



The Age of Social Machines

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EPSRC

Engineering and Physical Sciences
Research Council

Semantic Web Systems – Guest Lecture – 17 March 2016

Includes slides by members of the SOCIAM team (www.sociam.org)
and the Farr institute (<http://www.farrinstitute.org/>).

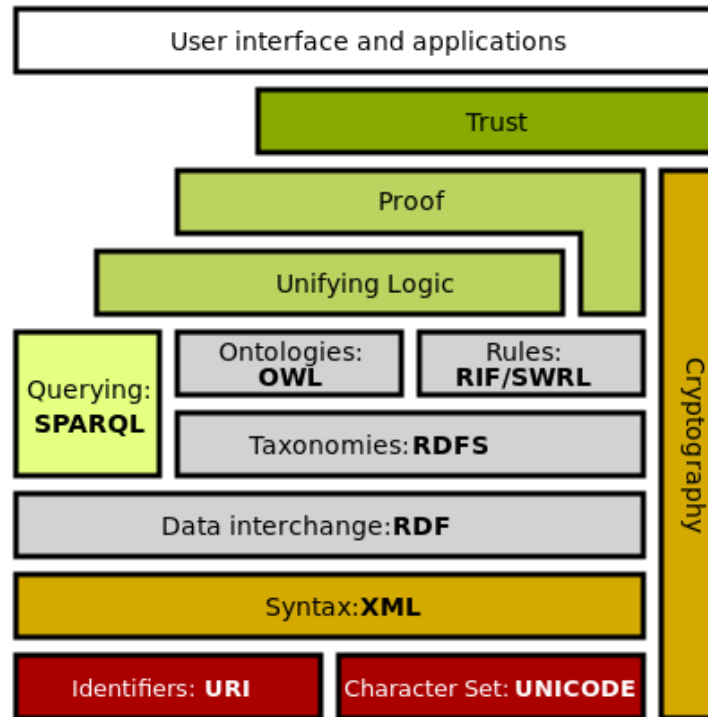


The Semantic Web Vision

*I have a dream for the Web [in which computers] become **capable of analyzing** all the data on the Web – the content, links, and transactions between people and computers. ...the day-to-day mechanisms of trade, bureaucracy and our daily lives **will be handled by machines talking to machines.***

Tim Berners-Lee (1999) Weaving the Web

Did it work?



- “*Semaphobia*”: fear of average Web developers to use Semantic Web technologies. – *Markus Lanthaler*

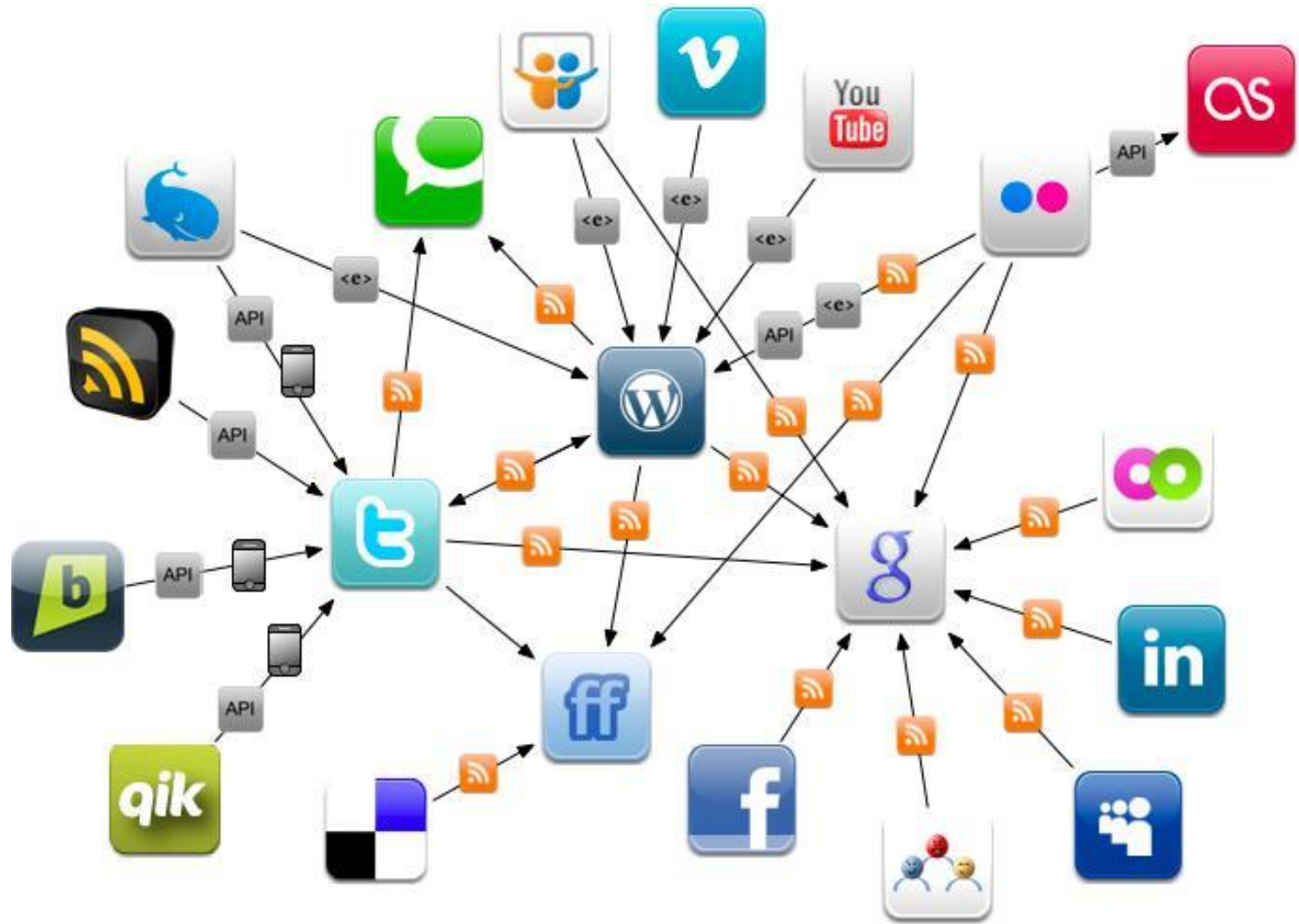
The Semantic Web is dead! Long live...



The Social Machine Vision

*Real life is and must be full of all kinds of social constraint – the very processes from which society arises. Computers can help if we use them to create abstract social machines on the Web: **processes in which the people do the creative work and the machine does the administration.** The stage is set for an evolutionary growth of new social engines.*

Tim Berners-Lee (1999) Weaving the Web

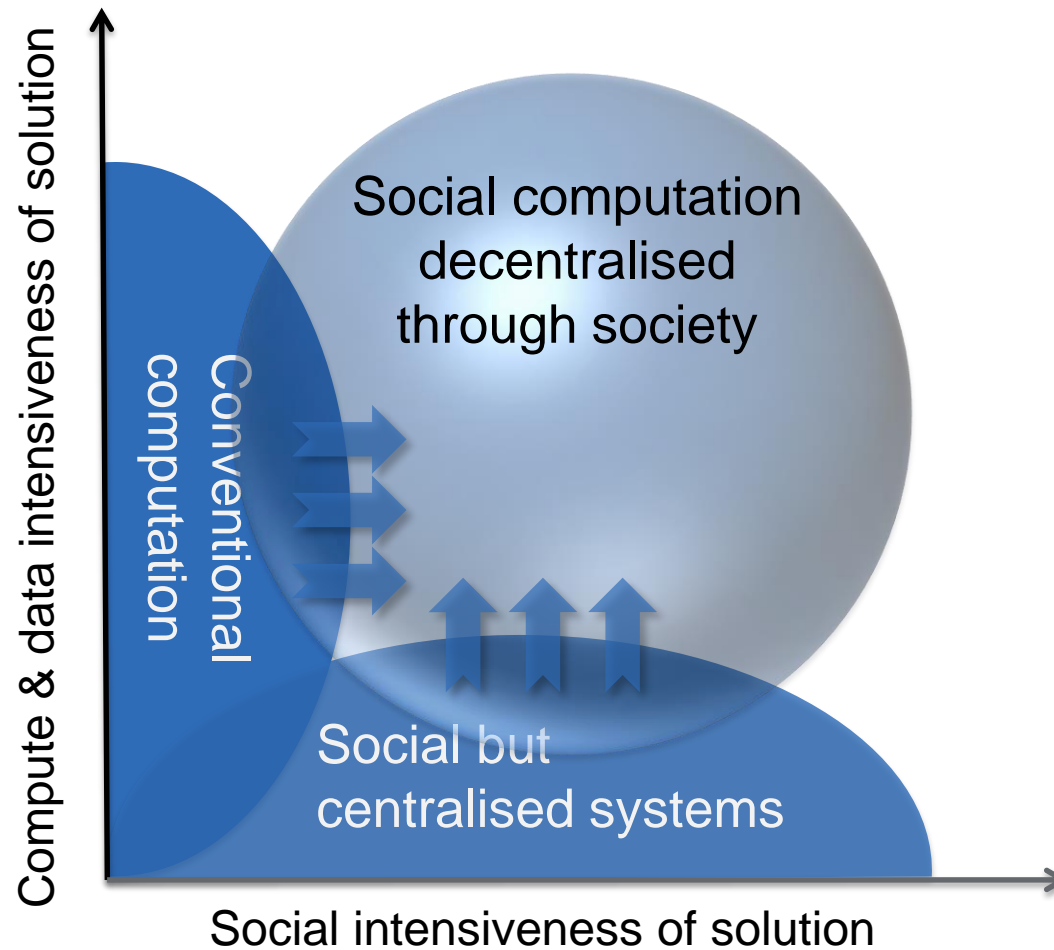


But more than that!!



Anne Helmond, May 2009

Pushing the boundaries





EXAMPLES OF SOCIAL MACHINES



WIKIPEDIA
The Free Encyclopedia

ZOONIVERSE
REAL SCIENCE ONLINE





WeatherSignal

Use your **mobile** as a weather station

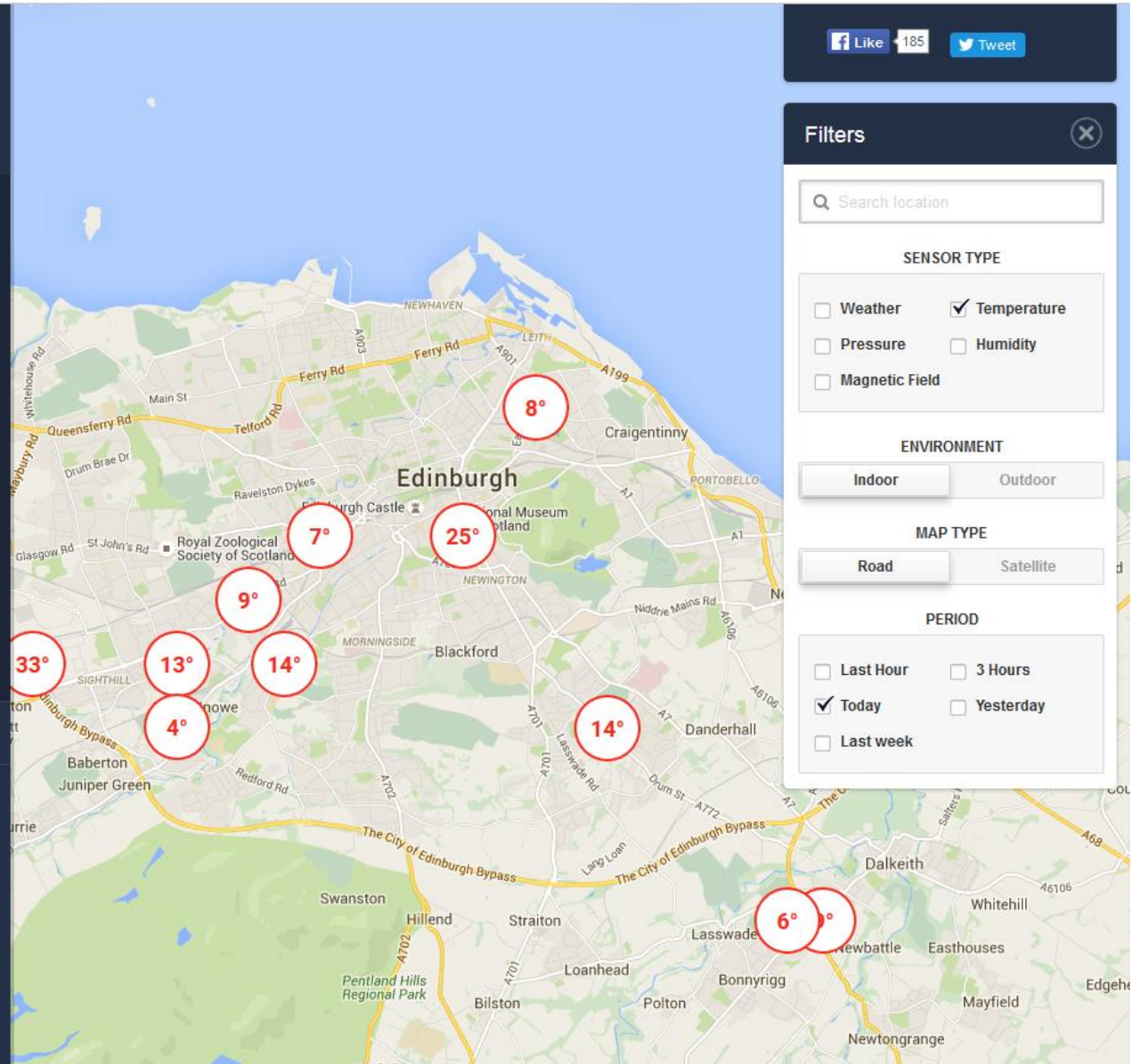


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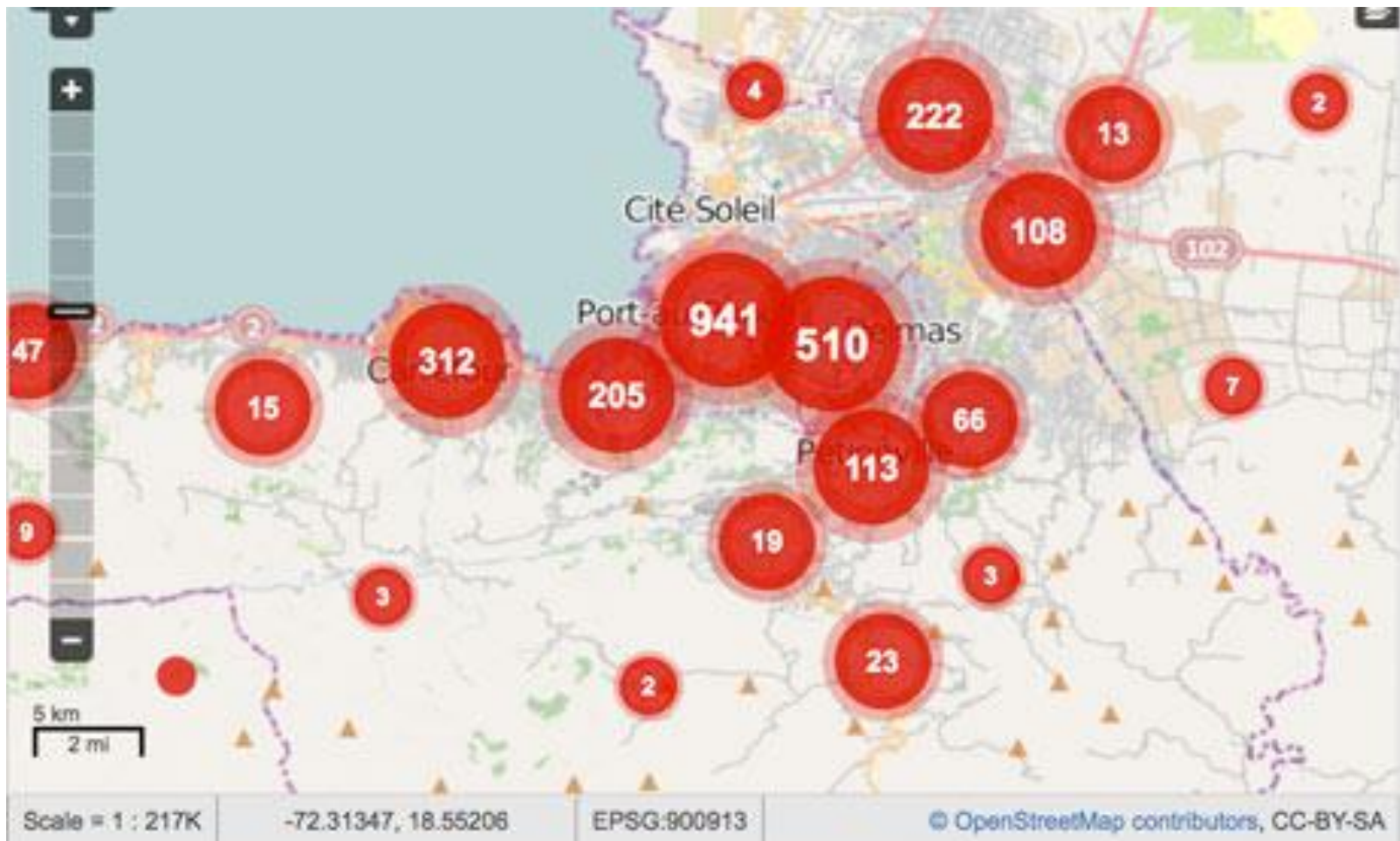
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Like 185

Tweet





EVENTS TWEET US @lummid east Updated on 14/03/2016 20:19:21

32 minutes ago Comments 0
Russia will not send the aircraft carrier "Admiral Kuznetsov" to the coast of Syria

BREAKING NEWS

source Tell friends

36 minutes ago Comments
Electricity returns to Kobane after years of outage. Repairs have been completed on the countryside

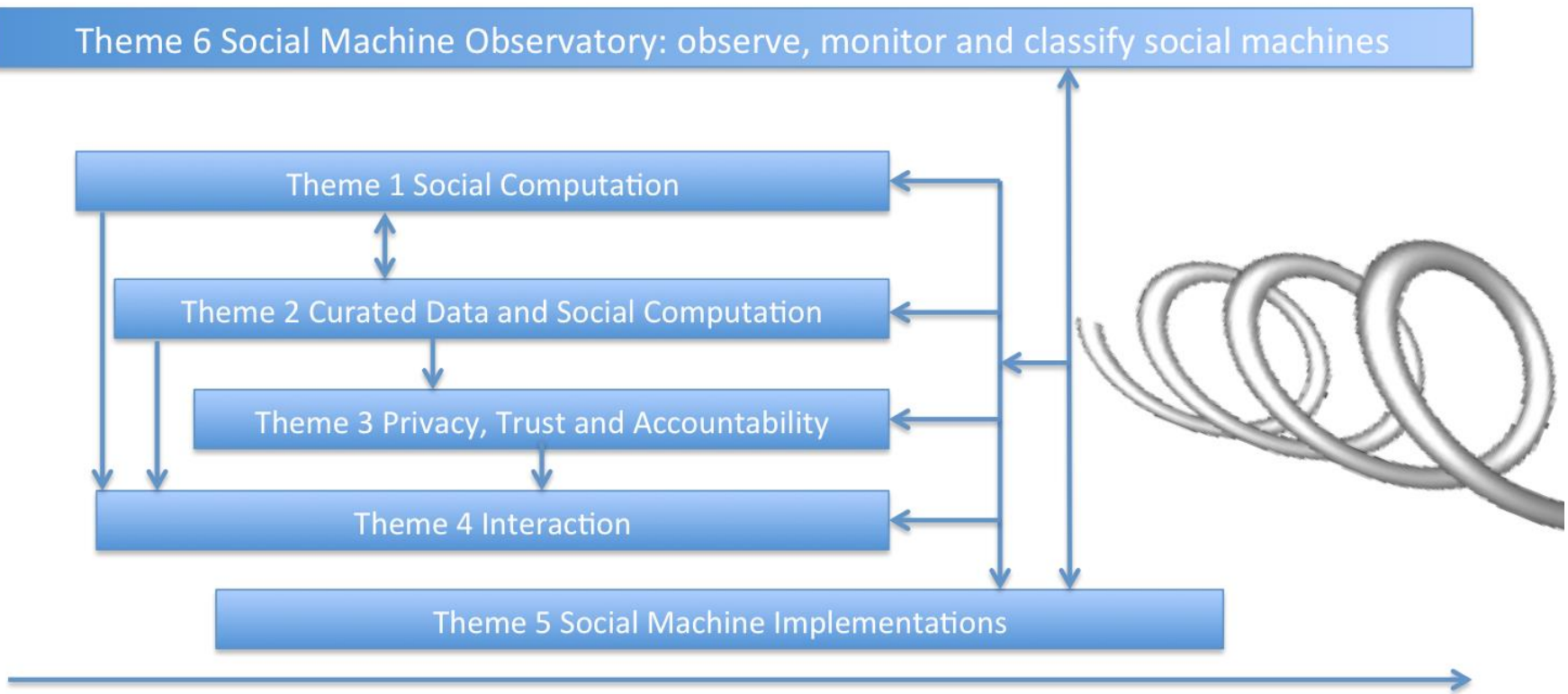
Download on the App Store Google play



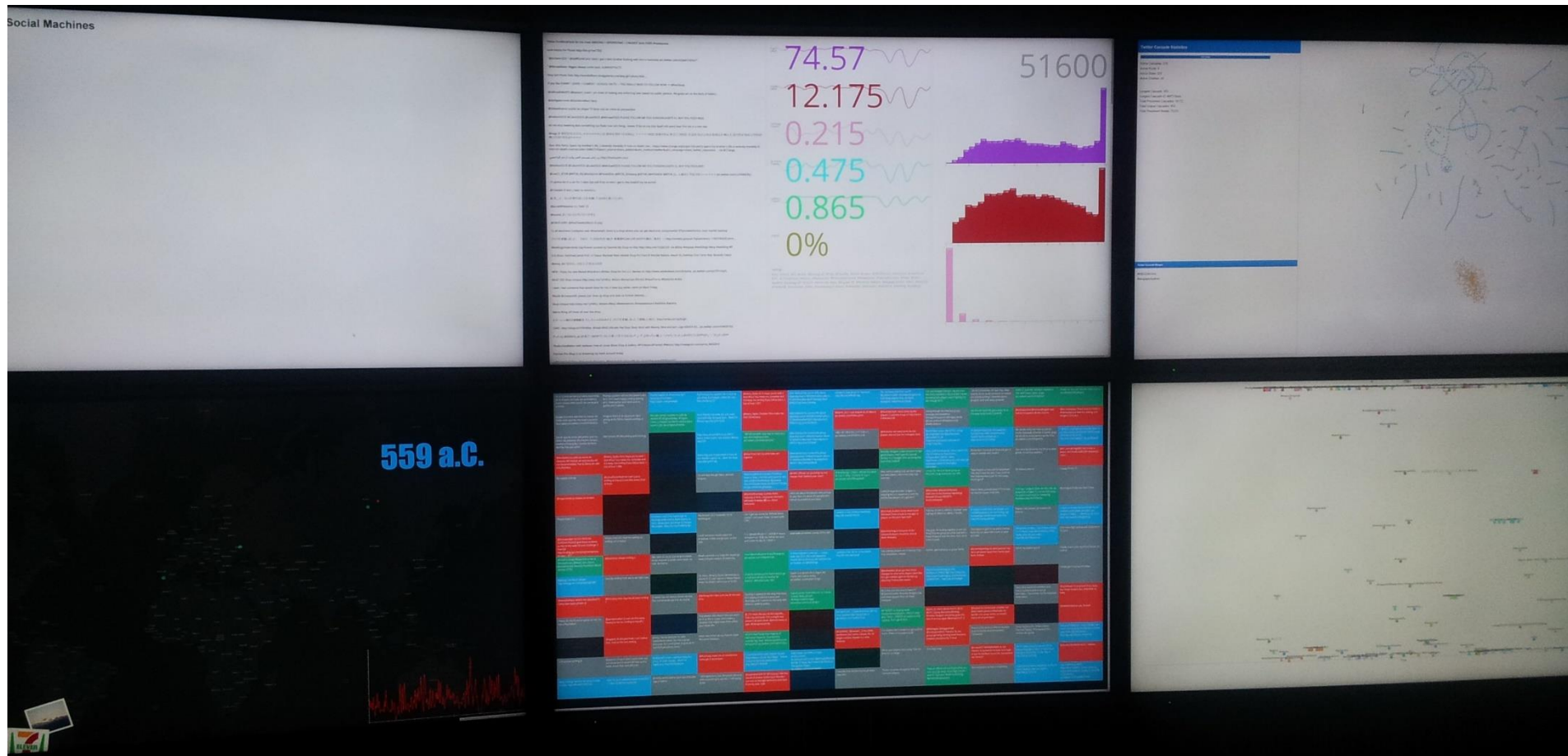
www.sociam.org

THE SOCIAM PROJECT

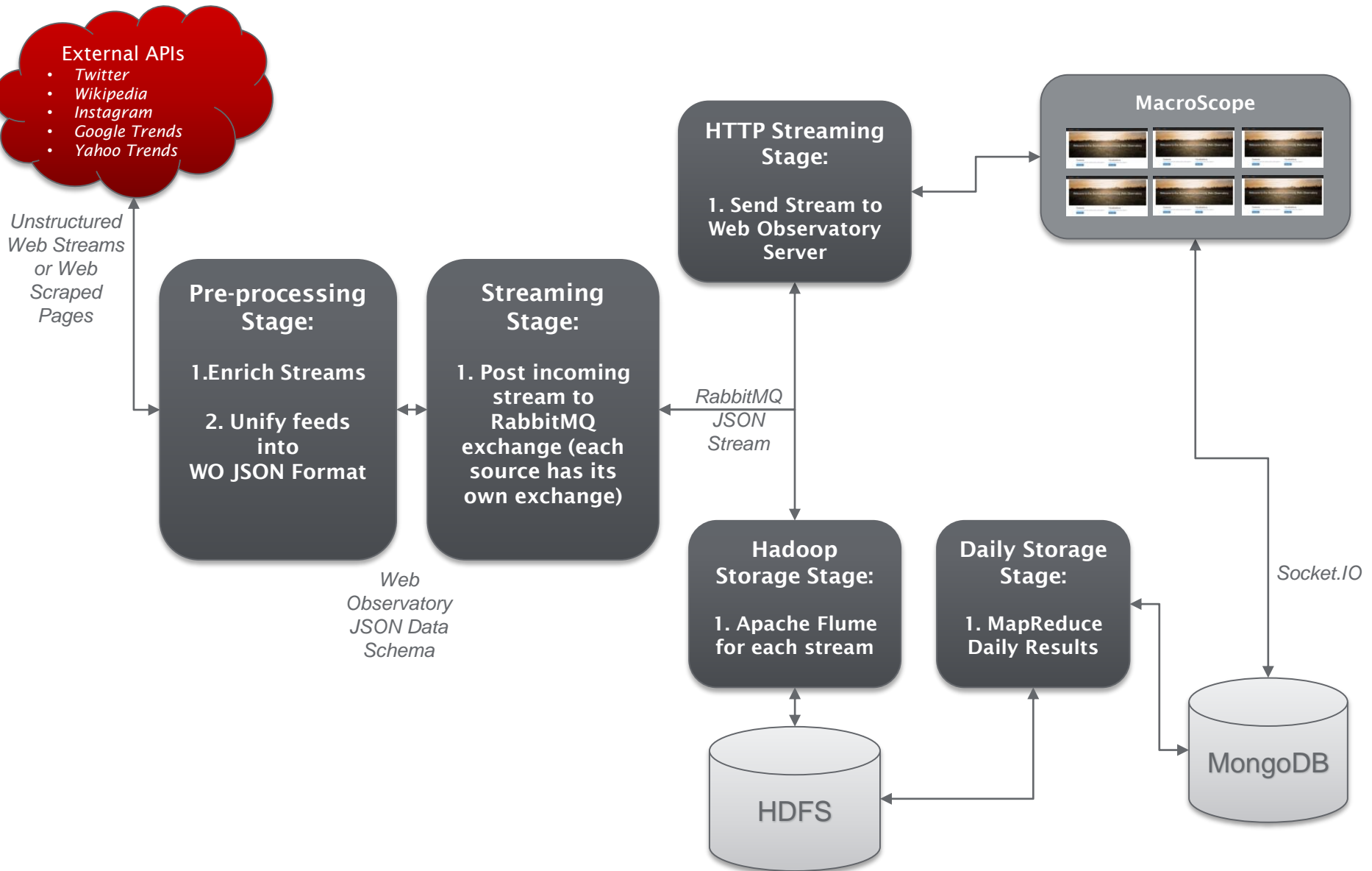
The SOCIAM Project



Web Macroscope



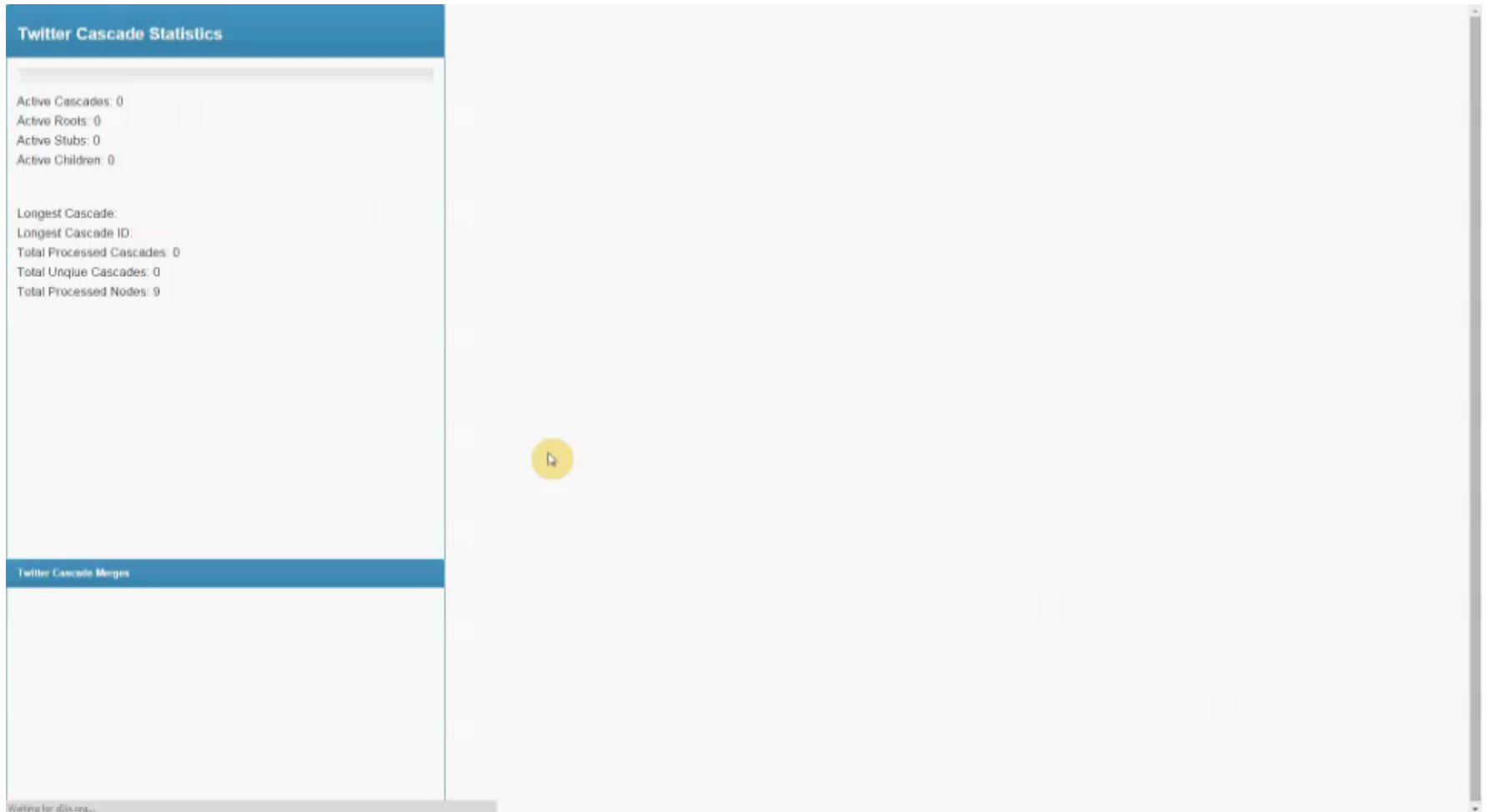
Web Macroscope



Observation – analysis: Wikipedia



Observation – analysis: Twitter

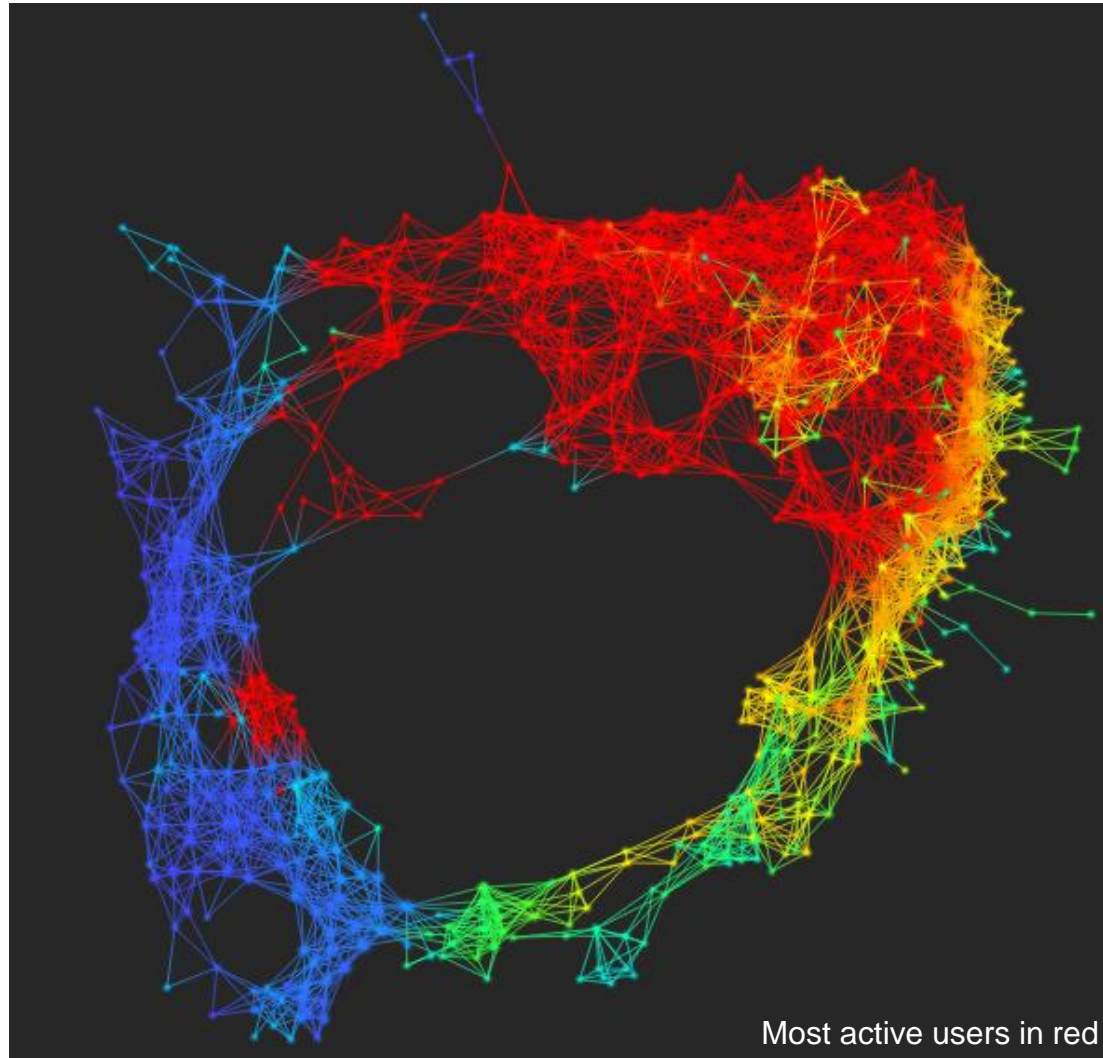


The screenshot displays a web interface with a left sidebar and a main content area. The sidebar is divided into two sections: "Twitter Cascade Statistics" and "Twitter Cascade Merges". The "Twitter Cascade Statistics" section contains the following data:

- Active Cascades: 0
- Active Roots: 0
- Active Stubs: 0
- Active Children: 0
- Longest Cascade:
- Longest Cascade ID:
- Total Processed Cascades: 0
- Total Unique Cascades: 0
- Total Processed Nodes: 0

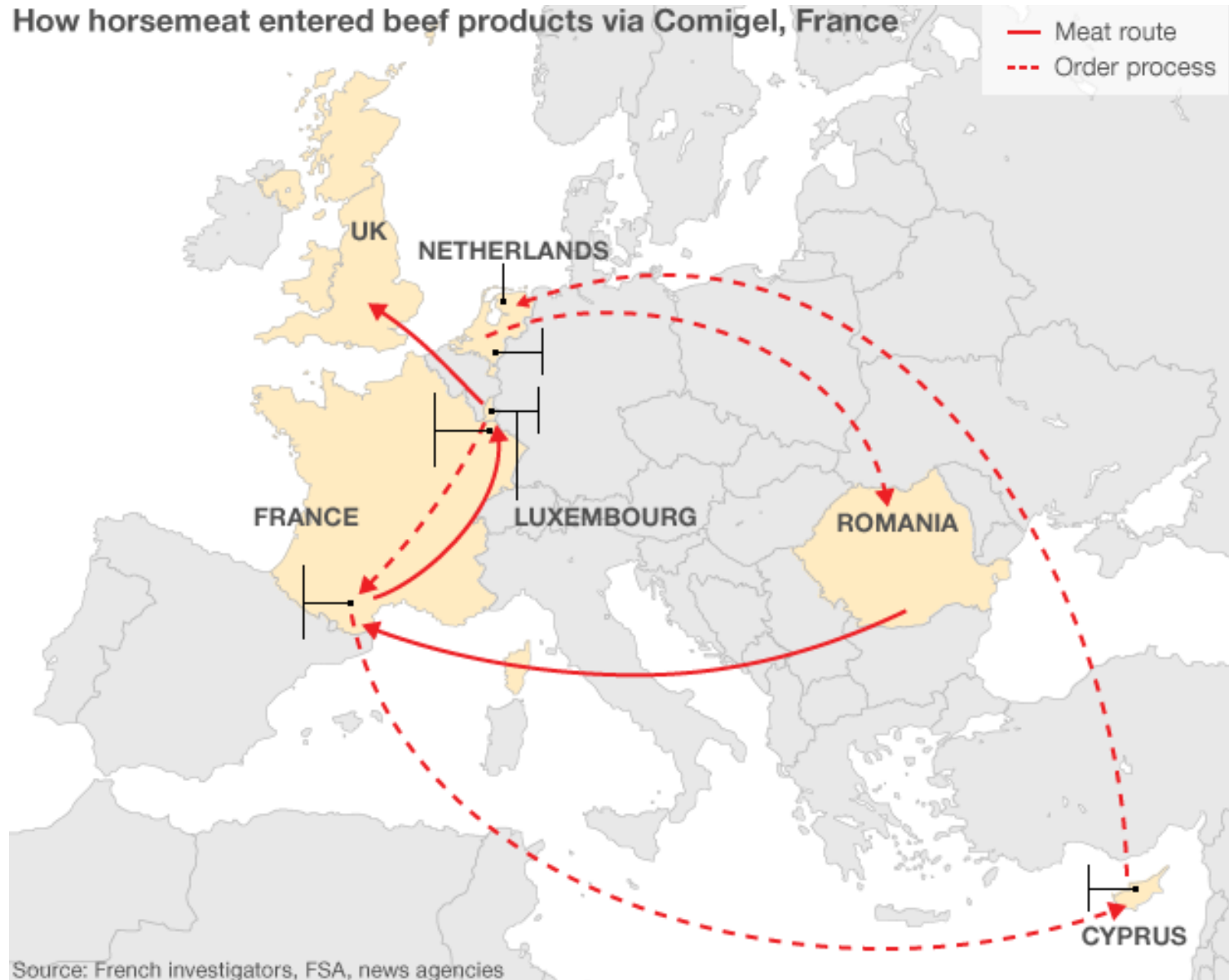
The "Twitter Cascade Merges" section is currently empty. The main content area is a large, empty white space with a vertical scrollbar on the right. A yellow mouse cursor is visible in the center of the main area. At the bottom left of the browser window, the text "Waiting for dijkstra..." is visible.

Observation – analysis: Zooniverse



Policing: e.g. the Horsemeat Scandal

How horsemeat entered beef products via Comigel, France

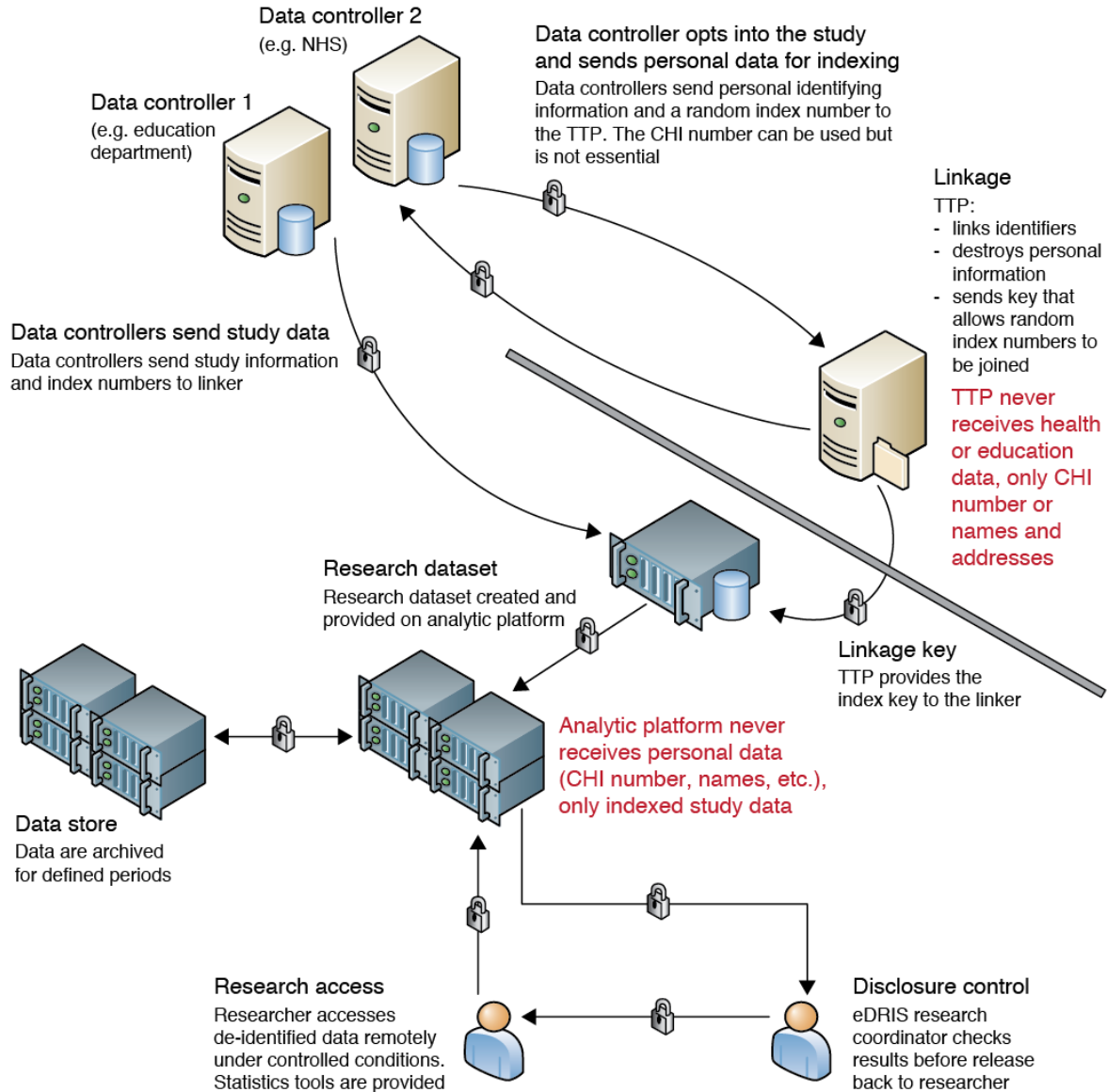




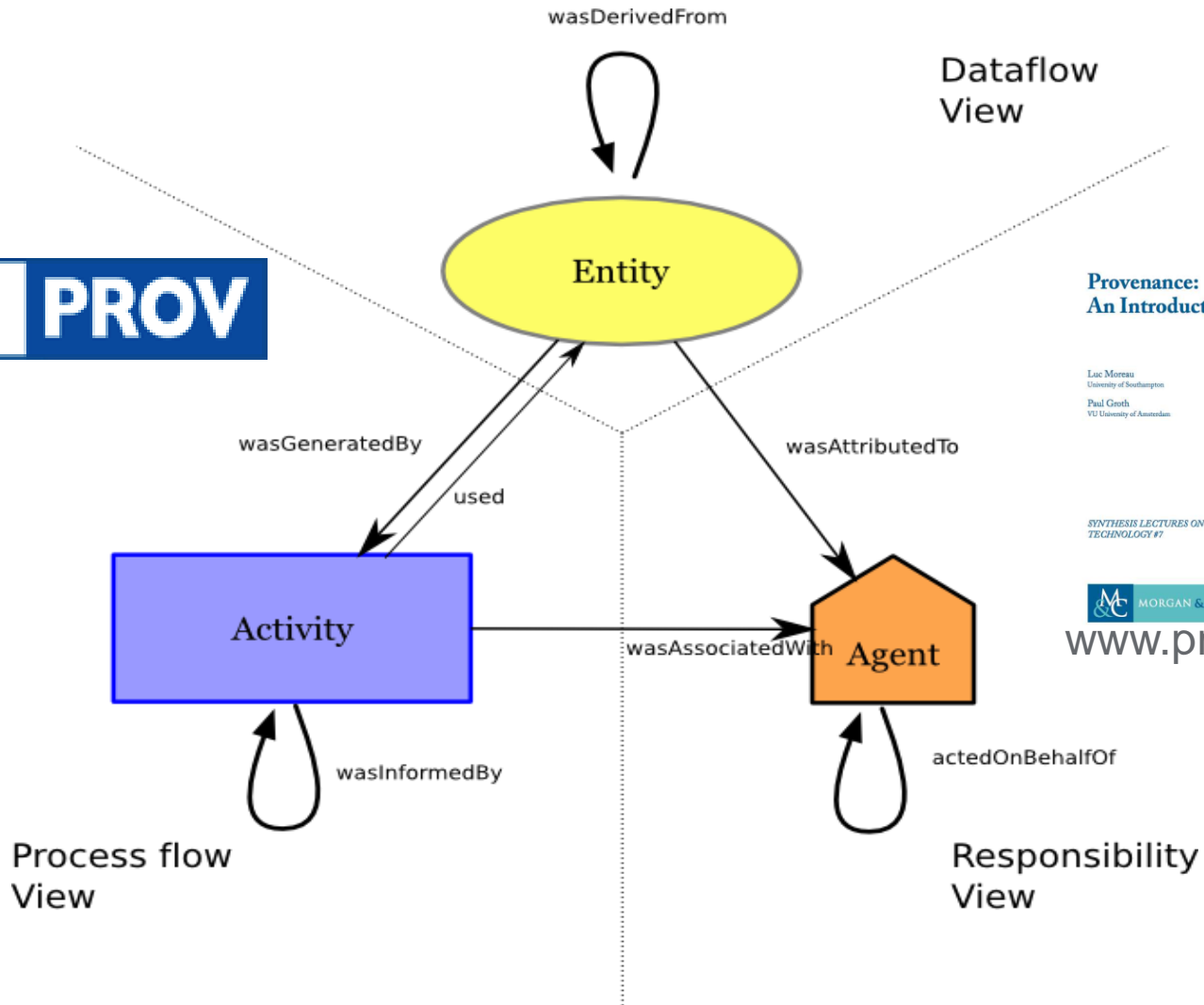
Sociality – Narratives

- Stories in social machines
 - [individual/local level]
 - [group level]
 - [wider community/global level]
- Archetypes

Trust: e.g. Healthcare Research



Provenance



**Provenance:
An Introduction to PROV**

Luc Moreau
University of Southampton
Paul Gauthier
VU University of Amsterdam

SYNTHESIS LECTURES ON THE SEMANTIC WEB: THEORY AND TECHNOLOGY #7

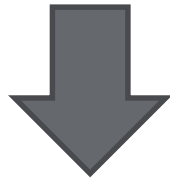


www.provbook.org

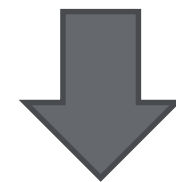
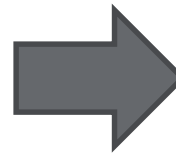
Privacy vs Provenance – Safe Havens



DATA



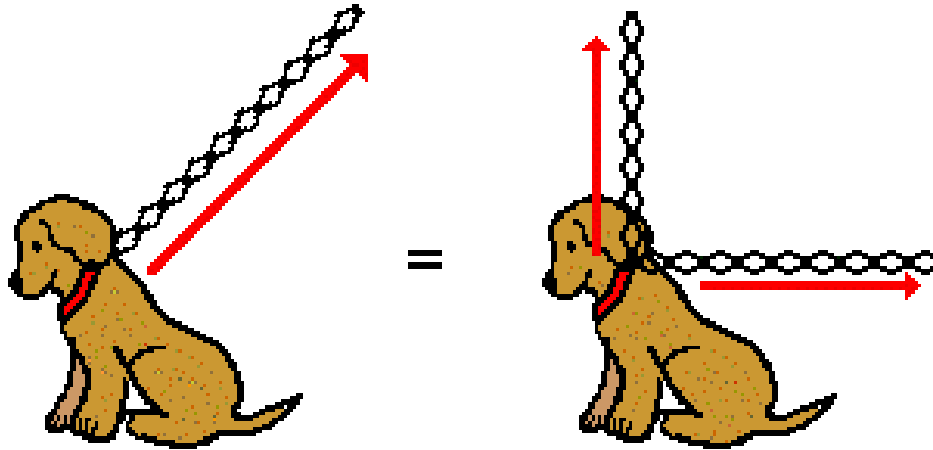
DE-IDENTIFIED
DATA



RESULTS

- *How can we test/reproduce the results?*

misaligned incentives



people want to

text, chat, call, post
privately share photos,
keep things forever
joke, troll, experiment,
look up sensitive info,
buy embarrassing stuff

facebook wants to

understand everything
you like and dislike, and
keep track of what you do

infer what you might buy

predict what you might do



Decentralised Equivalents
(of popular social machines)

Diaspora
CozyCloud
OpenLink Data Spaces (ODS)
SMOBE
Self-hosting
Needs-driven

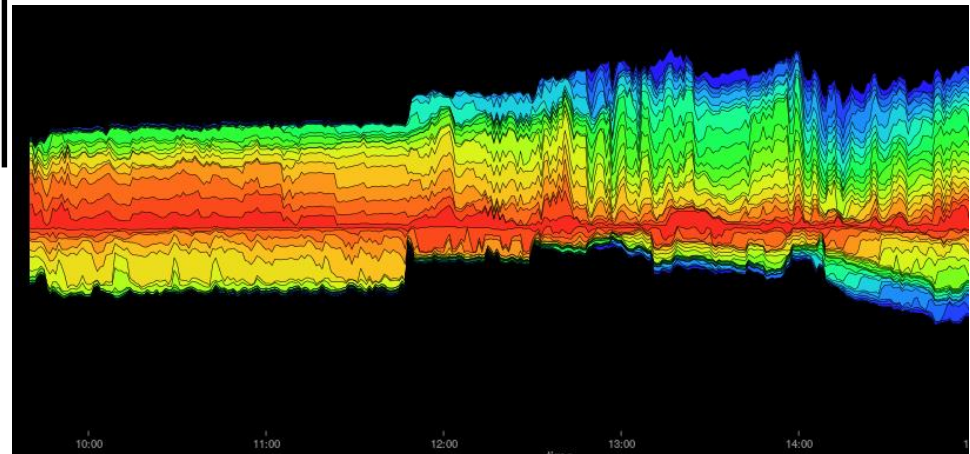
Privacy & Persistence
Desire for Control
Self-hosting



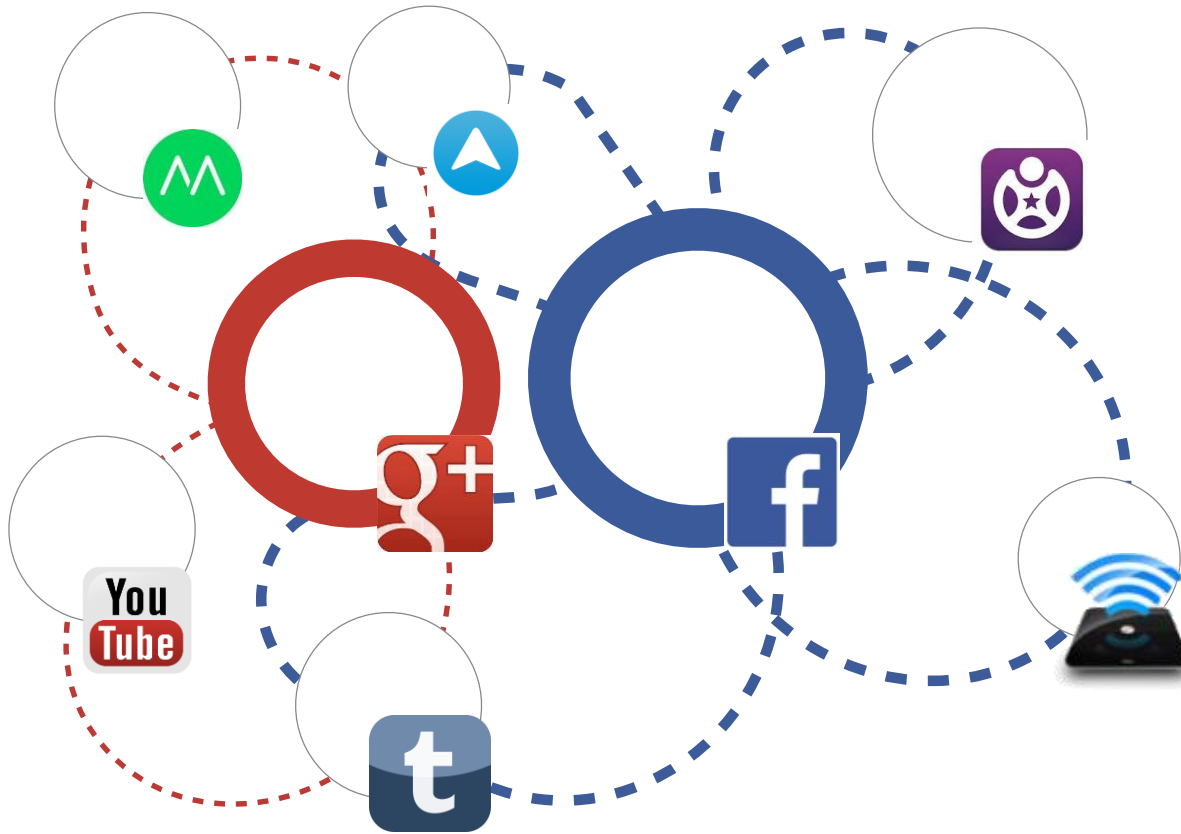
Radical Departures
(from popular social machines)

Technology-driven
Tor
BitTorrent
Bitcoin
Ethereum
IPFS
OpenBazaar

Cryptography for
disintermediation &
anonymity



platform-
centralised web



precludes
identity
partitioning

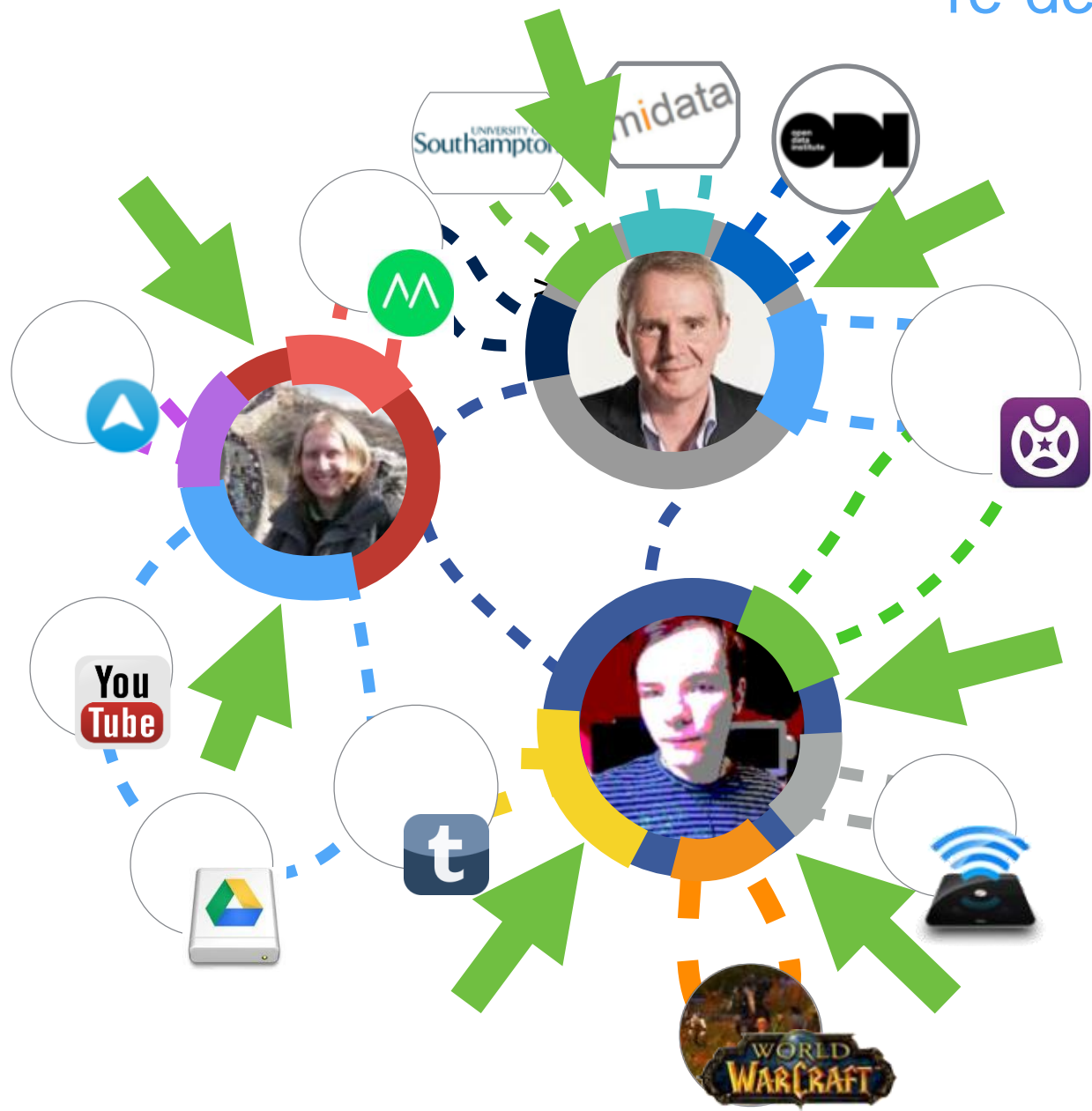
identity consolidation
and forced verified ID
among social machines

and places platforms as central
information controllers



re-de-centralised web

at the centre of each person's ecosystem is their **social personal data store**



<https://github.com/solid/>

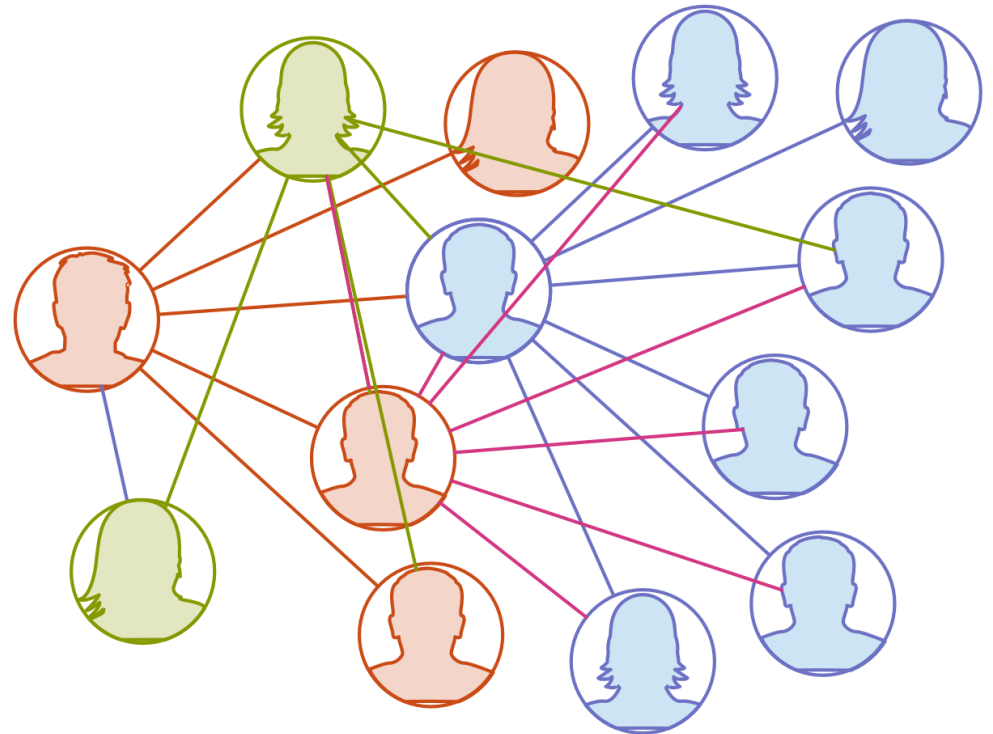


Social Machine

INTERACTION MODELS

Premise

- There is a **model of interaction** behind any social machine.
 - Who can communicate what, when, and to whom.
 - “Social **DNA**”

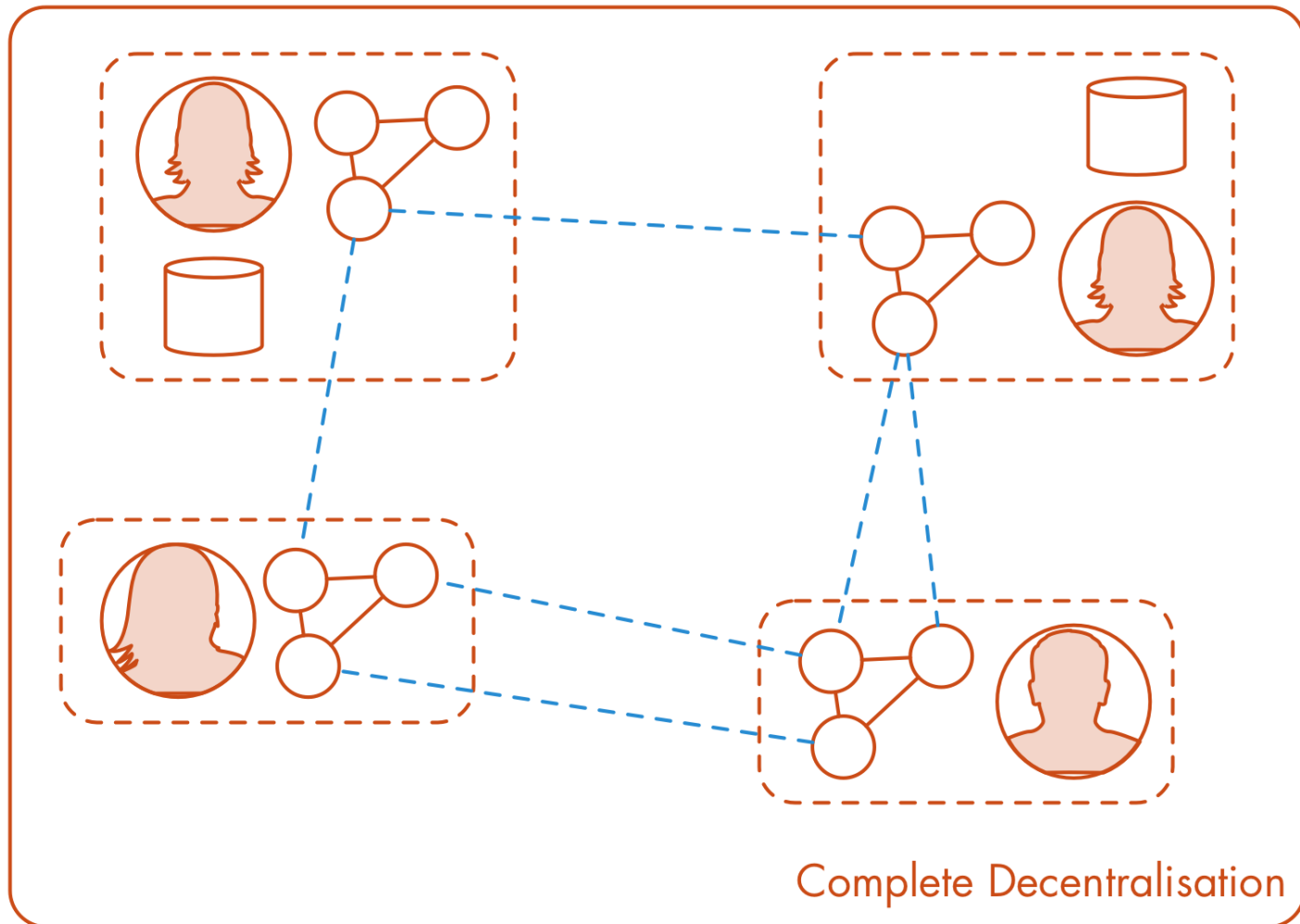




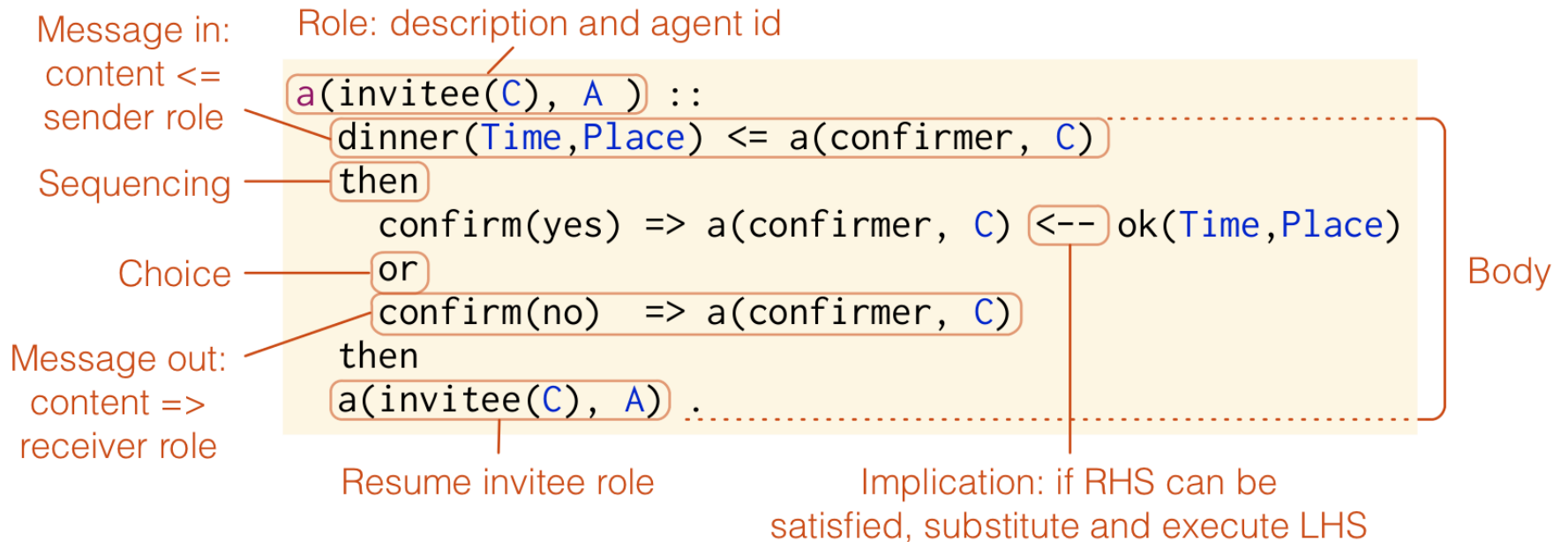
Goal

- *Can we build a social machine starting from its interaction model?*
- Lightweight Social Calculus (LSC)
- Protocols that are first-class objects:
 - Declarative, transparent, executable
 - Heterogeneous
 - Editable, discoverable, shareable, composable
 - Distributed, platform-independent
 - Verifiable

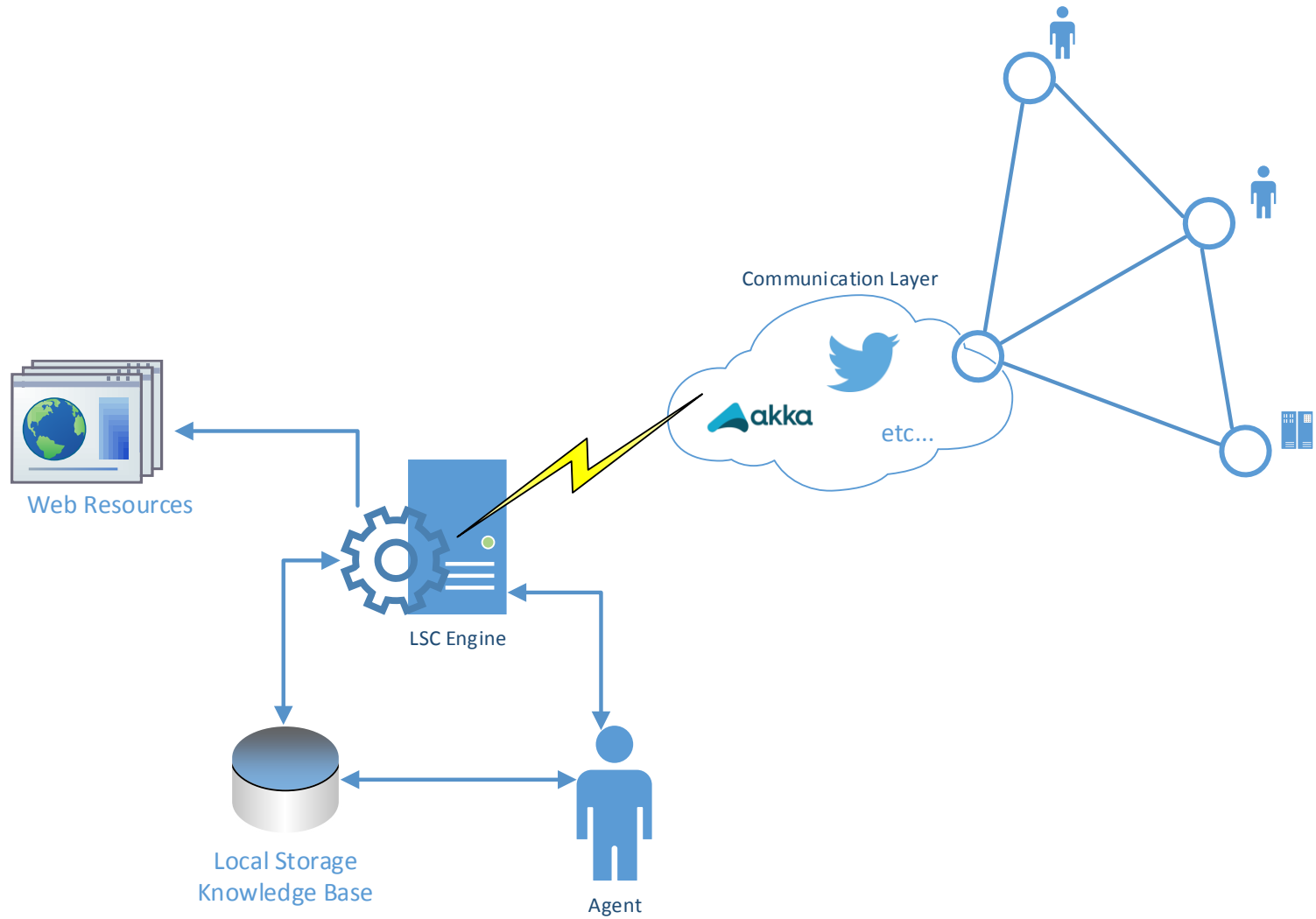
Decentralised protocols of social interaction



LSC Example



LSC Architecture

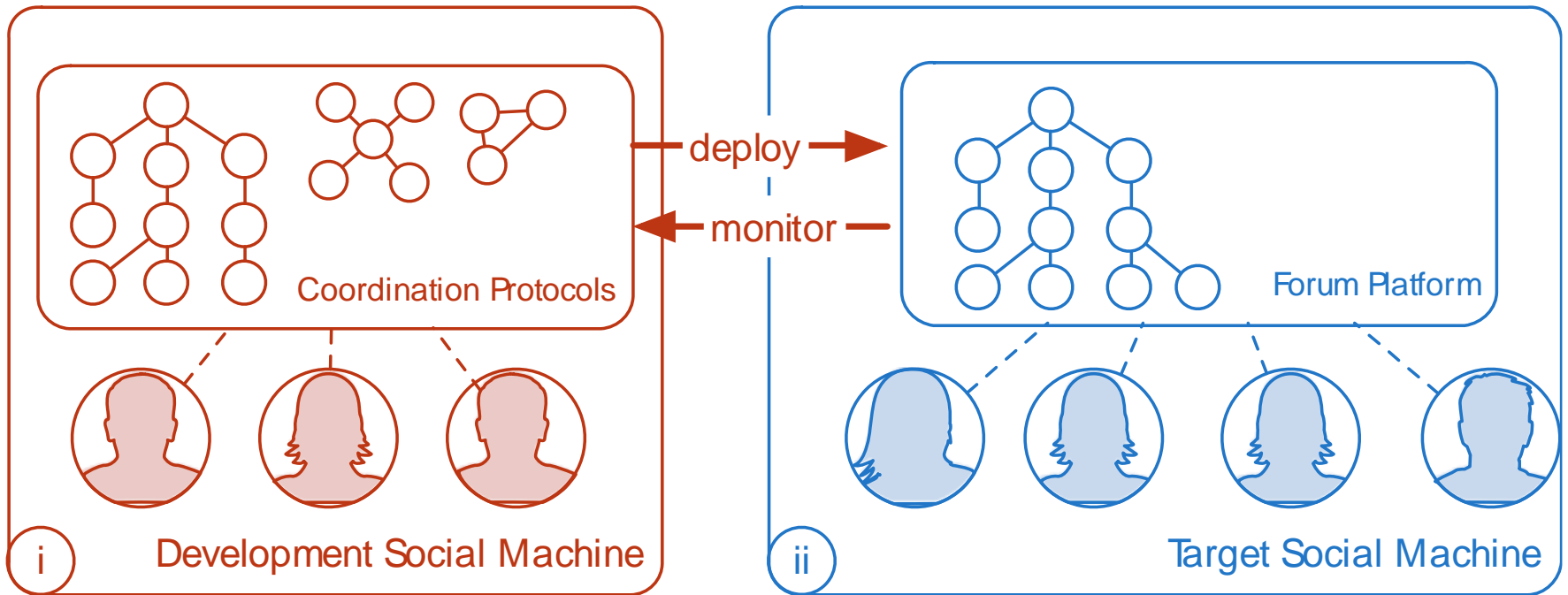




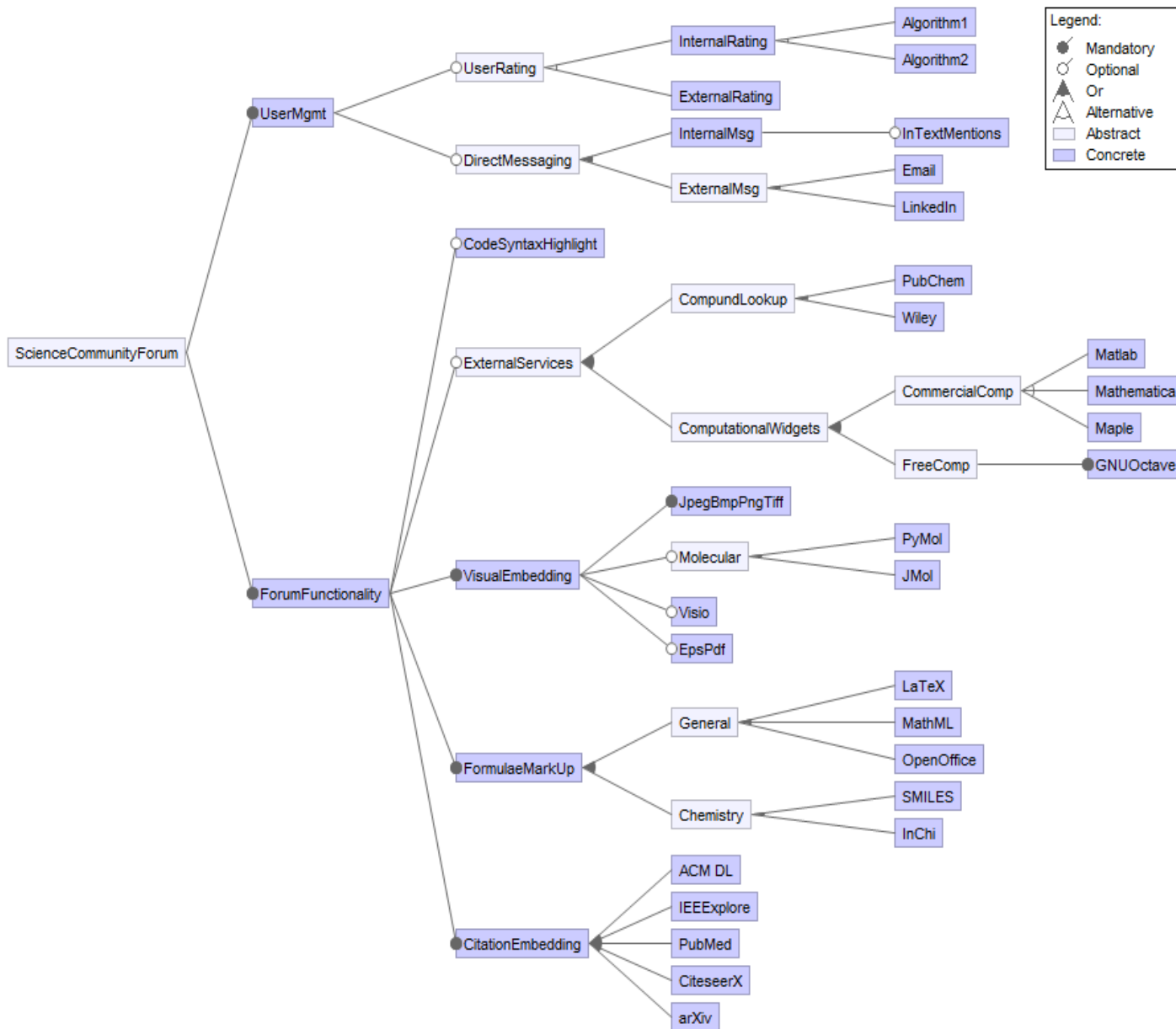
Current Directions with LSC

BOOTSTRAPING SOCIAL MACHINES

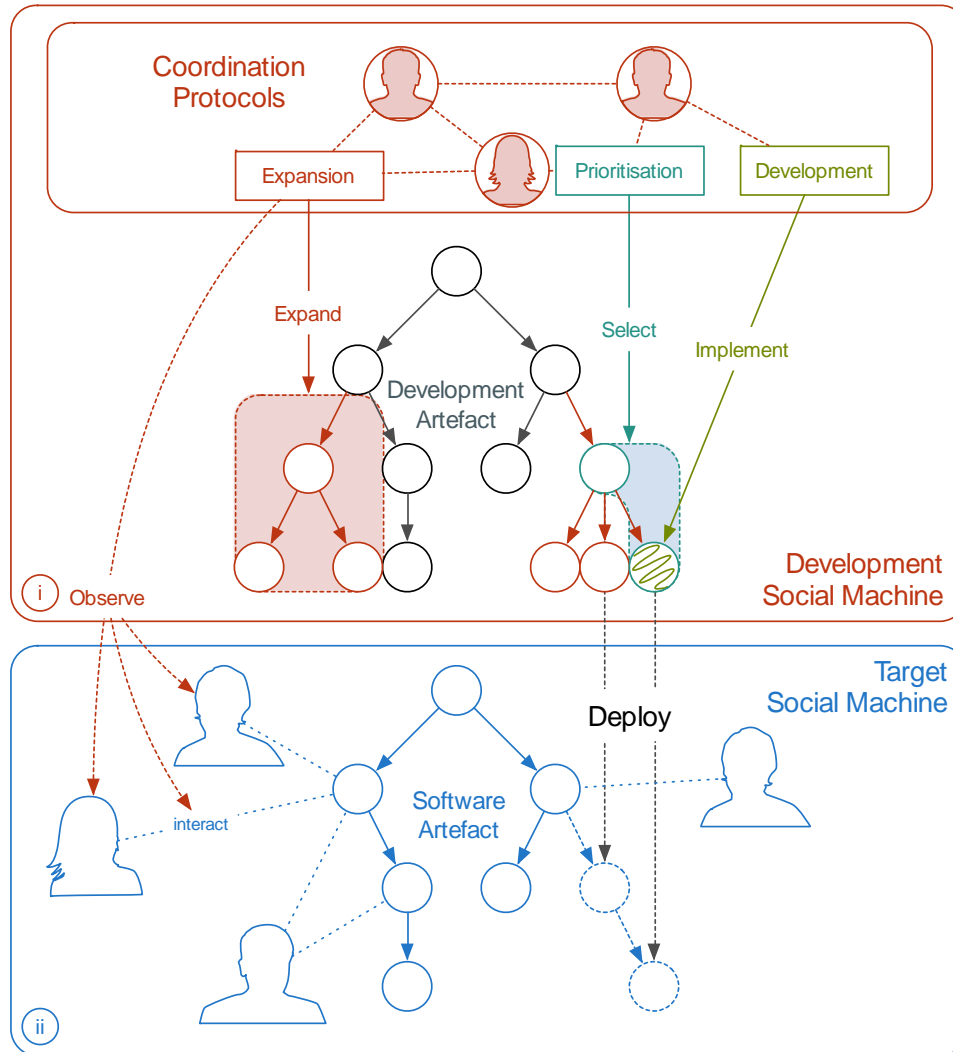
Social Machines creating Social Machines



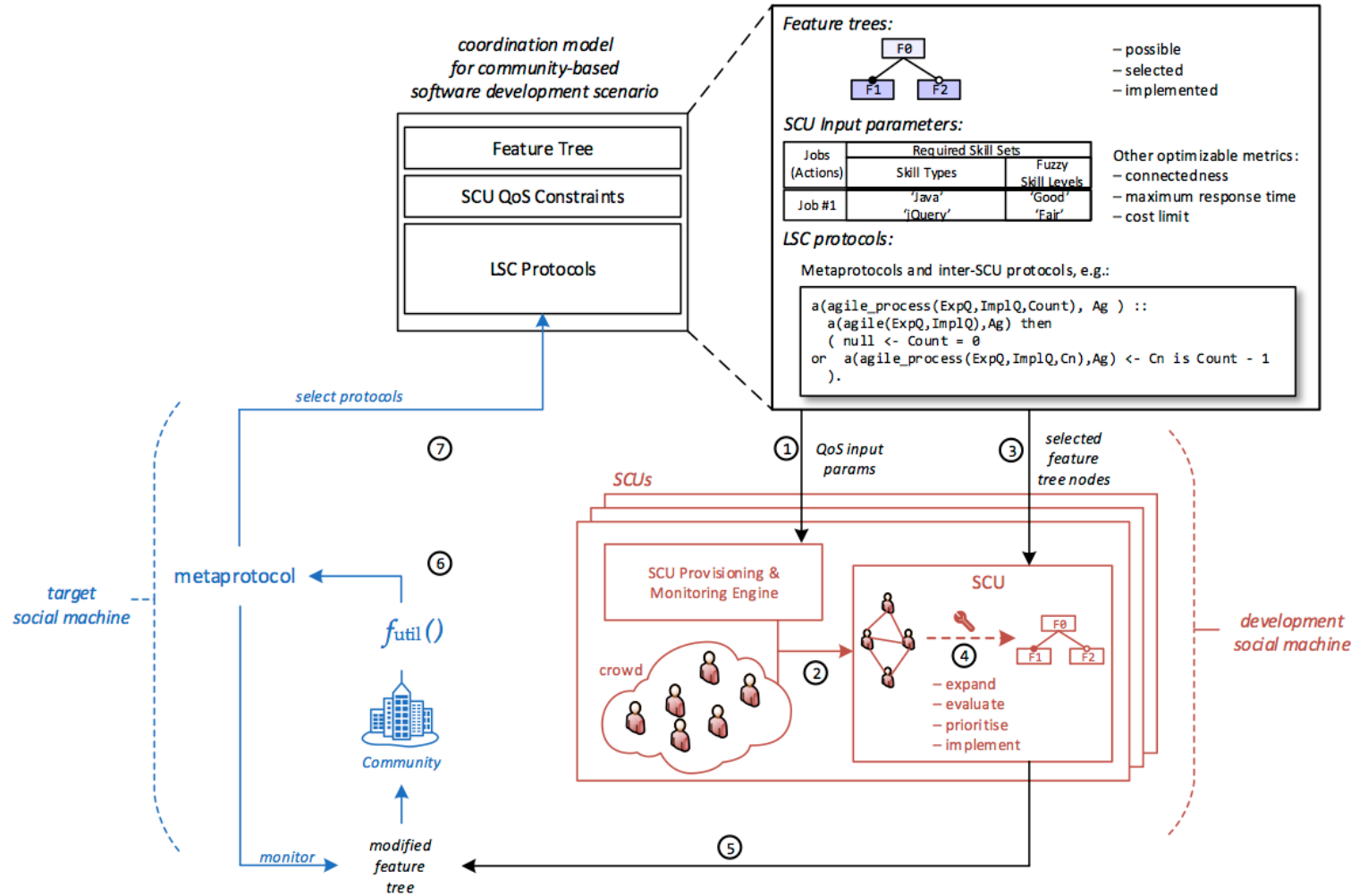
Feature-Oriented Software Development



Interaction



Coordination Model

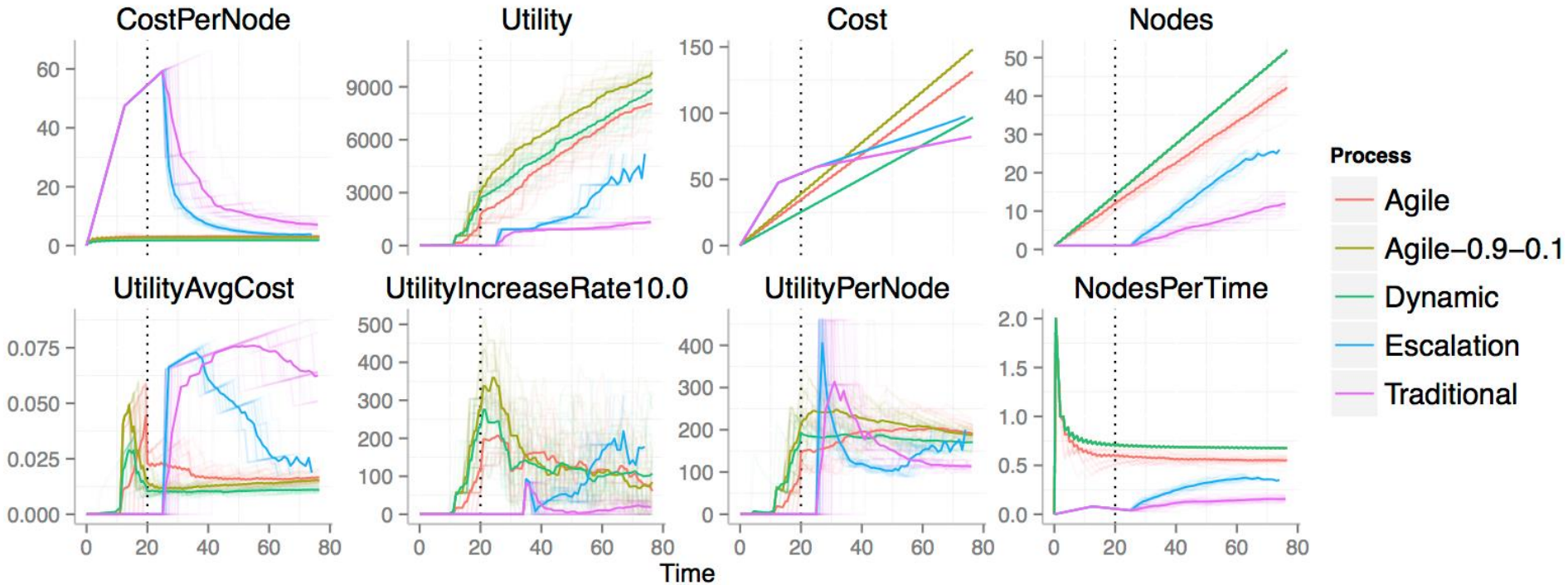




Dynamic Protocols

- **Adapt** to changing situations / evolving Social Machines – **monitor** state:
 - Population shifts, participant involvement, etc.
 - Utility / interest shifts.
- **Combine:**
 - Computational Intelligence
 - Observation / Big Data Analytics
- **Prioritise** different aspects:
 - Cost, Utility, Speed.
 - Set goals and select best strategy.

Simulation





Current Directions with LSC

SHADOW INSTITUTIONS

Lightweight Social Machines

Twitter

Stream of messages on existing social network



dave > @mealbot: organise a meal tonight #sociam-dinner



mealbot > @dave: Want dinner tonight? Subscribe and vote for locations on #int2045 #sociam-dinner



jen: I'm in! #int2045 #sociam-dinner



pat: Let's do the Rockstone at seven #int2045 #sociam-dinner

Master

Looks for messages which initiate interactions

follow @mealbot

found interaction

```
InteractionSpec: <protocol=meal-protocol,
AgentSpec:<coord3245,role=coordinator(tonight,...)>,
AgentSpec:<@dave,role=subscriber(coord3245)>>
```

create runner for interaction 2045

follow #int2045

announce interaction

found role

```
AgentSpec: <@jen,
role=subscriber(coord3245)>
```

found role

```
AgentSpec: <@pat,
role=voter(coord3245,
"Rockstone", "seven")>
```

Runners

Look for messages belonging to particular interactions

create agent coord3245

create shadow @dave, set role subscriber

create shadow @jen, set role subscriber

create shadow @pat, set role voter

Agents

Formal agents running interaction model. Includes purely computational agents, and shadow agents representing humans

coord3245



@dave



subscribe

@jen



subscribe

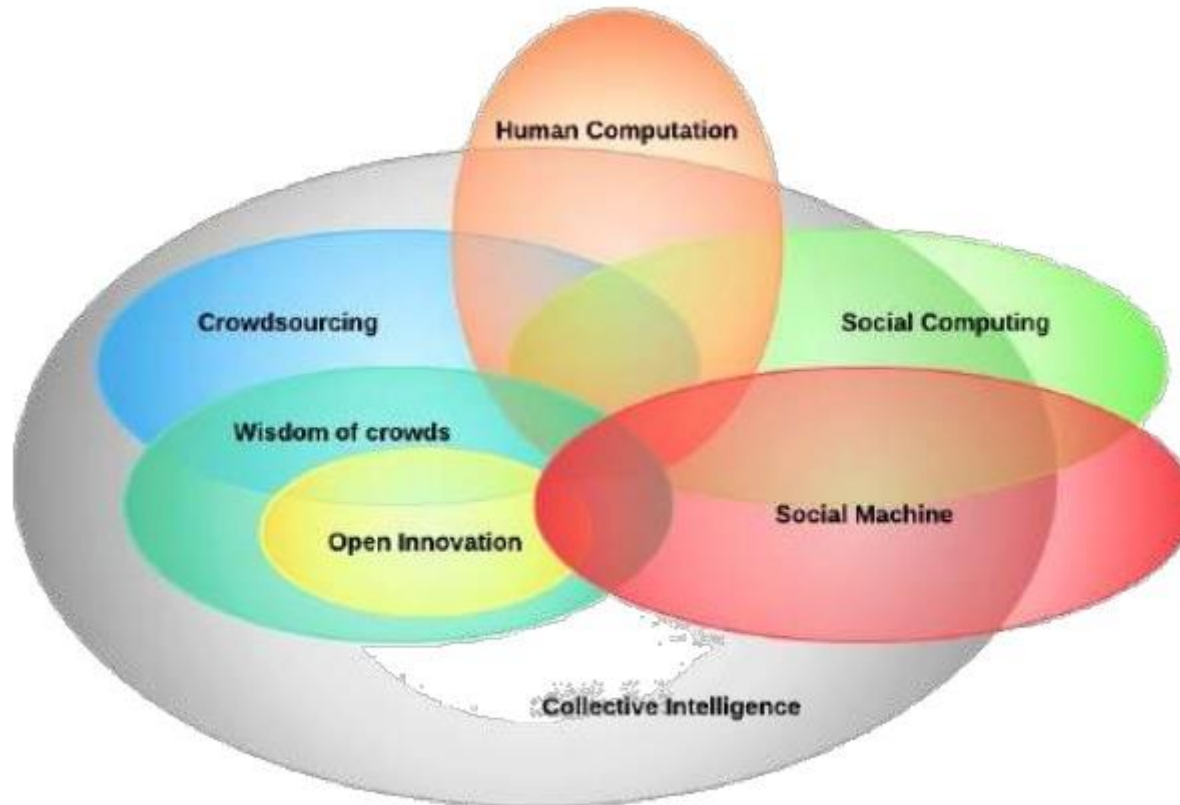
@pat



vote(Rockstone, seven)

Other people sign up, vote, etc.

The Age of Social Machines



Nigel Shadbolt et al