



## **Social Computing in 2020 - Part C of Submission**

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**Date:** January 29, 2009

**Title:** Anatomical Analytics

Ubiquitous computing is a model of human-computer interaction in which small, inexpensive chips are embedded into everyday objects.<sup>1</sup> In contrast to popular futuristic visions of cyberspace where we immerse our bodies inside a virtual reality system, ubiquitous computing extends technology beyond the borders of our screen and works like reverse virtual reality. Radio-frequency identification (RFID) tags are commonly used in ubiquitous computing applications. RFID tags are already all around us: they are woven into our passports where they store bits of data about our identity, they connect products on the shelf to a database which instantly aggregates an inventory status, and they are used in certain libraries to map a book's exact location within the library. My idea for a technology in the year 2020 is to embed RFID chips inside our body in order to monitor health. Connecting these chips across a global network will allow us to manage health trends and lead to new developments in what I will refer to as *Anatomical Analytics*.

The first step in this technology would be attaching microscopic RFID tags near a few vital organs. Perhaps this is best achieved by placing small RFID chips at locations closest to the organ and just beneath the skin; or the RFID could be administered as an annual pill that over time would organically disintegrate inside the body and be re-administered each year. The chips don't store data, they communicate data. Each tag is a listener that transmits the current condition of the respective body organ to which it monitors. The data is then collected by a server and illustrated graphically by an online software application. The software interface would resemble something like Google Analytics, but for your body. A few examples of how this type analysis would be extremely helpful in the prevention and the detection of illness include:

- The analytics would display signs of high blood pressure putting a strain on the kidney and therefore warn of kidney damage.

- If you are consuming inordinate amounts alcohol the analytics could map out a projection to see if you are in jeopardy of developing liver disease.
- In the case of someone suddenly falling unconscious, before the patient arrives at the hospital the doctors could receive a Twitter-esque status alert and preparing for "A man in his late 50's suffering from heart failure."

On a macro-sociological level the data is aggregated by Anatomical Analytics Trends in order to predict local, national and global health trends. Once the RFID chips are in place it would be fairly easy to monitor an individual's location by using RFID readers that could be installed in schools, the workplace and stores. Combining locative data we could potentially link an outbreak of E.Coli to a particular fast-food chain; visually segment the population based on nutritional intake data; or detect and track influenza activity in The United States.

Of course there are many ethical issues surrounding anatomical analytics, but I don't think it is too difficult to imagine developments into this type of technology over the next 10 or 20 years. Consider other examples of placing technology in our body:

- It has been over 50 years ago that the first pacemaker was implanted into a human.
- Recently it has become popular to place RFID technology under the skin of pets.
- Filmmaker Rob Spence has begun plans to install a camera into his eye socket.<sup>2</sup>

Furthermore, issues of privacy and Orwellian surveillance would be of concern to many. Yet again any intrusion of privacy made by Anatomical Analytics is not all that far off from many present-day scenarios. A notable

example of a surveillance tool commonly used in our cars is the electronic toll RFID tags that, in addition to charging our credit card, transmit locative data each time we use a toll. The other - perhaps less obvious but more pervasive - example of a locative surveillance tool is the Internet. As Lawrence Lessig has shown through his research of "code as law" the Internet is actually one of the most controlling mediums that has ever existed. And despite the fact that we never know who or when someone might be looking at the data we leave on the Internet, we sacrifice privacy for efficiency in our lives.

Kevin Kelly in speaking about the future of ubiquitous computing has remarked, "Ten years ago the notion that all doors in a building should contain a computer chip seemed ludicrous, but now there is hardly a hotel door in the U.S. without a blinking, beeping chip in its lock. These microscopic chips will be so cheap we'll throw them away."<sup>3</sup> My theory is that in the future, the idea of monitoring human vital organs with RFID chips won't seem so ludicrous. The definition of ubiquitous computing will eventually have to be expanded beyond 'a network that *connects everything*' as it will truly be 'a network that *connects everything inside everyone*'.

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1 Wikipedia, "Ubiquitous Computing" <[http://en.wikipedia.org/wiki/Ubiquitous\\_computing](http://en.wikipedia.org/wiki/Ubiquitous_computing)> (accessed January 27, 2009).

2 <<http://blog.wired.com/gadgets/2008/12/eye-spy-filmmak.html>> (accessed January 25, 2009).

3 Kevin Kelly, *New Rules for the New Economy* (San Diego: Viking, 1998), pg. 10.