



SCIENCE & TECHNOLOGY FORESIGHT

2004 NRC Foresight Workshop

Wildcard Scenario: The End of Bureaucracy

Consultant: Karl Schroeder

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Abstract

This scenario focuses on the health care system more than the biotech industrial sector; but there are lessons here for both. It is an attempt to synthesize some of the ideas from the March 22-23rd 2004 workshop, but it is also an attempt to show what unexpected drivers may change the climate of the discussion on health care in radical and previously unforeseen ways. In particular, we will take one key idea, that of *silent commerce*, and develop its implications in the context of health care.

Synopsis 2020

In the year 2020 Canada has retained the checks and balances of information processing represented by the health care bureaucracy that exists in 2004; but the nation has eliminated the bureaucracy itself. In its place is a nimble and “smart” data network to which every citizen of the nation has immediate and *unmediated* access. Reductions in the friction associated with health care transactions means that physicians have more time to spend in areas of their core competency, and spend very little time in activities that could be considered maintenance or bureaucratic support activities.

Canada got to this point by aggressively attacking the inefficiencies inherent in entrenched bureaucratic structures. A common complaint among health care workers in 2004 was that they had to memorize five or six login/password combinations, each one for a different computer system. It was observed that computers, where used, were used to reinforce the existing processes of the bureaucracy, rather than replacing them. Radical systems redesign was undertaken, in an attempt to eliminate all human activities that did not directly involve interaction with the patient or physical infrastructure (eg. buildings, shipping/receiving) in the health care system. The model of health care delivery was derived from the experience of organizations as diverse as Federal Express and the international banking system.

The principle behind this seismic shift was simple: *Institutions are information processing systems*; more specifically, bureaucracy is a command-and-control system with a variety of inputs and outputs. The inputs and outputs are physical actions in the real world; the bureaucracy itself might be viewed as a kind of “black box” inside of which any sort of processing may take place. A corollary to the notion of institutions as IP systems is that once an institution exists, its internal processes undergo a process of natural selection favoring activities that perpetuate the institution and reinforce its internal structure. The introduction of computers has done almost nothing to offset this tendency.

One problem faced by the health care system in 2004 was that health care took place *inside* a bureaucracy; doctors, nurses, pharmacist etc. were workers inside the “black box”. Nothing got done unless the proper steps were followed and the proper information flow

occurred. To some extent this was a good thing: the 2004 reformers did not naively propose that we remove the checks and balances that ensure patient confidentiality, safety and right to make their own decisions. It is true, however, that all information processing requires work, and bureaucracies inevitably operate with a great deal of internal and external friction. This friction can be expressed in two forms: as money, and as time. Sociologically, it can also be expressed in the degree to which stakeholders such as doctors and patients feel disenfranchised, or unable to control their own experience within the system.

The redesign of the system was therefore intended to directly reduce time and cost of health care processes, and improve people's experience at the same time.

Key Events

- 2005 Canada undertakes a massive systems-analysis of information flow within the health care system. This analysis differs from traditional business process re-engineering schemes in that it seeks to explicitly identify elements of the system that are parasitic, i.e. that exist only to perpetuate themselves.
- 2006 Legislation requires all new patient records to be encoded in an interoperable form, initially an RDF-compliant XML language. Initially, Microsoft .NET and related technologies will be used to connect the diverse systems.
- 2007 Recommendations from health care analysis result in identification of entire agencies that can be eliminated.
- 2007 Legislation is passed to permit the personal preferences recorded in certain software agents to act as "living wills" for persons incapacitated by accident or disease. Similar legislation is passed permitting software agents to make certain legal decisions, cutting humans out of the loop for *routine*, but not *critical*, legal processes.
- 2008 Standard national patient record implemented. This record is a "live" process within health agency computers, a practical example of a *software agent*. It consolidates all health-related information and personal choices (i.e. a living will) for the individual, in one record. This record is redundantly distributed but encrypted such that only the individual normally has complete access to its contents.
- 2010 Canada begins consolidating its health care bureaucracy, eliminating positions via attrition. Savings are directed down to the front line, for hiring of more doctors, nurses, and specialists as well as maintenance of long-term care facilities, ambulance fleets etc.
- 2016 Attrition process ends. Most Canadians are now represented by a "live" health care record within a single networked system.
- 2020 Physicians and specialists now spend 60-80% of their time working in their area of core competency. Traditional "paperwork" jobs have been almost completely eliminated; where bureaucratic positions still exist, they do so entirely to manage exceptions to the rules.

Example: The Patient Record

Within a traditional bureaucracy, records are static objects that must be manipulated by human beings in order to have significance. This is changing; financial transactions are increasingly managed by automated processes, giving rise to the recent concept of silent commerce. In twenty years silent commerce can be expected to move out of the realm of warehouse management and inventory control and into every aspect of our daily lives. Following is an example of how the concept can be applied to patient records.

In our scenario, a patient record is not a static collection of information, not even as part of an XML-based national data repository. Such repositories are part of the old way of thinking, in the world of 2024. A true patient record is a live process whose pedigree includes computer worms and the automated agents enabled by Microsoft's .NET framework, Sun Microsystem's JINI language, and MIT's *Oxygen* project. Your record is not static information residing in a database. It is a cross between a living will and a constantly-updated profile of your health and requirements, and it is never completely idle. As an inhabitant of the database space of the National Health System, your record jostles with millions of others, calling for attention when conditions warrant, and updating and reorganizing itself the rest of the time. It is your advocate with the health care system; it is present at any consultation, updated when you fill a prescription, and even interfaces into your home exercise equipment so that it knows your fitness level. This would be an Orwellian nightmare of surveillance if the record were not entirely under your control. It is, however.

To see how we might get from here to there, it's a good idea to look at the current financial networks used by banks. Billing systems are the best example of autonomous, unconscious software agents that operate on your behalf: when you travel and take your cell phone with you, background systems that you are quite unaware of update your roaming profile and ensure that you can make a phone call with the cell whether you're in Calgary or San Jose. No human intervention is required for this process to run smoothly. By extension, we can imagine a patient records system that uses technology derived from the cell phone system, and that updates your patient profile in a similarly invisible way.

The practices of silent commerce are critical to understanding this evolution. Business-to-business communications (ordering, billing etc.) are increasingly done by automated processes. It is natural to assume that this methodology will eventually reach health care. Your health care record can be seen as a silent commerce system owned by you.

Your patient record may remain in an arms-length relationship with you, if you don't like to be reminded of health issues. However, if you want it can be a constant companion, using GPS technology to know when you're in a position to walk to your next meeting rather than taking an elevator--and willing and able to nag you to do it. If you've given it access to your bank cards, it knows what groceries you've bought, and may even suggest alternatives while you're in the store. It does so via your cell phone or PDA.

As your representative, your record combines all the information necessary to constitute a living will. Should you be injured and unable to communicate with health care providers, your record does so in your place--although it makes no assumptions about decisions you haven't communicated to it. It is in this sense the ultimate descendant of medic alert bracelets, living wills, driver's license organ donation tick boxes--all the systems for decision-making that are currently managed by separate physical and bureaucratic mechanisms.

Key Issues/Questions

- Everybody's different. The virtue as well as vice of bureaucracy is that it categorizes people. A key question is whether people within bureaucracies spend most of their time handling exceptions--i.e. uncategorizable people and situations. If this is true then automating the flow of information in a bureaucracy will do little to improve efficiency.
- After over a quarter century of experience with computers, almost no one has any replicable skill at redesigning business processes around computers, though the private sector spends billions trying. Information-flow re-engineering schemes go spectacularly wrong more often than not; thus this is a very dangerous thing to try on something so large and delicate as a national health care system.
- People, in particular the elderly, need familiarity with their experience of the health care system. Hospitals, doctor's offices and traditional modes of communication such as pre-checkup phone calls can't be eliminated. However, the idea of this scenario is to eliminate insofar as possible all activities that do not involve direct contact with the patient. A direct measure of failure would be disruption in patient service.
- This scenario seeks to highlight the fact that any other scenario in the 2004 Foresight workshop that proposes new legislation will add to the bureaucracy; the extra bureaucratic work will cost time and money and this may offset any anticipated gains in efficiency/economy of the system. The only solution that will work in the long run is to introduce measures to reduce the bureaucracy.
- This proposal, unlike those of traditional fiscal conservatism, does not suggest eliminating bureaucracy by simplifying or scaling back on the activities of the health care system (eliminating or consolidating categories, creating one-size-fits-all solutions etc.). Rather it aims to retain the richness of the current system while reforming the way that information flows within it. The means to do this is by introducing the concept of *silent commerce* to health care.