

The Social Computer – Combining machine and human computation

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Workshop and policy Forum on FET Flagships
Brussels June 9-10, 2010

<http://TheSocialComputer.eu>

The Social Computer

- The **social computer** is a future computational system that harnesses the problem solving, action and information gathering powers of humans and the environments in which they live in order to tackle **large scale social problems** beyond our current capabilities.
- The social computer exhibits a **predictable, resilient** and **dependable (algorithmic) behavior** whose performance improves with **time** and **participation**.
- The **hardware** is supplied by people's brains and bodies, the environment where they live, including artifacts, e.g., buildings and roads, sensors into the environment, networks and "usual" computers.
- The **software** is the people's minds, laws, organizational and social rules, social conventions, and computer software.

... Social Computing with a purpose

... see vision paper on

The Social Computer – an example

Problem: A new disease with a virulent (d1) and a non-virulent form (d2).
Two schools of thought on how to relate symptoms and diseases

Solution

1. Deploy all relevant solutions
2. Individuals give local feedback
3. Individuals inform collective choice (by discovering the ratings of the others)
4. Collective choice influences service provision

Characteristics

1. Social reinforcement through local incentives
2. Scaling with increasing societal involvement
3. Correctness as a social measure (fed back into algorithm)
4. Completeness as a social judgement
5. Local deviations from social/ global behavior
6. Evolution through social influence

See also:
Human Flesh Search Engines

Our goal

A network of *prototype* social computers and social computer enabled systems across Europe

+ the *science* needed to study them (**society**)

+ the *engineering* needed to build them

+ the needed (large scale) experimentation and evaluation *facilities*

Interdisciplinary Integration

Rooted in computer Science BUT with the focus on society

- **Economics**, on, e.g., the quantitative aspects of the transformation brought about, including **incentives**, the effects of competition, stability and so on
- **Sociology and organizational science**, on, e.g., the synergy between the new technologies and the social and organizational structures together with the **trajectory of adoption and successive adaptations and evolution**
- **Law and criminology**, on, e.g., the legislative consequences of the approach and its negative effects (attacks, viruses and other threats to the social computer).
- **Ethics**, on, e.g., the **foundations** for the creation of a better society
- **Innovation, Technological innovation, Social innovation**, on, e.g., the difficulties encountered when **transferring technology** to people.
- ...

Research Challenges

- Developing a new notion of **computation** which embraces society as well as the mechanics of traditional computation and also harnesses social scale to accommodate local behavioral deviations.
- Developing much more abstract design **methodologies** and **languages**, exploiting notions which are closer to the societal notions, and where computers and humans are treated within a single framework.
- Charting the space of possible **architectures and components** for social computer based systems.
- Handling **diversity** (of data and programs) in space and time and, consequently, adaptivity, mutation, and evolution.
- Developing fundamental **science** aimed at explaining the emergence of social computation. This will require **large scale experimentation** and **evaluation**, requiring new synergies between empirical and analytical methods.
- ...

Ambition

- A new holistic (human) science and engineering as a result of a process of bi-directional, interdisciplinary mutual ***convergence which will change all the disciplines, including ICT.***
- A better and more integrated society which harnesses the diversity and richness of the European regions and cultures
- A solution to a first set of large scale societal problems, e.g.,
 - improved management of societal crises (e.g., energy management),
 - Increased availability of scarce resources (e.g., knowledge of rare diseases),
 - real time management of mobility and/or last minute opportunities,
 - opportunistic cooperation towards an economic goal (e.g., among SMEs)
- Social innovation via technological innovation
- Value creation via social innovation

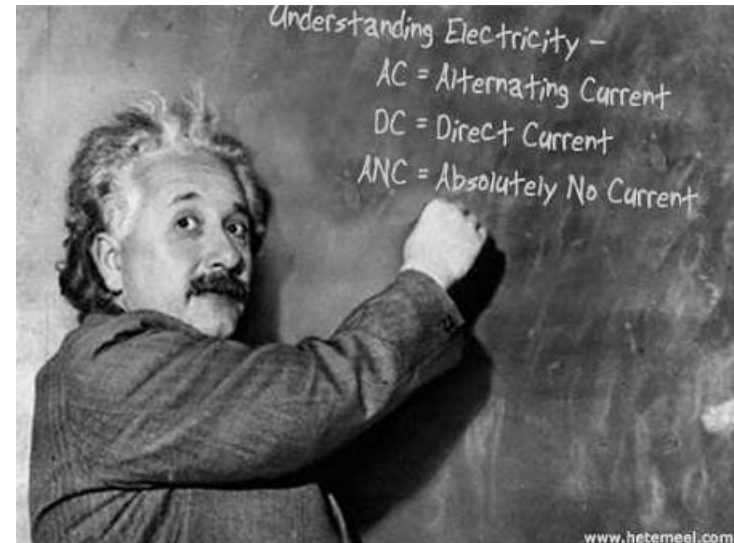
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Thank you!

[http://The SocialComputer.eu](http://TheSocialComputer.eu)

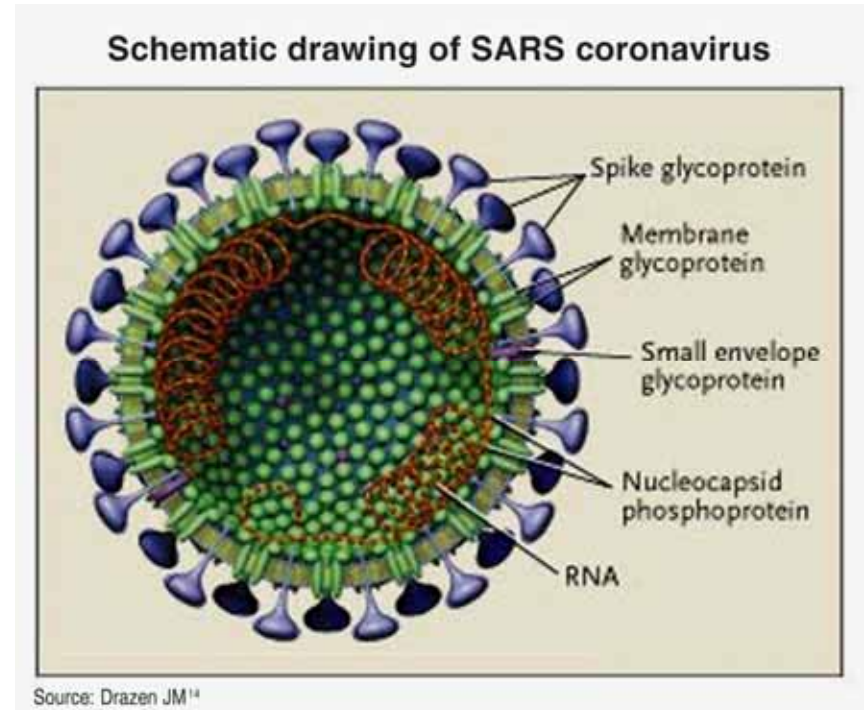
Example (2): Load Shedding

- Power can be scarce
- Neighbourhoods prefer to control use rather than experience power cuts.
- Agree keep below threshold demand
- Individual homes agree either to keep below a threshold or to be load shed when necessary
- Social computer manages individual contracts and the balance of strategies across the neighbourhood.



Example (3): Treating SARS

- Severity varies by categories and locality
- Deciding when to refer to hospital is key – too late bad for the patient – too early the hospital is flooded.
- Social computer can assess different strategies, identify different classes of patient and adapt as the epidemic progresses
- More participants mean more reliable evidence for referral decisions



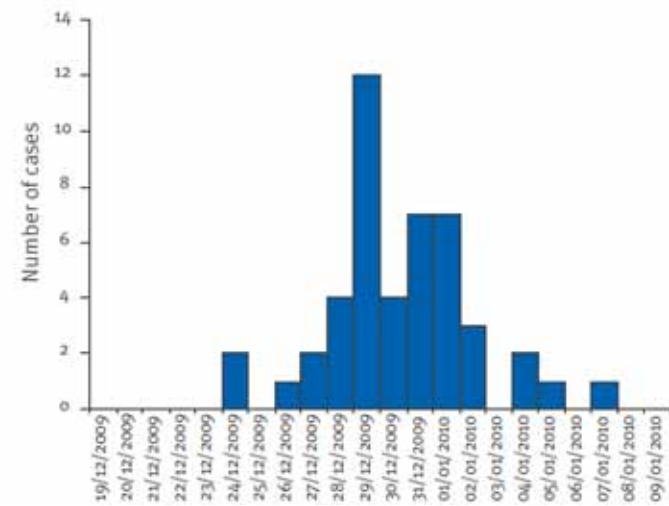
Example (4) Sourcing Legionella Outbreak

- Finding the source of Legionella outbreaks is key to control.
- The social computer can combine data from different social sources to identify the source.
- Premises with aerosol producing equipment can locate them using GPS on their phones.
- Friends of victims can walk their routes to work, leisure etc using GPS to track routes
- Using this data candidate sources can be identified rapidly.

Currently an investigation is ongoing to explore and control an outbreak of Legionnaires' disease, affecting 65 people as of 22 January 2010, in the cities of Ulm and Neu-Ulm, south-west Germany. A hitherto unidentified wet cooling system in these twin cities is considered as the most likely source of infection.

FIGURE 2

Onset of disease in patients with Legionnaires' disease, Ulm/Neu Ulm, Germany, information available as of 22 January 2010, (n=46)



Example (5): Local News

- Local reports of news events are interesting but are often conflicting
- The social computer can use a range of architectures to consolidate and cluster reports.
- Rapid reporting of news that captures different local perspectives.
- Becomes more reliable (and perhaps diverse) as more people report



The image is a screenshot of a BBC News article. At the top, there is a red banner with the 'BBC NEWS' logo. Below the banner, the breadcrumb navigation reads 'BBC Home > BBC News > South Asia'. A 'Menu' link is visible. The main headline is 'Afghan peace jirga backs Karzai Taliban talks proposal', dated '04 June 10 19:31'. A small photo shows a man in a dark jacket. The sub-headline states: 'Afghan tribal leaders have endorsed President Hamid Karzai's plan to seek peace with the Taliban, on the final day of national peace talks in Kabul.' The main text begins: 'The "peace jirga" ended by backing an amnesty and job incentives to induce militants to give up arms.'

Towards the Social Computer

