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Marshall McLuhan Information Technology Research Centre

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1. Preface

The following is a personal vision statement representing the views of the author. It does not claim to represent the official view of the McLuhan family, the present Director of the McLuhan Program or of the University.

2. Introduction

Marshall McLuhan made Toronto world famous through his philosophical writings on the nature of media and by creating a centre that served as a meeting place for serious discussions concerning the implications of new media. In the past generation this interest has expanded to include practical experiments in new media to explore and test theoretical claims. The role played by Professor Derrick de Kerckhove, the present Director of the McLuhan Program in Culture and Technology in stimulating these new developments is well known, particularly his graduate courses in video-conferencing.

This paper proposes that the heritage of McLuhan might be linked with an existing centre of excellence, the Information Technology Research Centre and with three further bodies at the University of Toronto: the Faculty for Library and Information Science (FIS), the Centre for Computing in the Humanities (CCH), and the Technology for Enhancing Learning (TEL) Centre. This would lead to a new Centre of Excellence called the Marshall McLuhan Information Technology Research Centre, which might possibly incorporate the aims of the proposed (virtual) Centre of Excellence for Cultural Industries and co-ordinate with other centres of excellence: i.e. the Telecommunications Research Institute of Ontario (TRIO), and the National Centre of Excellence on Tele-Learning.

3. Needs and Challenges

The reason for this new merger is to meet a series of needs. A first is to produce contexts where experts and practitioners can share ideas concerning the rapidly emerging technologies. To some extent, Toronto, which comes from the Indian word for meeting place, has begun to respond to this challenge through a series of societies including local chapters of the Special Interest Group for Graphics (SIGGRAPH) of the Association of Computer Machinery; the International Multimedia Development Agency (IMDA) which plans to join with the Canadian Computer Graphics Association (CCGA); the International Interactive Communication Society (IICS), the Society for Motion Picture and Television Engineers (SMPTE) and the Virtual Reality Special Interest Group (VR SIG); annual conferences on multimedia, CD-ROMs, and computer technology (Comdex); courses at the University of Toronto (McLuhan Program, the TEL Centre, CCH and FIS) and special lecture series (CSR, TEL, CCH). Notwithstanding national initiatives such as the Canadian Advanced Technologies Initiative (CAT), Centre for Information Technologies Innovation Institute (CITE), Canadian Network for the Advancement of Research, Industry and Education (CANARY), and centres of excellence (ITC, TRIO), the need for a centre that continues the traditions of McLuhan by reflecting on the implications of the new media remains. In the eyes of some this should be linked with academic degrees in the field of communications. It should also prepare persons in fields such as museum studies for the new realities of the cultural world.

Seven other needs and challenges loom: a front-end for the information highway, just in time learning, distance education, systematic treatment of space using retrospective GIs, systematic treatment of time with respect to telepresence in 2-D and 3-D, as well as integration of various tools.

i) A Front-End for the Information Highway

In the past decade there has been a shift in focus from hardware to software. Economists tell us that we are moving to a new information economy. Visionaries such as Toffler argue that knowledge will soon replace weapons in future power struggles. There is constant talk of an information highway with access to over 500 television channels, films on demand, not only titles but full texts of books and articles, plus the ability to view paintings and drawings from galleries and museum objects from around the world. To date most energies have been focused on pipelining, creating a system along which information can be passed, complete with switching features in moving from computers to phone lines, cable, fibre optic lines, satellite and conversely.

In the past two years there has been a growing awareness that we need to address problems of content. A number of large corporations now act as if this can be solved by buying up publishing companies, film companies, photographic collections and somehow owning the images of objects in museums and art galleries. The problem of content is actually far wider in scope. It includes an enormous amount of information that has been used for routine administration: e.g. materials in Geographical Information Systems

(GIS) of phone and hydro companies as well as municipalities, which will acquire a tremendous value-added significance when they are integrated into a more systematic collection of knowledge, namely, by providing geographical co-ordinates for purposes and opening up new ways of examining the growth of the man-made world as well as inter-relationships with the environment etc.

The problem of content also extends to questions of access: both how we get it into the system and more importantly how we find something once it is in the system. How do we navigate through databases with hundreds of thousands of hours of film and video; with millions of paintings and drawings and tens of millions of pages of text and images? This is a fundamental problem both in the case of libraries, museums and galleries in the public sector as well as publishers (especially those who bridge most media such as Murdoch, Reed, and Thompson) and collectors of information resources from Dialog and Microsoft to the new large scale partnerships between Digital and Microsoft, Digital and Kodak, IBM and Time-Warner, Viacom and Paramount, as well as the cable TV deals: U.S. West and Time -Warner, Nynex Corp.- Viacom Inc., Southwestern Bell Corp.- Cox Enterprises Inc., BellSouth Corp.- Prime Management Inc., the now failed Bell Atlantic and Tele-Communications Inc. (TCI) merger, and the proposed Rogers-McLean merger.

There are rhetorical solutions in the form of intelligent agents and electronic butlers. In practice, however, these strategems deal only with the most naive level of searching and assume a mono-cultural, unhistorical approach for which the United States is simultaneously world-famous and infamous. Needed are intelligent search systems which take into account different levels of access depending on education and specialized training; which include multi-cultural viewpoints, which change with time, which reflect kinds of learning, as well as kinds of learner; which integrate individual items of knowledge with particular goals (outcomes, benchmarks, curriculum guidelines); tools which allow us to navigate and to create electronic versions of notebooks and even learned tomes, such that the process remains one of interactive searching rather than passive bombardment by someone else's programmed sequences.

ii) Just in Time on Line Learning (JITOL)

The need for efficient access to information is most obvious in the realm of advanced and high level training, which combines detailed written instructions and manual skills. In the past these written instructions were relegated to rote learning while manual skills were typically conveyed through a master-apprentice relationship. This no longer works for two reasons. First, the instructions are increasingly so lengthy and complex that they cannot simply be memorized. Second, there are too few masters to go to all the places in the field where problems typically arise, and apprentices lack the necessary experience to know what needs to be done. This has led to calls for just in time open learning (JITOL) and knowledge on demand systems.

iii) Distance Education

A number of persons have recognized the value of extending these principles for high level training to the realm of distance education in general. Canada has played a pioneering role in various early experiments on this front including the use of radio, correspondence courses, satellite transmission to television, tele-conferencing and, more recently, the use of interactive audio-graphic methods linked with computer terminals (e.g. Visit, Vis-a-Vis). While many persons are now working on aspects of just in time learning and distance learning, sometimes even in tandem, no systematic approach to these problems is evident. In a world where persons in remote places are redefining democracy to mean persons having equal access to the materials available to those in major centres, distance education is becoming increasingly important.

iv) Retrospective GIS and AM/FM

At all levels of government, a revolution is underway with respect to the implement-tation of Geographical Information Systems (GIS) as well as Area Management and Facilities Management (AM/FM) for administration of basic facilities: electrical lines, water and sewage pipes, surveillance of lot sizes, maintenance of existing roads and planning for new ones. This is being increasingly achieved through the innovations of Autodesk and its third party developers (e.g. ESRI, Kanotech, Cartologix, Softdesk, LandCadd, Archibus). Even so, enormous problems remain in relating protocols from one local system with those of another system; which is aggravated by the fact that small communities frequently opt for simple solutions very different from those employed by major municipalities. Similar discrepancies arise in the case of major corporations (e.g. Hydro Ontario or Bell); provincial and federal bodies and international institutions which have larger territorial mandates. Hence many problems remain in moving from satellite images, to maps of regions, places, views of cities and towns, sections thereof, to individual houses, pipes, hydro-lines and isolated objects.

While immense energies are being expended on solving these problems, we need to apply these principles retrospectively, i.e. to co-ordinate up to date geographical information with historical records. In the realm of local government this will provide a new global awareness of changing demographic patterns. In the realm of education this will transform the teaching of geography, history, environmental studies and most other subjects.

This is a topic that also has immediate business applications. Systematic access via maps to museums, galleries and sightseeing attractions such as Niagara Falls, can be used by both governmental tourist boards and individual travel agencies in "selling" Canada's attractions both at home and abroad. If such a database includes significant architecture, hotels, restaurants, and shopping concourses, this could open up a new chapter in advertising, which some are now speculating will be dealt with by home shopping channels.

v) Telepresence in 2-D (On Demand Continuous Media)

Corresponding to this new systematic approach to space through GIS, there is a need for an integrated approach to time. At one level this entails concordances of different chronological systems which entail static time. Much more difficult are problems of dynamic time in the case of continuous media (film, media). While this could be seen as a subset of the front-end for the information highway and/or just in time learning, the problems are sufficiently complex to deserve independent treatment. Herein lies the key to a fully operational version of on demand home entertainment, the promised new market which is leading to billion dollar mergers. Solving these problems of continuous media will also transform the use of 2D telepresence techniques, notably tele-conferencing and interactive audio-graphic techniques such as Vis-a-Vis in that it will permit seamless integration of past and present encounters. Hence a teacher explaining a technique to a student in a distance learning class will be able to have their students search for video-clips of demonstrations.

vi) Telepresence in 3-D (Virtual Reality)

At present practical applications of virtual reality remain limited to a few domains such as architectural walkthroughs, molecular models in chemistry, simulation of medical operations and entertainment (new video games, dungeons and dragons etc.). However, if one looks at virtual reality as a three dimensional version of telepresence, it has enormous implications for advanced training, education and sharing of experiences in multi-cultural contexts. For instance, a business student in Tokyo might use virtual reality to explain the tea ceremony to a colleague in Toronto, who in turn might demonstrate the mysteries of making cappuccino, thus preparing each other for cultural differences. In the past young persons often had pen pals: in future they may have virtual reality pals. There can never be peace among persons if they do not have an opportunity to discover the variety and inherent value of cultural differences.

vii) Integration of Various Tools

At present there is a plethora of software which aims to simplify problems of dealing with text (writing, editing, correcting, printing) and images (drawing, designing, altering, adjusting, transforming, morphing, publishing). Often the code in one program is incompatible with that of another. The recent introduction of OLE and the emergence of new partnerships augur well for a new interactive integration tool which is badly needed.

3. A Solution and a Vision

The Marshall McLuhan Information Technology Research Centre will have a twofold purpose. First, it will continue Marshall McLuhan's approach by fostering continued reflection and discussion concerning new technologies and their implications; promoting philosophical thinking and writing in the form of academic encounters, publications and degrees. Here the challenge is to produce active thinkers with independent viewpoints, rather than problem solvers who are responding passively to situations. The commitment

to creating theories while doing practical experiments with the new technologies will ensure that the McLuhan Centre remains more than an ivory tower.

Second, it will create a product that responds to the seven needs outlined above. This product will draw on local and international software and hardware. Its starting point will be the System for Universal Media Searching (SUMS, Copyright 1992) which already exists in prototype. SUMS uses maps and basic questions as one of its points of departure: who, what, where, when, how, why? Five steps are needed to transform this prototype into a product that will position Canada as one of the key countries leading the move towards a new knowledge based economy.

Step One: A Shell

At present the prototype uses off-the-shelf software. This is being rewritten in C++ to create a shell that will eventually be hardware and software independent. Early versions o the product will use specific content to demonstrate features and potentials of the system. Ultimately the shell will be the equivalent of a digital bucket, a tool for others to enter their own contents, ranging in scope, from students who use it for their first experiments as knowledge builders, to research scholars who use it to present their lifetime's insights. Larger scale versions of the same shell will be used by libraries and museums in making more accessible their own materials both internally on their own premises and externally through the Internet. The shell will be modular, varying in complexity with a given subject and level of user. Hence, while the basic shell is standardized, its more specialized features will be open-ended, changing as categories and fields of knowledge shift and expand. Step one will focus on *who* and *what* questions. A first phase will focus on integrating different classification systems to ensure multiple access points. Further phases will address each of the basic levels of knowledge in succession, namely, definitions, explanations, titles, partial and full contents, as well as different levels of interpretation.

The shell will have three basic functions: a front-end for the information highway that applies to both traditional and standard knowledge; a tool fo just in time learning in the realm of advanced training; and an instrument for distance education, making all kinds of learning more accessible to persons both inside and outside major centres.

Step Two: GIS-AM/FM (Space)

The basic shell for will have additional features that serve as add-ons. Step two will focus on tools for systematic treatment of and navigation through space. Thanks to enormous developments over the past twenty years most of these elements already exist in isolated form. For example, there is software for zooming in on maps, for aerial fly-overs, for calculating the lighting on a building for any city at any given time of the year, day and even hour; for relating photographic versions of buildings to their equivalents in drawing packages (e.g. Vectar's Real View). These need to integrated systematically such that the SUMS shell can utilize their external protocols. To achieve this one would work closely with both industry (Autodesk and third party developers such as ESRI and Cartologix)

and existing scholarly projects such as the network linking schools of architecture at Toronto, Harvard, M.I.T. and Zurich. The challenge is to integrate the best existing software as it evolves rather than trying to re-invent the wheel on all fronts. Step two will focus on *where* questions.

Step Three: Interactive Telepresence in 2-D (Continuous Media and Time)

Step three will expand the shell to deal systematically with questions of time, with particular attention to the treatment of continuous media in the form of video and film. At the practical level of creating links, switches and interfaces, the Rogers Communications Centre has focused on ways of using token ring and fibre optic links. Meanwhile a special project at ITRC has focused on sociological and psychological aspects of telepresence. Here the challenge is to coordinate both practical tools from Ryerson and theoretical insights from Toronto. Hence step three will deal with temporal aspects of the SUMS shell, *when* questions, but since these techniques have such a crucial bearing on problems of training this will also entail *how* questions.

Step Four: Interactive Telepresence in 3-D (Virtual Reality)

Step four will expand the shell to include interactive telepresence in 3-D, commonly termed virtual reality. To achieve this it is proposed that the new centre invite one of the leading experts in the field, Warren Robinett, to head this phase of the project.

At present specialized systems such as Mandala allow a person's figure to be superimposed on either a still scene or a set of moving images in another place. However, since the person's figure is captured by a single camera this means that the effect amounts to merging two 2-D images. A next logical step is to capture the same person's figure with two cameras positioned at ninety degrees relative to each other, leading to a 3-D record of the space and thus permitting the person to move about in the virtual space. Instead of having to stand up against the blue screen in order to be integrated into a virtual golf or hockey game, a person can then walk around in the virtual space. The challenge is to develop a relatively inexpensive, portable version of this arrangement that can be added to museum and installation versions. Alternatives using stereoscopic glasses (e.g. by IMAX or Stereographics) and/or head-mounted displays will also be explored. These tools have enormous implications for museum displays as well as for teaching and training: they offer new ways of dealing with the questions *how* and *why*, because they allow a complete demonstration by an expert which can be relived virtually by the student. Such realistic applications may prove to be at least as important as tendencies to use virtual reality as a means of visualizing reality metaphorically.

Step Five: Interactive Integration of Tools

Step five will add the features of standard software packages for text (e.g. Word) and images (e.g. Corel Draw) to the shell, such that users can seamlessly edit, add, modify, transform, morph or otherwise alter their own creations. To date most of these programs

have functioned in isolation. The challenge lies in linking them directly with databases and the electronic highway itself through a front-end.

SUMS may end up being a whole range of products. In any case it will need to plug into industry standard software. The completed product(s) will effectively be an application generator(s) enabling users to create their own knowledge packages. These will range in scope from electronic versions of what were traditionally notebooks and filing cabinets to equivalents of multiple volume tomes. As was the case with traditional scholarship some users will spend their energies excerpting passages from other authors, while others will focus their efforts on recording their own experience. Applications will range from organization of personal notes and a new kind of multimedia book, to containers for courseware, teaching and training, tools for research in major libraries and galleries and presentation tools in these and other institutions.

4. Public Interest and Private Business

There is a complicating factor that needs to be recognized and tackled head on. Traditionally the great museums, galleries and libraries have been paid for by taxpayers' monies and hence their contents have been seen as part of the national heritage. This remains an important view in Europe and Canada and has led in our country to the development of a Canadian Heritage Information Network (CHIN) and more recently to a new body with an even wider mandate, namely, the Canadian Heritage Access Program (CHAP).

In the United States another view is gaining ascendancy: that if one could only buy up rights to the electronic versions of this heritage then there would be large new business opportunities in selling access to this material on a pay-per-view basis. The most blatant efforts in this regard by companies such as Microsoft have secured rights to the images of the Seattle Museum but have led to rejection by the Europeans, notably by France and Germany. The profound danger in this approach is that scholarship and learning generally would become a function of money rather than ability and interest. Corporations such as IBM, Digital and Kodak have been exploring more subtle approaches which would effectively make them brokers by working at arm's length through other companies with museums and galleries.

Where will SUMS stand in these tensions between public interest and private business? SUMS is fully consonant with the ideas of access to cultural heritage and thus expects full cooperation and support from Canadian and European museums and international visions such as the World Memory project of UNESCO. There are in fact several issues involved: one is the front end itself, another is the cost of the items accessed through the front end. In the past we bought televisions and cables which served as a front end for subscriptions to cable TV. As another front end, SUMS can be sold in the same way that televisions and new items such as 3-DO are sold. Hence it represents a major business proposition even though it is committed to the public access side of the debate.

In the past museums, galleries and libraries had a range of policies: that use of their books, images and objects was free to scholars and teachers, but cost money if used for commercial purposes. This tradition can be extended to the electronic market: scholars, teachers and students can view the materials for educational purposes. If they wish to copy materials they pay a nominal fee through the use of smart cards to the institution that owns the material. If they wish copies at higher resolutions, colour prints etc., the costs would be proportionately higher. A corporation wishing to use *Mona Lisa* for advertising purposes will pay accordingly more. Hence SUMS offers Canadian and European museums a clear alternative which keeps culture and education at some level independent from the narrow profit goals of business.

The potential partners for such a universal product are many. In the public sector at the national level there have been seed monies from the Canadian Heritage Information Network (CHIN), and there is interest from the Canadian Heritage Access Program (CHAP), the National Gallery, the National Film Board (NFB), and the Museum of Nature. There is also interest from the Centre for Information Technology Innovation (CITI), the International Development Research Centre (IDRC) and the Centre De Recherches d'Informatique (CRIM). At the International level the Danish Technological Institute has proposed a joint project.

At the local level there is interest from various owners of content such as the Royal Ontario Museum (ROM), Art Gallery Of Ontario, and the Robarts Library. SUMS is being sponsored by the Toronto Board of Education and plans are underway for its integration within a New Technologies Education Centre or Toronto Technology, Telecommunications and Design (TTTAD) Centre in the Faculty of Education at the University of Toronto. At Ryerson Polytechnic University, the Rogers Communications Centre has expressed a desire to work together, as has the Cultech project at York University.

In the business world this centre is of interest to major computer companies, technology companies, telephone and cable companies, because, independent of the question who owns the content, these developments will mean new sales of hardware and software as well as more transmission charges. In the future knowledge will be patterns of facts rather than facts in isolation. Change has become so rapid that we need new ways to visualize shifts in employment, shifts in markets, products, discoveries a and innovations. Hence banks and other large companies are interested because of new methodologies in understanding dynamic demographics as well as applications to training. A more complete list of existing and potential partners is provided in Appendix A.

While there are short term goals and deliverables, it is important that the scope of the new Centre is long term in focus. The digitization of knowledge is not a passing fad. It is a revolution greater in scale than that of printing as championed by Gutenberg. It needs a solid basis that is not subject to the funding problems of a temporary project or political fashions. To this end it will be necessary to create chairs for each of the five steps, especially since each of these represent major areas of development, plus at least one McLuhan chair, for a scholar focusing on more theoretical aspects of communication.

Given the scope of the project and the partners concerned, this will be a modest price for Canada to have a venture with international implications.

5. Maintaining a Canadian Viewpoint

Some will inevitably argue that, despite its obvious business potentials and cultural value, SUMS is something that Canada cannot afford in a time of economic recession. If the predictions about a shift from an industrial economy towards a knowledge economy are correct then we need to re-assess very radically what are our assets.

As was noted above Canada has developed some of the most advanced computer technology and software in the world. In the past year our politicians have allowed some of the most important of these assets to be sold to foreign concerns: from little companies such as Image Ware, to key players such as IMAX and SoftImage. Meanwhile the new Viacom-Paramount group has just bought up two respected publishers of this country: Maxwell Macmillan Canada and Ginn. If this pattern continues we shall in the very near future have sold off the very assets which offer us a hope of competing in an increasingly electronic world. In Europe and elsewhere, national bodies and organizations in the European community regularly intervene if they feel that their cultural heritage and their identity are being threatened or challenged from outside. Canada has to decide whether it too will be pro-active on this front or if it will passively allow other countries to pluck its prime assets.

Keeping the assets is only a first step. There is also the challenge of doing something with them. In the United States there are major centres such as the Media Lab at the Massachusetts Institute of Technology (MIT), the Studio for Creative Inquiry at Carnegie Mellon University, and the Center for Advanced Imaging in Camden, Maine. Canada has in the past had institutions such as the McLuhan Centre. It also has centres of excellence such as ITRC and TRIO. If the talents of these institutions are combined we could readily have a Canadian equivalent to the institutions elsewhere. The alternative is to watch others create de facto standards and then complain that we are being dominated by others. Canada has u ds to the information highway. Else we spend the next century complaining about the filters of others or even worse forget that we are being shown the world through someone else's filter. Seen in this context SUMS is not a luxury. It is a key to keeping what we treasure most: our different cultural heritages.

6. Future Synergies

Once the basic shell with its add-ons exists, other modules can be added. For example, already under discussion is a major project dealing with problems of Just-in-Time-Learning, linking efforts of the Centre de Recherches d'Information de Montreal (CRIM) and the Information Technology Research Centre (ITRC). If this project is co-ordinated with SUMS, then special modules applying to the specialized needs of high level training can be added.

The basic shell will be hardware and software independent. As it is applied to

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