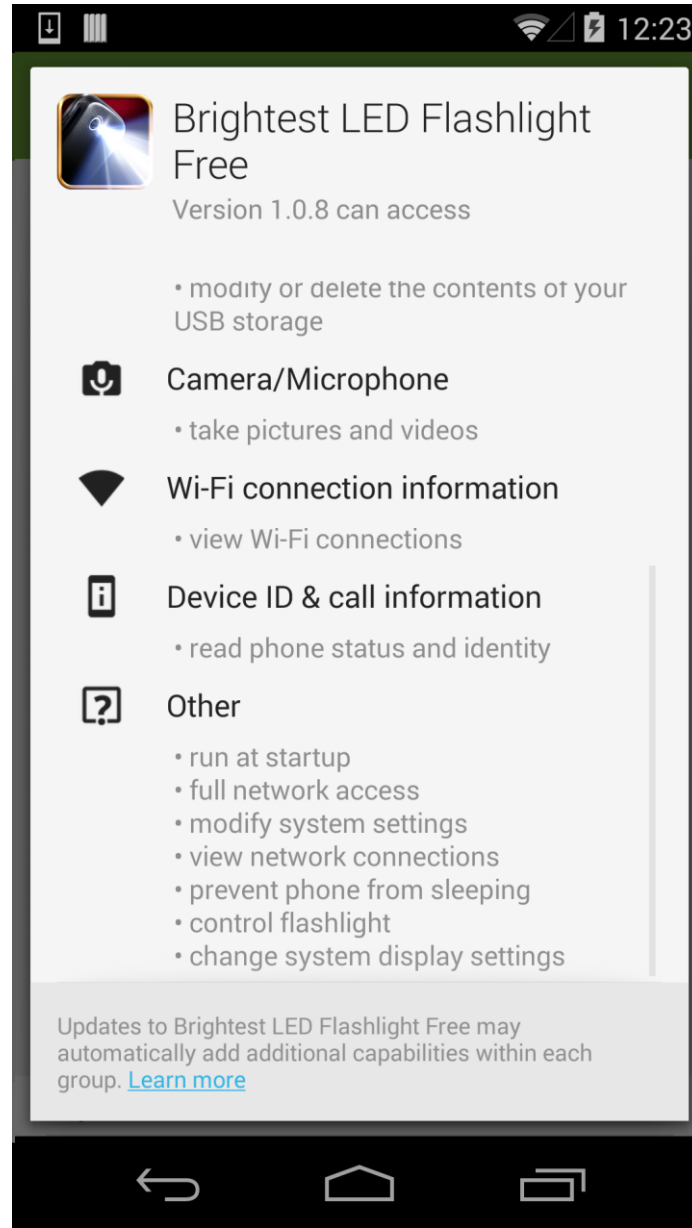
- Create more secure humans
- Create more usable technology

Creating Awareness at Point of “Sharing”





# Android Permissions



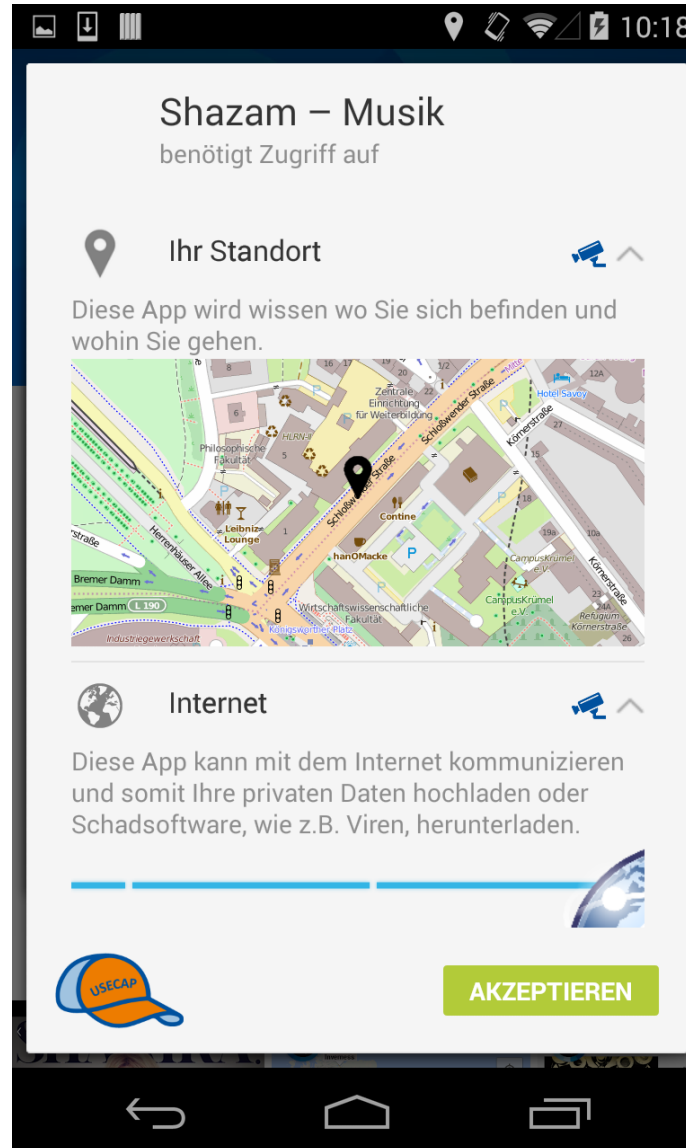


We have two options:

- Educate users about permission (good luck with that)
- Create a more intuitive way of communicating with users

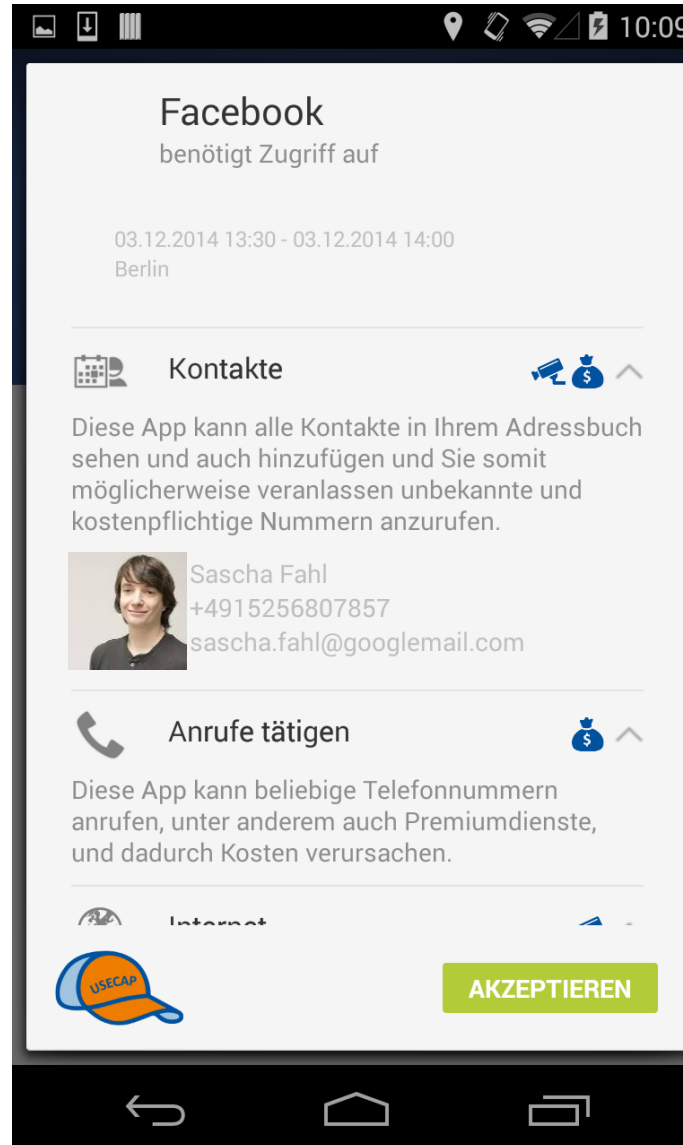


# Personal Warnings





# Personal Warnings





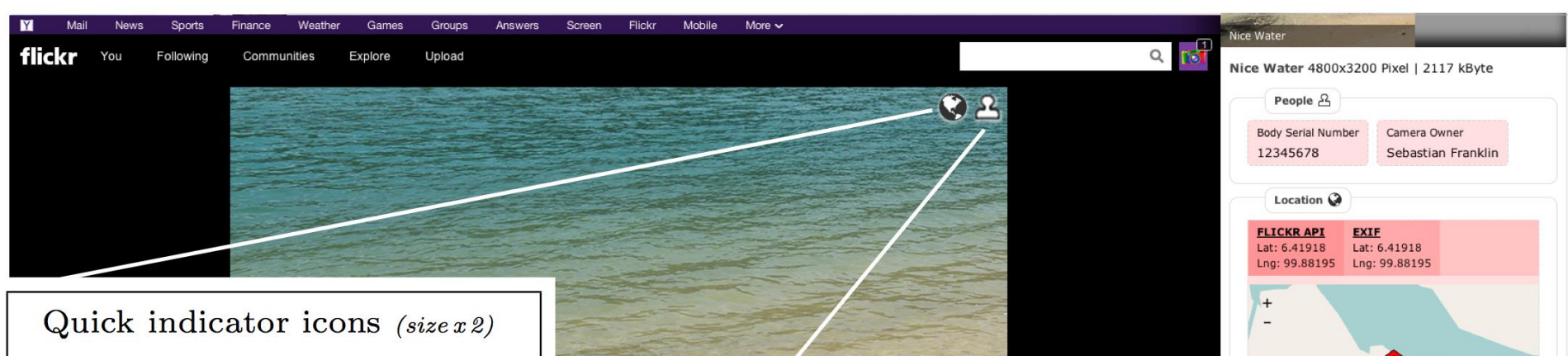
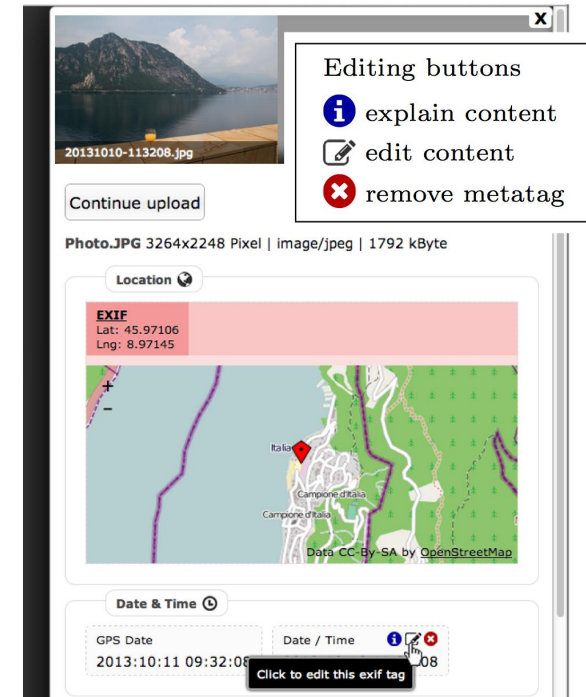
- Lab Study
  - N=36, 12 female, 19-30 years old
- Online Study
  - N=332, 128 female, 18-64 years old
- Installed mockup app on personal device (lab) or Web-based Play Store mockup (online)
- Each participant was asked to choose between two apps in six categories
- One app requested more permissions than the other
  - having similar functionality, ratings, and visual appeal

- “Omg, it can see my photos? I don't want that!  
*This scares me a bit...*”
- “Now *I understand what this „phone status“ permission means*. I did not get that before. I'll be more careful in the future!”
- “The new system is a lot better. I'd prefer to use it in the future because it helps me to *understand whether a permission might be necessary or not.*”




# Chrome Meta-data Extension

- Visualize relevant meta-data
  - Browsing mode
    - Raise awareness
    - Useful for positive meta-data
  - Upload mode
    - Interrupt upload process
    - Visualize meta-data
    - Help remove/edit/encrypt meta-data
    - Enable users to make conscious choice











20131010-113208.jpg

Editing buttons


-  explain content
-  edit content
-  remove metatag

Continue upload


**Photo.JPG** 3264x2248 Pixel | image/jpeg | 1792 kByte

Location 




**EXIF**  
Lat: 45.97106  
Lng: 8.97145




Data CC-BY-SA by [OpenStreetMap](#)

Date & Time 

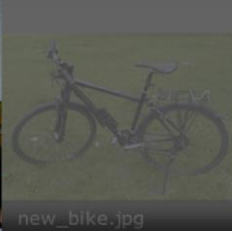
GPS Date  
2013:10:11 09:32:08

Date / Time    08

Click to edit this exif tag



grandma-visit-08.jpg




new\_bike.jpg

Continue upload


Continue upload; encrypt metadata

**grandma-visit-08.jpg** 1088x1672 Pixel | image/jpeg | 1704 kByte

People 

Person tags


**Name:** Sebastian

Location 

Sub-Location  
Augusta Street

City  
Linden

Province/State  
Wisconsin

Content Description 

Caption  
Grandma on a visit

Delete ALL metadata

Show all metadata

- Lab study with 43 attendees
  - 62.8 % of the participants were female
  - 37.2 % were male
  - Average age was 24
- How much does the new feature improved awareness about what is shared with their photos.
  - 4.5 on a 5 point likert scale (5 very much)
  - with 69% answering very much.
- Same question about control of what is shared,
  - 4.3
  - with 55 % answering very much.

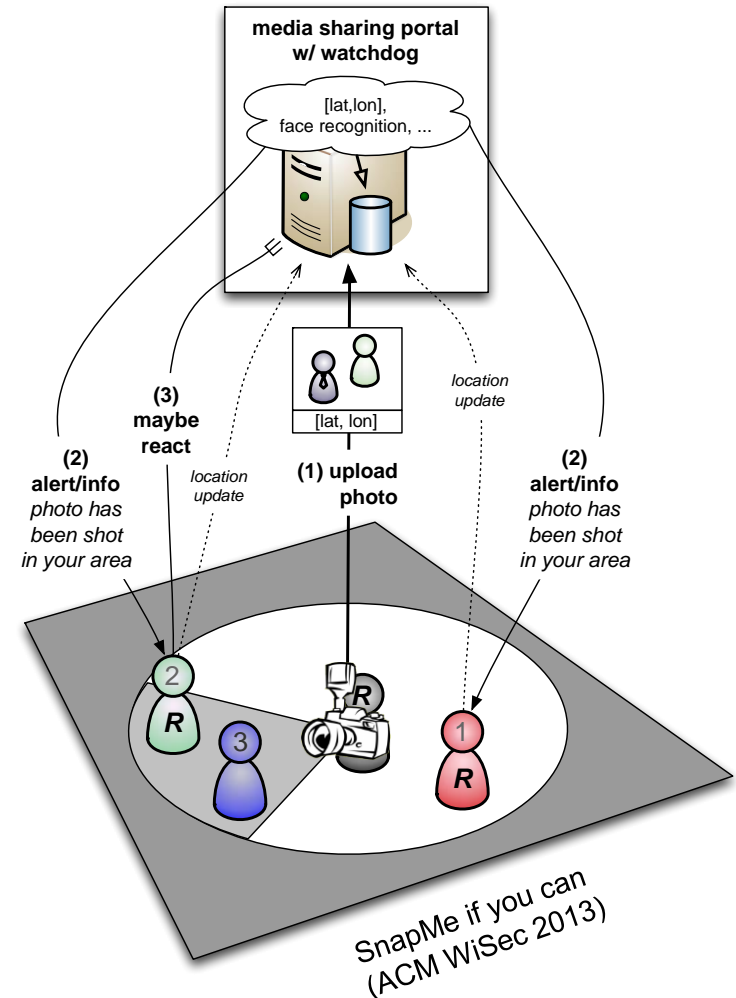
Staying on top of the big-data deluge

(what do others share about me?)

- Just in the last two years the number of photos uploaded to Facebook per month has risen from **2 billion to over 6 billion**
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*Users define private locations on a map or update their current location at the service using a LBS. Based on co-location checks of users' location and the location information of photos uploaded to the SNS via the service, the service notifies users who may be depicted in a photo based on respective locations.*



Online Survey with 414 participants:

- *“I am less upset if someone finds out where I have been than if that person gets to see private photos of myself.”*
  - *mean 3.0 (sd=1.7); 66.2 % agreed, 15.7 % neutral*
- *“I am less upset if my SNS knows where I have been than if my friends and strangers gets to see unwanted photos of myself.”*
  - *mean 3.3 ( sd=1.8); 60.4 % agreed, 16.2 % neutral*
- *“If there is a privacy service that notifies me about unwanted photos in which I am depicted but needs to know where I have been, I would use it. I would tell it where I have been to get to see potential photos of myself.”*
  - *mean 3.7 (sd=1.8); 53.2 % agreed, 16.1 % neutral*



- What goes on behind the (cloud) curtain?



- And how do we make that transparent & understandable?