

: How will decision support technologies shape our global society?

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Change is definitely occurring in our global society. Some changes are minor and seemingly insignificant. Other changes linked to mobile computing and "smart" software seem more disruptive. The forces creating the changes are difficult to discretely identify. We live in a multi-causal world of pressures that are tugging, pushing and interacting. One **cannot** say definitively that the Internet or social networks or even computers are having or have had a profound impact on how we live. Perhaps we live in an emerging hyperconnected, digital, information age. Perhaps the change process has just begun. We can certainly interact easily with people from most countries often in real-time. Most data is now digital and we are creating and capturing enormous amounts of data. Where are we headed?

Increasingly we live in an crowded world struggling to cope with a growing shortage of some physical resources by substituting information technology. What seems true is that technology is enabling change and people are adopting new technologies because of how a specific technology might improve or favorably alter their lives.

Change is not directed or controlled. We technologists do not know where a technology like analytics and decision support and its direct intervention and involvement in human decisions is leading humankind. People decide what they do for reasons hidden from careful inspection and review by others. Information technology changes the view and record of human decision making. Academic researchers have a role in investigating current and future uses of decision support capabilities, but the implementation of the technologies is not in our direct control. Researchers do not make choices about whether people or organizations should adopt or not adopt new decision aiding tools. Those who do make the decisions are primarily considering the impact on their organizations in the next 3-10 years rather than long-run consequences for global society. Decisions about using information technology seem to primarily focus on analyses of short-run financial and operational consequences. Managers and technologists will continue to innovate and adopt new technologies, but researchers need to find a balance between systematizing what we know and speculating about what will result from decision support technology adoption. Decision support researchers should more consciously act to shape society rather than accept that social change resulting from our research is a random product of myriad uncontrolled, interacting events and developments.

Researchers need to better understand the impacts of decision support technologies and stimulate excitement to move the field of decision support in new directions. In 1965, Robert Anthony compared Strategic Planning to Management Control and speculated about the development of large planning data banks. Big Data advocates are moving to realize that vision in corporations and government organizations. Computerized decision support, computing and information technologies

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can improve planning and performance in business organizations, but potentially these technologies will reshape society in negative as well as positive ways. Government and social planners as well as business planners need to use data to support both management control and strategic planning.

Analytics, collaboration, and decision support technologies are changing and reshaping society. Some would say society is being transformed and permanently altered. Perhaps we are creating smarter cities and a smarter planet. The broad question is does decision support make a positive, significant difference in people's lives and perhaps equally important could we stop the transformation that is occurring if we desired to do so?

To answer these questions it is necessary to engage in speculation about first and second order consequences, to systematize prior research so we can teach our findings, and perhaps to differently organize what we know to change how developers and adopters evaluate decision support.

Technology speculation has been occurring for many years, but future fiction literature is considered entertainment rather than content that is useful speculation that might contribute to our understanding of both intended and unintended consequences of adopting decision support or other technologies. Stories by authors like Isaac Asimov and Robert Heinlein are both entertaining **and** useful to technologists.

In a story by Heinlein titled "Beyond this horizon" that was initially published in *Astounding Science Fiction* magazine in April 1942-May 1942, we read of a future earth where science and technology have transformed society. A computer system with data on all of the financial transactions of a continent predicts economic activity and recommends changes in "the subsidy on retail transfers of consumption goods" and changes in "the monthly citizen's allowance" to maintain a stable social equilibrium (cf., p. 7). The computing system supports decision making, but its predictions are accepted as true and political decision makers have no real choice but to accept the "recommendations".

Isaac Asimov, a prolific science and science fiction author, wrote the Foundation trilogy, "Foundation" (1951), "Foundation and Empire" (1952) and "Second Foundation" (1953) and then added some additional books to the series many years later. The story revolves around the consequences of developing a decision support model that predicts the future. Mathematician Hari Seldon proposes and then creates a psychological model and a science called psychohistory. The Prime Radiant computer model combines data and equations about history, sociology, psychology, and mathematical statistics to make general predictions about the future behavior of very large groups of people. Seldon explores many alternative futures that span thousands of years and tests various interventions that change outcomes. His predictions are uncannily accurate as it turns out

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until chance and human mutation alter the course of events. In the short run, a few hundred years, the decision support forecasting model assists in changing actions, but ultimately people must respond and act more independently to survive.

In Mack Reynold's novela "Computer War" (1967), the world is divided into two nation states. Only one, Alphaland, has computers. The computer predicts victory, but the war goes on without explanation. For some reason the computer's conclusion of Alphaland's economic superiority over Betastan does not lead to a single world state. Computer support and rational analysis was not able to help the leaders of Alphaland defeat a seemingly irrational and unpredictable human foe.

British author John Brunner wrote "Stand on Zanzibar" (1968) about an overpopulated dystopian world of 2010. A major plot element is a supercomputer named Shalmaneser that can listen and scan conversations for key words. In the novel there is discussion of whether Shalmaneser is self aware. Shalmaneser can not solve our future problems.

Perhaps the most well known supercomputer in science fiction is HAL 9000. HAL is a star of Arthur Clarke's novel and the associated movie directed by Stanley Kubrick titled "2001: A Space Odyssey" (1968). The movie and novel deal with many issues including humanities move beyond computer decision support to artificial intelligence and its possible consequences. HAL 9000 has some type of breakdown or malfunction and acts to defend itself. Ultimately HAL kills some crew members and mission pilot and scientist Dr. David Bowman disconnects Hal's processor core. Bowman's act destroys most of Hal's processing functions or intelligence. A "smart" decision making system intended to help people inexplicably harms them and must be disabled.

Many more novels, novellas and short stories speculate on the impact of computerized decision support and artificial intelligence on human society. After reading many such stories, I can not easily recall a decision support innovation that led to a uniformly positive set of consequences and outcomes for humanity. We seem faced with difficult choices of development, adoption and implementation. Compiling scenarios about alternative decision support futures can potentially assist business, political and science decision makers as they grapple with funding research and purchasing systems to assist in military, government and business operations and strategy. The future is unknown and unknowable, but it **is worthwhile** contemplating what might happen in the long-term if various decision support technologies improve substantially and are adopted.

Harvard Professor Robert Anthony (1965) argued "It is because of the varied and unpredictable nature of data required for strategic planning that an attempt to design an all-purpose internal information system is probably hopeless. For the same reason, the dream of some computer specialists of a gigantic bank, from which planners can obtain all the information they wish by pressing some buttons, is

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probably no more than a dream (p. 45)." Perhaps Anthony was wrong and we can expect much more powerful data-driven decision support with gigantic data banks to assist with strategic planning. Scenarios of future possibilities should be part of the gigantic data bank.

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Anthony (1965) compared strategic planning and

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management control. See his conclusions in the table:

Category

Strategic Planning

Management Control

Person primarily involved
Staff and top management
Line and top management

Number of persons
Small
Large

Mental activity
Creative; analytical
Administrative; persuasive

Variables
Complex; much judgment
Less complex

Time period
Tends to be long
Tends to be short

Periodicity
Irregular, no set schedule
rhythmic; set timetable

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Procedures
Unstructured; each problem different
Prescribed procedure, regularly followed

Focus
Tends to focus on one aspect at a time
All encompassing

Source of information
Relies more on external and future
Relies more on internal and historical

Product
Intangible; precedent setting
More tangible; action within precedent

Communication problem
Relatively simple
Crucial and difficult

Appraisal of soundness
Extremely difficult
Much less difficult

Definition of hyperconnected from <http://www.pcmag.com/encyclopedia/term/64454/hyperconnected>

(1) Refers to the high-tech communications of the 21st century delivered by local networks, broadcast media, telephone networks and the Internet, all of which is 24/7 and never ceases. It encompasses radio, television, phone and video calls, texting, e-mail, blogs, forums, chat rooms, instant messaging, social media interactions, as well as access to corporate data. Starting with the iPhone's introduction in 2007, the smartphone has connected more people to more things than any other electronic device, because people keep it with them almost constantly.

(2) The enormous volume of information that can be obtained about a person via the Internet. It is a common practice to use the same e-mail address for every online account and even the same password. In addition, users' Internet addresses (IP addresses) are often a constant that can be used to identify them. The problem with today's hyperconnected life style is that not only can a huge amount of information be derived for one individual, but if a password is compromised, numerous online accounts may be vulnerable.

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