

# Going Beyond Access Control in Online Social Networks

**Barbara Carminati**

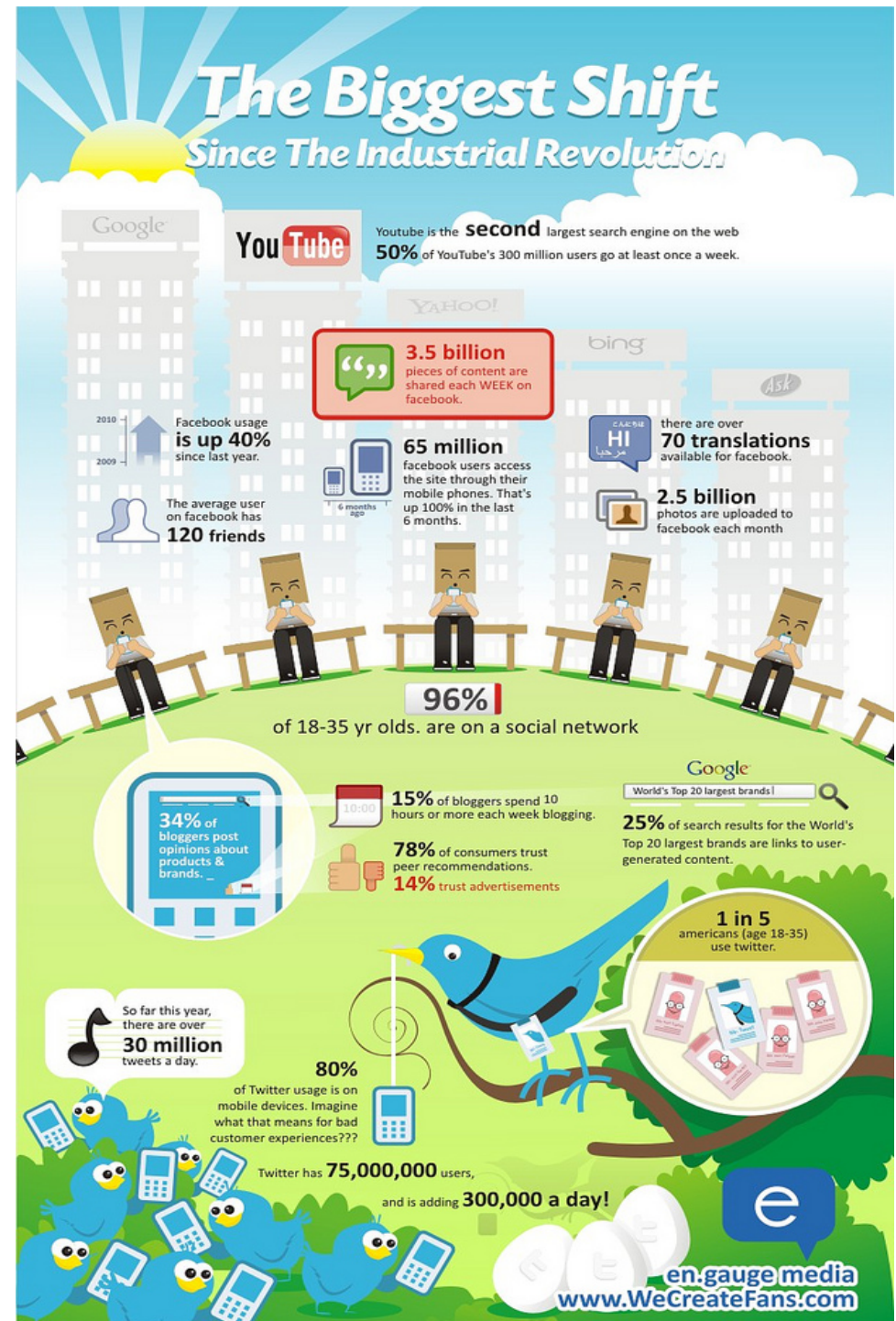
University of Insubria – Department of Theoretical and Applied Science

StrictSocialLab <http://strict.dista.uninsubria.it>

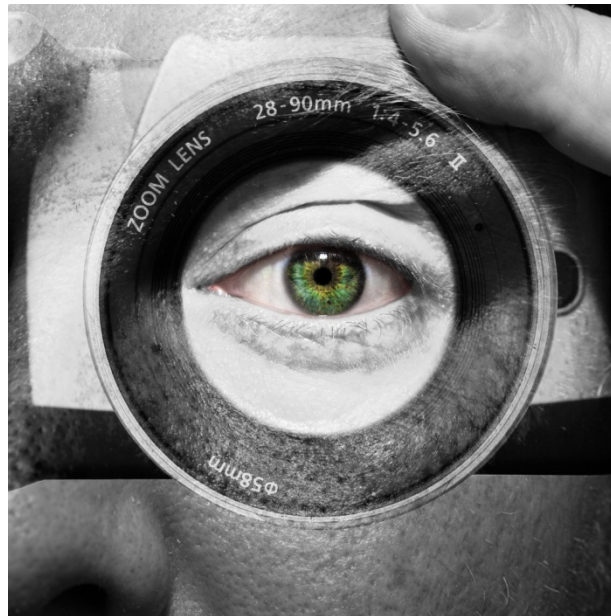
Interdisciplinary Workshop on Data Privacy 2015

# On-line social networks

According to some,  
it is “the biggest shift”  
since the industrial  
revolution!

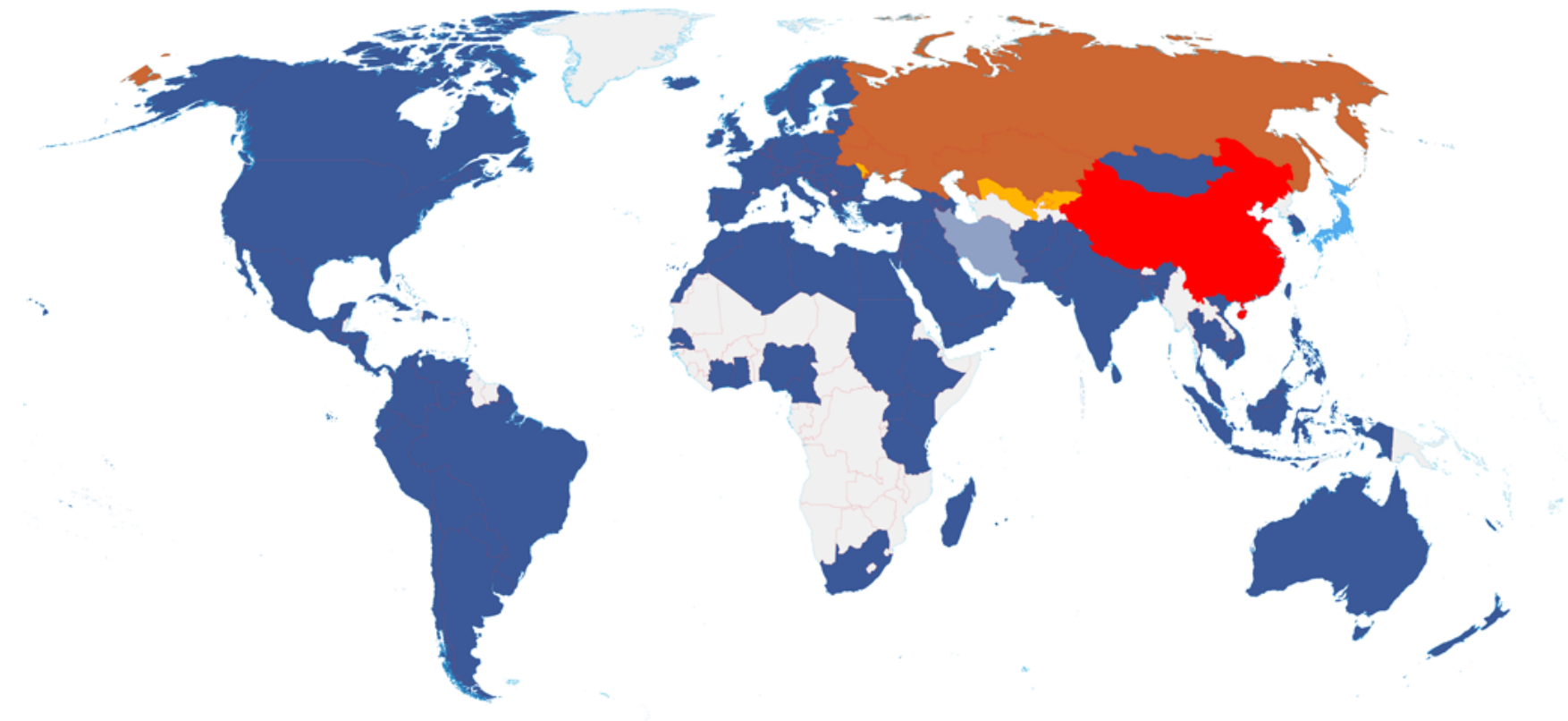


# Let's start with some statistics...



# WORLD MAP OF SOCIAL NETWORKS

August 2015



Facebook

QZone

V Kontakte

Odnoklassniki

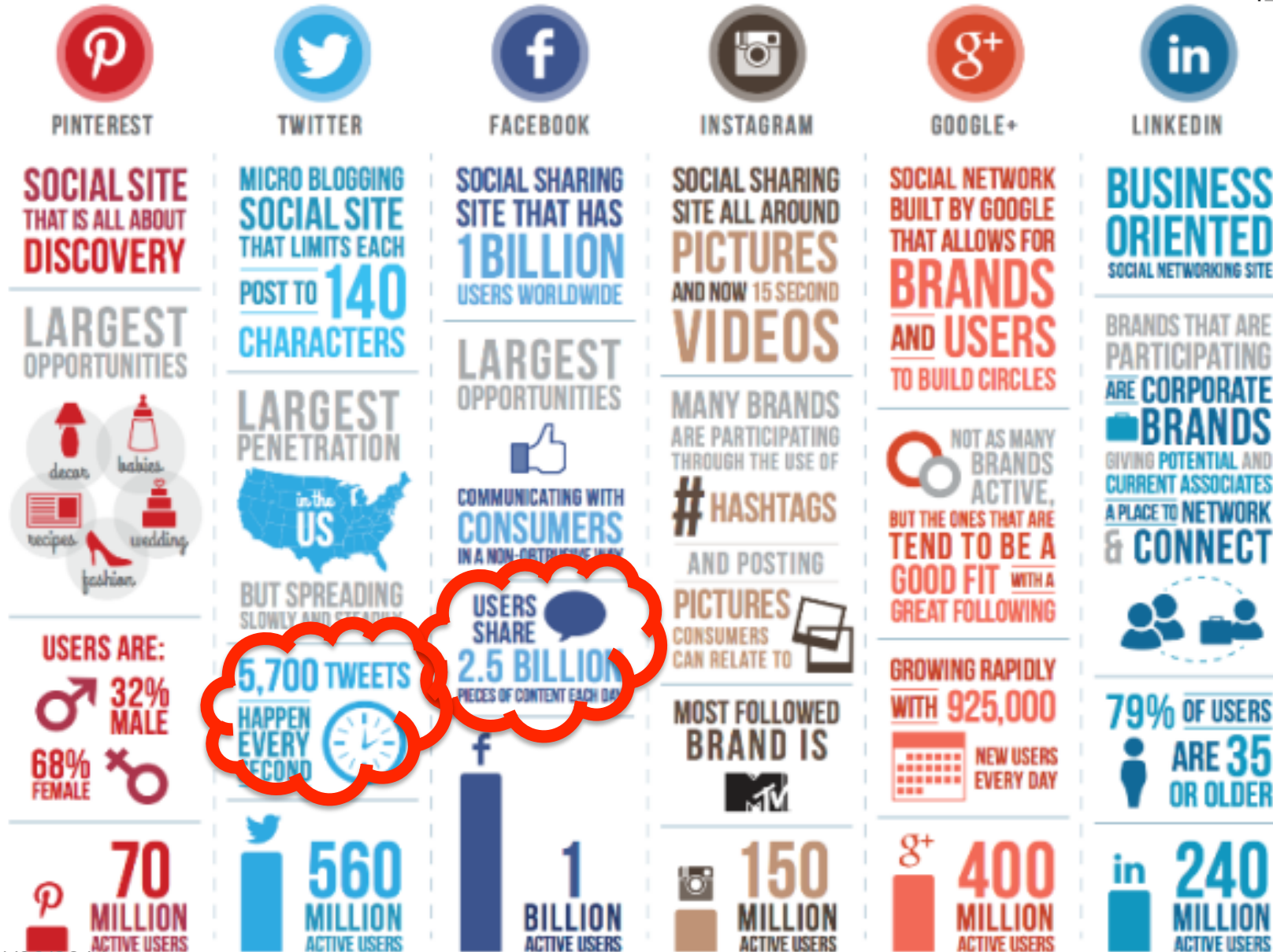
Twitter

Facenama

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01/06/2014

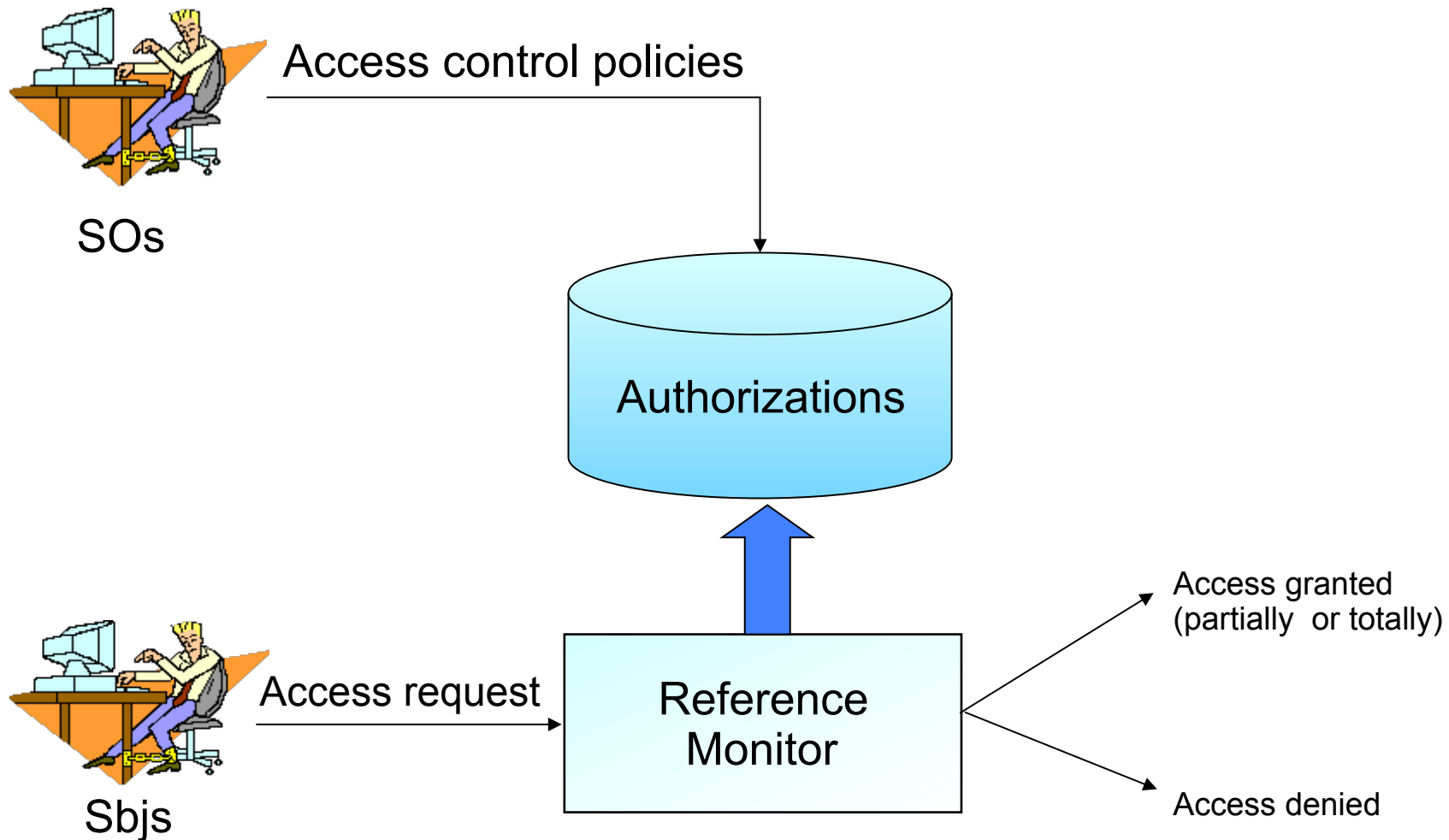


# OSNs: why access control?

- Given this figures... there is clearly a big need for maximizing information sharing but keeping it selective



# Access control: old style



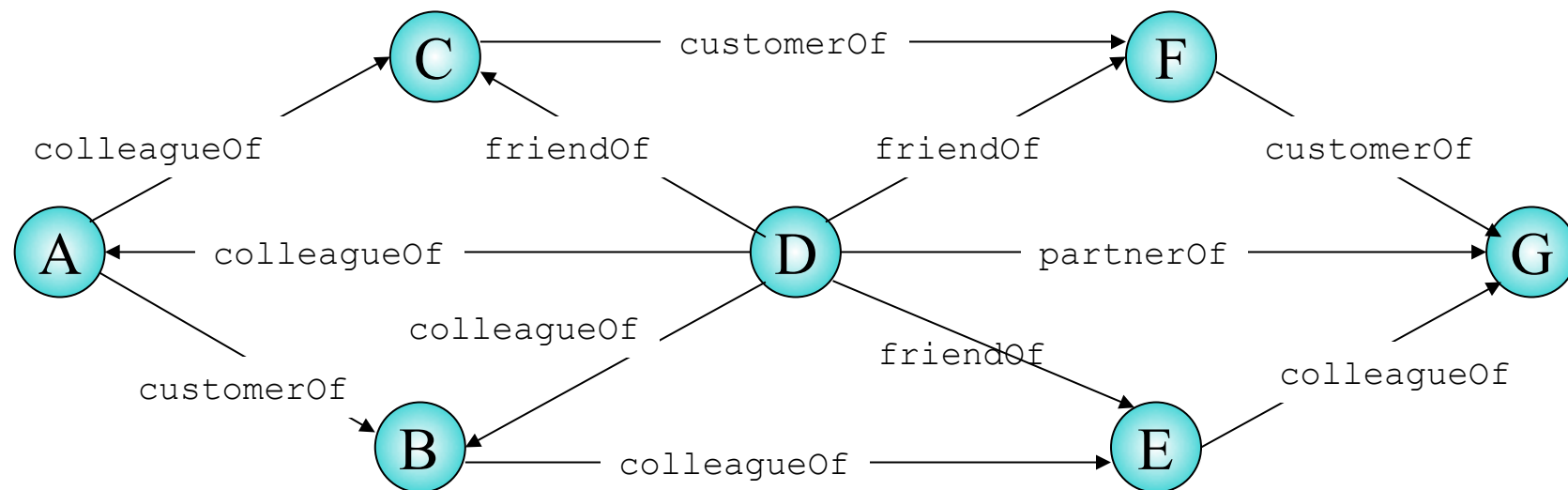
# From relational data to OSNs

- OSN as a graph
- Each person is a node
- Each relationship is an edge
- E.g., Alice is a friend-of Bob





# OSN graph



# What has been changed?

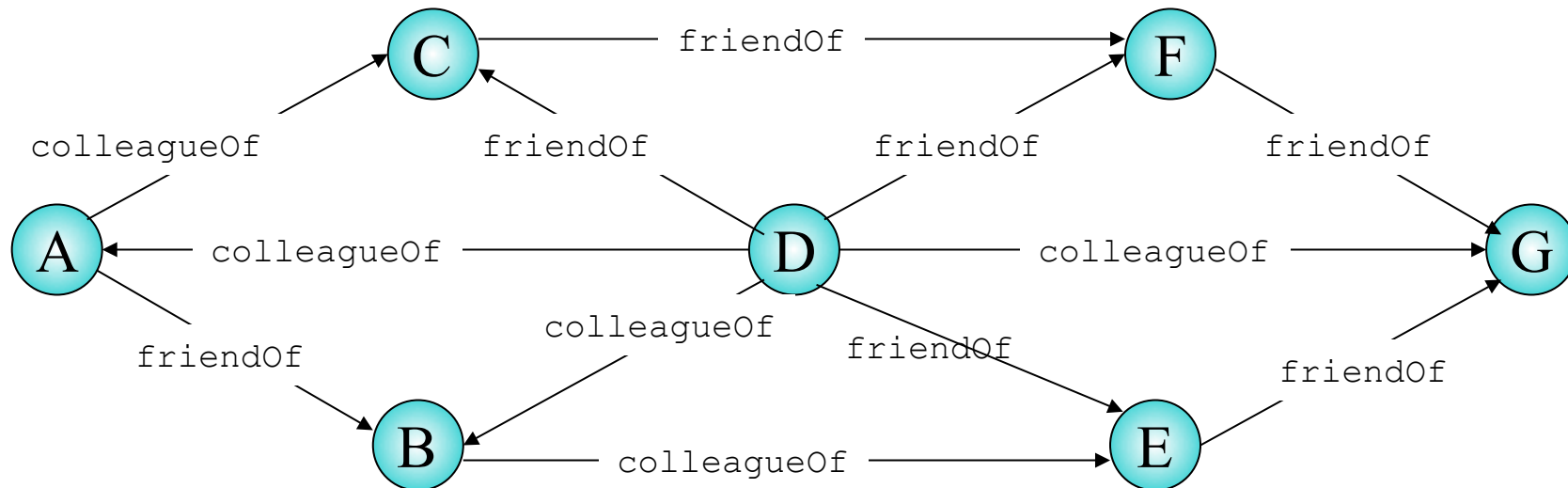
- Authorized users are identified by posing constraints on relationship in the OSN graph



Relationship-based Access Control

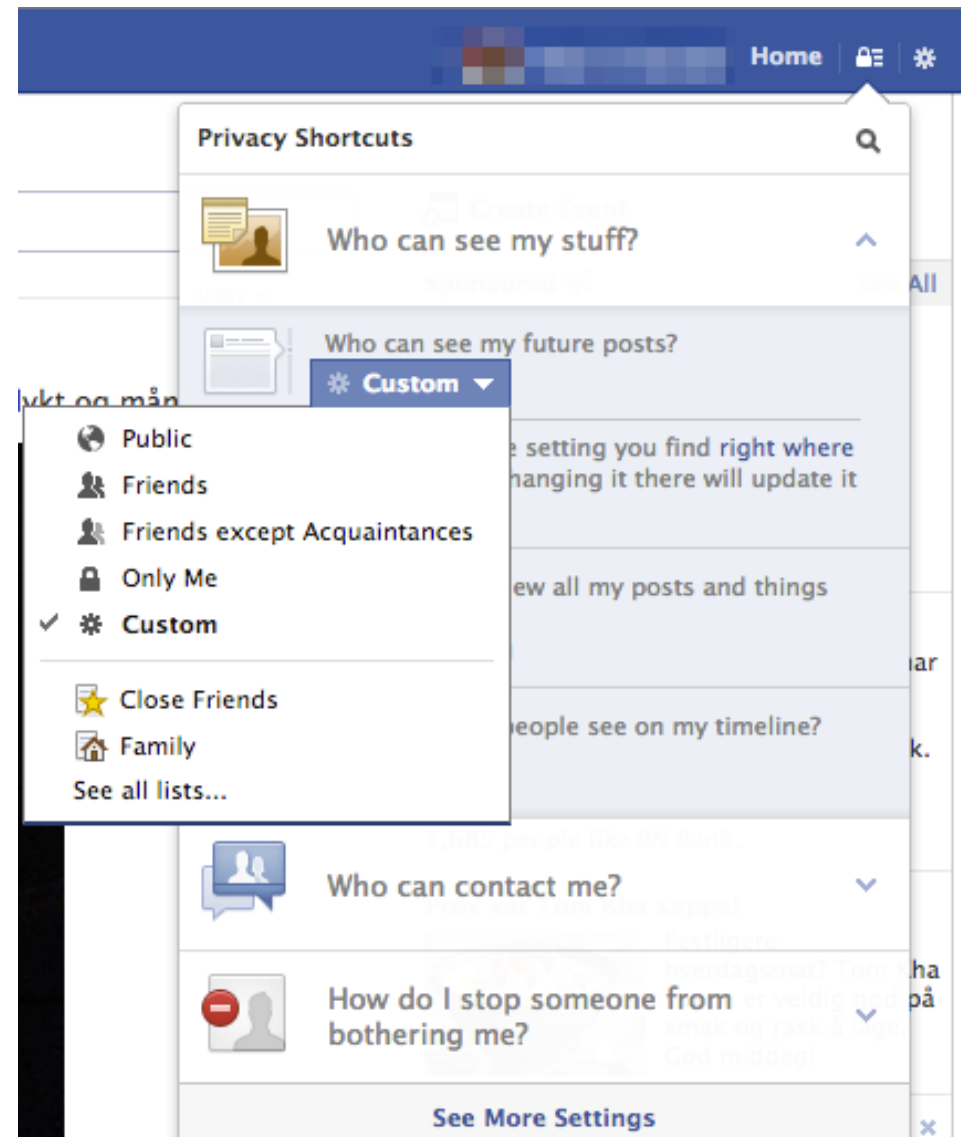
# ReBAC

D's resources can be accessed only by D's direct and indirect friends

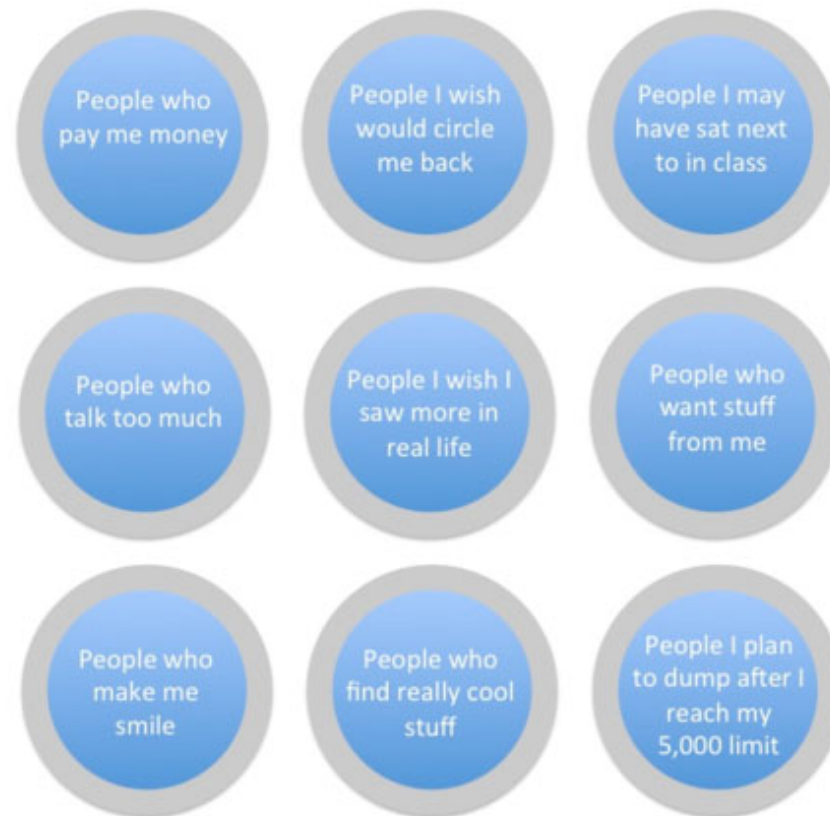


**(D, friendOf, 2)**

# FB privacy settings



# G+ circles



[fuckyeahalbuquerque.tumblr.com](http://fuckyeahalbuquerque.tumblr.com)

Google+

# Data Protection in Social Networks: Going Beyond Access Control

- Privacy settings of many commercial OSNs are based on ReBAC,
- but is ReBAC the solution?

No

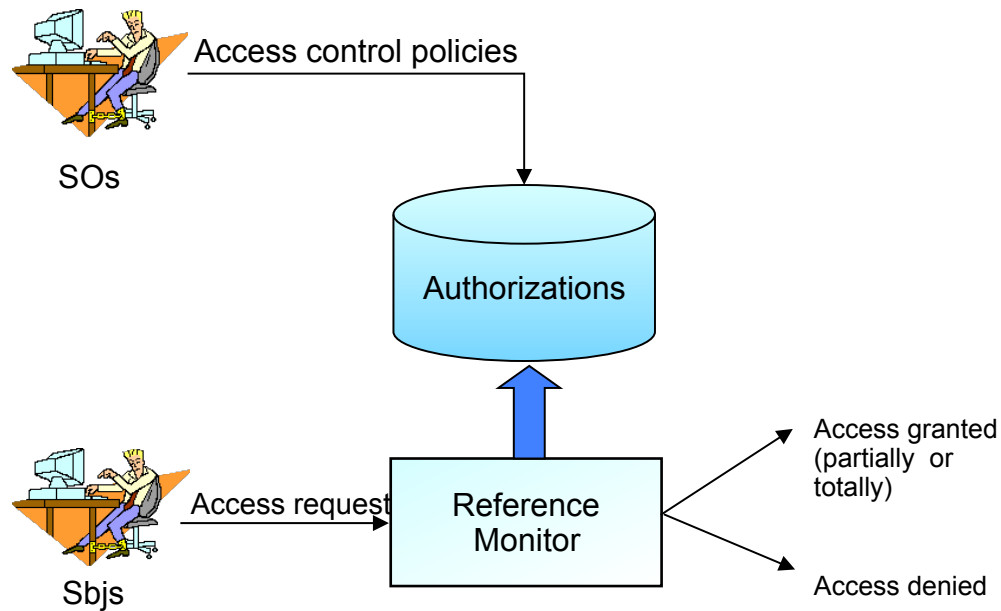
- Let see some open questions





# ReBAC: is this the solution?

- OSN architecture:





# ReBAC: is this the solution?

- OSN architecture:
  - Can we trust the OSN provider?



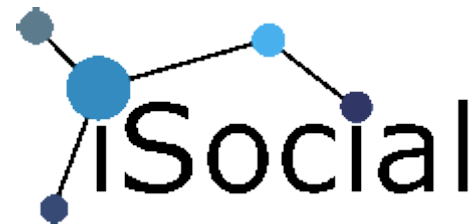
# Who is the Boss?

- Conventional thinking is that OSN users must be willing to give up on privacy
- In free online services:
  - You're not the customer.**
  - The ad service is the customer.**
  - You're the commodity.**

# Decentralized OSNs

- Diaspora, OneSocialWeb, Persona, Vegas, SoNet, PeerSoN, Safebook, LifeSocial, Cachet...

- iSocial



EU Marie Curie ITN project  
(FP7-PEOPLE-2012-ITN)

<http://isocial-itn.eu/>



# ReBAC: is this the solution?

ReBAC enforcement:

Alternative access control solutions in the scenario of untrusted SN providers

– Decentralized

- It better preserves confidentiality/privacy of user data but...
- It requires decentralized path discovery and management of off-line nodes
- If relationship privacy should be preserved, there is the need of exploiting (costly) cryptographic solutions



# ReBAC: is this the solution?

ReBAC model limitations (OSN resources):

- users create joint content
  - Alice uploads a photo, Bob tags it to say that Dave appears in it and Ann comments on Bob's tag
- OSN users can reference other users in resources; and it is generally not possible for a user to control the resources published by another user
- We need collaborative access control mechanisms





# ReBAC: is this the solution?

ReBAC model limitations (OSN users):

- Many empirical studies show that:
  - Average social network users have trouble specifying detailed access control policies for their data with today privacy settings
  - As a result, very often they do not change the default privacy settings that are very permissive
- We need something much more usable

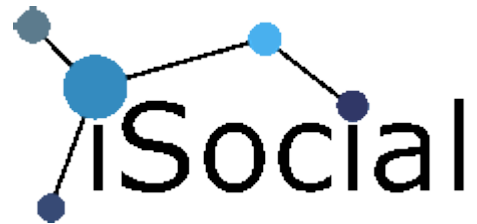


# ReBAC: is this the solution?

## ReBAC model limitations

- Current solutions are mainly designed focusing on direct contacts only
- We cannot assume that friends will make the right choices about friendships, because friends may have a different view on people they want to be friends with
- We need alternative parameters on which release of information should be based
  - Trust?
  - Risks?
  - Others?





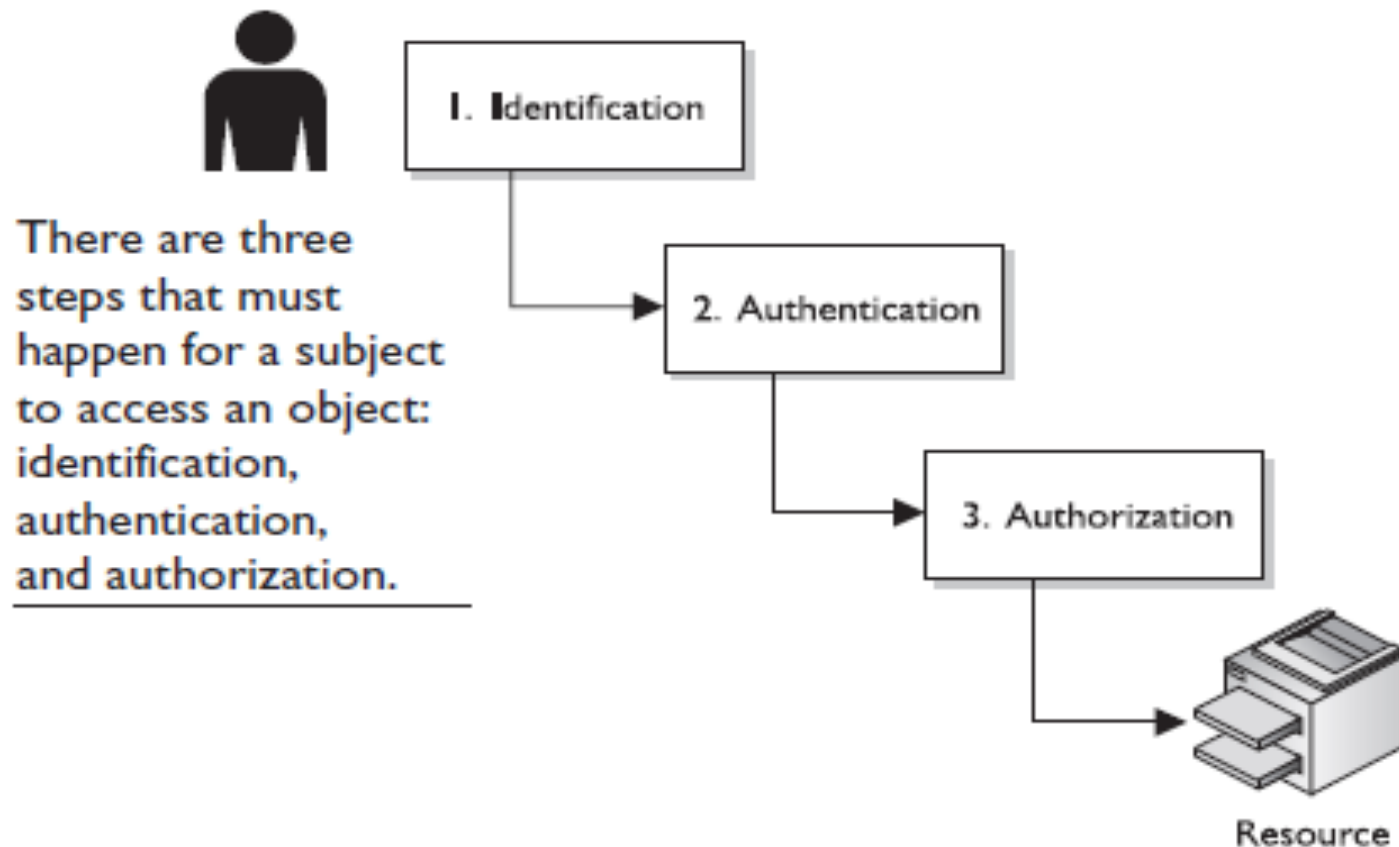
# Community-based Identity validation in OSN

Leila Bhari, Barbara Carminati, Elena Ferrari

In Proc. of the 34th International Conference on Distributed Computing Systems (ICDCS), June 2014.

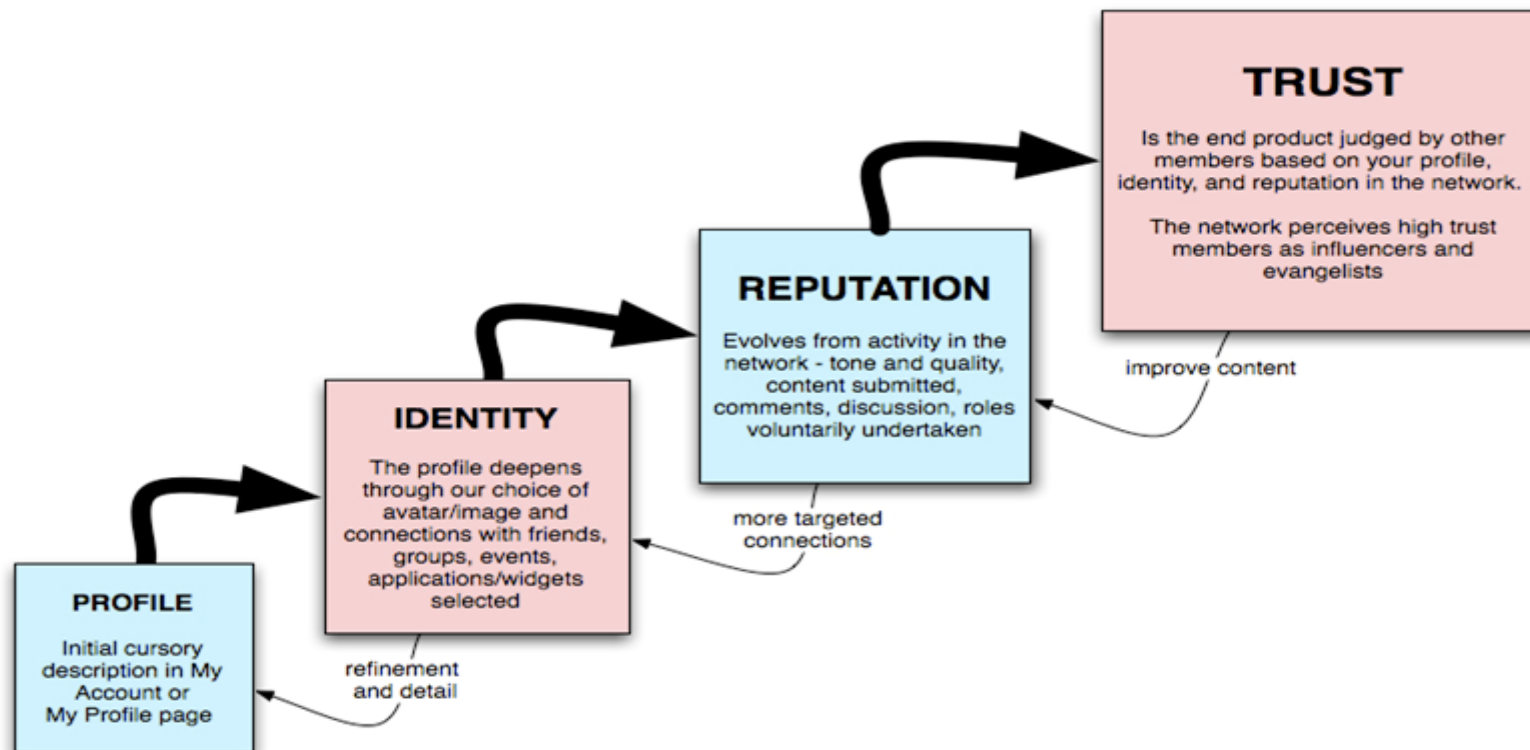
# Identity validation – what for?

1. It is the first step in **ACCESS CONTROL**



# Identity validation in OSN – what for?

2. It is a building block towards **REPUTATION & TRUST**



# But who I'm socializing with?

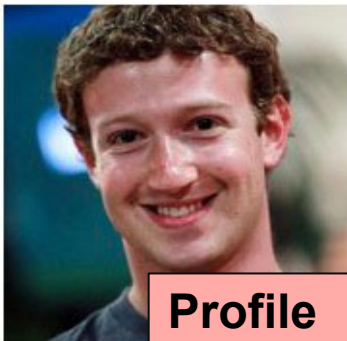
facebook

Search

Name?

Quick Bio?

Home Profile Account



Profile Picture?


Wall


Info


Photos (826)


Questions


Family

 Karen Zuckerberg  
Mother

 Edward Zuckerberg  
Father

 Randi Zuckerberg  
Sister

 Donna Zuckerberg  
Sister

 Arielle Zuckerberg  
Sister

## Mark Zuckerberg

Has worked at Facebook Studied Computer Science at Harvard University Lives in Palo Alto, California From Dobbs Ferry, New York Born on May 14, 1984



Education and Work

Employers

 Facebook  
Feb 2004 to present · Palo Alto, California  
■ [FBX Profile](#)

College

 Harvard University  
Computer Science · Psychology  
■ CS182. Intelligent Machines with Andrew Bosworth  
■ CS121. Introduction to Computational Theory with James Wang and Kang-Xing Jin

High School

 Ardsley High School

 Phillips Exeter Academy  
Class of 2002

Education? Job?

Philosophy

Favorite Quotes

"All children are artists. The problem is how to remain an artist once he grows up."

Send Message

Poke

You and Mark



3 Mutual Friends

Sponsored

Create an Ad

Police Auctions

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Like a slick deal? Now you can get up to 90% retail with police seized auctions. Get in on the action.

SF Bucket List

partners.livingsocial.com



Things to do in San Francisco before you die. One huge coupon emailed daily.

Stay close to your team



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Craft Beer Attorney

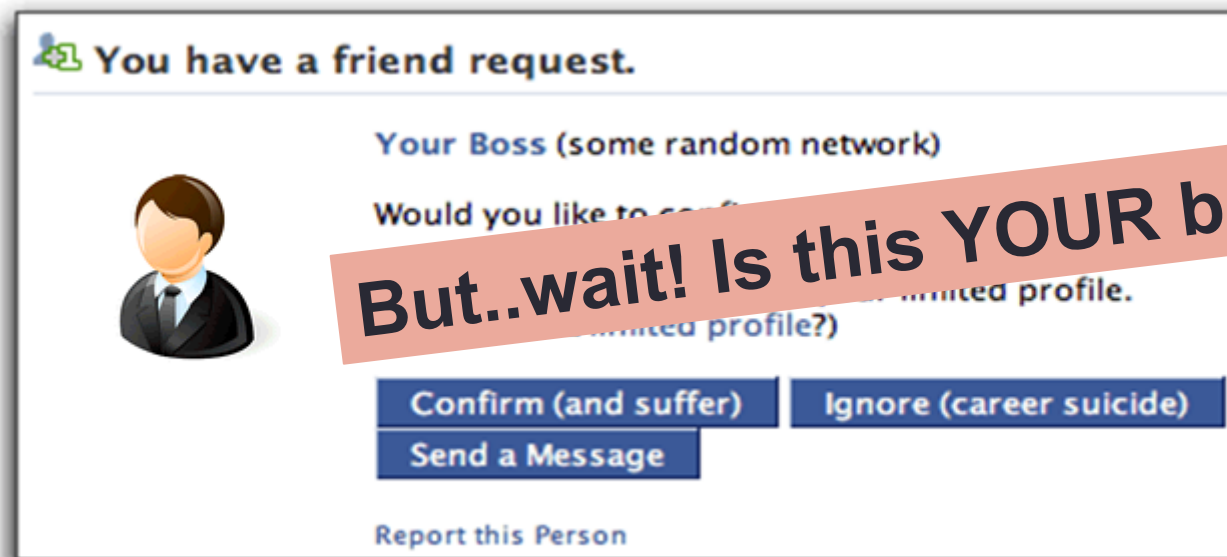


Need legal assistance with your California craft beer



# Our research perspective

Would you accept this request?



# Can the OSN help?



# But who I'm socializing with?

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Wall  
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 Photos (826)  
 Questions

Sor of  
 Coherence?!  
 these!

Education?  
 Job?

Personal preferences?

# But who I'm socializing with?

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Personal preferences?

Coherence?!  
 of  
 these!

Education?  
 Job?

## Some insights from sociology ...

- *“the final identity, [...] includes all significant identifications, but it also alters them in order to make a unique and reasonably **coherent whole** of them.”* Erik Erikson, as in Shwartz, 2011.
- *“The final formed identity converges to satisfy **consistency** with regard to some **socially assimilative** models.”* P. Schachter, 2004



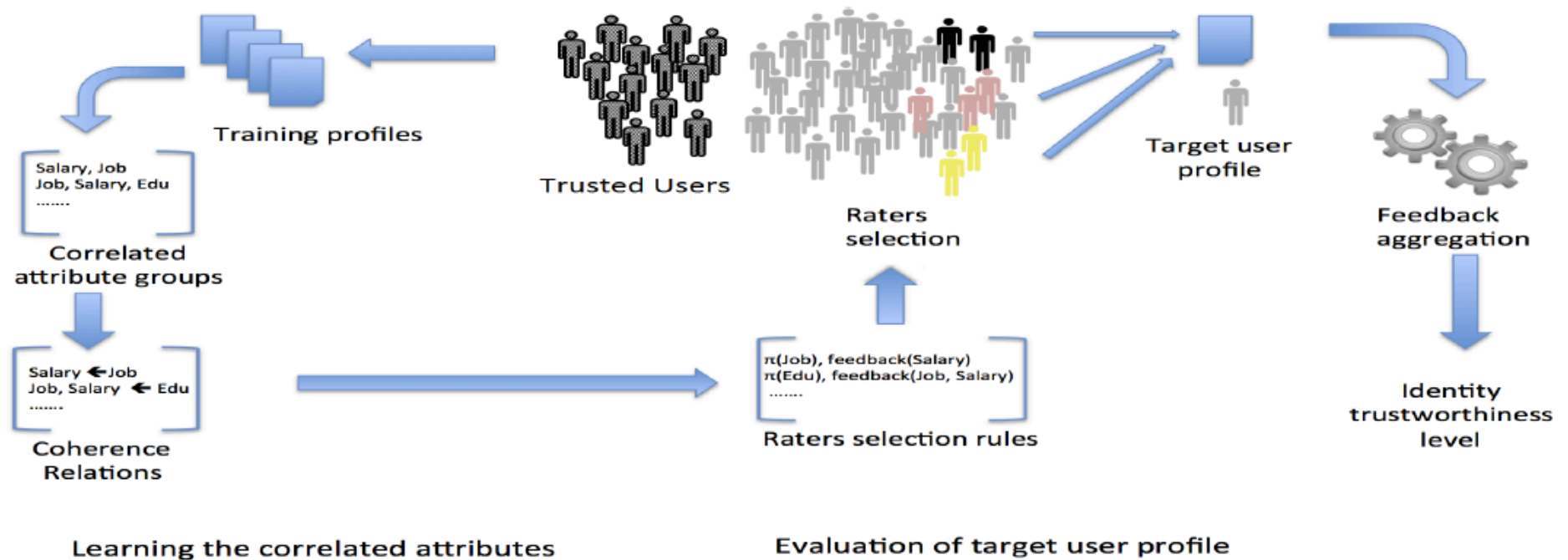
# Research Questions

- Can the OSN provide identity validity indications to users?
- Can we make use of the community?
- Can we rely only on profile information?

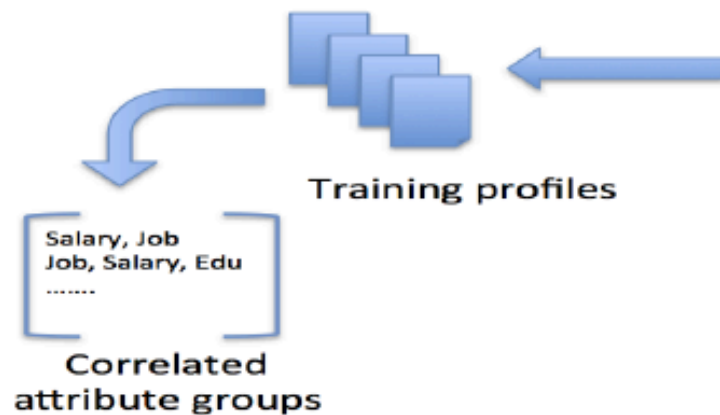




# Community-based identity validation



# Learning Phase



- not all attribute values are expected to be coherent.
- capturing the coherence of a profile requires **first finding those groups of profile attributes whose values are expected to be correlated.**
- We refer to these groups as correlated attribute groups

# Learning Phase



- we expect **more meaningful evaluation from raters who share the same ground** as per some of the values they are asked to provide their opinion on.
- We propose then to select raters based on the values of correlated attributes of the target profile that has to be judged

CAG=(Salary, Job)

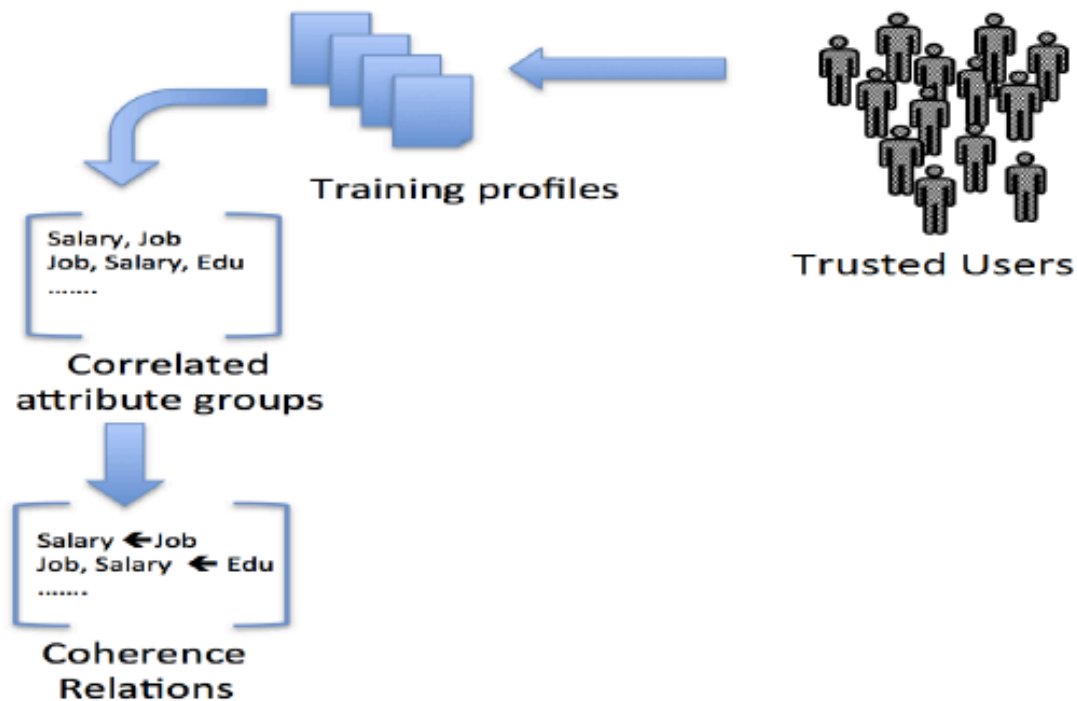
Profile: (job=plumber, Salary=3k\$/month)

~~student~~

Plumber

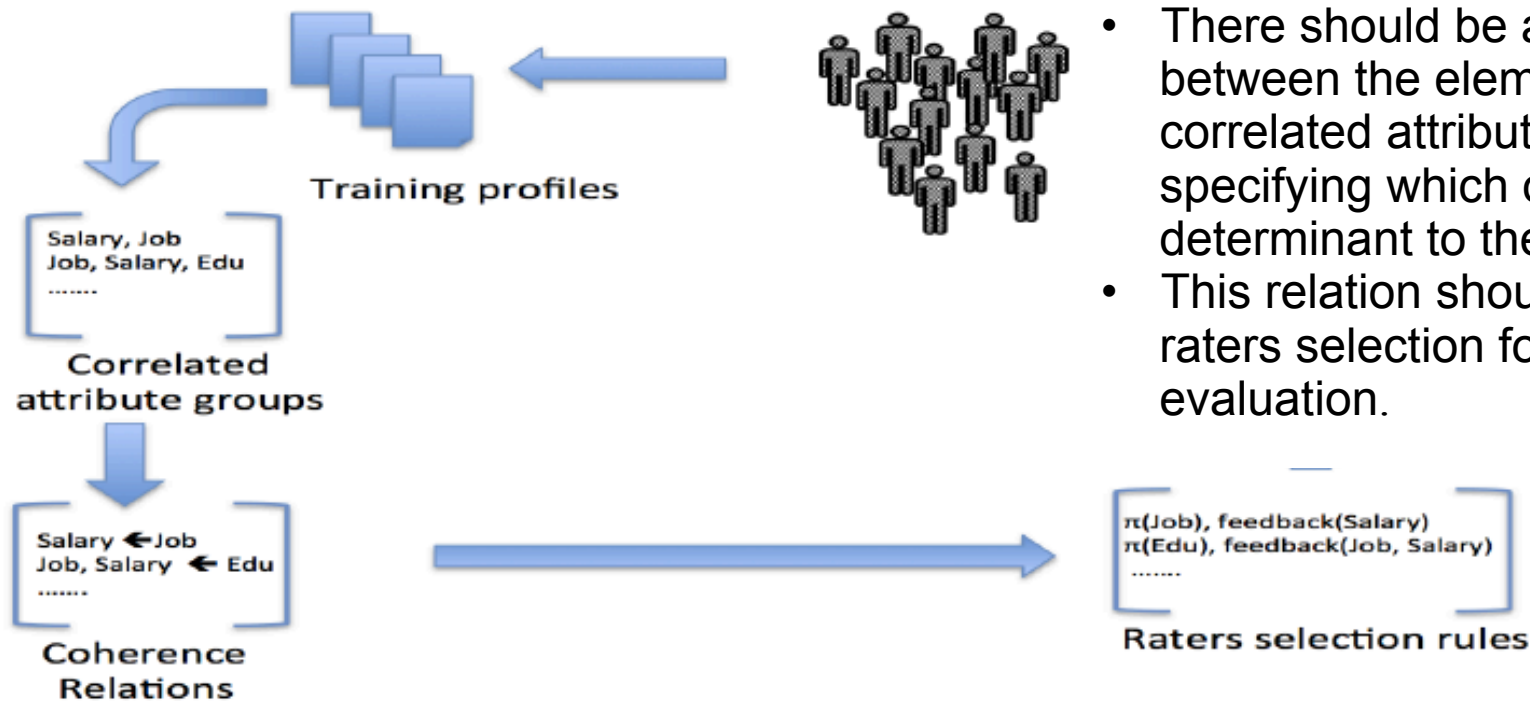
Individual with  
3K\$/month income?

# Learning Phase

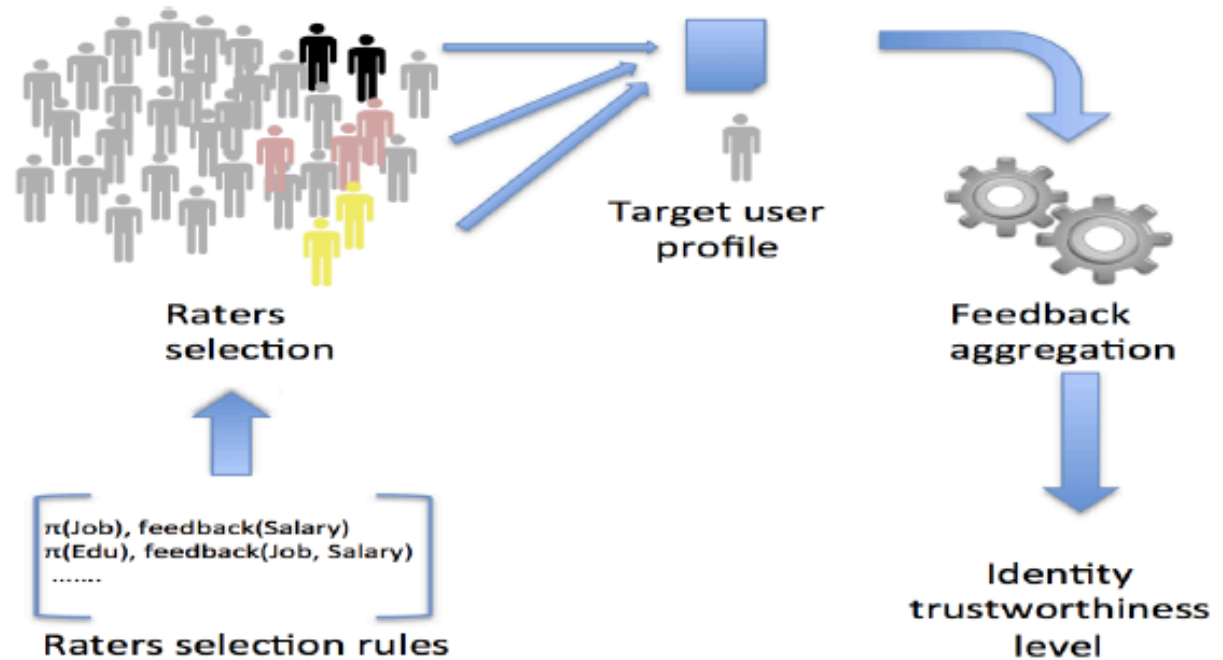


- There should be a **relation between the elements of correlated attribute groups** specifying which one(s) are determinant to the others.
- This relation should drive the raters selection for profile evaluation.

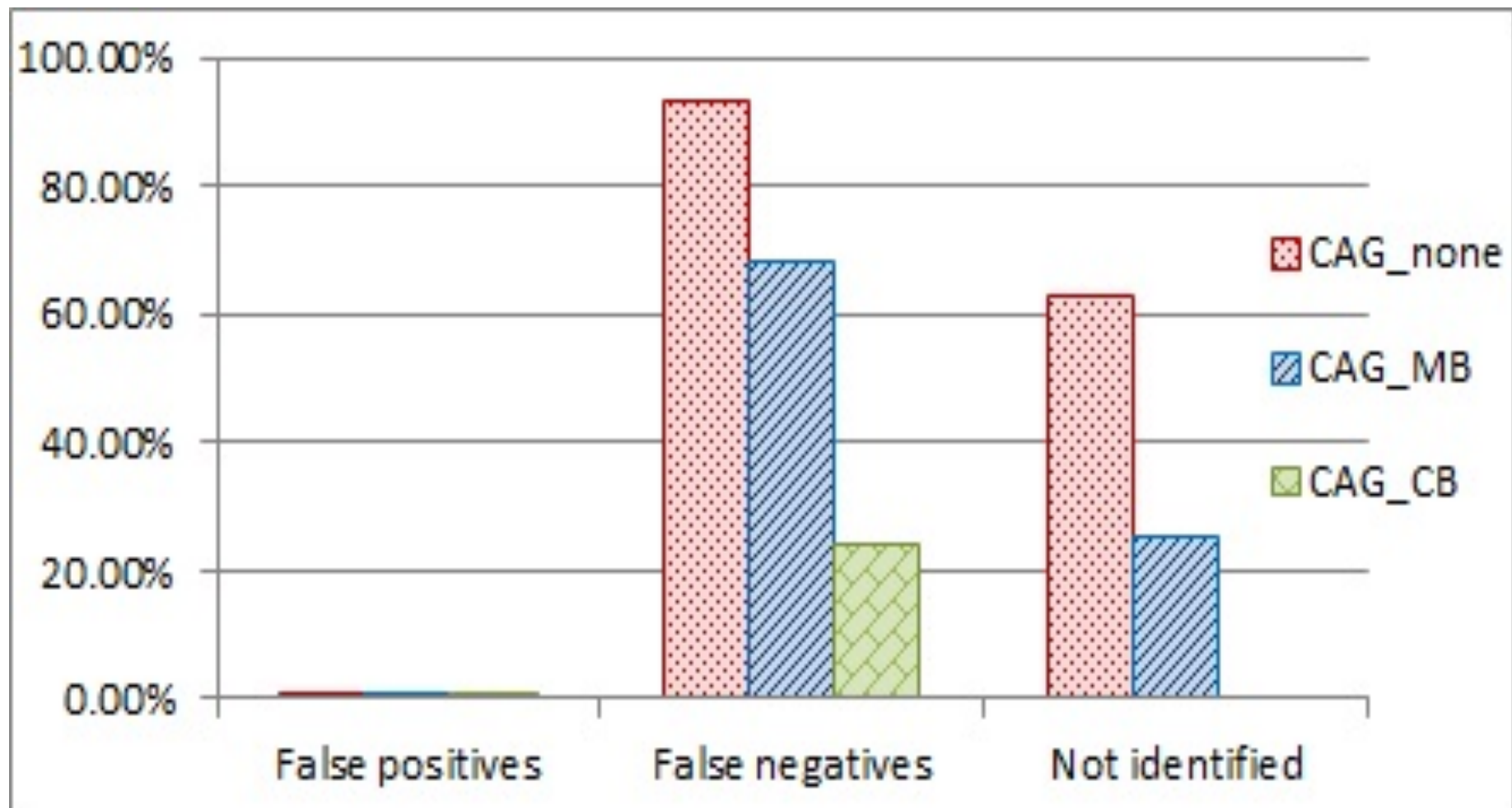
# Learning Phase



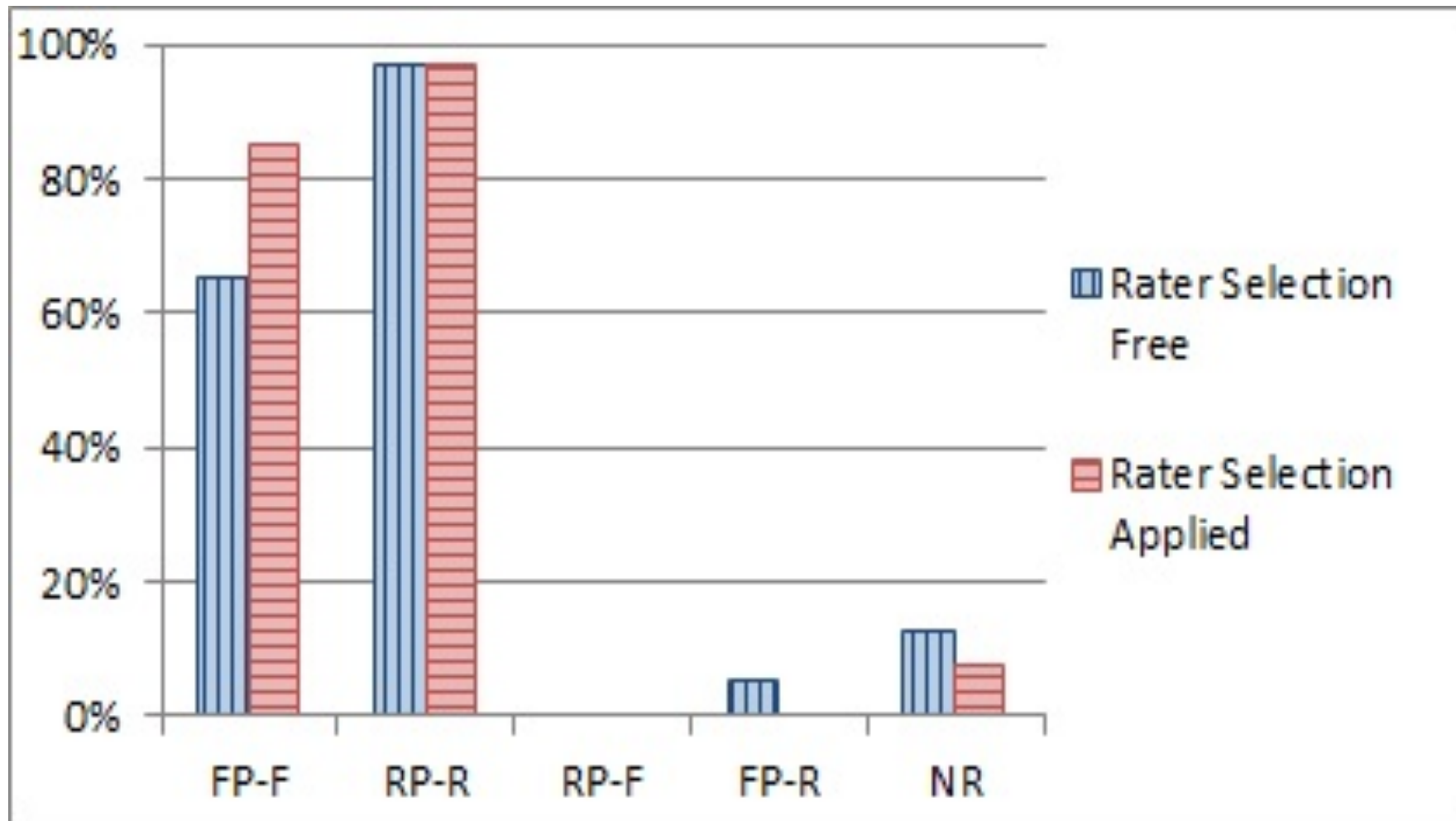
# Evaluation Phase



## Results - Learning



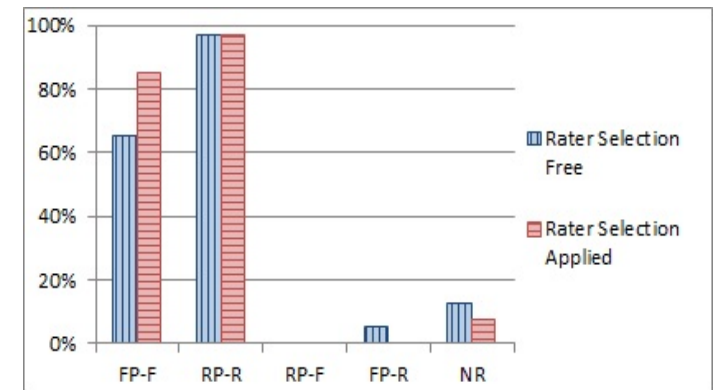
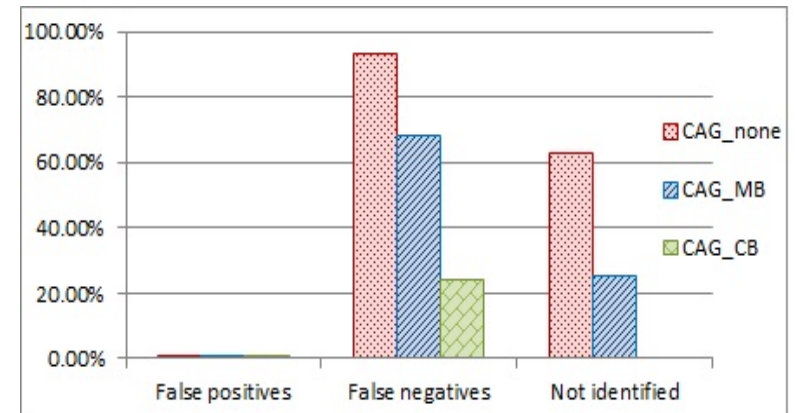
## Results – Evaluations





# What did we learn?

- Crowdsourcing unveils correlations that are meaningful for validating identities
- Machine learning unveils some of such correlations but fails for others
- Crowdsourcing allows capturing varied semantics in OSNs content
- Some attribute correlations are community dependent





*... for your attention*