

Summary

The information revolution is bringing about profound changes in many aspects of life. RAND has embarked on a three-year effort, sponsored by the National Intelligence Council, to chart the future course of these changes over the next 10-20 years, all over the world. As a first step in this effort, RAND convened a conference on political/governmental, business/financial, and social/cultural trends driven by the information revolution, as they manifest themselves in various nations and regions. This conference was held in Washington, DC on November 16-18, 1999, with participants from North America, Europe, and the Asian Pacific region, covering a broad cross section of intellectual disciplines.

The Political/Governmental Dimension of the Information Revolution

Regarding the political/governmental arena, conference discussions focused primarily on possible changes in the role of the nation state as a result of the information revolution. Such changes were seen as occurring for two general reasons:

- Traditional mechanisms of governance (e.g., taxation, regulation and licensing, etc.) are becoming increasingly problematic, as the information revolution allows action beyond the reach of national governments.
- The distribution of political power is changing, as new non-state actors are being empowered by the information revolution, in the business, social, and political realms, at the sub-national, trans-national, and supra-national levels.

Governments will have to find mechanisms to deal with these changes and with these new actors. Different nations may take different approaches. How they do this will affect the future course of the information revolution in their regions and go to define the role(s) of the nation state in the information age.

We elaborate on this theme in Section 4.

The Business/Financial Dimension of the Information Revolution

Conference discussions focused on two aspects of IT-driven changes in the business and financial world: the rise of electronic commerce, and new models for the internal organization and functioning of business enterprises and for their external interactions with customers, suppliers, and competitors.

E-commerce is growing rapidly, in both the business-to-business and business-to-consumer segments. It demolishes many existing barriers to market entry. Stage one of e-commerce adoption usually focuses on cost reduction via increased efficiencies and effectiveness within existing business models. This often tends to attract companies “offshore,” to suppliers in other countries with lower labor costs (yet a high standard of education), good (local) infrastructures with global connectivity, and tax breaks for exports. Stage two of e-commerce adoption involves revolutionary change in the business model. This requires skills in innovation and business change that are likely to be incompatible with foreign out-sourcing. Such skills are more likely to be found in “clusters”: geographic concentrations of interconnected companies and institutions in a particular field.

Besides its impact on business, e-commerce is also affecting governments and people in fundamental ways. It affects *government* by increasing efficiency and changing interactions with the outside world, affecting the speed and availability of information, and challenging existing regulatory frameworks. It affects *people* by reducing prices, creating new products and services and increasing choice, changing working methods, and, on the negative side, by creating possibilities of social exclusion.

In parallel with the spread of e-commerce, new business models are emerging. These models are characterized by:

- The centrality of the customer, the dominant factor in business today, and of competition, fundamental to the development and progress of a business enterprise.
- A non-linear world defining business processes, in which businesses are driven by information from the real world, not the internal company world, and must operate in real time.
- A customer services approach to developing everything, with technology and business closely integrated.
- Globalization, in all its manifestations.

- A redefinition of basic business functions, with new paradigms for product, service, delivery, support, and pricing.

These changes look profound and disturbing to some (in the business world and elsewhere), but the business community and the broader society are beginning to adapt. The course of this adaptation will vary from nation to nation, and will be affected, among other things, by the structure of the capital markets in different countries: the availability of funding for new IT-related businesses and concepts and the manner of the funding process (i.e., the vagaries of getting funding, listings, capital, acquisitions, etc.) directly impact the growth and development of new IT industries in any given region.

We elaborate on these themes in Section 5.

The Social/Cultural Dimension of the Information Revolution

Regarding the social/cultural implications of the information revolution, conference discussions focused on the developing world, not the developed (i.e., OECD) world, and highlighted contrasting views. One view hypothesized that the information revolution is likely to bring with it significant change and unrest within developing areas of the world. In particular, it was argued that in those developing areas, technology tends to exacerbate differences within a society, with a technologically savvy, highly educated, and IT conversant elite juxtaposed with a technologically unsophisticated, undereducated group of people who largely have been passed over by the information revolution.

In this view, globalization of information exacerbates societal cleavages and is likely to destabilize some governments in the developing world. Further, it aids trans-national movements, creates new sources of authority, and widens socio-political gaps. If current trends persist, we can expect to see more political movements using IT as an element of political dissent, a growing hostility toward political elites in a number of settings, and increasing alienation in a number of sectors -- in the developing world.

A second view, widely held at the conference, was that things are not that bad. The picture painted by the first view may hold in some areas of the Middle East and South America, but is not generally applicable in much of the rest of the developing world.

Proponents of both of these views agreed that generalizations about the cultural and social dimensions of the information revolution are exceedingly difficult to

formulate. While there are certain universalities which can be identified, there are also regional and national peculiarities which are not always that easy to ascertain.

We elaborate on these themes in Section 6.

A Vision of the Information Revolution Future: “The Great Information Revolution Attractor”

Across the many, highly varied conference discussions, a shared picture emerges of the world towards which the information revolution is driving humanity. This future world should be thought of as a destination towards which all regions and nations are being drawn, at varying rates and from varying distances removed. By analogy with the “Great Attractor” in astronomy (a region 200 million light-years away towards which all of the galaxies in the vicinity of the Milky Way are being drawn), we term this future world the “great information revolution attractor.” It is characterized by a number of interrelated features, including:

- *A rise in “information work” and “information workers,”* as an ever increasing fraction of economic activity and the overall workforce, with a broad range of consequences.
- *New business models,* for the internal organization and functioning of business enterprises, and for their external interactions with customers, suppliers, and competitors.
- *The rise of electronic commerce,* as a major form of economic activity, with accompanying changes in the nature and structure of markets and the elimination of a wide variety of “middlemen” heretofore facilitating economic transitions.
- *Challenges to the power and authority of the nation state,* for a variety of reasons (including the two immediately following).
- *The creation of a wide variety of sub-national, trans-national and supra-national groupings, communities, organizations and enterprises,* in the business, social, and political realms, often largely beyond the control of individual nation states.
- *An ever increasing porosity of national borders,* to trade and financial flows, to population flows, and to the flow of ideas, entertainment, and culture.
- *Many new winners, and also many new losers.* Some individuals, groups, localities, nations and regions will gain (in power, influence and material

well being) as a result of the information revolution; others will lose. All will not share equally in the benefits.

- *New fault lines, within and between nations.* The widening gulfs between the educated, wealthy, and cyber-privileged of all nations, on the one hand, and the not-so-lucky of all nations on the other, will lead to fault lines within nations as well as between nations.

Differences in Regional Emphasis Regarding the Information Revolution Future

Different regions of the world react differently to this presumed future, to this “great IR attractor”: some accept it more or less unquestioningly; some wish to modify it; some strive to achieve it; some try to resist it. As reflected in the breakout group discussions during the conference, these differing emphases appear to be as follows:

North America

The predominant North American attitude could be characterized as “information revolution determinism.” The information revolution is viewed as being inevitable. It will run its course no matter what. Backlashes of various forms are expected to occur, but these are not considered likely to sufficiently retard or modify the process.

Concerns are expressed regarding the disenfranchisement of the “information poor,” leading to increased social stress and stratification. Conflicts over privacy are also expected.

But in the end, the information revolution is expected to prevail. North America is in the camp that accepts the information revolution as being more or less irresistible and socially beneficial.

We elaborate on this North American view in Section 8.

Europe

In Europe there is much more of a focus on realizing (economic) value from the information revolution while at the same time maintaining and protecting existing cultural and social values. Europeans believe that they can and must actively shape the course of the information revolution to achieve these ends.

There is much more of a determination to alleviate disparities (between winners and losers) insofar as possible, than appears to be the case in the U.S. (Canada may be closer to Europe than to the U.S. on this issue.) There are also major concerns about maintaining privacy. (Currently, these concerns regarding privacy are greater in Europe than in the U.S.)

Europe is in the camp that wants to shape the course of the information revolution, to suit its own ends. To what extent it can do this remains to be seen.

We elaborate on this European view in Section 9.

Asia Pacific Region

The emphasis in the Asia Pacific region is on realizing value from the information revolution -- primarily economic value. There is less concern with disparities, and less concern about privacy (possibly because of the "communal" nature of Asian culture). The prevailing attitude appears to be: "Don't worry about losers; concentrate on becoming a winner." There appears to be widespread confidence that many/most Asian countries can become winners.

The Asia Pacific region appears to be in the camp that is striving to achieve the information revolution, and is generally confident that it can do so.

We elaborate on this Asian Pacific view in Section 10.

Middle East, Africa, and South Asia

This part of the world is often characterized by strong differences in focus between leadership/elite groups and mass citizenry. Many leaders/elites want, and use, the benefits of information technology -- but are wary of its influences on the citizenry.

In some major nations (e.g., India), there is a determination not to be left behind by the information revolution (i.e., to be one of the winners, not one of the losers). As one conference participant from this part of the world said: "We missed out on the industrial revolution; we don't want to miss out on the information revolution." In these nations, there is much discussion of what it takes to get access to and successfully exploit information technology, to raise the nation/region (economically, socially, etc.) But it often proves difficult to expand "islands" of information-revolution expertise, both within nations and to the rest of the countries in the region.

Some other nations' leaders/elites in the region may already anticipate losing, and may be starting to imagine dire consequences. But many citizens are unaffected and unconcerned now, and will be into the indefinite future.

Especially in this region, much of the information revolution emphasis may be on non-Internet technologies: e.g., wireless telephony, accessible satellite TV broadcasts, photo copier and fax machines, audio and video cassettes, etc.

Many in the Middle East, Africa, and South Asia want to use the information revolution to better themselves and their countries, but with widely varying abilities to do so.

We elaborate on this Middle Eastern, African, and South Asian view in Section 11.

Some Inferred Candidate National Models of the Information Revolution Future

The conference discussions did not explicitly develop a comprehensive set of models of what the information revolution future might be like in various nations and regions throughout the world. However, from those discussions it is possible to infer the following candidate set of national models of the information revolution future:

- *IR Achievers.* These are nations that have substantially attained most/all of the characteristics of "the great IR attractor." Information work and information workers represent an ever increasing fraction of the economy and the workforce; new, information-based business models and electronic commerce are spreading throughout the business and financial communities; many/most segments of society are well into the information age, and substantially "wired" into the global arena. Australia is one example (among several) of a nation that is today an IR Achiever. (This country assignment, as well as the others that follow, is very preliminary and meant merely to be illustrative.)
- *IR Drivers.* These are nations that go well beyond being merely an IR Achiever. They not only have attained most/all of the (then) existing characteristics of "the great IR attractor," but go well beyond this to create new characteristics, new manifestations of the information revolution. The U.S. is the best, but not the only, example of an IR Driver nation today.

- *IR Strivers.* These are nations that are working very hard to reach “the great IR attractor,” but still have a considerable way to go, with the final result still in some doubt. Taiwan is an example of a nation that today is an IR Striver.
- *IR Modifiers.* These are nations that are not satisfied with one or more characteristics of “the great IR attractor” towards which they are being drawn, and wish to actively shape and modify those characteristics to suit their own ends. They are trying to change the course of the information revolution, insofar as it applies to them. Singapore is a clear example today of an IR Modifier. It is trying to realize all of the benefits of the information revolution in the economic sphere, while at the same time strictly controlling developments in the social/cultural sphere.
- *IR Veneer Societies.* These are nations in which a small fraction of the society is participating in the information revolution and well into the information age, with the vast bulk of the population still in the industrial or even the agricultural age. India is a clear example today of an IR Veneer Society. It has geographical clusters of high technology (e.g., around Bangalore), with software (and other) companies fully participating in the global information economy and some even on the NASDAQ stock exchange. At the same time, the vast majority of Indian citizens (probably 95% or more) are uninvolved in and unaffected by the information revolution.
- *IR Left-Behinds.* These are nations that have been more or less totally left behind by the information revolution. It has passed them by, for whatever reasons (most often socioeconomic). They are not involved, and largely unaware. Zaire is one such example, today, of an IR Left-Behind.
- *IR Luddites.* These are nations that, for whatever reason, actively oppose the course of the information revolution. They want to opt out. They don’t want to participate. They don’t want it happening in their society. They are more or less totally opposed to the changes being brought on by the information revolution. North Korea may be an example today of an IR Luddite.
- *Sore IR Losers.* These are nations that are unhappy left-behinds. They feel themselves losing out, as the information revolution progresses, and they are not happy with this outcome. It is not clear that any nation fits into this category today. But some could in the future.

This set of future models appears to span the range of situations suggested during the conference discussions. Most nations and regions should fit into one or another of these categories, insofar as the information revolution is concerned. (At any given time, some of these models could be empty sets, and some nations could be in more than one category.) We intend using this set of models as a

point of departure during our future efforts to chart the worldwide course of the information revolution. (During these future efforts, this set of models will most likely evolve and change.)

What Comes Next

This November 1999 conference was just a beginning. The next step in our multi-year effort to chart the future course of the information revolution will be a conference in the Spring of 2000 focused on the technology underpinnings of the revolution. This conference will address the question: how may these technology drivers change over the next 10-20 years?

Following that, we expect to carry out a number of in-depth studies and small workshops focused on specific topics identified during the November 1999 conference as requiring further investigation.

Once these are (substantially) complete, we anticipate holding two more major international conferences, preferably in Europe and in Asia, to expose and vet our results before a wider international audience, thereby broadening and deepening our models of the future course of the information revolution throughout the world.

We elaborate on these future efforts in Section 13.