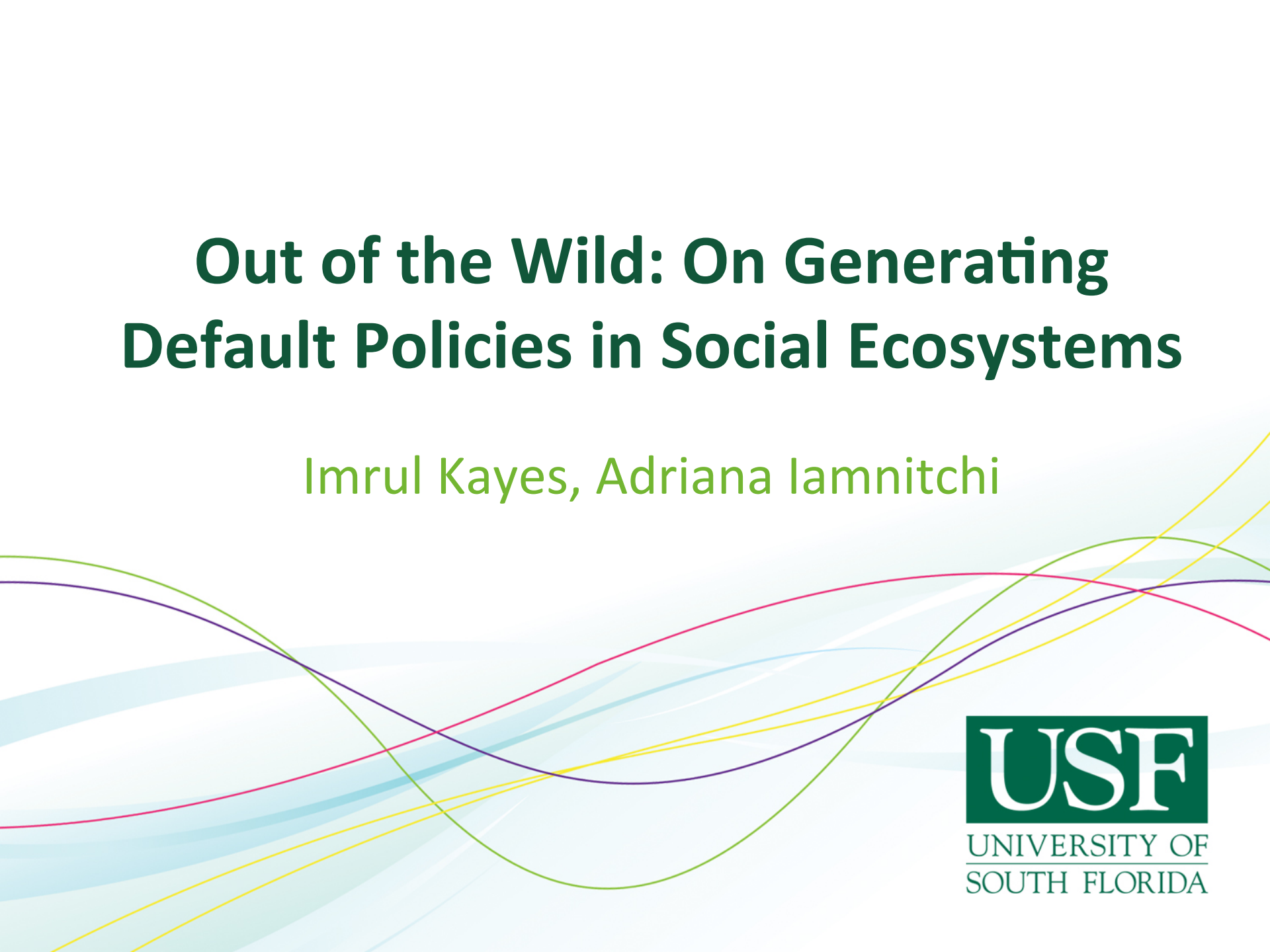
Out of the Wild: On Generating Default Policies in Social Ecosystems

Imrul Kayes, Adriana Iamnitchi



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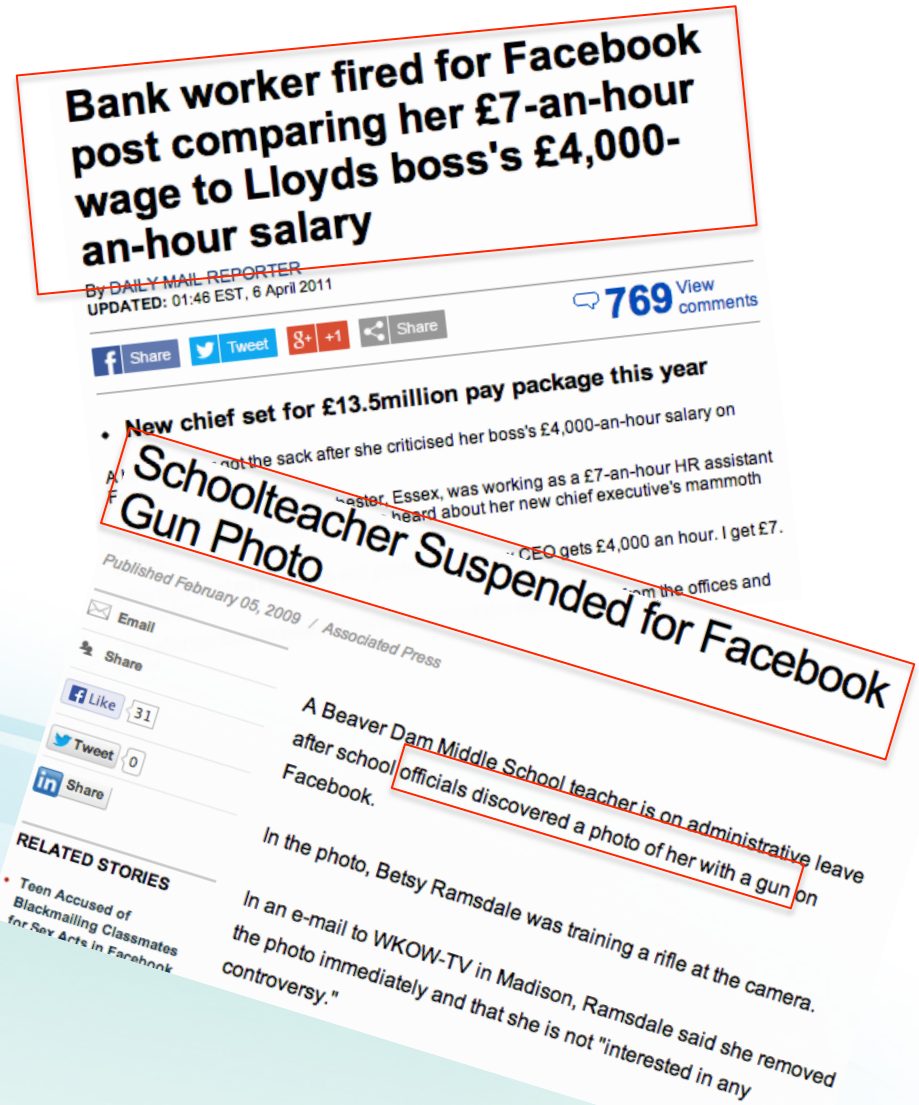
Social Privacy Risks



Bank worker fired for Facebook post comparing her £7-an-hour wage to Lloyds boss's £4,000-an-hour salary

By DAILY MAIL REPORTER
UPDATED: 01:46 EST, 6 April 2011

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- **New chief set for £13.5million pay package this year**

...not the sack after she criticised her boss's £4,000-an-hour salary on ...
...aster, Essex, was working as a £7-an-hour HR assistant ... heard about her new chief executive's mammoth ...
... CEO gets £4,000 an hour. I get £7. ...
...om the offices and ...

Schoolteacher Suspended for Facebook Gun Photo

Published February 05, 2009 / Associated Press

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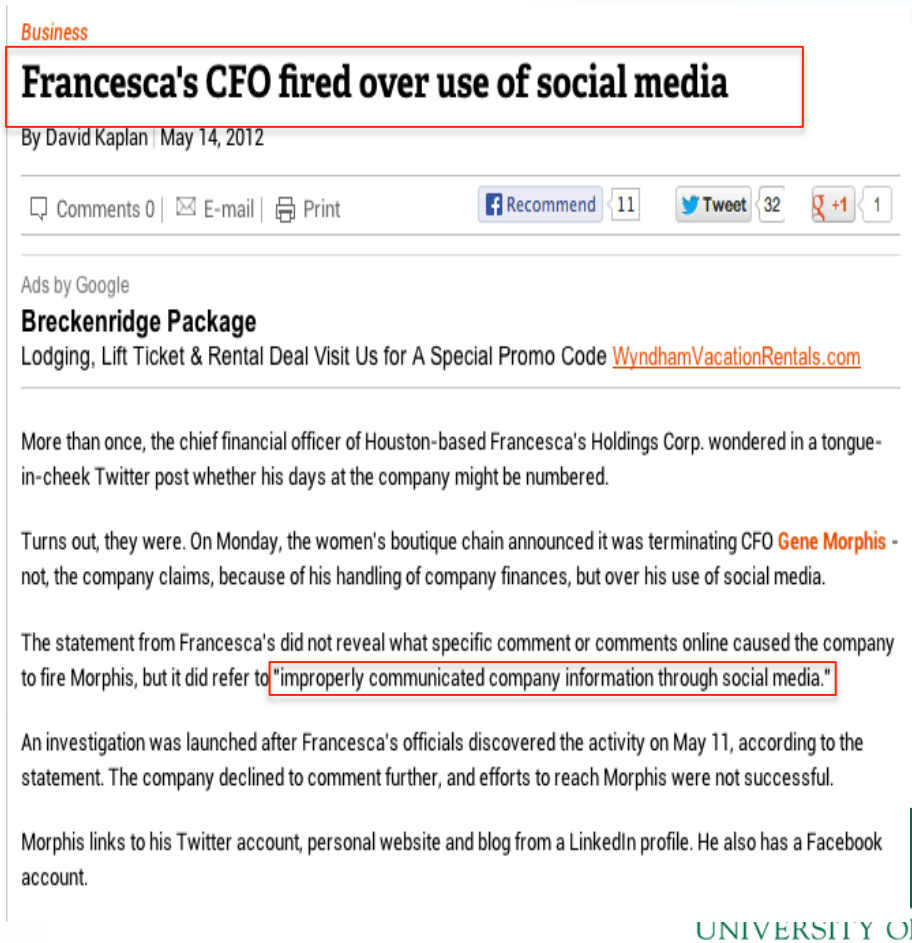
A Beaver Dam Middle School teacher is on administrative leave after school officials discovered a photo of her with a gun on Facebook.

In the photo, Betsy Ramsdale was training a rifle at the camera.

In an e-mail to WKOW-TV in Madison, Ramsdale said she removed the photo immediately and that she is not "interested in any controversy."

RELATED STORIES
- Teen Accused of Blackmailing Classmates for Sex Acts in Facebook



Business

Francesca's CFO fired over use of social media

By David Kaplan | May 14, 2012

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More than once, the chief financial officer of Houston-based Francesca's Holdings Corp. wondered in a tongue-in-cheek Twitter post whether his days at the company might be numbered.

Turns out, they were. On Monday, the women's boutique chain announced it was terminating CFO Gene Morphis - not, the company claims, because of his handling of company finances, but over his use of social media.

The statement from Francesca's did not reveal what specific comment or comments online caused the company to fire Morphis, but it did refer to "improperly communicated company information through social media."

An investigation was launched after Francesca's officials discovered the activity on May 11, according to the statement. The company declined to comment further, and efforts to reach Morphis were not successful.

Morphis links to his Twitter account, personal website and blog from a LinkedIn profile. He also has a Facebook account.

Why Does This Happen?

- (Permissive) Default privacy settings by OSN provider
  - Because they can
  - Lack of universal framework that establishes what is right and wrong
- Users do not change default settings
  - 99% Twitter users
  - >80% Facebook users
  - When they do, they get it wrong

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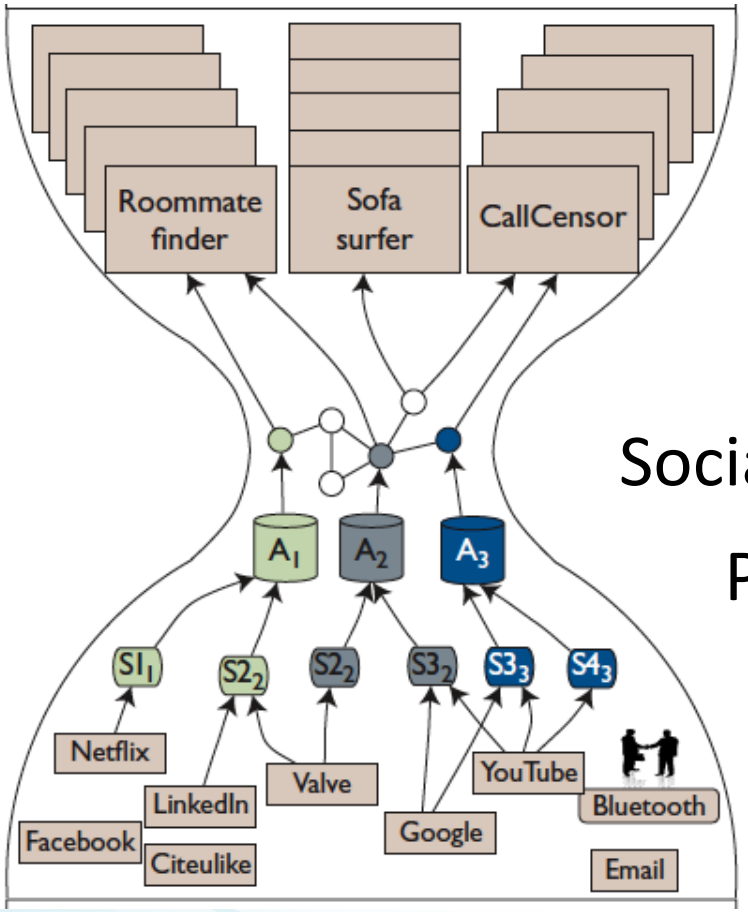
Evolution Towards Social Ecosystems



Applications

Social Inference API

Social Data Management

Personal Aggregators

Social Sensors

Social Signals

Iamnitchi et al. "The Social Hourglass: an Infrastructure for Socially-aware Applications and Services." IEEE Internet Computing (2012).

Privacy in Social Ecosystems

- Social Ecosystems amplify privacy concerns
  - Aggregated data from different contexts of activity
  - A more complete (uncomfortable?) digital recording of a person's life
  - Social applications from different contexts of activity
- Default privacy settings become critical

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Privacy as Contextual Integrity

- **The right to appropriate flow of personal information**
- Based on two life facts:
  - transfer of personal information happens in a social context
  - people alter behavior to correspond with the norms of the context
- Two norms:
  - Norms of appropriateness
  - Norms of distribution

Nissenbaum, Helen. "Privacy as contextual integrity." Washington Law Review 79.1 (2004).

Our Solution

- Ontology-based social ecosystem data model to capture user online data semantics
  - Model social spheres
  - Model user roles
- Generate default privacy from social data based on Nissembaum's contextual integrity framework
- Extensible, fine-grained default policy customizable by users

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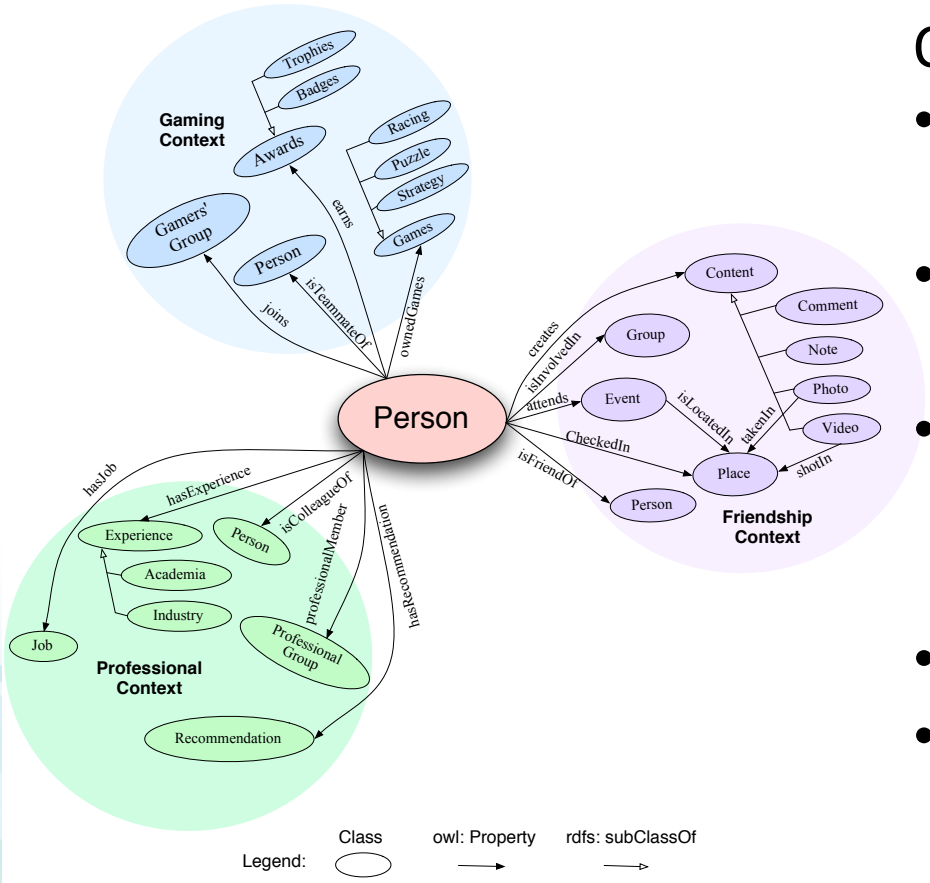
Social Ecosystems Data Model



Ontology-based data model

- set of entities, instances, functions, relations and axioms
- a vocabulary for social ecosystems
- provides formal and structured representation of user's data and social spheres
- gives semantic interoperability
- high-level logic inference is possible

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System Model

1. There is an unrestricted set of disjoint social contexts;
2. A user belongs to only one social context at any time;
3. A user can have one or more roles in every social context;
4. Each piece of data (resource) is initially assigned (created) to only one context; sharing a resource with other users means replication in each of the other users' current contexts;
5. A request for a resource is made on behalf of the requester's role in the context in which the requester is when request is made;
6. A request specifies an action, which could be read, write, delete or replicate to another user's ownership.

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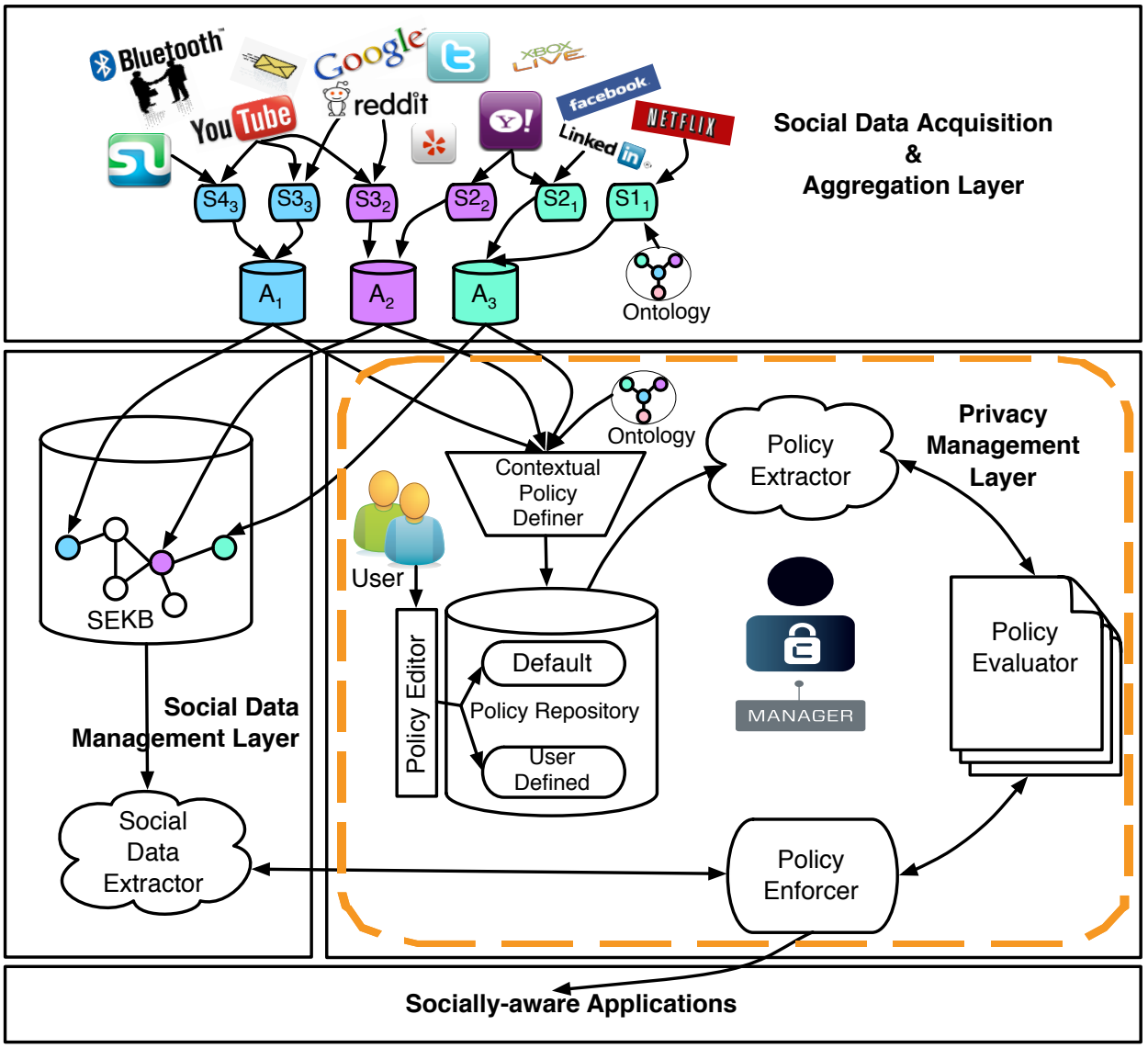
Architecture



Policy Specification

- A policy is defined as a set of RDF statements
- Policies obey the two information norms of CI

Norms of appropriateness: Bob's colleagues can read his professional groups in the Professional context

```
<Policy>
ASK
where {
?req rdf:type p:requestor.
?req p:allowed p:read.
p:read p:performedOn Bob.
?req se:isColleagueOf Bob.
Bob se:professionalMember ?group.}
```

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Policy Specification

Norms of distribution: policy restricts the access to Bob's photos if they are shared

<Policy>

ASK

where {

?req rdf:type p:requestor.

?req p:allowed p:read.

p:read p:performedOn Bob.

?req se:isFriendOf Bob.

Bob se:hasPhoto ?photo.

?photo se:status se:notShared}

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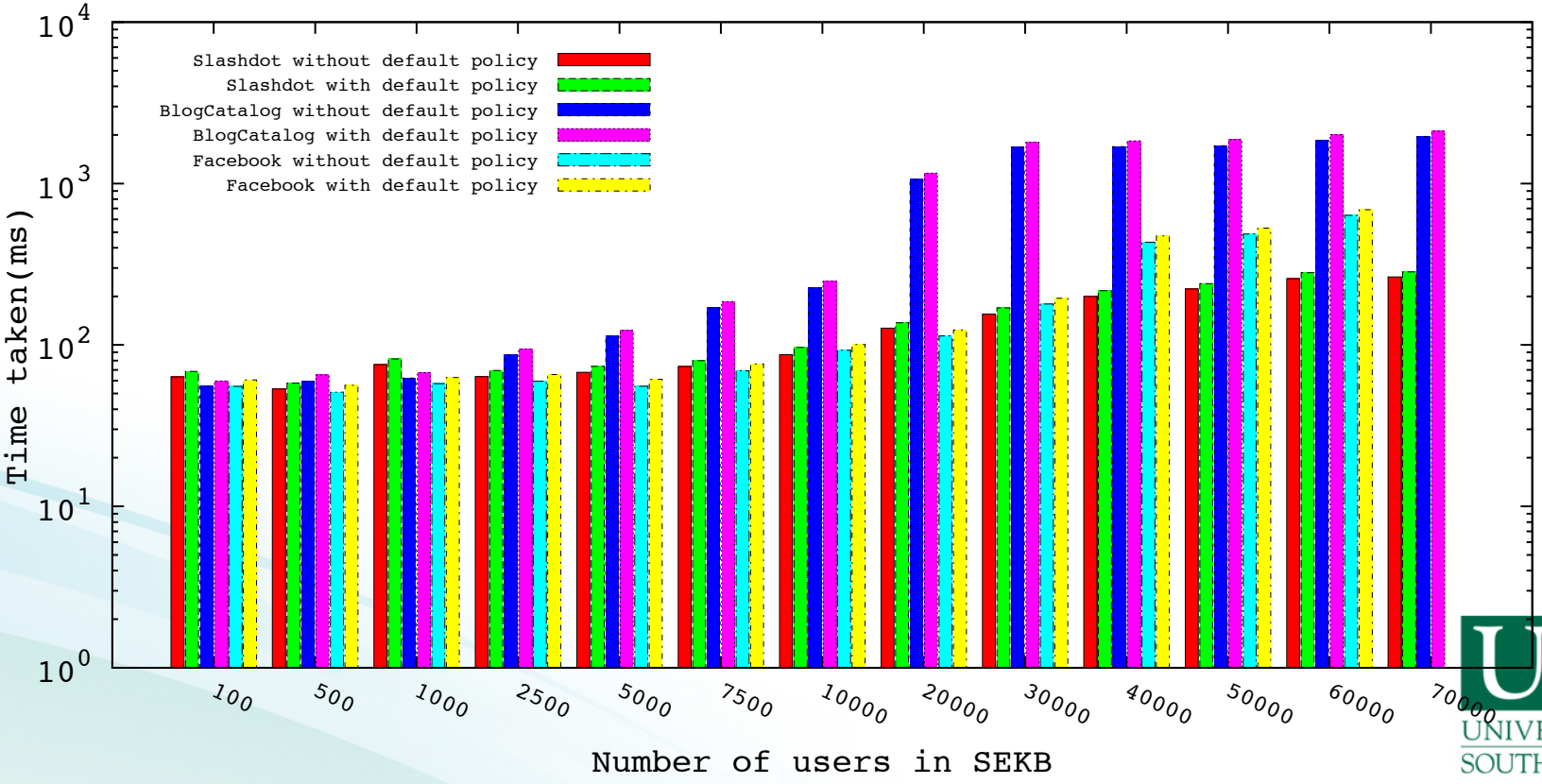
Prototype Implementation

- Implemented the prototype in Java Platform Standard Edition 6 (Java SE 6)
- Knowledge base: Jena's APIs for RDF data management
- Ontology: Jena's API API for handling OWL ontologies
- SPARQL: Jena's query engine

Prototype Implementation

- 3 datasets: Slashdot, BlogCatalog, Facebook
- Performance results show solution is practical



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Summary

- Proposed an ontology-based social ecosystem data model to capture user social data
- Employ semantic web technologies to generate default privacy polices based on Nissembaum's contextual integrity theory
- Provide an architecture and prototype implementation of privacy model

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Thank you!

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