

**Community Networks, Digital Cities and Community  
Informatics**

# Strategies for On-Line Service Delivery to Digitized Communities

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**Abstract.** There is an emerging need for all sectors of society to find ways to optimize the opportunities which Information and Communications Technologies present. Research and development work in Information Systems and Information Technology has accepted a model of computing where the individual interacts directly with the computer and, through the computer and communication systems, with other individuals. Community informatics is a technology strategy or discipline which links economic and social development efforts at the community level with emerging opportunities in such areas as electronic commerce, community and civic networks and Telecentres, electronic democracy and on-line participation's, self-help and virtual health communities, advocacy, cultural enhancement, and others. The "Community Informatics" approach is presented as a means for supporting ICT enabled service delivery through "Community Networks" and "Digital Cities".

## 1 Introduction

From scarcely a million users of the Internet in 1990, the current estimate is 125 million users and growing exponentially. Where (Information and Communications Technology) ICT-enabled commerce was unknown ten years ago, it is estimated that \$1.5 trillion annually of transactions will be undertaken via the Internet in 5 years' time. Some tens of thousands of discrete web-sites are being created daily and it is estimated that there are currently several billion "pages" of information on the World Wide Web. Internet companies have surpassed in paper value entire conventional industries. Normally conservative commentators are arguing that Internet-enabled education will put in jeopardy the current tertiary educational systems of the world and have a transformative impact on all other levels of education.<sup>1</sup>

Much of the research and development work in the area of ICTs<sup>2</sup> has been focused on pushing the frontiers of the hardware or the software—to make it faster, smaller, cheaper, and more functional. The model implicit in this is of the individual directly interacting with the computer and, through the computer and communication system, with other individuals building "virtual" relationships in a "virtual world". Information Technology research and development has been directed to continuously enhance and extend the capabilities of individuals working with these machines, and in this way enhance the activities of the corporations, organizations, or governments in which they work.

But many applications and application areas are not accommodated within this schema. For example, ICT-enabled activity also can be focused on "physical communities" as well as on "virtual" ones,<sup>3</sup> and on those currently at risk of being excluded from participating in an ICT-enabled world and the opportunities, which it presents, alongside the rather narrow demographics of current users. Community Networks and their realization through "digital cities" are one socio-organizational means by which these applications can be organized and delivered.

## **2 Community Networking**

The Internet was developed in the 1960s as a private network for facilitating communication within small scientific communities, particularly those engaged in defense-related research. Over several years these connections spread to link scientists from several disciplines and communities throughout the United States. From there, as graduate students looked to maintain this type of electronic contact, the network extended even further into the non-scientific community and in the early 1980s linked several thousand computers interacting as a single telephone based network.<sup>4</sup>

Freenets were founded and maintained by volunteers -- computer professionals, professors, and others -- who made the Internet resources of the university available to community groups and members of the general public. The Cleveland Freenet, arguably the world's first, was created in 1986 at Case Western Reserve University. It offered free dial-up access to a university Internet server for local community members (or anyone else who did not mind paying long-distance calling charges) who had a computer, a modem and an inclination to connect to the Internet.<sup>5</sup>

Freenets built on the experience of pre-Internet public computer networks. The Community Memory Project at the University of California at Berkeley, for instance, had installed a networked system of public-access computer terminals in laundromats and libraries in 1976. Through the 1980s, "basement" computer hobbyists set up their own dial-in Bulletin Board Systems (BBSs) accessible to anyone with a computer and a modem, hosting discussions on a range of topic areas.

Eventually, the Freenets began to build content on their servers by and for their members. When logging on to the Cleveland Freenet for instance, you would see a (text-based) “map of the city, with an option to “go” to the courthouse, library, or post office by typing a certain key. Community groups posted newsletters and event listings, or individuals posted classified ads. Freenet members could communicate with one another or with anyone else in the world with an E-mail address.

Freenets generally survived on volunteer labour and donations. As it grew, the Freenet movement came under pressure. Volunteers were burning out since it was extremely labour intensive to maintain the growing computer networks. At the same time, university administrators and government officials began to take notice of the increasing human and capital resources being used.

Some Freenets have restructured and continue to grow and operate, maintaining a principled commitment to free public access to information and electronic networking. Others have evolved to “community networks”, charging for service (often with a sliding rate scale) while often expanding from providing raw service to playing a developmental role in the community.<sup>6</sup>

Apart from semantics, the change from “Free” Net to “Community” Net has also meant a broader focus on community development issues as they relate to technology. Schuler argues that Community Networks (CNs) can and do take action at any point where ICTs intersect with what he calls the “core values” of the community: education, culture, communication, democracy, individual health and well-being, and economic equity and opportunity.<sup>7</sup>

Most CNs offer dial-up access to the Internet. However, as commercial Internet Service Providers (ISPs) continue to prove that they can offer high-speed, low-cost Internet access, some CNs have been happy to abandon server maintenance and the resale of dial-up accounts, which was proving to be bothersome for volunteer-based organizations. Newer CNs are also increasingly taking on the role of advocates for the broader interest of communities facing technological change.

### **3 Digital Cities**

The notion of the “digital city” is only slowly coming to be articulated and realized in practical form. The Amsterdam Digital City<sup>8</sup> has been gradually evolving from its beginnings as a source of low cost Internet access (c.f. “freenets”); to its adopting of the physical layout of the “city” as the primary metaphor for organizing its presentation of its information and communication facilities; to its current providing of electronically mediated “services” to its inhabitants. Several of the CNs discussed above have been going through similar evolutions as they search for ways to survive, now that low cost Internet access is so widely available. In an interesting way even the commercial “digital cities” i.e. commercial websites looking to become the dominant for-profit “portals” to local information, are also evolving in a similar

direction.<sup>9</sup> They too are casting about for ways to capture the attention of the local community users in a highly fragmented and competitive marketplace.

An associated development is the appearance of what are being presented as “Smart Communities”<sup>10</sup> (or smart cities, smart regions, smart states, smart countries etc.), which are communities looking to find ways to integrate the availability of low cost ICTs into the operation of their local communities.

The Canadian Government “Smart Communities Program” gives the following definition:

*A Smart Community is a community with a vision of the future that involves the use of information and communication technologies in new and innovative ways to empower its residents, institutions and regions as a whole. As such, they make the most of the opportunities that new technologies afford-better health care delivery, better education and training, and new business opportunities.*<sup>11</sup>

#### **4 Community Informatics**

“Community Informatics”(CI) is an approach to the "design principles" for how these services are to be delivered. CI pays attention to physical communities and the design and implementation of technologies and applications, which enhance and promote their objectives. CI begins with ICTs, as providing resources and tools that communities and their members can use for local economic, cultural and civic development, and community health and environmental initiatives among others.<sup>12</sup>

Discussion on the impact of ICT has to date, concentrated on the "virtual" world of "virtual communities" and the "virtual relationships" which are, for example, enabling on-line electronic commerce (E-commerce). But for most people their "physical" relationships with their "physical" communities remain of more significance. Physical communities continue to provide the context in which people raise their families, educate their children, ensure their health and well-being, conduct their businesses, tend their surroundings, and influence the on-going management of their civic affairs. Attention therefore needs to be paid to how communities, community affairs, and "civil society" in general are interpenetrated, enhanced, and enabled through the use of ICTs. These are areas of concern for CI.

CI is the “discipline” which is arising from the fund of experience and empirical evidence which is being amassed as a result of the on-going implementations of CNs, Digital Cities, Freenets, community or public access Sites, Telecottages and the other strategies for linking physical communities with ICT enabled opportunities. CI studies how ICT can help achieve a community’s social, economic, political or cultural goals. Fundamental to the CI approach is “access” to the technology (in the physical, social, cultural and economic senses), since without at least minimal access, little can be accomplished.

CI<sup>13</sup> is concerned with developing strategies for enabling individuals and communities to take advantage of the full range of opportunities that the technology is providing. It is also concerned with enhancing civil society, strengthening local communities for self-management, supporting environmental and economically-sustainable development, and extending access to those who otherwise might be excluded.

CI includes the technology/ICT and the “user” (and the “uses”)<sup>14</sup>, and is as concerned with community processes, user access, and technology usability as it is with systems analysis and hardware or software design.<sup>15</sup> CI accounts for the design of the social system in which the technology is embedded as well as the technology system with which it interacts.<sup>16</sup> Thus CI extends from “organizations” to “communities” the “socio-technical” approach to systems design, and reflects the increasingly ubiquitous distribution of personal computers and Internet access to communities and individual end users as well as corporations and governments.<sup>17</sup>

CI may also include distinctive software, hardware and applications design (C-Suite, on-line voting, community web-sites);<sup>18</sup> specialized approaches to automated information processing and management;<sup>19</sup> the development of community-oriented ICT training, education and organizational design;<sup>20</sup> and appropriate management strategies and structures.<sup>21</sup> Insights on how communities are organized and governed, pursue their common objectives, and manage themselves internally to develop and process information, are all elements in a CI analysis and design of ICT oriented applications.<sup>22</sup>

## **5 Service Applications in a Digital City**

CI is concerned with a wide range of ICT activities and applications:

### **a) Community Internet Access**

"Public" access to ICT is being made available within communities through a variety of government and not-for-profit community access sites, Telecentres, and Civic Networks; and through for-profit cyber-cafes and Internet-enabled telephone centres among others.<sup>23</sup> With the very rapid proliferation of low-cost E-mail and even free E-mail accounts by companies such as HotMail, this role for CNs has diminished very significantly. This has had a negative impact on a number of North American CNs and forced them to rethink their strategies and objectives, including towards that of becoming the local providers/managers of "public Internet access". CI is concerned with developing the most appropriate physical, organizational and technical design reflecting the need for appropriate community input and responsiveness in each of these areas.<sup>24</sup>

#### **b) Community Information**

The provision of "Community Information" includes a range of information of local interest such as local listings, directories, a local calendar/schedule of events, and so on. In many cases, social service entitlement and referral information (as in earlier non-computerized library supported Community Information Centres) and public health information is provided.<sup>25</sup> In some cases this is being done through the local CN which, on a voluntary basis, is maintaining a community database, now generally in the form of a community web-site. In other instances, this is being done on a competitive and commercial basis, often by the local newspaper who is providing free listings for voluntary organizations, in order to build traffic to the site (and thus potential or actual advertising revenues) and even in some cases by civic governments.<sup>26</sup> The most appropriate strategies for accomplishing this task is a responsibility of CI.

#### **c) Community Service Delivery On-Line**

ICT is being used as a means for providing public services, including registrations, entitlements, information certification, health information and counseling, and employment information and small business support (including mentoring).<sup>27</sup> The direct provision of services to individuals in their local communities or at home through ICT is only in its infancy. However, one can expect that this will grow dramatically in the very near future as it comes to be realized how cost effective this approach may be in a number of sectors and particularly in those areas which are highly information intensive such as information provision, training, registration/licensing, and so on. CI should be able to provide direction in how these services can be designed as both user appropriate and cost effective.<sup>28</sup>

#### **d) Civic/Community Participation On-Line**

ICT is being used to enhance civic and civil society participation through non-partisan electronic democracy projects, through party-sponsored civic forums, and through government-sponsored public consultation initiatives.<sup>29</sup> Such "electronic democracy" is providing to citizens the initial means to obtain and circulate information of local political/civic interest. In addition, it is able to support electronic interaction with local officials and politicians concerning issues of local concern in those few instances where public officials are willing to enter into this type of interaction. Ultimately it is likely that the on-line expression of public opinion will be linked in directly to the formal discussion of on-going local issues, even to the extent of formal electronic "voting" on issues and direct participation in decision-making.<sup>30</sup> A major challenge for CI is developing the means to manage this type of interaction; both enabling an enriched electronically enhanced democracy while ensuring that such an interaction does not disintegrate into democracy by plebiscite or by instant public opinion polling.<sup>31</sup>

#### **e) Community E-Commerce**

Both commercial and non-commercial agencies are making efforts to ensure that some of the opportunities emerging through Electronic Commerce are being made available to geographic communities (alongside virtual communities), as for example through E-malls, community web-sites, links between SMEs and on-line commerce and others.<sup>32</sup> A number of community based informatics strategies and initiatives are currently underway to link local commercial and production activities with E-commerce, both for retail and trade purchasers, and suppliers.<sup>33</sup> An interesting example developing in several rural Atlantic Canadian communities is linking community access sites to genealogy research, part of which may now be done best through the Net and part of which may involve local (and locally-hired) researchers.

#### **f) Education/Training/Community Learning Networks**

A major and rapidly emerging CI application area is in education, training, or life-long learning. Increasing areas of education and training are being provided on-line, including the on-line distribution of course material in text, oral, and even video format along with an asynchronous or synchronous interactive component through e-lists or forums or chat facilities. The medium is still in its early stages with techniques for incorporating some of the unique opportunities which the technology affords only just now being developed. Also, methods for linking on-line facilities to training and life-long learning needs, existing community organizational and institutional structures, and on-going and emerging opportunities for on-the-job training in a variety of work contexts are presently evolving.<sup>34</sup>

#### **g) Community and Regional Planning**

A rapidly evolving area for CI is in the increasingly sophisticated community involvement in local land use and environmental planning is now possible application of Geographic Information System (GIS) technology.<sup>35</sup> New developments in GIS include four-dimensional models that track and project impact of management strategies over *time*, predicting, for example, the impact on forests of various forest management strategies, or the impact on business and communities of various development plans.<sup>36</sup>

#### **h) Telework**

ICTs may support local economies by allowing for work to be done remotely from the workplace, or "telework". Decentralized computing linked to a communications capacity as, for example, through the Internet or dedicated data-lines, allows work to



be done from any connected remote location. Skills and training can be provided remotely. The playing field for technology-enabled education, training, and other work-related services is being leveled. Some have suggested that technology would allow for certain enterprises or their employees to be located anywhere so long as they were tele-connected. This notion has, at least to date, proven more vision than reality with an ever more apparent need for a CI approach to responding to the difficulties of organizing remote production, remote management, and the overall conservatism of organizations in how they undertake their activities.<sup>37</sup>

## **6 A Community Informatics' Approach 38**

CI is an approach to ICT, which includes a concern for the accessibility of the hardware, the software, the connectivity, and the information; and for the use and user to which the technology is being applied, particularly within the context of the user's physical community. Incorporating the user and his community into the system design process introduces new elements and new "stakeholders" into an extended approach to ICT design, development, and implementation.

### **a) On-Line Service Delivery**

CI approaches will be central to using ICTs linked into community, institutional, and social systems for delivering community-based services through Telecentres and networked PCs.

Among the services that are currently being provided through the Internet are:

- Information
- Education and training
- Mentoring and consultation
- Self-diagnosis/self-monitoring
- Transaction processing

### **b) Access Facilities**

How the user gets access to the technology is of particular interest. For many and particularly in less "connected" regions and countries, this will be through public or community-access facilities, i.e., Telecentres, CAP sites, "cybercafes", etc. These centres, in addition to providing communications and small business support, also may become centres for the delivery of electronically mediated health, training, and public information services. This presents both responsibilities and opportunities—the responsibility to design activities so as to effectively provide these services, and the

opportunity to help communities while (and not incidentally) developing sufficient revenues to ensure sustainability.

### **c) The Design of the Service**

Central to the success of the activity will be the information or service being provided. There is a vast amount of information and services available on the Internet. However, relatively little of it is appropriate or useable in contexts where environmental conditions, resource scarcities, skill deficiencies, and cultural expectations and practices are different from those in wealthy areas or the developed countries and particularly the US (the source of most of this information).

For services to be widely useful, information providers must design and provide services of specific interest to the end user, and particularly which takes account of the specific contexts of the various regions and cultural and linguistic groupings. What would be best is if information service providers were widely distributed and close to those using the information so as to localize information from other regions and to develop information of special interest within local contexts.

### **d) Design of the Telecentre**

The Telecentre as the site of community access is key to CI and is central to the impact of ICT in many local communities. The range, number, and distribution of Telecentres will determine whether services are available to the few or to the many. The effectiveness of the Centre will determine the effectiveness and success of the service delivery. The physical and organizational design of the Telecentre should also reflect its likely use as a service facility and should include among others:

- Connectivity;
- A paraprofessional staff with online and information management skills;
- Translation facilities for the key languages served in the community;
- Multiple uses--education, extension, small business support, communications;
- Sources of revenue to ensure sustainability; and
- Links to an established physical institution for on-going stability and support

### **e) Design of the Community System**

There is a tendency to think that the mere presence of electronic resources will meet the requirements of a "community" without the need for further intervention or leadership. The design of the community system into which the ICT-enabled service or information will be transmitted will be particularly important for a CI project working through public access Telecentres.

It will, in this context, be necessary to look at the entire service process as a system, including the information or service provider/designer, the paraprofessional intermediary, the professional, and the group or community information user/recipient.<sup>39</sup> Effective planning and development for all stages of the process will be needed for the service activity to be successful. It may also be desirable to establish a process of information sharing between *groups* with similar concerns, as a parallel to the useful and beneficial interactive communication processes, which have developed between *individuals*.

#### **f) Information as a CI Service**

Useful and useable information is at the core of ICT-enabled services. For this information to be retrievable, understandable, and relevant to the consumer there need to be "mediating structures". These link the electronic "CI service" with the end user. For example, a technologically-trained paraprofessional would translate the needs of a community support group into appropriate Internet search criteria, and then sift, interpret, and translate the returned information and put it into a form that is useable by the "client" community.<sup>40</sup> The Internet is uniquely equipped to be a low-cost, high volume, very fast deliverer of this type of information. (It is clear that one major role that an organized network of Telecentres could play is to create and maintain index web sites and search engines that meet the specific needs of information consumers in specific regions.)

#### **g) On-Line Support**

"On-line support" is the mechanism whereby individuals provide information, comfort, and mutual assistance through the medium of the Internet. This can be done by E-mail, newsgroups, or web conferences (asynchronous) or by chat (synchronous), although in most cases it is done asynchronously.

The challenge is to ensure that the considerable benefits available to those participating in these on-line processes can also be made available in the public access/Telecentre context as well. To achieve this it will be a task for CI to develop a means to identify and implement innovative on-line practices and evolving technologically enabled service support opportunities.<sup>41</sup>

## **7 A CI Model for an Integrated Service Delivery System**

ICT gives the promise that information intensive services and applications, which had previously been limited or inaccessible to many because of physical isolation,

disability, or the costs associated with access, will now be much more widely available. CI is concerned with how to design electronically enabled "services" or applications so that they are as widely available and useable as possible.

In the above we have begun to discuss CI-enabled services and application delivery systems. A preliminary model of this type of service delivery system would include:

- a community-based technical capacity to receive services and information;
- a social/organizational capacity to receive and redistribute services and information;
- an organizational capacity to localize external information;
- a technical capacity to electronically mount and deliver this information;
- a human capacity to mobilize resources;
- a social and organizational capacity to utilize and implement the services and information;
- an overall program development and management capability;
- linkages between the formal system and the informal system; and
- a means to ensure evaluation and feedback.

And a CI Digital City application would have the following features among others:

- a design for ease of use;
- training for the first time user;
- mediation between the service and the end user for those requiring this;
- a management or "governance" system consistent with ensuring responsiveness to end-user requirements; and
- a means to ensure long term financial sustainability.

## **8 Conclusion**

To date the firestorm of development and implementation of ICTs, and particularly the Internet and the World Wide Web, has been linked almost exclusively to a limited range of activities in the information and research intensive sectors, certain highly entrepreneurial technology intensive enterprises, and to those with a strong interest in and knowledge of information and information technologies. Other sectors including the not-for-profit and the public sectors have lagged behind the leading edge of development. Also many, without a specific interest linked to information technology or information intensive activities (particularly those in manual and resource intensive employment); those with difficulties with literacy; certain ethnic groups; those with lower incomes; and so on -- all have been slower to embrace the technology.

The pace of change and the opportunities and risks which are being presented are of such potential significance that efforts need to be made to ensure as broad a base of participation as possible. The reality is that many of those who are being left behind by the technology race are those most economically and socially vulnerable. While the better educated and more advantaged are able to derive considerable benefit from

their participation in a "virtual world" and to shift a variety of their activities and commitments to this sphere, those less advantaged or simply less able to participate effectively (such as the elderly, the physically-challenged, the geographically-isolated, as well as the economically-marginal) may not have the means individually to undertake the same shift. They may find themselves further disadvantaged and at risk whether from unemployment, lack of education opportunities, or lack of political power where these have effectively shifted to the on-line mode.

There is thus the need to pay attention to the means by which those at risk of being left behind may be provided with support to overcome these limitations. This is a role for the "community sector" and a mission for CI. Alongside this, CI can be supportive in ensuring that there is an on-going place for "physical" communities within the context of the "virtual" cyber-spatial world of Electronic Commerce, virtual communities, and virtual service delivery.

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## ENDNOTES

- 1 The most generally available and widely accepted compilation of Internet user statistics is that provided by the Irish firm Nua <http://www.nua.ie>.
- 2 The term ICT is often used to cover a similar area as is Information Technology (IT) or Information Systems in North America, with the inclusion of "communications" technologies and particularly the Internet.
- 3 Much of the discussion concerning "communities" in the context of IC/ICT in recent times has been concerned with "virtual" communities rather than with "physical" communities. In this paper we are concerned exclusively with the use of IT/ICT by *physical* communities. Cf. Rheingold (1993) and Hagel and Armstrong (1997) for discussions of *virtual* communities and their use of IT/ICT.

- 4 Leiner,, Cerf,, Clark,, Kahn,, Kleinrock,, Lynch,, Postel,, Roberts,, & Wolff,, 1998 Feb.
- 5 Cf. Schuler, 1996, and Kanfer, 1994
- 6 Cf. A very interesting discussion of “communities” and “networks” by Phil Agre, “Rethinking Networks and Communities in a Networked Society”, Red Rock Eater Service, June 1, 1999 via E-Mail.
7. Cf. Schuler op. cit.
- 8 <http://www.dds.nl>
- 9 <http://home.digitalcity.com/aboutus/>
- 10 See <http://www.smartcommunities.org> and <http://smartcommunities.ic.gc.ca/> and associated links.
- 11 <http://smartcommunities.ic.gc.ca/def/html>
- 12 “Community Informatics” draws heavily from the on-going practical and research work linked to the area of “Communities in a Networked Society”, Agre, op.cit.
- 13 Others who use the term include the Community Informatics Research and Applications Unity (CIRA) at the University of Teeside, Middlesborough, UK, <http://wheelie.tees.ac.uk/circa/index.htm>. See also the use of the term “Social Informatics” at the Centre for Social Informatics at the Indiana University <http://www.slis.lib.indiana.edu/SI/>
- 14 This approach is often associated with those adopting what is called a Participatory Design (PD) Methodology and concerned with the study of the Computer Human Interface (CHI) and with development of approached to Computer Supported Collaborative Work (CSCW). The literature on all of the above is very large and can be easily explored on the World Wide Web by employing any available search.
- 15 This area among others is discussed at some length in the various chapters in Gurstein, (Ed.) (1999). Community Informatics: Enabling Communities with Information and Communications Technologies Hershey; PA: Idea Group Publishing. (forthcoming)
- 16 Cf. Pigg., 1999 April



- 17 This approach is often linked with Enid Mumford and the ETHICS Methodology, see Mumford, E. (1996) Systems Design: Ethical Tools for Ethical Change. ( Macmillan)
- 18 See for example <http://www.chebucto.ns.ca/Csuite/AboutCSuite.html>, which discusses the Chebucto Suite software for Community Networks.
- 19 One of the more interesting areas in which this has developed is the community use of GIS software as a support for Community based planning. See for example the use of GIS by the City of Seattle to assist home owners in locating their property <http://www.ci.seattle.wa.us/maps/>
- 20 Gurstein,., Learner,., & MacKay,. (1996, November 15), Gurstein,., & Andrews,., (1996, October 31). And Dienes, . (1997)
- 21 Dienes and Gurstein, 1998
- 22 Gurstein, . 1996
- 23 For additional resources on “access” issues see <http://www.benton.org> and <http://www.fil.utoronto.ca/research/iprp/ua/>
- 24 These issue have been very extensively discussed on the E-mail list Communit-L which functions as the internal communications vehicle for much of the Community Networking “movement” in the United States. For a more comprehensive approach to developing a CI model for service applications see Gurstein and Dienes (1999).
- 25 The provision of public access has in some instances flowed out of these Community Information Centres, as for example in Australia <http://www.vicnet.net.au/vicnet/contents.htm>
- 26 See, for example, the range of cities identified through <http://www.citylink.com>
- 27 Gurstein and Dienes, 1999
- 28 An interesting example of this can be found at the very extensive website created by the Canadian Department of industry, <http://strategis.ic.ca>.
- 29 Schwartz, 1996 and <http://www/e-democracy.org/mn-politics-archive/> which is the classic electronic democracy experiment.
- 30 Although this is not yet happening it is being widely discussed as for example Kaczmarcayk, A., Perspective of Cyberdemocracy, <http://www.imm.org.pl/mat/Acbdema.html> and the Dutch Ministry of the

Interior and Kingdom Relations, *Electronic Civic Consultation: A Guide to the Use of the Internet in Interactive Policy Making*, nd.

- 31 Cf. Gurstein, M. "A Cathedral" of Public Policy to a Public Policy "Bazaar", <http://ccen.uccb.ns.ca/articles>
- 32 Gurstein, 1999b, Gurstein, 1998b.
- 33 See for example the Government of Canada's "Mainstreet" program, the World Bank's Virtual Souk, the US-based WebMarket and similar initiatives elsewhere.
- 34 See for example <http://www.handsnet.org/information1241/information.htm>. A very interesting experiment is underway in rural Nova Scotia where a commercial ICT-enabled training company (MacKenzie College) is collaborating with the local telephone company (MTT) and local Community Access sites to provide the means for local access to sophisticated training software.
- 35 Bruce Dienes in a private communication provided me with several interesting examples of this for East St. Louis, Illinois. "The UIUC-University of Illinois, Urbana/Champagne, prepared data that supported a change in the proposed path of a public transit light rail system. They also use it to track land usage, match potential building projects with flood plains, etc. The use of GIS requires a University or similar resource to crunch the data and prepare the presentation. The final product is a nice balance between being visually easy to comprehend (so the local citizens can interpret it and make their own decisions) but also steeped in statistics and data (so the local Planning Board will take notice of it.)"
- 36 Dienes, private communication.
- 37 Telework has become a major theme of Government activity in support of the Information Society and particularly in Europe and with the European Union; cf. <http://ww.eto.org.uk>
- 38 The following section is adapted from the paper "A 'Community Informatics' Approach to Health Care for Rural Africa" with Bruce Dienes, presented to *The African Telemedicine Project: CONFERENCE '99 "The Role of Low-Cost Technology for Improved Access to Public Health Care Programs Throughout Africa"* Nairobi, Kenya, February 19-21, 1999. This paper in turn is drawn from a very extensive review of the Canadian and International experience with the use of ICT for the delivery of service to both urban and rural communities. Cf. Gurstein, M. *The Net Works: The Internet, Local Economic Development and the Future of Work in a Global Economy*. 1999 (forthcoming).

- 39 In a private communication, Liz Rykert one of the more experienced practitioners in on-line group facilitation argued that the notion of the “mediator” between the information and the end-user was precisely the kind of mediation which many, currently receiving public services, as for example social support services or employment counseling services, might wish to avoid and the “disintermediating” effects of ICT was precisely one of the most beneficial results for many of those on low or fixed incomes.
- 40 Cf. Heeks, Richard, “Information and Communication Technologies, Poverty and Development available on-line at [http://www.man.ac.uk/idpm/idpmdp.htm#devinf\\_wp](http://www.man.ac.uk/idpm/idpmdp.htm#devinf_wp)
- 41 See Gurstein & Dienes, 1998, <http://ccen.uccb.ns.ca>, on the benefits of combining Telecentres with existing organizational structures, such as a library system and see the overall approach undertaken by C\CEN as presented through the website.