BUILDING A MODEL OF A KNOWLEDGE COMMUNITY

A STUDY OF THE SOCIAL CONSTRUCTION OF INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN RURAL ECONOMIC DEVELOPMENT

By

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"Not everything that can be counted counts and not everything that counts can be counted".

Albert Enstein

Abstract

The objective of this thesis is to establish the case that information and communication technologies have to be understood as the backbone of a community knowledge infrastructure underpinning the learning community.

Measurement of success is of central relevance to this work. The predominant model for measurement in the first phase of the current societal change has centred around quantitative outcomes. This thesis starts from the premise that this model is no longer adequate and that new measures must be identified.

This stance is justified by looking at a theoretical level at the current societal change. There is recognition of the cross-sectoral nature of ICT as an enabling mechanism for development and for decision-making.

This thesis focuses on a rural community. It is in rural areas that technology has been most forcefully presented as a 'deterministic' solution to disadvantage

In line with the concepts of reflexive modernity, the fieldwork undertaken works out from the key agents of development at the local level in the study region. Evidence is gathered on the meanings and importance attached to information and communications technology in regional development. This then is triangulated, validated quantitatively and matched with wider evidence gathered from local community groups. Concrete actions are proposed for the study region.

The policy context forms an important backcloth to the fieldwork and so an analysis is done of Information Society Initiatives and Rural Development Policy. The findings of two recent evaluative studies are taken into account.

In this thesis the argument is made that community informatics may best be understood as a group support system promoting a collective agenda, increasing creativity whilst preserving community identity.

A Community Knowledge Cone is derived and proposed as a model for the measurement of progress towards a knowledge-based community and consideration is given to appropriate performance indicators.

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Introduction

The end of the Millennium is approaching. Is it a time of opportunity or a time of crisis? The answer has to be both. The world has become increasingly dependent on technology. You have only to consider the current Y2K problem to realise the fragility of modern society. Yet advances in technology have also made possible many of the positive changes we see about us. In particular the advances in information and communication technology (ICT) have given us both powers to store, retrieve and manipulate information and, increasingly, the power to disseminate and communicate across time and space in novel ways. Like a child with a new toy this new potential has led in the first instance to a fixation with an information society defined in terms of power: economic growth; consumption; competitiveness and technological competence. But as we mature towards a knowledge-based society there is increasing recognition that the success criteria for the twenty first century are ecological integrity, effective decision-making and social cohesion. There is agreement that success will be achieved less through top-down policy administration but rather at the individual, group and community level. It seems that society at large must take on board some of the lessons learned by the private sector in recent years. Today's successful companies have recognised information as a key resource and have reshaped their structures. They have become learning organisations responding to the ongoing nature of change, flexible and creative, geared to exploring new opportunities rather than "firefighting" problems. Learning organisations must become communities and conversely, to be successful, communities must become learning organisations. Sustainable development will require both a holistic and a structured approach incorporating mechanisms for the management of change.

The objective of this thesis is to establish the case that information and communication technologies have to be understood as the backbone of a community knowledge infrastructure underpinning the learning community.

As a major economic entity the European Union (EU), in the 1980's, responded to the potential of information and communications technology by creation of a Directorate for Information Technology and Telecommunications (DGX111) and by a plethora of sectoral initiatives. The aims were fourfold:

- To develop a thriving software industry in the EU;
- To put in place an ICT infrastructure throughout the EU and ensure that development did not only happen at the centre but also in the most peripheral areas;
- To support and encourage service providers on this infrastructure;
- To stimulate uptake of those services.

Achieving these aims necessitated research and development, business support, and capacity building alongside of introduction of technology. Overall there has been considerable success and there is now a vibrant software industry and a skilled workforce although there is still a predicted shortfall of software developers as we turn into the next century. Success in service provision and the uptake of services have proved harder to achieve. This has been the case globally and has focused policy makers' attention on liberalisation of telecommunications and provision of a universal service.

Measurement of success is of central relevance to this work. Based on the aims outlined above the predominant model for measurement in this first phase of change, has centred around quantitative outcomes: number of computers in place; number of connections to the Internet; number of people trained in basic ICT skills. This thesis starts from the premise that this model is no longer adequate and that new ways of looking at the societal impact of information and communications technologies must be identified.

This stance is justified by looking at a theoretical level at the current societal change. It marks a shift from the modernity of Marx (1976), where industrial social forms dis-embedded and re-embedded traditional social forms. In a new information and communication intensive modernity alternate ways are sought to dis-embed and re-embed social forms of industrialisation, and arrive at what Beck (1997) calls reflexive modernity. This reflexive modernity is seen by Beck as deterministic, 'blind' development while Giddens (1991) talks of the creation of technocratic expertise that takes charge and delivers order out of chaos. Others define it in terms of consumption and capital accumulation (Lash, 1994; Lash & Urry, 1994). Most important to this thesis is Beck's assertion that reflexive modernity takes place within a transitional phase and the outcome is subject to both the structural setting and the power relations of the key stakeholders. Combined with the work of other researchers in the field of information systems who have found little evidence to support technological determinism e.g. (Markus & Robey, 1988) it is felt that this opens the way for a new approach to the evaluation of ICT in the community.

The nature of community itself is also changing. The spread of the techno-economic paradigm based on ICT on one hand and globalisation of the production and consumption of culture on the other, has created a new form of individualisation, collective identity and community. Today individuals may join communities of choice irrespective of temporal or spatial constraints. The effects of this change are only beginning to become apparent. Communities of interest such as environmental movements and the women's movement etc. are increasingly influencing social policy. It is also apparent that the opening up of global opportunities engenders an increased need for local identity and sense of place. This does not imply a focus on the past. Society has perhaps for too long driven looking in the rear view mirror as Marshall McLuhan (1964) puts it. Rather it implies identification with place and acceptance of shared responsibility for the future of that place and community. Therefore globalisation and the converse new localism mark a further stage in current societal change. Current and proposed policy indicates wide spread recognition that the future of society cannot be directed simply at economic development. Within the EU policy makers seek to confront sustainability for future generations and employ technology to underpin all facets of life. Considerable reflection has been devoted to the social implications of the Information Society. Noticeably, since 1994 there has been an increasing emphasis on people rather than products. This has been evidenced most recently in the new Framework V Research and Development programme with the focus on the user and in the launch of new initiatives such as the Connect programme on Technology and Culture. There is also recognition of the cross-sectoral nature of ICT as an enabling mechanism for development and for decision-making.

Community issues have equal relevance in both an urban and rural setting. Within this thesis there is an emphasis on the rural. This is deliberate for a number of reasons. Firstly a large part of the population of the EU live in rural areas, a figure that will increase with the accession of proposed new member states. Rural development policy is a current issue for the EU as it rolls out Agenda 2000 and re-negotiates the Common Agricultural Policy. The societal shift in rural areas is particularly dramatic as many seek to "leapfrog" from an agricultural base to a knowledge base. Secondly it is in rural areas that technology has been most forcefully presented as a "deterministic" solution to disadvantage: declining agricultural employment; out migration; sparse population; poor physical infrastructure; lack of educational opportunity. As a result in areas such as the study region there has been heavy investment in building an ICT infrastructure and in capacity building. Finally rural communities also present a unique set of advantages or positive attributes. The community tends to already have a strong sense of place and cultural identity, experience in collective working and a self-help entrepreneurial culture. Typically this is combined with a high quality environment, a community ethos and a tradition of intergenerational learning. These attributes match the characteristics identified by other commentators as necessary for long-term sustainable development. So lessons learned should be transferable to any community, rural or otherwise.

Within the computing profession, the application of ICT at the community level has become a sub-discipline known as community informatics. In this thesis the argument is made that community informatics may best be understood as a group support system, promoting a collective agenda, increasing creativity and opening new avenues

of opportunity whilst preserving community identity. Such a system has three primary components – people, knowledge and technology.

In line with the concepts of reflexive modernity, the fieldwork undertaken works out from the key agents of development at the local level in the study region. Treating community informatics as a social science, evidence is gathered on the meanings and importance attached to information and communications technology in regional development. This then is triangulated, validated quantitatively and matched with wider evidence gathered from community groups participating in the development of community decision support systems for the region. Concrete actions are proposed for the study region.

The policy context forms an important backcloth to the fieldwork and so an analysis is done of Information Society Initiatives and directions in Rural Development Policy. Evaluation of progress and measurement of success are key objectives. The findings of two recent evaluative studies are taken into account. These are a study of European Social Fund programmes in Ireland (ESF, 1999) and the deliberations on the LEADER programme (LEADER,1998) that has driven much of the shift to bottom up development.

By marrying the contextual study with fieldwork results, a Community Knowledge Cone is derived and proposed as a model for the measurement of progress towards a knowledge-based community. Consideration is also given to appropriate performance indicators.

As community informatics in itself is a new area of computing, reflection is also given on the methods used and on their validity and acceptability to an interdisciplinary audience.

In summary the thesis makes the case that:

- Community informatics offers a management infrastructure for sustainable development;

- Community Informatics affords a mechanism for the selective re-embedding of social institutions at the local level;

- Community Informatics underpins a new localism accommodating the multi-perspective interpretations;

- A Learning Community is effectively an open system, influenced by and influencing the external environment;

- Progress reflects the interdisciplinary nature of sustainable development;

- Success is measurable as progress towards a knowledge-based society;

- Measurement must include feedback;

- Measurement criteria must be themselves adaptable to change.

CHAPTER		**CONTRIBUTION**

1.

Transition to a Knowledge-Based Society

Overview of the nature of knowledge. Defining knowledge based development.
The question of sustainable development

2.

The European Union and Information Society Initiatives

Defining the policy context in which the European Union is guiding change and EU stated objectives for the Information Society

3.

Rural Development Policy Initiatives

Examining the changing nature of rural development and the role given to ICTs. Considering evaluation

4.

Community Informatics – evolving Information and Group Support Systems

Establishing a wider definition of IS and the characteristics of informatics in the community

5.

A sociotechnical approach to community informatics

Reviewing other approaches to impact studies and the need for empirical research in IS in the context of this study.

SECTION 1 SCHEMATIC

Chapter 1: Transition to a Knowledge Based Society

The distinction between the past, present and future is only a stubbornly persistent illusion.

Albert Einstein

1.1 Key Points

- Society is in a period of change, a shift from an industrial base to a knowledge base.

- In rural areas this is often a shift from an agricultural base to a knowledge base.

- It is said that we are in the second half of the current societal shift.

- A knowledge-based society focuses on information as a right, as well as information as a commodity.

- A knowledge-based society is one in which semantic information is incorporated with existing knowledge and generates new knowledge.

- Knowledge creation is a continuous process of growth and change.

- The move to a new localism places emphasis at the community level with increased participation in decision-making.

- At the community level there is a wealth of tacit or local knowledge in the people who make up that community.

- This combined with non-local data sources constitutes the community memory or knowledge base.

- Competitive advantage will accrue to those who can manage knowledge effectively.

- Future development must be sustainable development.

- There is a need to understand the role of knowledge generation in sustainable development at the community level.

- There is a need to measure knowledge-based development in the community.

The objective of this chapter is to highlight the importance of community informatics in the management of knowledge in the community. This is done by:

1. Examining the nature of current societal change;

2. Reviewing the literature on knowledge;

3. Considering the change implied by a shift to a knowledge economy;

4. Considering the role of knowledge in sustainable development;

5. Examining the place of information amongst the performance criteria that have been established to measure sustainable development.

1.2 The Nature of Change

No century other than the twentieth has seen so many changes. Strictly speaking, this change only began post World War 1. If one thinks of any pre-World War 1 television or film series it is easy to picture the society of the turn of the last century with primarily agricultural employment, live-in servants and strict class distinctions, craftsmen and tradesmen. As Peter Drucker said four fifths of the total labour force worked for themselves and by themselves or for a master or mistress (Drucker, 1994). 'Blue collar' workers are a phenomenon of the post war period. By 1960 they formed more than half of the working population. That grouping too is now in decline and it is estimated that by the end of the century only one eighth of the US workforce will be classified as 'blue collar'. The growth area now is in 'knowledge workers'. Uniquely, knowledge workers gain access to work, job and social position through formal education.

Drucker goes so far as to say that eventually, in his opinion there will be no 'poor' countries only 'ignorant' countries. A sobering viewpoint when one considers that a large portion of the world has not yet made the transition from the agricultural era to

the industrial era. The change is encapsulated in Figure 1. adapted from the work of

Bohlin in "Knowledge Networking: the Major Productivity Breakthrough", (Bohlin,

1998).

Agricultural Era	Industrial Era	Knowledge Era
Land	Labour	Knowledge
Natural Resources	Engineering	Skill
Security	Capital	Flexibility
Population	Market Access	Learning
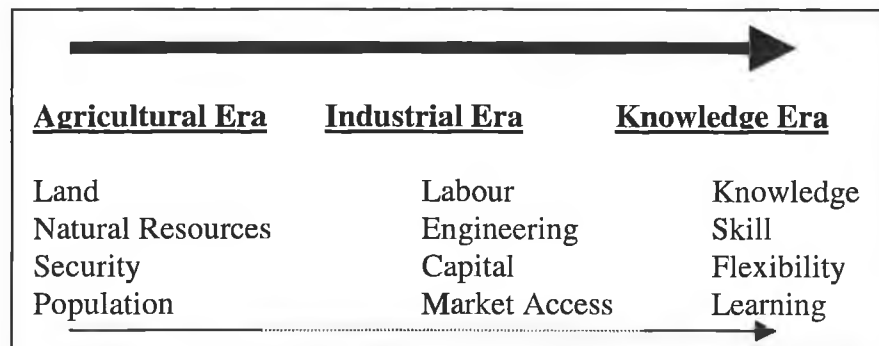
Figure 1 Societal Change

It is also worth noting that while most urban centres would fit readily into the middle

section the majority of rural areas are on the left of the diagram and are effectively

trying to 'leap frog' forward.

1.3 Defining Knowledge

Later in the thesis the difference between data, information and knowledge is

discussed and related to information and communication technologies. Here we turn

attention to the concept of knowledge. The conceptual stance of Western philosophy

is the base of the following reflections and echoes with the same epistemological

stance of Descartes, the Cartesian split between the subject who knows and the object

that is known.

For many centuries knowledge has existed as a value, knowledgeable being an

adjective applied to a person usually with a rounded education. Knowledge relating to

the liberal arts or the German Allgemeine Bildung was a concept possessed by an

individual. Also known as 'truth in judgement' it was an idea attributed to Plato.

Similarly there are two schools of thought on the acquisition of knowledge.

Rationalism argues that knowledge is acquired by deduction, a mental process, while empiricism argues that knowledge is acquired inductively from particular sensory experiences. Again Plato was the father of the former stance. He first introduced the concept of an idea as a form seen through the mind. His student Aristotle took this further and argued against rationalism contending that an idea cannot exist without relationship to a physical object through form. Following this train of thought, knowledge of the underlying form or object is always gained from sensory perception. Each sensory perception forms a memory and multiple memories form knowledge whether that is the knowledge of the craftsman or the knowledge of the man of science. The debate on knowledge was carried forward for many centuries as other philosophers in their time aligned themselves either as rationalist or empiricist. Descartes is perhaps the most widely known rationalist with his famous words, 'Cognito ergo sum', 'I think therefore I am'. Laslett records that John Locke, a contemporary British philosopher argued against Descartes that the real world exists in objective form. He characterised the human mind as 'tabula rasa', a white paper that has no a priori ideas, Locke contended that experience filled the mind with ideas and that these experiences were either sensory or reflective, (Laslett, 1994). The German philosopher Kant tried to bring these two schools together (Kant in Reiss1991). Kant put forth a premise that although all our knowledge begins with experience, it does not follow that it all arises out of experience. Kant's stance would appear to have been closer to rationalism that empiricism in that he saw the human mind acquiring sensory experience all the time but generating concepts to interpret these experiences. George Hegel expanded on this and introduced the concept of dialectics, the creation of synthesis by thesis and antithesis i.e. by accepting what is rational and rejecting that which is not rational (Hegel, 1981). Finally Karl Marx again

tried to bring rationalism and empiricism together and introduced the idea of perception and an interaction between the knower, (the subject) and the known (the object), (Marx and Engels, 1970). This philosophic debate has continued down through the years to today. Within the constraints of this thesis it is impossible to do more than touch on some key points in the hope that they aid understanding of some of the challenges of a move to a knowledge-based society. This implies something more than simply a society of knowledgeable people or a market for knowledge products. It implies knowledge in relationship with action. This emphasis bears examination in more depth. Various philosophers have presented the view of language as a game or interaction played by multiple players following distinct rules. Likewise others have held the view that an idea is of worth in so far as it causes change that has a monetary value. That is to hold that there is a close relationship between ideas and actions in that the only worthwhile ideas are those that translate into actions that cause change in the world. One of the confusions of today is the use of the words, information and knowledge. While they are often used interchangeably there are some fundamental differences. It is important to this study that the differences between, and relationship of, information and knowledge are established.

Information is divided into two types - syntactic and semantic. Syntactic information is grammatical or structural. Semantic information is that which conveys meaning. Information is a flow of messages, new meanings and additional insights that affect existing knowledge, change it and thus are part of a process that generates new knowledge. Information is only of value when it adds value to the existing knowledge of an individual. Therefore information is a commodity that must be understood within the context of the beliefs and values of the recipient. Berger and Luckmann

authors of the Social Construction of Reality, argue that people interacting in a historical and social context share information from which they construct social knowledge that in turn influences their judgement behaviour and attitude (Berger and Luckman, 1967).

Knowledge grows when it is shared, yet once you share it you still have it. Knowledge does not wear out although specific information may have a 'sell by date'. Knowledge does not get depleted and is difficult to protect. Knowledge is in effect universal and yet because it cannot be captured within boundaries it is the ultimate bonding agent. Universal or global knowledge refers to that body of knowledge that has been made explicit through the physical sciences etc. The concept of knowledge as power tends to restrict the operational definition of knowledge to that of universal knowledge. In fact a much bigger body of knowledge is that of tacit knowledge or local knowledge. This is knowledge that is not of immediate commercial value but that underpins the foundations of society. Polanyi drew the distinction between tacit knowledge and what he termed explicit knowledge. According to Polanyi tacit knowledge is personal, context specific and hard to communicate while explicit knowledge is codified and transmittable in formal systematic language. For each individual, tacit knowledge includes both knowledge of 'what is' and also knowledge of 'what ought to be' (Polanyi, 1966). In considering the assets of a community in a knowledge-based society tacit knowledge becomes extremely important. Nonaka has written extensively on the process of knowledge conversion (Nonaka, 1991). This is a social conversion process between individuals in which the tacit knowledge within each individual is mobilised and through social interaction converted into explicit knowledge of the group, thus enhancing the quality and quantity of the tacit knowledge of the group.

Universal knowledge is also sometimes referred to as declarative knowledge with tacit knowledge referred to as procedural. Standard theories of cognitive science see the process of learning as converting procedural knowledge to a declarative knowledge product. Nonaka however visualises the process as a spiral, a continuous pattern of growth and change. This idea places the emphasis on the process and the development of the individual or group and is key to this research.

We tend to restrict our thinking in the 'West' by assuming that making explicit has to infer passage through language. In fact it can be argued that transfer of tacit knowledge is least efficient by language. The most enduring model we have of successful transmission of tacit knowledge and of the spiral of growth is that of the apprentice and master craftsman where tacit knowledge is made explicit in action and learning occurs through observation, imitation and practice. Even through the medium of language, externalisation of tacit knowledge takes many shapes - metaphors, hypotheses, analogies, and models. One of the challenges of community informatics is to find the best medium and mode of communication of information and knowledge in any given situation. In the private sector recent business practices have begun to address these issues. The goal of capturing organisational memory and incorporating individual tacit knowledge has led to 'think tanks' for collective reflection and concept generation teams. It has also led to a rethinking of models of decision-making accepted and unchallenged for the last half century. Without digressing too far the latter reflect Taylorism in management. The work of Herbert Simon comes to mind as a model of decision-making at the core of many of today's tools and techniques for decision support (Simon, 1973). Simon disregards any aspect of tacit knowledge in the decision-making cycle as mere 'noise' and also views the organisation's

relationship with its environment as passive. This obviously is a very inadequate model for consideration of community based decision-making and is a point that will be considered further in a later chapter. Further clarification is given by the definitions of knowledge as formal and informal knowledge. The differences between these terms are perhaps best explained by describing formal knowledge as the kind of knowledge perceived to be objective and often transferred in hard copy as books, educational courses or even research findings. Informal knowledge by contrast, is subjective and tends to exist in localised settings, to be distributed orally in a manner determined by the transmitter and the recipient. Early taxonomies of knowledge use the tree metaphor while later management models tend to show knowledge in a hierarchical pyramid, a structure that has been replicated in information systems requirements analysis. Western management theory and economics have been likened to a century long effort to challenge the scientific view with the humanistic one. From the perspective of this work what is of particular interest are the thoughts of those who concluded that more than universal knowledge was needed for economic development. Over fifty years ago Frederich von Hayek made the point that the knowledge of the circumstances in any given situation never exist in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. Therefore, the economic problem of society is not simply how to allocate resources but rather is a problem of knowledge not held by any one person in its totality (Hayek, 1945).

1.4 Technology and Knowledge Production

The institutionalisation of knowledge can also be regarded as a shift to a change oriented economy where innovations are the key to competitiveness. Ulrich Beck divides modern society into three epochs: pre-industrial society, industrial society and

'global risk society' (Beck, 1992). Beck argues that our society is facing new kinds of risks that are difficult to define and record. Threats in the 'global risk society' are based on theoretical knowledge rather than experiential knowledge. Science determines the risk and the population perceives it via the mass media. Important to this thesis is the view Beck presents of sub-political activity as the consequence of demonopolization and demystification of science and politics. Sub-politics means the shaping of society from below, from the grass roots up. Society can be viewed as a continuous process in which people simultaneously structure and are structured by society. Giddens speaks of two primary aspects of all social systems: action and structure (Giddens, 1990). Social reality produces and reproduces itself. A computer network for example is both an instrument for and a result of institutionalised practices. Today's permanent state of risk is characterised as 'low probability, high consequence'. Giddens also holds that three central mechanisms underpin the dynamic nature of today's modernity: separation of time and space; disembedding mechanisms and institutional reflexivity. He explains the term 'institutional reflexivity' in the light of society's general move to detraditionalisation. Modernity's first development phase, called high modernity by Giddens and reflexive modernity by Beck comprised a mixture of tradition and modernity. Giddens' views detraditonalization as the process by which tradition no longer conserves the past but allows one to reconstruct it. Tradition is used to organise our collective memory. In a global society we are freed to think about different traditions according to our own experiences and general knowledge, reflexively applied knowledge. In previous eras the acquisition of knowledge and the use of one's resultant skills were solely in a local context. Today through social agents such as information and communications technologies traditional knowledge and local relationships are often recontextualised

from the local. Time and space have now become tools by which we organise our lives. Globalisation results in a continuously changing phenomenon whereby global and local relationships and situations influence each other. Giddens goes on to break down dis-embedding mechanisms into 'expert systems' and 'symbolic tokens', (Giddens, 1991). We are surrounded by expert systems in the institutions of transport, education, health, banking etc. In high modernity we no longer control or experience these at the local level but rather interact with them at a level of abstraction. In doing so we acquire some mastery of the principles upon which they are based and thus regain some control over our own lives.

1.5 The Knowledge Economy

Throughout the world communities are grappling with the concept of knowledge-based development. What does it mean? What is a Knowledge Economy? It has been suggested that it is a concept viewed with much scepticism in most quarters in much the same way as each previous societal change was viewed (Knight, 1986). So it is with some trepidation that a non-economist ventures into the world of economics. But it is obvious from the literature that interest in a new world-order based on knowledge has grown exponentially in both industrialised countries and developing countries around the world. It is equally obvious that there is widespread acceptance that competitive advantage in the future will be tied to the ability to manage information and knowledge effectively. The economics of information, as a commodity, is a relatively new area. While some proponents put forward a straightforward explanation of a process of production, transmission, use of information, knowledge and ideas, there has been considerable debate on the less tangible facets. Knowledge seems to defy the economic principle of scarcity – the more we use it the more it spreads. Amidon has described it as a 'kaleidoscopic

economy'. She goes on to say that economists and managers are dealing with the impact of multitudinous changes, in a 'real time' environment of opportunity (Amidon, 1998)). Ritzer proposed a basic model to explain the 'knowledge-economy' (Ritzer, 1992). He saw it made up of three layers, which were

- Computers

- Communications Networks

- Knowledge-human capital

This has since been refined and expanded by Don Tapscott in his book " The Digital Economy", (Tapscott, 1995) as:

- Computing

- Communications

- Content

with an interactive multi-media bridge between.

Tapscott talks of a new industrial sector emerging from the convergence of computers (computers, software and services), communications (telephony, cable, satellite and wireless) and from content (entertainment, publishing, and information-providers). He suggests highways will give way to the I-way. Just as the roads and electric grids were the infrastructure to support the industrial era so electronic communications networks will underpin the knowledge economy. The knowledge economy will be global and intellectual capital will be paramount. Knowledge is already equal in status to the traditional key factors of the economy, land, labour and capital. In the future an organisation or community's intellectual capital will undoubtedly be its primary asset. The future is about change. Adrien Grove of Intel has said, "Computers will become communications platforms (....) People will use them to tie their work together, to

collaborate (...) in ways that will revolutionise the way groups of people work" (Grove, 1997, pp1). The future is about groups empowered by ICT – knowledge-based, knowledge-centric, knowledge-intensive. In the new era networks, intellectual capital and knowledge-based systems will replace structural capital. In economic terms the future means dealing with how individuals use, transmit and produce ideas and knowledge. In contradiction to the paradigm of industry with knowledge-intensive products, the cost is inversely proportional to the amount of time spent understanding the product. This of course raises questions of how information is traded and used who controls information as well as the impact of information on those that do and do not have access to it. Govindan Nair of the World Bank has proposed a four layer model of the knowledge economy (Nair, 1998). He identifies four functionally related layers that are needed in order for knowledge to be transformed to economic value. These are: the physical infrastructure for generating, transporting and retrieving information; data which can be used for productive purposes by the public and private-sector; institutions and processes involved in the generation, dissemination, assimilation and use of knowledge and information; and applications which use the other layers to perform economic and social transactions. Nair highlights the complexity of the third and fourth layer. The third layer includes institutions and networks in the social sense, not necessarily physical. The fourth layer refers to specific applications that involve many facets from hardware and software to users and interfaces, valid data and compatible functioning knowledge institutions. The optimum applications will be those where the various facets of the fourth layer are all engaged. The user view is thus central to the success of the knowledge economy.

In concluding this section it is worth remembering that societal change is said to take up to fifty years to complete from inception to maturity. Allowing that the shift to a knowledge economy started no earlier than the mid seventies, we are perhaps just at the half way point and can expect significant change over the next two decades as the cycle completes. This is borne out in real terms by Stewart (1998) who noted that by 1991 capital spending by US companies was greater on ICTs than on industrial, construction, mining and farming equipment (Stewart, 1998).

1.6 Defining a Learning Community

One cannot look at this period and consider the growing importance of information or knowledge without also discussing environmental pressures and quality-of-life issues. These are resulting in an increased awareness of the need for development which, not only addresses the aims of materialistic advancement, but balances this with development that is ecologically and culturally sound. The concept of sustainable development is not new and in fact refers to the perennial tension between population growth and economic development on one hand, and the use of natural resources and ecosystems on the other. The term sustainable development today has come to mean development to meet the needs of today without compromising the ability of future generations to meet their own needs. Kiesler and Hinds suggest that the city has to become again the civilising force in society rather than centralisation in the hands of the State (Kiesler & Hinds, 1998). We can readily substitute community for city and perhaps even more easily see the growing importance of local knowledge. Local knowledge has been a neglected sector in the knowledge business. The private sector and academia have largely focused on amassing more and more universal knowledge through business, science and technology. As Kiesler and Hinds also point out, local knowledge is very diffused, latent and limited generally with very little immediate

market value. It cannot be acquired formally but exists mainly in the tacit knowledge of the people who form the locality. However, currently there is wide acceptance that, if we are to understand our deepest human needs and natural constraints, local knowledge and values have to be articulated and integrated with appropriate universal knowledge. Only when the two are in balance will there be sustainable progress. It is also agreed that this integration can only take place at a local level. The challenge of the second half of this technoeconomic shift is not to discover more and more scientific knowledge but to integrate the differing types of knowledge. Kiesler and Hinds make reference to the often quoted fact that knowledge is growing exponentially and that 90% of mankind's present knowledge has been produced over the last 30 years. Paul Samson adds that it behoves us to remember that it is the various definitions and interpretations of sustainable development which largely determine the direction and use of technology not vice versa (Samson, 1998).

A recent publication by the Department for Education and Employment suggests that a ' Learning Community' is one, which strives to learn how to renew itself in a period of extraordinary global change(DfEE, 1999). The authors of this report go on to say that the rapid spread of new technologies presents considerable opportunities for countries and regions to benefit from the transfer of new knowledge and ideas across national boundaries. At the same time global shifts in capital flows and production are creating uncertainties and risk in managing national and local economies. They conclude by defining a Learning Community as a community that develops by learning from its experience and those of others. Thus the key characteristic of the learning community is the ability to develop successfully in a rapidly changing socio-economic environment. The learning community is creative in its understanding of its

own situation and wider relationships developing new solutions to new problems. The implication is that a learning community is one, which strives to understand how it is changing in order to shape its future and in turn influence the type of changes that are shaping the knowledge society.

1.7 Towards Sustainability

The call of the Bruntland Commission for the development of new ways to measure and assess progress towards sustainable development was subsequently echoed in Agenda 21 of the 1992 Earth Summit. This has since been taken forward at all levels and adopted nationally. In the United Kingdom all local authorities have been asked to have in place a Local Agenda 21 by the year 2000. Launching 'Sustainability Counts' the Deputy Prime Minister, John Prescott, pledged committment to a new way of thinking. Thinking which puts environmental, social and economic concerns alongside each other at the heart of decision-making. Mr. Prescott went on to define sustainable development as:

- Maintenance of high and stable levels of economic growth and employment;
- Social progress which recognises the needs of everyone;
- Effective protection of the environment;
- Prudent use of natural resources.

Measuring progress requires some form of indicators against which performance can be gauged. An indicator is something that helps you understand where you are, which way you are going and how far you are from where you want to be. It is said that indicators must first be rooted in shared vision in order that they show progress towards that vision. The traditional indicators of economic growth or of environmental rectitude are inadequate as a measure of sustainability as they do not

weave the links between the economic, social and environmental strands. Maureen Hart (Hart, 1998) has suggested that community indicators of sustainability (CSI) must be:

- Actions for today that will not cause problems for tomorrow;

- Understandable by the community at large i.e. non academic;

- Developed and accepted by the people of the community;

- Link economy, society and environment;

- Focus on the long term view;

- Advance local sustainability (but not at a wider cost);

- Based on reliable information – robust and scientifically sound;

- Based on timely information – capable of being updated regularly.

Coupled with the drive for sustainable development there is also a move toward a new localism. Throughout Europe and the United States local communities are being given more responsibility for their own future and asked to organise themselves to participate in strategic decision-making. Commentators world-wide are agreed on the need for communities to learn and adopt new methods of collective working and to be positioned to take informed decisions. At the community level there is a need to assess resources in order to control the process of change and make informed and strategic decisions. Community indicators empower by developing the local knowledge system. A community has two strengths – community capital and carrying capacity. The former refers to all the things the community has at its disposal to allow the community to live and interact productively. The latter is the ability to enhance the community capital to provide for the community's needs long term. Community

capital can be subdivided into natural capital, social capital and built or physical capital. Information resources are part of physical capital but the wider concept of community informatics also brings in the social capital in the form of the skills, education and natural ability of the people and the social networks and relationships that underpin collective working.

Agenda 21 was so named because it lists twenty-one classes of indicators with some one hundred and forty suggested specific measures. To simplify Agenda 21 the UK Government has produced the following list of headline indicators.

Economic Growth	Health	Climate Change Air Pollution	Waste Disposal
Social Investment	Education Training	Transport Water Quality Wild life Land Use	
Employment	Housing Quality		

Figure 2 Headline Indicators

As noted above information resources are part of both the physical and social capital of a community. By deduction they are implicit in all the Headline Indicators. This seems to reflect the idea of information and communications technologies as an underpinning structure. No evidence has been found in the literature of the explicit measurement of knowledge-based progress or the information resource.

1.8 Summary

In this chapter we have looked at the nature of knowledge and at the development of a knowledge-based society. Many commentators have written on the increasing dependence of communities and individuals on information and on the skills needed to transform information to knowledge. A knowledge-based society is one in which

knowledge exists and is generated in relation to action. Technology is a key component of the knowledge infrastructure. Other key components are the stakeholders and the information base with which they interact. The industrial era has perhaps, placed undue emphasis on the generation of universal or scientific knowledge. While this process is still to be advocated, there is a need in the era of the Information Society to promote the integration of universal knowledge with local or tacit knowledge. Business now looks to its organisational memory - it seems a reasonable step to assume that an equivalent community memory will prove just as valuable an asset to society at large. Articulation of tacit knowledge at community level and integration of this knowledge with appropriate sources of universal knowledge will be corner stones in the successful transition to a sustainable knowledge based society and within that the development of Learning or Knowledge-based communities.

In this research in assessing knowledge-based development evidence will be sought of:

- Knowledge being considered as a primary asset;
- Balance between universal/scientific knowledge and local tacit knowledge;
- Continuous growth and change;
- Adequate infrastructure, data and processes for the dissemination, assimilation and use of information.

Progress must be appropriately measured within the wider framework of national indicators of sustainable development. No existing indicator has been found for information or knowledge. Derivation of a new indicator must be rooted in community consultation and that indicator must then be valid within the overall policy

framework that forms the larger environment. Herein lies the difficulty. Much of policy at central level in the European Union is aspirational and is operationalised through individual Member State initiatives. Much that happens at community level is of a 'pilot' nature. Can or do the two ends meet? Certainly any worthwhile evaluation must be rooted in the 'on the ground' reality but must also provide a mechanism for completion of the feedback loop to policy. In this thesis the focus is on rural communities within the European Union. Therefore the next two chapters will examine the policy context of Rural Development and of the Information Society initiatives.

Chapter 2: The European Union (EU) and the Information Society.

Where is the life we have lost in living,
Where is the wisdom we have lost in knowledge,
Where is the knowledge we have lost in information?

T.S. Eliot

2.1 Key Points.

- **Overall the EU aims to secure competitive advantage, nurture equality and inclusion and preserve cultural identity.**

- **Information and Communications Technologies have been targeted areas of activity for more than a decade.**

- **The Information Society policy initiatives recognise the importance of both knowledge-based production and technology as factors in societal change.**

- **The stated aim of Information Society policy initiatives is to promote balance and to use ICT to create an inclusive productive society.**

- **Specific activity to deliver an Information Society has been delegated to Member State administrations.**

- **Within the EU the region as a local community is the natural forum where variety expresses itself most clearly.**

- **Information Society initiatives should be seen as an opportunity to reinvigorate the spatial communities at the local level, build stronger social networks and foster a sense of place.**

The objective of this chapter is to trace the development of ICTs both as an economic sector and as a social imperative.

Given that this thesis is focused on community level particular attention is given to a comparison of policy initiatives and stated anticipated benefits with implementation at the local level and evaluation to date.

The chapter concludes with a summary of targeted areas of change and these will also inform evaluation of the interpretation of ICT in the study region.

(NB: -. Policy documents are listed at the end of the references section).

2.1 Developing the European Software Industry

The foundations of the EU are of course economic so it is not surprising to note that initial response to the emergence of IT and telecommunications was based on development of the software industry and of knowledge products. In the mid-1980's the European Commission was charged with securing a place in the global software industry, creating a trained workforce and overseeing the putting in place of a comprehensive electronic infrastructure. This policy was realised through a series of initiatives, many supported by the European Social Programme and by special infrastructural initiatives such as STAR, and Telematique. With hindsight there were many limitations to these programmes and thus to what was achieved.

Basic IT skills were taught in many guises but the training courses were unrelated to use in the sense that they predated new job opportunities. Success was measured by numbers completing the course and there was little or no follow on to assess usefulness of the qualification.

Infrastructurally there was a very uneven playing field with vast differences in the starting point for different member states. In some countries STAR funding supported introduction of digital telephony rather than provision of an Integrated Digital Services Network. In many countries the bulk of funds made available were given to the Telecommunications Providers and only a small proportion set aside for delivery

or uptake of services. This was the case in N. Ireland where British Telecom was the primary recipient of grant aid to put in place a fibre optics network. Fermanagh, the region studied in this work, was fortunate to have a node on that network in Enniskillen. Without that start it is unlikely it would today be in the position it is. Even allowing for that there were major demotivating difficulties caused by the newness of the technology and compatability issues. This did not encourage small business to invest in the technology. Where success was more apparent was in larger centres of population and within the software industry.

With parallel advances in personal computers and client server technology and investment by third level educational institutions there has been a steady growth of this sector and of the related financial services sector. The European Union supported this growth further through a progressive R & D programme under Framework IV.

2.2   European Policy to Promote the Information Society.

In Chapter 1 the nature of the shift to a knowledge-based society was discussed. By the mid-nineties it was apparent to all that this shift was underway and that it extended to all aspects of life, social , economic and environmental. As the United States began to target development of the Information Super Highway the European Union looked to adopt a holistic view of societal change and to nurture social inclusion, equity and cultural diversity alongside economic prosperity in a competitive market.

Creation of a specific Information Society policy area dates to 1994. The EU has chosen to embrace the reality of the shift to an Information Society and to seek to address it positively through a series of targeted initiatives.   The EU did so

recognising that the benefits are not equally distributed nor are the costs evenly borne. Therefore the EU set out to devise policies to ensure that everyone reaps the benefits of technological progress and that there is equitable access to the Information Society.

In the world of work three particular challenges were identified by the European Commission:

- To build knowledge and raise awareness of change;

- To help SMEs maximise the potential for change;

- To find new ways of labour contracts to ensure both flexibility and security.

A major aim of the EU is to create a society that is both economically and socially cohesive. Overall, it is important to note that EU policy aims to use ICT to promote job creation, social solidarity, equality of opportunity, equality of access and preservation of cultural diversity. In addressing this aim ICT should support regional and local development. Over the last 50 years ICTs have contributed significantly to reductions in the costs associated with storage and retrieval of information. There is now a similar revolution in the cost of transmitting information. Growth in dissemination and communication of information is the catalyst that is bringing the Information Society out into the community. ICTs are reshaping working life and the organisation of enterprise away from hierarchical structures and complexity towards decentralised and networked organisations. At the local level it was said that this would be enabled by:

- Liberalising the telecommunications industry;

- Integrating structural funds and Information Society initiatives with local and regional employment pacts;

- Advocating policies which support social inclusion and ensure that we do not have new class divides in "an information rich" and an "information poor" society.

Some six years later only the first of these enabling action is in place. The second is in process but the third is really still the subject of much debate with a significant chasm between those involved in community work and those in the policy arena.

2.3 Growth, Competitiveness and Employment.

As already stated, the Information Society became a focus for EU Policy in 1994. Since then there have been a number of important policy statements and debates. Of particular note is the 1994 White Paper on "Growth Competitiveness and Employment", (Delors, 1994). This addressed the potential offered by ICT and information as a commodity in a market led economy. Collectively the EU has a market of over 370 million and over 16 million enterprises, making it a key player economically on the world stage. The White Paper emphasised that competitiveness, growth, employment and unemployment are closely interrelated. Over the last twenty years the European economy's potential for growth decreased from 4% per annum to 2.5% per annum. However, between 1985-90, 9 million additional jobs were created and an additional 0.5 % growth per annum achieved. The report noted that the Community faces global changes:

- Geopolitical changes - new competitors and the end of communism;

- Demographic changes - an ageing population and transfigured family structures;

- Technological change - new industrial revolution with rapid and far reaching changes in technologies;

- Economic change – the economy is becoming knowledge-based and manufacturing activities are fading out;

- Possession and transmission of information is becoming crucial to success;

- In financial terms interdependence of markets is affected by freedom of investments and new technology.

The White Paper concludes that we are passing through a period of immense change when there is a gap between technical progress, the "how" of manufacturing and work organisation and creativity of new products to meet newly identified needs. It is interesting to note that, while the paper has a predominantly economic focus, there is reference to the role of technology in what is now referred to as sustainable development.

Overall the stated aim is for an economy that is healthy, open, decentralised, competitive and based on solidarity. Decentralisation reflects a radical change in the organisation of our societies that are all confronted with the growing complexity of economic and social phenomena and the legislative or regulatory framework. Hence the growing importance of the local level at which all the ingredients of political action blend together most successfully and partnership networks are developing and

the need to consider the moves to New Governance made by each Member State. The corollary to decentralisation is information sharing and communications. Confirmation of social and economic cohesion is an essential pillar of European construction. An economy based on the creation, dissemination and exploitation of knowledge will be one of the dominant features of the 21st century and against such a background a number of competitive factors play a crucial role in generating a recovery in growth and increase in employment. Given the purpose of this study, it is interesting to note that amongst the factors having a major impact on the competitiveness of the Community economy, Member States highlighted both, inadequate assimilation of the new technologies and a failure to fully exploit results of research and development.

Correspondingly, and of interest to this discussion are the actions taken by the Commission to define and develop an information society for the people of the EU. The Commission's 1994 Action Plan "Europe's way to the Information Society", placed a strong emphasis on social and societal questions. In conceptualising the way forward, experts were brought together by the Commission in a broadly based Information Society Forum. This forum became known as ''The High Level Expert Group'', (HLEG) and was chaired by Commissioner Flynn. This group met and consulted over a three year period and later in this chapter the results of the HLEG are considered. Before that attention is given to the Green Paper, ''Living and Working in the Information Society: People at the Centre'', (Commission, 1996). This paper was put forward as a consultative document to stimulate debate. The contents are now discussed in some detail as they provide some of the backcloth for the importance and timeliness of this study.

2.4 Living and Working in the Information Society: People at the Centre.

A major identified obstacle to growth is a lack of awareness of new possibilities. There are no "turn key" answers. The Green paper states that these new possibilities are particularly pertinent in relation to ''micro-enterprises'' which classically are small unit, market driven and teamwork based. Looking at industry in the island of Ireland and most certainly within rural Ireland, a large proportion would have to be categorised as micro, in many cases with a work force from one to ten.

Changing the nature of work has a 'roll on' implication for relationships and the nature of work. The Information Society is characterised by new forms of work, less formality, more flexibility and new relationships between employer-employee; work-leisure; work-learning; traditional work-teleworking. Some studies have now been done on the theory that technological progress inevitably leads to job losses and to the realities of technology and employment. Contrary to popular belief there are job gains rather than job losses. There are the obvious new areas of employment such as Call Centres. The latter is one of the fastest growing sectors of the economy employing over 170,000 people in Europe as a whole. It is also a sector in which Ireland has achieved highly, partly by imaginative use of time zones, and partly because of the availability of skilled labour. Overall, the studies undertaken show that where the development and introduction of ICT has been greatest there have been the highest levels of employment growth. This is true both in the United States and Europe. There appears to be a positive link between technological progress, productivity and economic growth. In the case of SMEs and micro industries ICTs offer new opportunities for innovation and entrepreneurship. On the down side if -high-tech/high-skill/high-wage jobs are increasing there is a steady decline in

manufacturing - low-tech/low-skill/low-wage jobs. This only serves to emphasise the need for retraining and upskilling. The main growth area is the services sector where new technologies have more than balanced any job losses due to automation. In core ICT industries the software services sector is also booming. Over 750,000 people are now employed in this sector. Audio-visual and multi-media services are also a growth area as are telemarketing, telesales, and telebanking. Liberalisation of telecommunications and the spread of ICTs are predicted to lead to job creation in the rest of the economy. Over the period 1985 -1994 employment grew by 10 million. The second half of that period still saw a growth of 2 million jobs in business, computers and research. This was the same increase as in the previous period with 0.6 million extra jobs in education health and sanitation. But overall employment growth has been weak in Europe. Macro economies obviously have a role in that but the Green Paper emphasises the structural aspects. The high levels of unemployment also reflect increasing long-term unemployment. This is attributed to passive labour market policies creating social exclusion through income support rather than reskilling or skills upgrading. The Green Paper also urges Member States to make better use of the multiplier effect. European economic integration and interdependence has intensified. Europe's future lies in policy measures addressing the EU as a whole. ICTs are leading to structural change in the workplace. All stakeholders and actors must be involved. The Green Paper suggests that this requires new forms of partnership between employers, workers public authorities, education and training providers, training institutions and business support systems. This is an area in which Northern Ireland has excelled, partly through active participation in the rural development LEADER programme but also through the structures set up to administer the Special Programme for peace and Reconciliation. These 'bottom up' partnerships are now

beginning to spawn wider multivariate partnerships similar to those suggested in the Green Paper. But ICTs also place new demands on the work force.

Added to basic skills of numeracy and literacy must be the skill of interaction with the technology – ''informacy''. The Green Paper highlights the mismatch between job change and skills acquisition. Each year 2.3%, one age cohort leaves the work force i.e. retires, and another enters. However the rate of change of enterprises and skills requirements far exceeds this and so we are heading into a two speed labour market with a redundancy of old skills and a bottleneck for new. The answer has to be in re-adaptation of those in the workforce, employed and unemployed. This requires a radical approach by government. The paper highlights the reality that the workforce is ageing and the technology is getting younger. The answer is said to be new arrangements for lifelong learning, a pro-active approach to industrial adaptation and change. The foundations must be laid from school age and we must create learning organisations and learning communities.

ICTs have a powerful capacity to shrink distance and improve access to information and services. The new technologies and networks have the potential to bring work to areas of high unemployment, to reduce the disadvantages of less favoured and peripheral regions. But many fear ICTs will actually reinforce inequality and concentrate wealth and information 'haves' and information 'have-nots'. Market forces lead to concentration. Public policy must balance this and use ICT to create an inclusive productive society. Many of the EU Member States have adopted regional strategies. Although initially these have focused on infrastructure, the more progressive have now moved on in terms of partnership for development. Overall

there has been slow progress in achieving equalising income/head in the EU. Some disparities have widened the gap over time. Use of Structural Funds has minimised some disparities. Measures such as the liberalisation of the telecommunications industry and a new regulatory framework are targeting closing the gap. Policies are needed to support infrastructural and human resource development. The concept of a Universal Service is important but perhaps more importantly raises issues of access in less favoured regions. A report was adopted in 1998 on Universal Service provision. It said that a crucial factor in determining the long term success of a region is the knowledge of the people and their capacity to use ICTs. Particularly in less favoured regions prospects for success are tied to new innovative structures. In 'Action for Employment - a Confidence Pact' the Commission has encouraged the set up of new Territorial Employment Pacts. Article 10, the European Regional Development Fund (ERDF) and Article 6, the European Social Fund (ESF) also support other types of action by the regions: the preparation of regional Information Strategies and Action Plans; trans-national pilot projects - applications in employment services, training, open and distance learning, healthcare and business support services. One of the aims of the Information Society is for increased participation and a more inclusive society. To achieve this requires active public policy over a wide spectrum including local community development and support. It requires that people are given the capability to adapt to change. The European model of democracy is embedded in access to information - an informed democracy. The Information Society must ensure public and equal access to ICT infrastructures, to networked information services, and to the skills required to access these. The vitality of the political debate could be reinvigorated by direct democracy. The Information Society offers potential for more accessible and effective public services. It offer the potential for education, health,

finance etc. to be reembedded at the community level, reinvigorating communities with a renewed sense of identity and place.

Overall the Green Paper was well received and there was general agreement on the points highlighted above. It did however begin to consider the 'how' to do it. It fell to other forums to take this agenda forward.

2.5   First Report of the Information Society (IS) Forum.

The IS forum was a 128 person grouping chaired by Ms. Brigitta Carlson. Six working parties discussed and formulated suggestions on various areas of implication of the Information Society. Overall the group reported under the banner that: people are the initiators and are as important as markets in the successful transition to an Information Society. The People Centred Approach includes:

- Giving people a "know how" sense to use the new information appliances and applications;

- Building on a lifelong learning society;

- Involving people early in the development of new applications and services so that these are useful to them in their day to day lives;

- Using the new technologies to bring people into decision-making and to enable them to exercise a closer scrutiny over what governments are doing having guaranteed pluralism and open access to information.

The Forum concluded that there was a great state of unreadiness and that for as long as it lasts, this state of unreadiness will be a serious handicap in Europe's capacity to

gain the potential benefits they offer of higher economic growth, more employment and a better quality of life.

2.6 Final report of The High Level Expert Group (HLEG).

In April 1997 the HLEG published their findings on "Building the European Information Society for Us All''. The report aims to suggest ways of taking the EU from "technological determinism to social embeddedness" highlighting social aspects of the Information Society that have not hitherto been at the centre of the policy debate. The generalisation of information and data use is being accompanied by organisational, commercial, social and legal innovation that will profoundly change life both in the world of work and in society generally. The HLEG focused on the differences between data, information and knowledge. In fact new technologies have little or no effect on the acquisition of knowledge and still less on wisdom - referred to as "distilled knowledge". But we all have to hope that the future will indeed be one of a ''wise'' society, functioning from a sound base of information and knowledge. This must be the aim of the EU in propagating the Information Society concept. Concentration on ICT requires concentration on the human resource. Advances in information and communication technologies are complementary to investment in the human resource unlike previous technological advances of the industrial society that supported physical capital accumulation. The HLEG recommend a social integrationist stance and thus reject the notion of technology as an exogenous variable to which society and individuals must adapt. Where there is no social and organisational integration of technological change, i.e. where such change is imposed on society we effectively see

technological disenfranchisement akin to political disenfranchisement. Information and communication technology should be seen as a part of the process of change, flexible in use.

The HLEG drew on some of the literature referred to in this thesis, and speaks of the dearth of user involvement in design implementation of ICT. HELG said that developing technological capability involves a complex endogenous process of change negotiated and moderated both within organisations and at the level of society at large. It is obvious, they say, that policies should not be confined to addressing economic integration of change but must also include all aspects of broader social integration. The HLEG aimed to illustrate the numerous social policy challenges associated with a future European Information Society, and stressed that these transcend rapid adjustment to a future determined " by the external force of technological change in which people have no influence and no desire to participate". Following is a brief summary of key points of the ten challenges identified by the group:

A: Acquiring Knowledge and Skills.

In a similar vein to the points made in the Green Paper, the report speaks of the "greying" of the workforce. Knowledge acquisition is no longer a process of incremental accumulation or "once for life" learning. Knowledge once gained must be maintained. Industry will no longer invest in general purpose knowledge looking instead for current specialisation. Against a backcloth of budgetary cuts in education and training, HLEG recommend that more education networks be formed, that there be new incentives for lifelong learning. In association they suggest that work must go

into improving and disseminating knowledge and learning methods geared to a world of "learning through consumption", that a pedagogy be developed to deal with the reality of 'cathodic abstraction' and that there should be investment in high quality low-cost learning materials.

B: Changing Role of the Public Sector.

HLEG describes the public sector as the guardian of competition, "creating the conditions in which investment markets and services can flourish". There is a need to regulate the emerging information markets both at European level and in terms of a global information infrastructure. Public Information Services are the new growth engine of the Information Society. The lack of European cross-border inter-connectivity is one of the greatest obstacles to mobility of workers and citizens in Europe. Again this is one of the issues dealt with in the Green Paper and also an issue addressed at a national level by both Northern Ireland and Ireland in their current implementation strategies. The HLEG recommended a shift in focus from infrastructure provision to content provision. The initial outline of the Framework V Research and Development programme reflects this shift, indicating that the Commission has taken on board the HLEG view.

C: Exploiting the Virtual Value Chain.

A major change in society is the shift towards intangible production and consumption – "de-materialism". ICTs are used to produce codified knowledge. It is becoming increasingly possible to codify knowledge that was previously tacit. The economic attractiveness of this can already be seen in the mass production of goods with built in 'intelligence'. Ironically this in turn gives rise to what has been termed 'the

technology paradox' - the 'nominal' value of mass-produced goods falls, as more technology is included in them. By contrast, services that allow the combination and reintegration of codified and tacit knowledge increase in value. These two extremes lead to reflection on 'value' questions: where is value created; how can it be extracted; how is it distributed? Now services account for two thirds of the economic activity of the EU countries. Interestingly the highest growth rates are in the development of new service products that do not require new competencies for use, e.g. Tape to CD. Throughout the HLEG report, the role and importance of the small to medium enterprise (SME), is emphasised. The report finds, that for equitable growth and participation it is important that SMEs should have the opportunity, and expertise to foster electronic links with those trading partners who match their own needs and suit their information handling procedures, rather than having inappropriate systems imposed upon them by trading partners who are larger, or more powerful, or have more technological experience. The Information Society and ICTs are resulting in more and more human activities being based on a representation of reality. There is therefore a need to understand the effect of virtuality on people's lives and a need for design guidelines and the implementation of 'people-centred' ICT systems.

D: The Changing Nature of Organisation and Work.

Organisational change in the Information Society should ideally consist of a set of closely related developments in the structure of firms, in production and work processes, in labour, in social requirements and in technological systems. The report finds that strategies that focus purely on the implementation of new technologies, and ignore their organisational contexts are ineffective and costly. ICT can improve the value-added chain at various points other than simply on the shop floor. The HLEG

cite the example of the shortened gap from research and development to production. They also highlight the fact that ICTs are not decreasing the importance of person to person communication. Decentralisation of function and responsibility, one of the frequent changes afforded by use of the technology, actually increases the need for communication. Overall, downsizing, outsourcing, and competition from low wage economies threaten SMEs. They have to free themselves from electronic hierarchies. The HLEG find that organisational and technical innovation in SMEs is highly dependent on support within the region.

E: From time to work to time to live.

Speed of response has become the essential ingredient of economic value. Time is a crucial and scarce production factor. But time cannot be accumulated nor really saved. We are moving in a time of time paradox - people have more time to spend but the time to do anything is moving faster. An estimate is given that on average most people are short twenty hours per week for non-work activities. Time management is becoming increasingly important in terms of filtering information. Time pressure is building because the range of opportunities is constantly increasing. As a result we all try to do many things in parallel. ICTs consume time and are making people depend on virtual time. A good example we are all familiar with is the mobile phone, extending the office and creating a constantly "on call" culture. People now have to choose to go off line or to restrict access. ICTs are changing people's time budgets and time rhythms. In a "screen and chair" society there is a very real debate between a people centred versus techno-centred organisation of work and leisure. In terms of the wider picture the HLEG point out that there is a certain misnomer in talking about a Global Information Society when over half the population of the world do not have

even access to telephony. However, we must address the capacity of ICTs to codify information and knowledge over distance and time. ICTs are allowing cheap ''global'' access to low wage locations and thereby facilitating the relocation of service activities. Firms are discovering the benefits of international wage differentials. ICTs contribute to economic transparency and international availability. The question then is one of accessibility and capacity to use or process information. ICTs therefore offer a tremendous opportunity for 'catching up'. The HLEG is cautious and includes in their report a comment from the magazine the Economist, " Europe's comparative advantage remains intrinsically in products and crafts of the past; its specialism in high demand high tech sectors remains limited". There is a need for a common minimum social framework in Europe otherwise ICTs will simply be used to de-localise, avoiding taxes and social costs - downward adjustment of social policy; harmonisation by erosion. A programme of policy co-ordination will give Member States, in accordance with the principles of subsidiarity, freedom to develop their own social policy but above a minimum European standard. HLEG highlight the need for reform of taxation, direct and indirect. Much of the products of the Information Society are intangible and invisible. Innovative thought is needed such as the 'bit' tax proposed as a tax on units of electronic transmission.

G: Including Everyone - Cohesion.

Cohesion is the extent to which any individual is able to participate in society.

Fear of increased social exclusion is real because those generally expressing it are currently excluded from taking part in economic activity. For those who argue that ICTs offer the potential to overcome disadvantage one point is missing. That is, that inclusion will not be market led. The excluded are inevitably not 'consumer groups'

of commercial interest. People and excluded groups in particular should not be forced to adjust to new technologies - rather the technologies must become better geared to human needs. ICTs will change the 'winners' and 'losers'; not everyone will win even in the Information Society. The 'death of distance' leads to focus on growth and development opportunities in those regions hardest hit by geographic boundaries. The HLEG differentiates between Less Favoured Regions (LFR) and peripheral regions. The former have problems with poverty and development usually accompanied by high density of population while the latter are peripheralised by their geographical position and usually have a corresponding low density of population. The Information Society will not happen automatically. There is a need for infrastructure provision in terms of a Universal Service affordable and accessible by all. Liberalisation, while desirable in a market economy, brings with it possible negative effects on regional and peripheral development. Commercially there is more likelihood of investment in Less Favoured Regions than in the remote regions because of the high population density characterising latent demand. Liberalisation will not necessarily help peripheral regions. New opportunities will be marked by competition on price and quality. Low-density population will not make the peripheral regions an attractive option. HLEG recommends that the Universal Service should be specified in functional terms such as scope of networking, data and mail interchange, access to new business and information services world wide and in core regions etc. Universality needs to apply to educational, cultural, medical, social and economic institutions of local communities. Community funds need to be targeted at regional 'black holes'. The fundamental challenge of the European Information Society is undoubtedly the search for competitiveness based on cultural, educational and social variety.

The HLEG recommended that the Information Society fosters a multicultural Europe through use of ICTs as a focus for cultural development, for the transmission of cultural ideas and artefacts, to foster direct contact between diverse (and often widely dispersed) groups and to support the multilingual nature of European society.

Within the EU "the region as a local community is the natural forum for variety to express itself most clearly". It is the point for nurturing, enhancing and integrating diversity. The HLEG recommend that the EU should celebrate the local community and that the Information Society be seen as an opportunity to reinvigorate the spatial community by promoting cultural production and consumption at local level.

The issues of governance have attracted a lot of attention elsewhere in commentary on the Information Society. The HLEG express concern that a privileged group could control the media and thus public attention. This however is balanced against Internet access that promotes decentralisation and individual participation. Citizens must get high quality neutral information. The recommendation is that there is a need for a European Media Council. In terms of social inclusion and democracy the HLEG caution against the 'confetti' democracy and say it would be easy to confuse data transmission with public debate. Enlarged democratic decision making depends on educational, financial and employment differences not creating a wider social gap between those who are able to participate and those who are not.

In conclusion the HLEG see much to be done to affect the social change necessary to ensure success of the Information Society. The Information Society marks a major point in society and is much more than a change in the technological paradigm. What the HLEG provided is an aspirational framework against which Member States could

develop their own plans. Naturally there is difference therefore in progress. Many ideas have been implemented as 'pilots'. Later in this thesis the question of 'mainstreaming' lessons learned is considered. What is also clear is that this is a many faceted development. Community informatics will play a critical role in delivering the benefits of ICTs at the local level. Equally for such a complex development measurement of progress becomes vital.

Summary.

The EU has a central aim of creating a socially and economically cohesive society. Technological advances and, in particular the growing potential of ICTs, offer immense opportunities but success is seen as conditional on a number of factors. Considerable thought has been given to the design of specific Information Society initiatives and to the stimulation of widespread debate. Implementation detail is in the hands of Member States. There is a considerable time lag between the conceptual framework put forward and actual change on the ground.

The hypothesis that technology is an exogenous variable to which we must adapt is firmly rejected. Those designing future policy do so from the premise that it is the manner in which technology is used and the capability of people to use it that will shape the final outcomes. It is worth noting that the HLEG see new policy as a shift from "technological determinism to social embeddedness", justification for renewed research effort to understand possible outcomes. Concentration on ICT requires concentration on the human resource and the manner in which change is managed and negotiated.

Also of relevance to this research is the emphasis placed on the "local" and on 'community'. A very positive case is presented for regeneration and renewal through innovative partnerships underpinned by ICTs embedded in social organisation. Similarly ICTs are seen as a vehicle to support an unprecedented celebration of cultural diversity which is a central part of the uniqueness of the EU.

A cautionary note is raised in terms of reinforcing divides. It is pointed out that information technology and telecommunications services are commercial products and, as such, will be subject to market forces unless there is specific intervention. Those currently excluded are unlikely to be targeted as prime commercial candidates. There is also a need for acceptance of a broad definition of 'excluded'. The findings reported highlight the vulnerability of rural areas that can be described as peripheral. Low population and remote geographical location may militate against such areas being included in on developments.

Differentiating between data, information, knowledge and wisdom the Information Society findings acknowledge that technology alone will not deliver a 'wise' society but that that should undoubtedly be the aim.

Chapter 3: The Changing Nature of Rural Development

"Here is where I belong, these are my people, I care for them, they care for me, I am part of them. I know what they expect from me and I from them, they share my concerns, I know this place, I am on familiar ground, I am at home".

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Yankelovich

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3.1 Key Points.

- **Eighty percent of the EU is rural and over a quarter of the population live there.**

- **Future rural development must be local and community driven.**

- **Rural Development must be seen as part of overall societal development and not as an annex to urban development.**

- **Transition to the Information or Knowledge Society must be understood in the rural context as well as the urban context.**

- **Research, such as that undertaken in this thesis, can contribute to understanding of positions relative to transition.**

- **Small scale diversified economies should be encouraged and integrated into the overall economy.**

- **Rural Development will be one of three community initiatives under Agenda 2000.**

- **Approaches are being refocused from sectoral to spatial or territorial.**

- **Structural funds should bridge the gaps and reinforce infrastructure.**

- **This thesis is concerned with the role of community informatics in rural regional development.**

The objective of this chapter is to provide a review of current trends in rural development in order that transition of a rural community into the knowledge society is better understood. This is done by:

    1. Outlining rural development policy over the last five years;

    2. Examining the proposals contained in Agenda 2000;

3. Considering the shift to a territorial approach;

4. Reviewing Northern Ireland policy;

5. Considering the importance of a telecommunications infrastructure.

3.2 Rural Development Policy.

More than 80% of the EU is rural and over a quarter of the population of the EU lives and works on the land. To date agriculture and agricultural policy have dominated discussion in relation to rural areas although rural policies have progressively attracted more attention since their initial introduction in the 1980's. As the end of the current round of Structural Funds approaches and further rounds of World Trade Organisation (WTO) negotiations are imminent, there is a growing debate on the nature of "rurality", and the need for measures designed to preserve and extend the quality of life in the countryside. There are challenges to be met in the growing imbalance on agricultural markets, in the area of environmental issues both negative environmental aspects of farming and in positive environmental services which society desires and is willing to pay for.

The emergence of rural development as a focus of European Policy can be dated to the beginning of this decade and in fact became a priority action area under EU Commissioner McSharry in 1990. During the Irish Presidency in 1996 a major conference was held to discuss Europe and its rural areas in the Year 2000. In his opening address EU Commissioner (Fischler, 1996) spoke of the diversity of landscape and the diversity of services offered. These, he said, covered, services to the economy through agriculture, forestry, crafts, tourism etc., services to society by providing attractive living areas and conserving rural traditions and cultural heritage, and services to the environment in maintenance of biological diversity and ecological

balance. He continued that people in rural areas bring to the equation a great sense of community and social cohesion, a spirit of enterprise and a self help culture. But time is running out and rural Europe faces constantly growing dangers. Many country areas are being downgraded into urban overflow areas and their identity and cultural autonomy swamped by the 'monolithic international culture of the television society'. In other areas gaps in infrastructure, too few jobs and inadequate services or access to training result in young people leaving the land and discourage companies from locating in the country. In terms of agriculture, ever increasing productivity measures and pressure of competition mean fewer people employed on the land. He concluded that "to secure the future of European agriculture, rural development policy must consistently foster the creation of jobs outside agriculture, the improvement of the infrastructure and the range of services on offer, and encourage still greater efforts to improve the condition of the environment (…). The emphasis must be on participation and a bottom-up approach which harnesses the creativity and solidarity of rural communities. Rural development must be local and community driven within a coherent European framework". The proposal for future policy initiatives is gathered under an umbrella of Integrated Rural Development. Drawing together the thoughts of many commentators (Murray and Greer, 1993), suggest the following main tenets:

- A multi-sectoral approach to development over and beyond improvements in agricultural performance and structures;

- Economic measures paralleled by initiatives in education, training and physical infrastructure investment;

- Concentrated aid on 'poor' areas;

- A requirement that local people become involved not only in needs identification but in implementation;

- Devolution of the institutions of governance to regional and local level.

The current provision in relation to rural development and agriculture has become incredibly complex and administratively 'top heavy'. At present there are:

62 Objective 1 programmes;

82 Objective 5(b) programmes;

101 LEADER programmes;

130 programmes under the agri-environmental Regulation

36 programmes for Objective 5(a) measures and reafforestation and early retirement programmes.

In both Objective 1 and Objective 5b regions the funding of rural development relates to:

- Diversification of agricultural activity and promotion of local products;

- Encouragement of SMEs and development of rural tourism;

- Labour force training;

- Infrastructure improvement;

- Conservation of natural resources and the environment.

A key feature of planning for 2000-2006 therefore has to be simplification. The enlarged interest in rural development comes not just from those living in these areas and is an indicator that the rural regions are developing new functions within the wider economy. The success of recent policies in no little way has reflected the increased participation by different actors and stakeholders at local, regional, national and European level. Future direction for rural development should build on these new

partnerships and on an integration of the old and new functions of rural areas. There is a danger that rural areas be seen as simply the spaces between urban centres - backward pockets with 'quaint' values and backward economic development. This decries the diversity of our countryside and the potential to maintain diversity while encouraging and supporting small scale diversified economies integrated into the international economy. New opportunities exist such as lower cost housing and industrial sites, smaller more flexible enterprises, quality ''craft'' based products and an underpinning telecommunication infrastructure offering enlarged market size way beyond the local economy. Saraceno (1996), Director of The Centro Ricerche Economico-Sociali, Italy postulates that this is a valid approach which appears significantly adequate also as a territorial concept. The latter appear to have been key factors in successful rural areas with low population density, niche quality segmented markets, and a structure based on SMEs and mixed forms of integration with the larger external marketplace. The (Future of Rural Society, 1988) acknowledged the process of diversification going on in most rural regions. Pursuing policy to support economies of scope is not in any way contradictory to the policies affecting professional farming. Agricultural policy through the Common Agricultural Policy (CAP) has been one of compensation against external markets. Rural Development policy has mirrored that on the basis of draining human and economic resources. Future directions for the new Millennium would appear to be much more positively seeking to implement policies of incentives for diversification, new linkages with external markets, upgrading of services and training and provision of enhanced infrastructures. This is a complementary and stimulating approach more likely to produce a dynamic and sustainable rural society.

3.3 The Way Forward - Agenda 2000.

At the beginning of his period as president of the EU in January 1995 Jacques Santer set the European Commission two objectives: strengthening the EU and preparing for enlargement. Following the Treaty of Amsterdam in July 1997 he announced the Commission's detailed plan for the first decade of the 21st century - Agenda 2000, (1998). Agenda 2000 is a strategy for growth competitiveness and employment, for modernising key policies and for extending EU borders through enlargement. The prospect over the next period is for an enlarged EU going from 15 member states to 25 member states with some 475 million inhabitants. Economic and social cohesion is enhanced in importance with obvious corollaries in terms of dealing with increased diversity. Development of internal policies is prioritised although considerable importance is also placed on the EU as a major world player. Internal policies are aimed in four directions: sustainable development; employment intensive growth; knowledge and technology at the forefront and modernisation of work practices and quality of life conditions. The competitiveness of the EU depends on the exploitation of the single market and the knowledge and skills of people. The report on Agenda 2000 identifies a key feature of today's economy as a rapid shift towards globalisation and use of ICT. ICTs are seen both as key in determining global competitiveness of economic sectors but also as fostering the emergence of new non-material goods and products. The EU therefore identifies the need for strong internal 'knowledge' policies - research, innovation, education and training. The Information Society is seen as an opportunity in terms of services such as electronic commerce and new products such as those in the multi-media area but also it places an obligation on society to prepare the citizens of tomorrow to participate. It provides a 'formidable medium for education, training and culture'. ICTs are one means of ensuring that the benefits of growth promote a more cohesive and inclusive society and that the EU responds to

increasing public demand for a higher 'quality' of life. Structural fund allocations for 2000-2006 will reflect these aspirations and policy shifts. ECU 275 million will be made available as opposed to ECU 215 million for 1993 - 1999. ECU 45 million will be earmarked for the new member states, some funds withheld for transition funding and approximately ECU 210 million set aside for the EU-15, existing member states (a slight reduction on previous figures). The present seven objectives will be reduced to three - two regional objectives and one horizontal objective addressing human resources. The area of the EU covered by Objective 1 and 2 will be reduced from 51% to 35-40%. There will be some transitional funding made available for those regions changing from designation as Objective 1 to Objective 2. Under the new arrangements Objective 1 regions continue to be defined as those lagging behind and facing serious difficulties in terms of employment, income, productivity or infrastructure. Threshold figures continue to be based on unemployment (above 60% community average). It is expected that in the new funding round some two thirds of EU funding will go to Objective 1 regions but the threshold of 75% GDP will be firmly applied.

A new Objective 2 is to be devoted to economic and social restructuring and this will bring together resources for regions suffering from structural problems, in particular declining rural regions and areas hit by industrial crisis. Vigorous structural measures are envisaged to foster diversification, economic dynamism and an active business culture. The new programmes for an Objective 2 area will favour diversification.

Objective 3 relates specifically to the development of the human resource. This is a recurrent theme in Agenda 2000 and is tied to a desire to modernise the labour market.

Priority is therefore given to access to employment, lifelong learning, promotion of local employment initiatives, and to territorial employment pacts.

Community Initiatives.

During 1993 - 1999 there have been a proliferation of programmes spawned from thirteen different community initiatives and there has been considerable duplication across initiatives particularly in the area of new technology and ICTs. Agenda 2000 proposes a reduction in the funding of initiatives to 5% of the total budget and, in the number of initiatives from thirteen to three:

- Cross-border transnational and inter-regional co-operation to

    support harmonisation and balanced spatial planning;

- Rural development;

- Human resources, paying particular attention to equal opportunities.

The reduction of economic and social differences is dependent not only on the measures highlighted above but, in terms of territorial development, decentralised partnership to facilitate preparation of integrated regional and social development strategies. Objective 1 & 2 will be run on multi-annual regional programmes. Objective 3, as horizontal will be run through a national programme with a set of regional sub-programmes. There will in the future be a clear division of responsibility between national, regional and local authorities based on:

- The Commission and the national, regional and local authorities identifying in partnership the priorities for development and assistance in relationship to verifiable targets;

- Decentralised management in the member states and regions;

- Adequate systems of monitoring.

Rural development separate from agriculture is an emerging focus. In December 1995 the Commission presented its Agriculture Strategy paper to the Madrid Council and highlighted the need for a policy of integrated rural development. However in Agenda 2000 it is noted that rural policy in the Union still appears as a juxtaposition of agricultural market policy, structural policy and environmental policy with rather complex instruments and lacking overall coherence.

Rural trends show a strong decline in the number of farms and people employed in agriculture. Agriculture represents only 5.5% total employment on average and in very few regions is its share greater than 20%. The long-term trend is towards a further drop in the number of full-time farmers, at a rate of 2-3% per year. At present supporting the CAP absorbs 0.6% of the GDP of the EU. Greater market orientation is considered necessary and will facilitate the progressive introduction of new Member States.

Other parts of Agenda 2000 deal with the issue of enlargement and the accession to the EU of a number of new nations. Detail of this is not pertinent to this study and is omitted in this review. In conclusion Agenda 2000 emphasises that rural areas are multi-functional and encourages the exploitation of all opportunities for rural entrepreneurs contributing to economic cohesion in the EU.

3.4 A Territorial Approach.

Recognising and celebrating the diversity of rural areas marks a refocusing of approach from sectoral to spatial or territorial. Area specific policies need to be multi-sectoral and integrative but tailored to specific regions. The challenge is to plan for internal cohesion within each region and external integration between Member State

regions. There is of course some way still to go. The moves to a single market and a single currency are creating pressures for individual Member States to bring their economies into line with each other. The last ten years shows a clear trend towards convergence. Between 1986 and 1996 the four poorest countries of the EU - Greece, Portugal, Spain and Ireland succeeded in raising their per capita income from two-thirds to three-quarters of the Community average. The most striking advance is that of Ireland where GDP has increased from 64% in 1986 to 80% in 1993 to 90% in 1995. Overall, however, disparity remains unchanged with the small improvements in the less favoured regions being mirrored by slight progression of the most prosperous countries. Unemployment is still a major problem within the Union with an average in 1994 of 11.3% compared with 6.1% in the United States and 2.9% in Japan. Economic commentators have noted the trend for economic growth to no longer be related to drops in unemployment. On the contrary, in countries such as Ireland the economic activity is in areas of low employment potential. In addressing the need to create a cohesive community the EU has since 1970 set aside a European Regional Development Fund (ERDF) and has enlarged that budget progressively ever since. The Maastricht Treaty prioritised social cohesion alongside monetary union. The cohesion policy is referred to as "structural" policy because there is a firm commitment to redressing imbalances through addressing the economic and social factors that create them. The aim is not just to give financial support to the poorer regions but also to give them the assets to support their development.

In financial terms, in the period just coming to an end the Cohesion fund stood at ECU 170 billion for 1993 - 1999. This is a very small sum spread over the time period and between all the needs. It implies clearly that the centre plays only a supporting

role in resourcing social and economic programmes. The Member States at national level have to find much of the required funding from their own internal budgets.

An attempt has been made to summarise the impact European assistance has had or is having, in an ongoing manner. The report particularly emphasises job creation and basic infrastructure. In the former, in the period between 1989 and 1993, it is claimed Structural funds preserved or created some 2.2million jobs and, in the latter, co-financed over 17,000km of road. Important to this study in the same period, Structural Funds have supported a 100% increase in digitisation of the telephone network in Ireland and correspondingly 80% in Greece, 75% in Portugal and 65% in Spain. In qualitative terms the Structural Assistance is also seen as having contributed to the construction of bridges or information networks and to an extent to Research and Development. The latter is of course funded separately under the R&D Policy initiatives. Use of structural funds within the regions is seen as a means of preventing an increase in technology at the centre and 'haves' and 'have-nots'. In network policy, cohesion touches on issues of liberalisation and provision of a Universal Service. These are important issues particularly in rural areas and will be discussed at the end of this section, as they are direct indicators of the need for this study and the need for a baseline against which these initiatives may be measured.

3.5 Rural Development in Northern Ireland.

In Northern Ireland planning has a strong urban bias (Murray & Greer, 1992). Between the sixties and eighties there was a policy of 'demagnetising' the Belfast conurbation by expanding other larger towns as 'holding points' to absorb out migration from rural areas. Significant change in rural policy can be traced first to Maher, (Maher Report, 1986), as a position paper response to the European

Parliament, and then to the subsequent designation of Northern Ireland as an Objective 1 region within the European Community under the Structural Fund reorganisation of 1989-1993. Following this, a high-level inter-departmental committee on rural development was formed and reported their findings in 1990. The main points were:

- The Department of Agriculture should become the lead department for rural development;

- An independent Rural Development Council should be established and be charged with the responsibility for activating a community-led approach to local regeneration;

- Small team of local co-ordinators should be appointed from across the public sector to bring together the responses from all agencies to plans and projects located in deprived rural areas.

Progress against this agenda has been considerable. Across Northern Ireland some 450 rural community development associations are currently active.

Northern Ireland in common with all of Ireland has a particular mix of small farmers and those who reside in the country, are not farmers, but have strong family ties and an equally strong sense of place. Orthodox planning policy has not had a good fit in Northern Ireland in a situation exacerbated by the lack of involvement of elected representatives in planning which has prevailed since the collapse of the Sunningdale agreement in 1973. More recently in 1993 the Department of the Environment responded to this situation with a progressive report, A Planning Strategy for Rural Northern Ireland (1993). The area defined as rural for the purposes of this report has a population of 950,000 or 60 % of the region as a whole. Returning to the work of

Murray and Greer, they conclude there are three key issues to be addressed in Northern Ireland Rural Development: the nature of local development programmes; reducing the implementation gap and training in rural development. Murray and Greer do not highlight the role of technology in addressing these issues. The use of technology or more correctly ICT tends to be implicit rather than identified as an explicit factor.

3.6 Towards an Inclusive Telecommunications Infrastructure.

The Information Society is dependent on the provision of adequate infrastructure throughout the community. As has been mentioned in Chapter 2, there was considerable investment in the 1980's on the physical telecommunications infrastructure. Service provision however has been more fraught and trends reflect the overall dichotomy of the competitive market led approach to selling the service and the recognition at a civic level of the need for inclusivity and equality of access.

Liberalisation of telecommunications was completed throughout the Member States by January 1998. Creating this competitive environment has led to a break in the perceived relationship between State and monopoly provider and the concept of a universal service available to all citizens at the same price irrespective of location or financial circumstances. This problem is common to the United States of America as well as to the EU particularly in relation to sparsely populated rural areas, and in both jurisdictions has led to a great deal of discussion. Various principles have been identified as underpinning universal service. These can be summarised as ensuring access for all citizens and assisting those who cannot afford to pay the cost of service provision at market prices, serving as a social mechanism rather than a commercial one or one connected directly with driving the Information Society forward. Provision of service to business is outside the remit of Universal Service. Basically Universal

Service is about providing a service where being without it would constitute a social or economic disadvantage. Initially Universal Service has been thought of as basic telephony but it is reasonable to expect that that definition will be expanded to encompass more fully the extended nature of information and communications technologies. These issues cannot be separated either from the discussion of The Knowledge Society or from the discussion of Rural Development. In parallel with any of these developments serious research must be devoted to determining new ways of adequately assessing positions relative to transition into the Knowledge Society. Kasvio notes that to date, developments have been discussed in terms of 'anecdotal' evidence. However, the information society must be understood as a qualitative new stage in development and studied accordingly, (Kasvio, 1997). The work of this thesis is perhaps a small step in that direction.

3.7 Evaluating Progress.

Much of this chapter has been devoted to future rural policy directions. In the context of this thesis it is also appropriate to consider the evaluation of the current round of activity. Two major investment programmes have been the Local Urban and Rural Development Operational Programme funded from the European Social Fund (ESF) and the LEADER programme. Both have been judged successful but the reviews of both also indicate areas for further development relevant to this research.

ESF & the Local Urban Rural Development Operational Programme (1999)

The stated aim of this report is, to describe and position the range of European and Social Fund (ESF) supported activities undertaken through the Operational Programme for Local Urban and Rural Development, and to assess the effectiveness of that activity and associated expenditure towards realisation of the programme's principal aims and objectives. The primary research was undertaken in the Republic

of Ireland and focused on all Enterprise Boards (35), all Partnership Companies (38) and funded Community Groups (33). Within the ESF study local development is defined as "the collective effort of a community to improve local economic, social and environmental conditions". The methods of data gathering used are questionnaire backed by case study interview. There is a close correspondence with both the subjects of the ESF study, the general ethos and the approach taken within this thesis. In the ESF study the authors accept that local development is subject to a multiplicity of external factors and that by definition a bottom-up approach throws up a tremendous variety of activities and outcomes. It is accepted that local activity has critical local outcomes but the prevailing argument is that the purpose of the funding of is to develop best practice through which a demonstrator effect can be realised. In order for the maximum benefit to the wider community to be achieved there must be clearly defined lines of communication that facilitate mainstreaming upwards and a body of objective supportive evidence gathered. Critical components are said to be:

- Coherent, collected and collated evidence of the efficacy of actions undertaken;

- Translation of the lessons learned into a form that is intelligible to the mainstream;

- Establishment of fora and receivers in mainstream to take on board messages from bottom-up activity;

- A continued emphasis on the strategic approach within a strategic framework.

Factors identified as missing are:

- Systematic routes for agencies to influence policy;

- Consensual statements on best practice broadly and objectively tested;

- Objectively verifiable data across a number of sites through which similar interventions have been tried and tested;

- Clarity of the activity engaged in by local development agencies;

- An overarching system to ensure added value of local development action.

Barriers to change are identified as attitudinal at the individual level and inflexibility at the organisational level. Potential linearity and commonality need to be managed with performance monitoring systems and indicators linking what happens at the local level with qualitative and quantitative data and contributing to regional coherence.

The conclusions are:

- That there is a need to learn from experimentalism;

- That any full evaluation of impact would require a set of reliable data over time both quantitative and qualitative;

- That success should be assessed not only in jobs created or grants issued but also in the creation of an 'enterprise culture' and added value sustainability.

Mainstreaming has to be predicated by communication. One of the successes of the LEADER initiative documented next has been the creation of fertile networks. The three specific conclusions of the ESF report are that: Local development is based on multiple factors, subject to multiple influences and will of necessity result in varied outcomes. Different applications in different regions will be similar but not the same. Funding local experiments will not have an optimum effect unless more can be captured than anecdotal vignettes of good practice. As the researchers in the ESF Evaluation study point out it is not possible to effectively evaluate or validate the substantial activity occurring across the board because there are no data or systems in place to make this possible. No one doubts the value of the 1994 – 1999 spend at local

level but again as the ESF Evaluation points out there has been a lost opportunity for defining the broad added value of local development agencies and a lost opportunity to construct a systematic approach to influencing mainstream policy, (ESF, 1999)

A Review of LEADER – Towards a New Initiative for Rural Development (1998)

One of the most successful and innovative initiatives of the 1994 – 1999 period has been the LEADER programme. Fermanagh Local Action Group was part of the study population. It is widely expected that there will be a LEADER III programme between 1999 – 2006. Recently over 800 managers of LEADER programmes gathered with members of the European Commission to review outcomes to date and suggest the manner in which the new initiative might be developed. Opening the symposium Commissioner Franz Fischler recalled the persistent state of economic weakness of most rural areas. He said that we can only have lasting development of rural areas if we succeed in mobilising the population on the ground. Use of local resources, participation of the local population, encouragement of private initiatives and strengthening of local partnership are the conditions needed for success. The Commissioner emphasised that it is precisely because we are at this stage of working towards a new approach to rural development and agriculture per se that we need a new kind of policy and the possibility of trying out new ideas and experimenting. LEADER II has been based on a laboratory basis and it is recommended that this approach should be retained. However caution is urged and here one sees an immediate overlap with the national ESF findings documented above. It is important that whilst retaining the laboratory approach that we do not repeat experiments again and again in different places but rather that we learn from our collective experience. Many LEADER groups report that they have found themselves operating in an

institutional, administrative, financial and legislative context that is ill prepared for such an approach. Difficulties highlighted include the intractable mentality of rural people, insufficient readiness of development actors, the sometimes negative role of local institutions, a lack of resources amongst beneficiaries and structural deficiencies. The future of rural development continues to be based on subsidiarity. People at all relevant levels must be enabled to play their part. Key words are transparency and efficacy of procedures. Too often a gap can be seen between the way national and regional authorities work and the local dynamic. The principles of LEADER are reaffirmed as bottom-up creation of local partnerships, global grant managed locally, integrated development, intangible investment, and transfer of experience. A clearer division of responsibility has been called for along with a more coherent working model based in relevant territorial level and within an integrated approach to the territory. The new Community Initiative should enable 'pools of expertise' to be created at the service of several areas to solve the transversal and specific problems and contribute to an increase in added value of available resources. Successful elements of the LEADER experience should become integral parts of the mainstream of rural and structural fund policy. The mainstream needs more local animation and participation, local analysis and modern planning, an integrated and multi-sectoral approach, emphasis on soft infrastructures and more networking of experiences. There is a continuing need to develop the partnership concept: vertical between levels of governance; horizontal between investment and development agencies; diagonal, mixed vertical and horizontal supporting regional planning and local; area-based and representing a plurality of the economy.

3.8 Summary.

The EU is a rural area and as such is facing many changes as we approach the new millennium. Not least amongst these changes is the shift from the land as a basis for market led agricultural activity to rural regions as areas providing a range of inputs to the economy across a number of sectors. Keeping rural areas alive and preserving their identity is a major challenge facing the EU as a whole. Rural people, as a rule, already have a strong sense of community and social cohesion and a great desire to develop their area. The region that this study focuses on is typical of many rural areas. It exhibits all the symptoms of rurality but also all the positive aspects of community entrepreneurship and a 'self help' culture. The way forward has to centre on creation of jobs outside agriculture and on an improved infrastructure. The bottom-up approach that has become prevalent over the last period must be supported by adequate access to information and to resources that facilitate decision-making. The future must be inclusive and thought must be given to expansion of the basic Universal Service. Alongside, there must also be creation of tools and techniques to allow measurement of the transition stage of any region into the new society and identification of ways of addressing disparity between regions. There is a need to understand both current policy proposals and their potential to effect change and transition in of rural regions. Agenda 2000 highlights the potential of ICT to underpin a cohesive and inclusive society with a higher quality of life and looks to the Information Society as the vehicle for change. In addition the structural policy measures are aimed at regenerating rural and declining areas and tackling the disparity of less favoured regions. A positive view is taken of the assets of rural regions and concentration is on giving support for development. Provision of a universal service is presented as a social mechanism tied to the European model of democracy and

technological enfranchisement. Key points from ESF and LEADER evaluation inform the research aims of this study. These are that:

- There is a need for lessons learned at the local level to be fed back to the policy arena;

- That a systematic approach must be taken in planning, implementing, and evaluating action;

- That verifiable quantitative and qualitative data should be collected;

- That cultural change and long term sustainability should be measured.

Chapter 4: The Nature of Community Informatics.

Those who cannot remember the past are condemned to repeat it.

Santayama

4.1 Key Points.

- **Information Systems (IS), as a discipline, is based on General Systems Theory and the concept of an 'open' system influenced by and influencing the external environment.**

- **Initial work in IS was, of necessity, focused on functionality and design from scientific principles such as reductionism.**

- **Major changes in technology and growth in demand for IS led to consideration of human factors and usability.**

- **The current development of community informatics demands a further widening of the definition of IS to include the environment of use and supporting infrastructure.**

- **There are lessons to be translated from the private sector to the public/community sector.**

The objective of this chapter is to place community informatics in the context of information systems development by:

1. Outlining systems theory;

2. Considering the nature of data, information and knowledge;

3. Outlining the development of the information systems discipline;

4. Discussing the concept of group support systems (GSS) and computer supported co-operative work (CSCW);

5. Discussing the components of a community decision support system.

4.2 Systems Theory.

The idea of a system is fundamental to all aspects of our life. A system is anything formed of parts placed together or adjusted into a regular and connected whole. Systems relate to each other and they themselves consist of sub-systems. A system

will have a set of inputs, a set of processes that affect these inputs and a set of outputs resulting from these processes. Systems serve a purpose and their elements interact in the fulfilment of that purpose. Systems exist within their environment and therefore we can define a boundary of a system, marking that which is inside the system and that which is outside the system.

General Systems Theory provides a framework of understanding of the interaction of systems as multi-faceted and complex. Bertalanffy establishes key concepts in systems theory that have been adopted in the arena of information systems (Bertalanffy, 1968). This is further developed by Peter Checkland in his seminal work, 'Systems Thinking, Systems Practice', where he seeks to impose some of the more 'fuzzy' organisational theory on to the design of information systems on the basis that these systems are addressing problems that are not well defined (Checkland, 1981).

One of the strongest tenets of systems theory that has influenced much of the development of the discipline of information systems has been reductionism based on Aristotelian principle that 'the whole is greater than the sum of the parts'. Thus to understand the complex whole one approach is to break it down into smaller more easily understood parts, confident that this division is not detrimental to the overall picture. The latter understanding is the principle of much of scientific enquiry. Many of the common approaches to systems development are built around this theme and, having 'ring fenced' a system, concentrate on identifying attributes etc. of the constituent parts and modelling their interrelationship. Given that information systems concern people and as such are human activity systems, care needs to be exercised

both at the level of the uniqueness of the response of the individual and at the need to see the whole, i.e. the widest possible context for the information system in question.

The final aspect of the work of system theorists that must be highlighted is the differentiation between 'open' and 'closed' systems. The latter by definition are self-contained while the former are continually affected by and affecting the systems with which they interface. Information systems by their nature are accepted as 'open' systems. They are not self-contained and rely on interaction between the system and its environment. Consequently there is a need for an awareness of that which is beyond the boundaries and external to the system. Information systems exchange information with their environment and influence and are influenced by it. By definition community information systems therefore are highly interactive, responsive and open systems.

4.3 Information Systems.

A further necessary consideration is the nature of information and its importance to society. To do this in this section the difference between data, information and knowledge is revisited.

Data are facts, numerical, pictorial, etc. that may or may not be useful for a particular task. In our daily lives we are bombarded by data, by the media, and by those around us. We can never hope to assimilate all the data we are presented with and so we rely on our powers of selection to filter out that which is meaningful in a particular situation and that which is not. Information is essentially data that has been processed - filtered, summarised and arranged appropriate to a particular task.

Knowledge is more complex and involves the combination of instincts, tacit understanding, ideas, rules and procedures allied to human judgement, Knowledge, information and data are inextricably linked in that people act based on information and knowledge in any situation. Knowledge draws on memory and actions and results feed into the process of deepening knowledge. This in turn increases the ability to assimilate more data into information to continue to feed the cycle.

Information has a number of special attributes that determine its value. Usefulness is dependent on quality, accessibility and presentation. In reality what is information to one person is garbage to another. Informal and formal information both have value. We have all learned that too much information is as bad as, or worse than, too little.

In an Information Society the question of ownership is an issue. In Chapters 1 and 2 the concept of a Knowledge Economy and of the Information Society have been considered. Undoubtedly, in this age information has become a commodity subject to market forces just as is any other commodity. Information is now part of the third sector of employment and as part of our economy has acquired new value. Fifty years ago people spoke of knowledge and wisdom as values giving one the ability to understand, predict, plan and assess. The concept of information now turns these social and contextual skills into a commodity possessing not only a use value but also an exchange value.

The conflict between a market driven economy and social equality is encapsulated in the access to information. Does it lessen disadvantage or increase the divide? Information is power and the unequal distribution of information or the access to it

creates an unequal distribution of power. The competitive society not only condones this but also applauds it, accepting that the benefits of technology accrue to those who invest in it. The question of equality also brings up the question of normality. Economies of scale to superficially satisfy a mass market may appear to address equality of opportunity but in fact, may establish norms that exclude. Individuals with special needs may be excluded because meeting their needs requires additional investment. Special needs should not be interpreted merely in the narrow definition of physical disability. In fact there may be hidden exclusion factors in a mismatch between different 'actors' or 'stakeholders' concept of reality.

The concept of information systems is also one that predates the use of computers. There have always been information systems in society. Initially these were informal systems of ideas, conversation and communication. The computer offers the advantages of speed, the ability to handle large volumes and assured accuracy. Computerisation can best be seen as a production line on which the computer processes raw data or facts and the results presented as information. The key to understanding the process is consideration of the 'added value' of the data transformed into information by the computer, and personalised to a particular task. This of course introduces the idea of the user, of the environment of use and of the need to plan the process to ensure the best interaction of the user and environment. Thus we arrive at the birth of the Information Systems discipline and the associated tasks of information systems analysis and design.

4.4 Philosophical Underpinning.

Mention has already been made of the base theory of systems and reductionism. Reductionism reflects an objectivist view of reality. Physical scientists would argue

that reality is definable. As with elements of the Periodic Table for example, definitions are limited by knowledge to date but exist to be discovered. Every aspect of reality has a unique definition and understanding is dependent on the accuracy of our knowledge of this definition. Translated to the world of information systems, this therefore means that if we draw a circle around a section of reality as the focus of a system, then to understand that section of reality, we must strive to identify each and every element therein and to derive its unique definition to the greatest level of detail possible to us. Or expressed slightly differently: every system is made up of a series of interrelated objects and the task of analysis is to rigorously define those objects and model their interaction with each other. Looking at the chronology of systems development this standpoint is pervasive with several decades devoted to the production of better and better 'tools' and 'techniques' for analysis, design and specification of information systems. Objectivism is reflected in the designation of computing as a science or as a branch of the engineering discipline. Objectivism also underpins the development of information systems methodologies following the principles of functional decomposition and a 'top down' approach or step-wise refinement.

Avison and Fitzgerald provide an excellent treatment of the chronology of systems methodologies (Avison & Fitzgerald, 1992). While most were proprietorial, many of the techniques used were common and based on the modelling of the system as a series of interrelated objects. However, despite the use of these methodologies many poor and unsatisfactory systems were developed and, by the 1980's, there was a growing realisation that objectivism addressed functionality but did not guarantee usability.

Usability was defined in terms of user satisfaction and learnability and user participation. In less technical terms the introduction of information systems and technology affected work practice and, while a system might be technically proficient, if it did not satisfy the user it would neither be used or successful. The traditional approach of predictive systems analysis failed because it failed to evolve systems at the same pace or time as the user's ability to understand or exploit them. The specialist designing for the user closed off many options before the user had fully grasped the implications.

The search for usability turned the information systems discipline towards 'People Centred Systems Design' (O'Dubhchair, 1989) drawing on the base concepts of the social sciences and nominalism. Nominalism starts from the premise that, in any situation there are many perspectives and that the objectives for a system will change depending on the perspective and viewpoint taken. Reality is multi-definitional, each definition arising from influences, cultural, educational, social and physical. Accordingly systems methodologies must accommodate multiple views of the one system and gain perspectives on multiple objectives. (Wilson,1984) gives an analogy that exemplifies the point. He considers two problems. The first is having a flat tyre. The problem is definite, the solution clear. The second is 'What should the U.K. Government do about N. Ireland?' When Wilson was writing, the solution was unclear and there were many interested but conflicting parties. Wilson suggests that methodologies suitable for 'burst tyre' problems are by definition unsuitable for 'organisational, N. Ireland' type of problems. Socio-technical methodologies embrace

the duality of information systems implemented through technology but embedded in organisational settings.

4.5 Group Support Systems.

Community informatics concerns the design and development of systems for use in the community and particularly in the group or collective setting. By definition therefore there are multiple users of community information systems and a real need to adopt a socio-technical approach. Community informatics is in fact the application of computing to the discipline of group theory with the objective of reducing process costs.

The beginnings of Group Support Systems research can be traced back to the 1970's and concerned 'same place, same time' communication. In the 1980's and early 1990's this was taken forward into consideration of computer supported co-operative work (CSCW), progressively time and distance independent. Results of research show the benefits of computer support and an automated environment. These fall into three main categories:

- The idea that technologically enhanced systems improve group task performance and reduce 'process losses';
- The idea that computers increase the range an depth of information available an d the speed with which it can be accessed and presented;
- The idea that groups using electronically enhanced communications systems can transcend time and space constraints;

In terms of community partnerships these can offer:

- A means of overcoming ignorance and confusion through information;
- Neutral space;

- A medium through which all voices can be heard;

- An environment in which the information resource can be matched to the task at hand.

4.6 Information and Communication Technology.

But what of ICT and it's relationship to information systems? We started from the premise that information and systems have always been a part of our society and our communications patterns. ICT is a relatively new phenomenon and one that is growing exponentially in its penetration of society. In doing so it evokes both positive and negative responses from commentators. ICT affects every aspect of our lives and every sector of society. Like the mass adoption of any other technology e.g. television, it is bound to change the way we live and work. Much of the change is seen as improvement and we have already documented the most popular characteristics of computerisation - speed, accuracy, volume etc. However, society must also reflect on the side effects of such change. Rifkin argued that the clock and the subsequent changes to our notion of time and space led to tremendously adverse effects in the quality of life in the United States (Rifkin, 1987). Similarly in the early days of the telephone sceptics who said that there was simply not enough skilled labour available to man the exchanges mocked an enthusiast who foresaw a world-wide network. Automatic exchanges were introduced and the problem was overcome. It is unlikely that the advance of technology will be limited by lack of human expertise or specialism. The lack of computer or information technologists that we are seeing currently can not be allowed to inhibit the spread of the technology. Rather the onus is on the profession to deliver mechanisms that ease the interface between the technology and the user and facilitate what has been called a 'self drive' culture.

Information systems use ICT to capture, transmit, store, retrieve, manipulate or display information. ICT is the hardware and software that makes information systems possible. The success and viability of an information system is therefore dependent on the ICT underpinning it. With the advent of the microcomputer and personal workstation the use of ICT to support generic application packages has become commonplace. These artefacts together form information systems when used in specific application areas or by specific groups of users. The focus on ICT in this study is therefore a focus on a component of an information system supporting a process or processes. The phases of computing have been dramatic. It is beyond the scope of this work to do more than review the changes that have taken place over the last fifty years. The following diagram adapted from the work of Daniel Atkin (Atkin, 1999), University of Michigan captures the extent of development and the unpredictability of the future.

THE PHASES OF 'COMPUTING'

1950's	1960's	1970's	1980's	1990's	2000's
Batch Mainframes		Time-shared Mainframes			
		Mini computers			
		IC embedded computing			
			Personal Computing		
			LAN's and WAN's		
			Distributed computing		
				Ubiquitous computing	
			Global Collab. Environment		

WWW Explosion   * Knowledge Networks
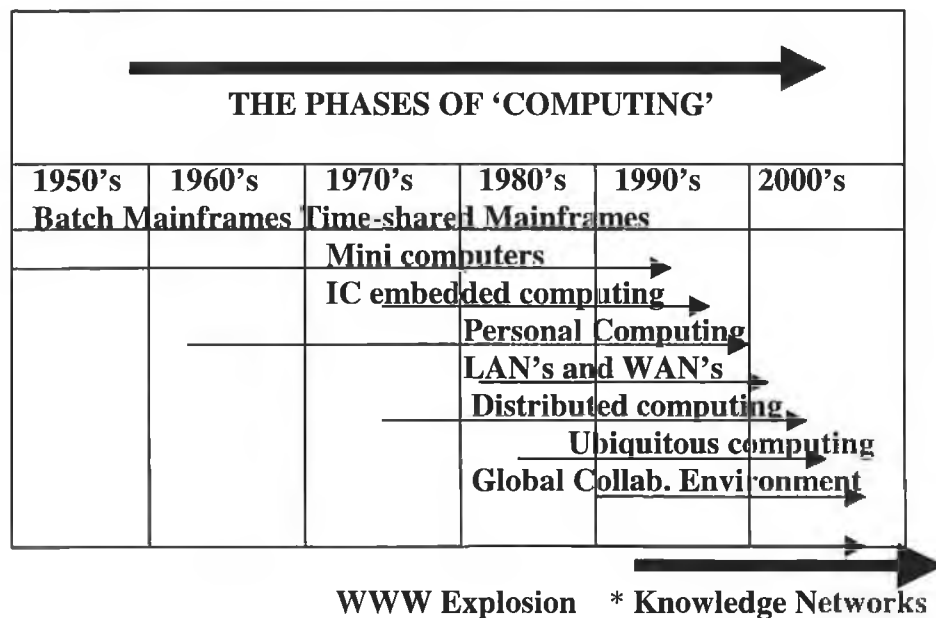
Figure 3 The Phases of Computing.

Today we think of global networks and of Vice President Gore's dream of An Information Super Highway. Use of such facilities as 'e-mail' are now considered

commonplace. On the world stage we see the rapidly advancing world of the INTERNET and World Wide Web. All these advances are again widening the environment in which information systems are operative and the diversity of ways in which technology can support everyday life. While this is of course to be welcomed it reinforces the need for reflection on the effect on society, the subject of this thesis. Information and Communications Technologies (ICT) has been coined as a composite term to cover the full range of underpinning hardware and software supporting the processes of using information systems. Throughout thesis this broader term is used in place of information technology.

4.7 Summary.

In this chapter the reader has been given a feel for the manner in which information systems have evolved over the years and the preponderance of the objectivist approach. Despite the debate moving on, many methods and techniques still rely on formal problem solving, (Bodker & Greenbaum, 1993). 'Hard' systems design is characterised by engineering a solution, searching for a means to an end. 'Soft' systems design is concerned with clarifying the means as well as the end. Conceptual rather than mathematical modelling is used and human activity is not considered to be straightforwardly systematic. Community Informatics demands a shift from the view of an information system a commodity production line, (Bodker & Greenbaum, 1993), to a fuller picture of a multi-purpose information system where the technological infrastructure facilitates, access and interpretation by differing groups or individuals. In other words public information systems, and their delivery through information and communications technology, are social constructs particular to those who use them. The fieldwork of this study works out from eight key agencies or organisations. These satisfy the criteria outlined for a system, each of itself being a sub-system contributing

to the overall process of regional development. The main components of this system are the people of the community, knowledge both tacit and universal and the supporting ICT.

Understanding the interaction of these components will allow articulation of a set of requirements for future development and a model for evaluation of progress.

Chapter 5: Studying the Societal Impact of Information Technology.

If we are to achieve a richer culture, rich in contrasting value, we must recognise the whole gambit of human potentialities and so weave a less arbitrary social fabric, one in which each diverse gift will find a fitting place.

Margaret Mead

5.1   Key Points

- This thesis is based on the philosophical assumption that reality is subjective and multi-perspective.

- Community Informatics is the embedding of information technology in the community as a support system for knowledge generation.

- Community Informatics must be understood as a social process and as a group support system.

- IS research to date has focused on building the theory behind the technology with only limited study of implementation and that in the organisational setting.

- There is documented need for more empirical IS research.

- There is also a growing need to understand the social phenomenon of the adoption of IS into community life.

- Social construction offers an appropriate approach allowing study of the meanings given to ICT and the way an information system is redefined through negotiation and conflict resolution.

- Inductive research will allow the development of a theoretical model grounded in observation.

- This stance resonates with that of Grounded Community Development Research and lets the participants and data speak for themselves.

The objective of this chapter is to justify the research approach by:

1. Outlining subjectivism and it's application to Information Systems;

2. Reviewing existing impact studies of information technology;

3. Considering social construction as a research approach and reviewing work to date in this area;

4. Documenting the recognition of the need for work such as this in Information Systems.

5. Highlighting the parallels with Grounded Community Development Research.

5.2 Subjectivity.

Epistemology refers to the underlying assumptions made about knowledge and how it can be obtained (Hirscheim, 1985). The methods employed in this thesis are based on the epistemological assumption that reality is subjective. Therefore the study of development must emphasise the perspectives of stakeholders and there is value in reflecting the plurality of goals, interpretations and interests of those involved in the process. New applications of technology should be seen as developments of permanent support systems that become part of the life of the organisation or community. There is a need to engage with the interaction between technology adoption and the social context in which it is embedded. This requires a critical evaluation of the boundaries between social and technical artefacts and a willingness to consider issues of difference, conflict, empowerment and dis-empowerment. Traditionally empirical research in the field of information systems has reflected a narrow paradigm and assumed away much of the richness and complexity of information systems implementation. Technology must be understood as the result of social process. The literature shows that research methods are in fact variously classified: subjective versus objective; nomenthic (focused on the discovery of general laws) versus idiographic (focused on the unique characteristics of a particular situation); taking an etic (outsider) versus an emic (insider perspective).

5.3 Review of Studies of the Impact of Technology.

Early commentators assumed the spread of information technology and computerisation necessarily to be a 'good thing'. In doing so they were in fact equating greater automation with change and change with progress. In their enthusiasm for something very novel and very powerful there would seem to have been a tendency to revert back to the sociology of the nineteenth and early twentieth century. Presenting information technology as a panacea for all ills, so vital to societies that it actually determines a society's future, structure and culture is termed technological determinism. Elements of the concept date back to the work of William Ogburn (Ogburn, 1950). Although the thinking of Ogburn has in the main, become simply of historical note, it is interesting that he maintained that change occurs first in material culture and that non-material culture always lags behind in terms of change in values, ideas and norms. Although the 'cultural lag' theory is perhaps not widely heralded now in sociological change it certainly resonates with the acceptance of information as a commodity. The potential of ICT to contribute to economic growth predates concern about the exacerbation by ICT of inequality and social exclusion.

However, the chief weakness of technological determinism is the assumption that there is a direct relationship between technological innovation and change. Change does not occur in isolation, it rarely has one cause and so it must be understood in the context of social phenomena. Markus and Robey noted that little evidence from early studies was gathered to support technology as deterministic or as a causal factor (Markus & Robey, 1988).

5.4 Social Construction.

Social construction refers to the process that embeds social meaning in an object under study. Social Construction works out from the object under study, extending the study from objective characteristics to include consideration of social networks and key actors in interaction with the object, history of meanings attached to the object and interests the key actors bring to their interactions. Knowledge is produced through social activities. Social construction explores the relationship between knowledge generation in any setting and the knowledge produced as a result. For a fuller treatment of the philosophical issue of the social construction of reality the seminal work of Berger and Luckman (Berger & Luckman, 1967) is recommended.

5.5 Technology as Social Construct.

Section 5.2 introduced the idea of the social shaping of technology. That is technology not defined solely as an object but in terms of human knowledge and social relations of use. In parallel to the works mentioned a number of studies have been undertaken testing the assumption that technology results in different outcomes depending on use, interpretation and implementation. Researchers such as (Bijker, 1987), (Dean, 1992), (Young, 1992) and (Zammuto & O'Connor, 1992) investigated the consequences of 'hard' technologies against the tenets of social constructivism. The term 'social construction of technology' (SCOT) is attributed to Bijker and describes a theoretical approach to studying the meaning of technology and how those meanings affect the implementation of technology within an organisation (Bijker, 1987). The emphasis is placed on the user's interpretations of technology although SCOT also considers the material properties of the technology. Technology is treated as part of a system made up of users, technical artefacts and the surrounding environment. Bijker advocates study of the technical, social, economic and political aspects of technology. SCOT draws on earlier work in the scientific field (Collins, 1983) who devised the empirical

program on relativism (EPOR). Collins carried out several studies that examined the social construction of scientific knowledge in the hard sciences. The social construction of technology uses the three themes of EPOR: Identification of 'Relevant Social Groups' - those who interact with the technology; 'Interpretative flexibility' - analysis of the differences in meaning that social groups give the technology; 'Closure' - the shared understanding or acceptance of a solution within a group.

5.6 The Social Construction of Information Technology.

The relationship between data, information and knowledge has already been discussed and the fact that 'information systems' is a young discipline highlighted. In terms of a theoretical base for the discipline it would be fair to say that computer scientists have concentrated on building the body of knowledge that underpins the technology rather than its implementation. Avison & Fitzgerald emphasise the need for more empirical research and there is now a growing body of empirical survey research based on data collection and analysis(Avison & Fitzgerald, 1992) An in-depth look at the different methods being employed in information systems research is given by (Galliers,1992), (Mumford, 1985) and (Nissen, 1991).

There is a need for more qualitative study to allow understanding of information systems and to add to the theoretical base. Paralleling advances already documented in design strategies and in the development of the technology, there has been a growing recognition of the importance of organisational and human factors in implementation. A number of commentators have for the last decade advocated mixed levels of analysis e.g. (Kling and Scaachi, 1980), (Markus & Robey, 1988). Over the last two decades there have been a growing number of studies that give useful insights into the interaction between the organisational context and the process of technological

implementation. (Hirscheim, 1985) reviewing office automation found that up to 40 % could be classed as failures. (Barley, 1986) found that the introduction of scanner technology into two hospitals had entirely different effects because of the social context. Barley explained the differences as being because the scanners became social objects whose meanings were defined by the context of their use. (Willcock & Mark, 1989) studied implementation of an information system to several NHS regions in the United Kingdom and concluded that the design had entirely omitted to take into consideration the role of the clinicians and their power to resist. A number of other researchers have focused on studies of power and politics related to implementation, notably (Kling, 1980), (Kling & Scaachi, 1980). More recently other studies on office automation have painted a similar picture. Considerable work has also been done on gender and office information technology. For those interested in this aspect (Green, Owen & Pain, 1993), provides excellent coverage of the key findings. Two contributions to Gendered by Design of particular interest in the context of this work are to be found in a critical examination of technological change and office work based on research in the West Midlands, and a study of the 'word processor' as a technological artefact.

But as established in earlier chapters, information technology as part of an information system is also part of a knowledge generating system. As such, information technology implementation lends itself very favourably to study as 'social construction' in order that understanding of technological frames of meaning may be added to the understanding of the more objective characteristics. Applying this approach to information technology and information systems is a relatively new area of research. Munson who studied the implementation of information technology from

a social constructivist perspective, has carried out leading work to date in this area in a hospital setting (Munson, 1990). Orlikowski explored information technology and organisational control and the use of information technology for purposes other than that intended by the planners(Orlikwskil & Robey, 1991), (Orlikowski, 1991). (Walsham, 1993) and (Robey & Azevedo, 1994) similarly studied various cases in which information technology was implemented. Sahay built on these earlier works and proposed an empirical approach focused on the different technical and organisational problems encountered by groups associated with technology (Sahay, 1994,pp 251). Sahay says that the "Social construction of technology provides the orienting principles for studying how people in organisations construct the meanings of technology, and how technologies may be redefined through negotiations and conflicts between different groups as they interact with the technology". He goes on to propose that problems are studied "over points of alternation and variation where significant technological choices are made". He emphasises the need for rigor in application of both qualitative and quantitative methods in order that the outcomes may credibly contribute to the construction of theory and inform practice.

5.7 Empirical Methodologies in Information Systems Research.

As a response to the call for more empirical research in the information systems discipline there has been increasing activity over the last decade. Many of these studies have been undertaken in the business field and therefore much of the associated commentary is to be found in Business and Management or Management Science. One such commentary is provided by (Grover, 1998). Grover examines the use of 'survey' research methods in the information systems area and the need for scientific rigor. He attempts to bring together good survey practice and IS theory development. Grover says "the IS field has witnessed a proliferation of field-based

methodologies over the past 15 years. While diversity of methods is generally positive and indicates a maturing of the field, it is critical that the methods be appropriately implemented in order to obtain meaningful and valid results. Inability or unwillingness to do so could impede the production of knowledge or theory which is very dependent on techniques for analysing and interpreting data"(Grover, 1998, pp307). Grover provides a very recent review and many of the points are worthy of note. He comments that although survey research is relatively new to information systems it is well-rooted in basic methods established since the 1950's. Any research should be carried out in a systematic and programmatic fashion. He stresses the importance of validated instruments that are carefully pre-tested in the field to ensure that new research builds on prior knowledge. Grover cites (Straub,1989) as an excellent overview of a general methodology for empirical research in the field. Straub's overview includes establishing theoretical foundations, selecting an appropriate design and data collection method, properly implementing the study, and finally using correct data analysis techniques for interpreting the results. Grover goes on to detail two types of survey research, in doing so referring to (Kerlinger, 1986). The first is 'exploratory' and the objective is to become more familiar with the topic under consideration. This type of study is indispensable in studying a new phenomenon as it develops units that comprise theories. The second is 'explanatory' surveying. This research is aimed at finding causal relationships amongst variables. It does so from theory-based expectations on how and why variables should be related. Survey research contributes to theory development. Again Grover cites Kerlinger's definition of theory as a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of phenomena by specifying relationships among variables, with the purpose of explaining and predicting the phenomena.

Constructs are abstracts not directly measurable or observable. Therefore, theory tries to set out the pattern of relationships between constructs. Deductive research tests theory, or construct relationships based on hypotheses which are confirmed or refuted. Inductive research establishes patterns amongst variables and, from this evidence, derives theoretical statements. Grover notes the increasing espousal of inductive research on socio-technical systems. He himself supports a middle ground approach of symbiotic interaction between deductive and inductive and cites the work in this area of (McGrath, 1979) and (Babbie, 1989). Sahay also advocates inductive research on the social construction of information technology because of the relativist perspective. "Relativism regards human beings as active agents and their behaviour as equally indeterminate. Unlike well-known physical stimuli, information technology may evoke interpretations and produce social consequences that are unprecedented" (Sahay, 1994 pp251). Inductive methods allow theoretical models to be grounded in observation and they encourage novelty, testability and relevance in the research process, (Eisenhardt, 1989). Interestingly this approach is also being mirrored in Community Development Research, specifically the category now referred to as Grounded Community Development Research (Grounded CDR). Grounded CDR is an inductive paradigm that allows the investigation of social phenomena whilst making minimum assumptions as to the nature of attitudes, values and needs. (Ward,1998) argues in favour of Grounded CDR. He says that deductive research is centred on the researcher's assumptions as to which factors are to be investigated. These assumptions develop from a variety of sources or hunches, personal observation, previous research findings or whatever. On the other hand, Grounded CDR enters the picture as a research tool that allows the researcher to investigate a social issue. At the same time, the absolute bare minimum number of research

assumptions as to why, or how an event has occurred are made - be that event, attitudes, values, needs and/or community developments. Furthermore, Grounded CDR makes no assumptions about which issues are to be discerned from the mass of data. The method of analysis like the method of data collection works on inductive principles and lets participants and collected data speak for itself.

5.8 Summary.

This chapter has been presented in three parts. From the literature reviewed in the first part it is clear that qualitative research methods are appropriate for the study of community informatics. The literature on the subject has referenced the work of other researchers in the information systems field. Qualitative research is underpinned by the assumption that reality is subjective and individual perspectives are influenced by many factors.

The second part of this chapter turned specifically to work done to date on the study of technology and the application of these findings to the area of community informatics. The social construction of technology has been the subject of studies since the late 1980's and itself draws on work on the social construction of science. Social construction explores the relationship between knowledge generation and the knowledge produced as a result. Community informatics is predicated on the use of ICT as a permanent knowledge infrastructure structure. This thesis seeks to further develop work undertaken in organisational settings and suggest a theoretical model of the implementation of IS in the community setting.

Finally this chapter reviewed the case made for more empirical research on information systems. The recent summary given by Grover is referenced as marking a

shift between diametrical positions on appropriate methods to a middle ground permitting symbiotic interaction between deductive and inductive work and the use of mixed methods to draw a rich picture and encourage novelty. Additionally, given the setting of this work in the community, it may prove helpful to the wider research community that it overlaps with the techniques of Grounded Community Development Research.

SECTION 2: RESEARCH DESIGN AND METHODOLOGY

Introduction

From the literature it has been established that:

- **A community information system is open-ended and must be considered within the wider environment.**

- **That there is a need for empirical study of the socio-technical aspects of information systems.**

- **That new technologies are of particular importance to rural regions as they seek to make the transition from an agricultural base to a knowledge base.**

- **That New Governance is increasing the pressure on local communities to position themselves to plan strategically and make collective informed decisions.**

- **That there is therefore a need to understand the meanings and interpretations of technology at the local level.**

- **That this understanding will contribute to building a body of knowledge on community informatics.**

This section of the thesis provides detail of the research perspectives used in the study. Chapter 6 provides the reader with background socio-economic information on the study area. Reasons are given for the choice of this region as a basis for meaningful research. This is followed by a summary of the participating organisations. An overview is also given of the author's involvement in the region.

The second half of this chapter begins with a description of the research paradigm adopted. Indications of the background to socio-technical research given earlier are expanded upon. The epistemological basis of qualitative and quantitative research is

discussed and the use of both methods in tandem justified. The importance of triangulation is discussed, as is the choice of inductive research and humanistic enquiry. The study is set in context against the need for empirical research studies on information systems and the use of grounded research theory in community development. The use of mixed methods is justified. The chapter concludes with a statement of the research objectives.

Chapter 7 moves to discuss the implementation strategy of the research study. The constructs chosen for primary investigation are identified and the question of controls and sampling discussed. Data gathering methods are described followed by explanation of the data analysis approach used. Data reduction and categorisation follow the principles of grounded theory. Issues of validation, qualitative and quantitative, are described concluding with an overall summary of the research design and implementation.

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┌────────────────────────────┐
│ Socio-economic Profile     │
│                            │
│ Local and Community        │
│ Economic Development       │
└────────────────────────────┘
              │
              ▼
┌────────────────────────────┐
│ The Participating          │
│ Organisations              │
│                            │
└────────────────────────────┘
              │
              ▼
┌────────────────────────────┐
│ Frame of Reference         │
│ Research Paradigm          │
│ Detailed Research Questions│
│                            │
└────────────────────────────┘
              │
              ▼
┌────────────────────────────┐
│ Data Gathering and Analysis│
│   •  Interview             │
│   •  Documentation         │
│   •  Survey                │
│   •  Dual Scaling          │
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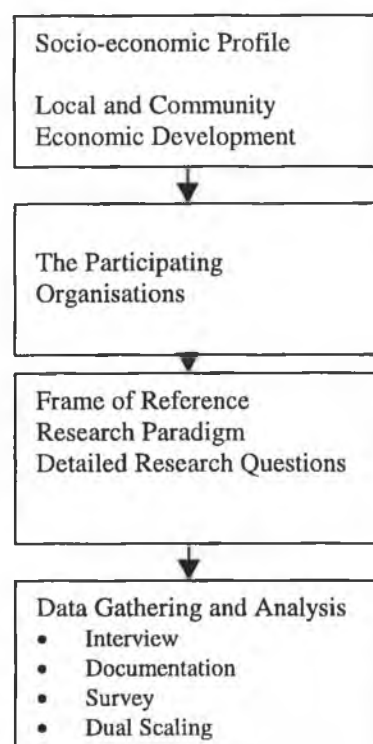
SECTION 2 - SCHEMATIC

Chapter 6:   The Research Focus

Sociology is a science concerning itself with the interpretative understanding of social action and thereby with a causal explanation of its cause and consequence.

Weber

6.1   Key Points

- **Fermanagh is a typical rural region, within Northern Ireland and within Europe.**

- **Through community development there is a strong social network and commitment to community economic development.**

- **The District Council have been proactive and taken the role of facilitating local economic development.**

- **There is considerable evidence of community informatics activity.**

- **Eight participants were chosen as representative of key stakeholders in regional development.**

- **The research paradigm is qualitative and inductive.**

- **The primary data collection method is 'open' interview.**

- **Evidence is triangulated through documentation and quantitative methods.**

With these points in mind the objectives of this chapter are:

6   to give the reader a good understanding of the nature of the study and of the participating groups;

7   to establish the frame of reference for this study;

8   to make the research paradigm explicit ;

9   to establish the justification for the research and the nature of the anticipated outcomes.

6.3   The Study Population

Two of the key objectives are to establish a contingency model of progress towards a knowledge based community and to attempt to provide some measure of that progress. It was therefore necessary to identify a community that was some way along the path and likely to exhibit characteristics of progress. Fermanagh was chosen and in this section a detailed socio-economic background is given followed by a vignette of the key organisations and the main participants.

Background

County Fermanagh is situated in the extreme west of Northern Ireland, 86 miles west of Belfast and 96 miles north west of Dublin, a 'border' county touching on five of the other 'border' counties. The region has many natural assets but also exhibits all the symptoms of rural peripherality. There are persistent problems caused by dependence on the rural economy and agriculture and exacerbated by events such as the BSE crisis. The county has a higher than average level of unemployment, with male long-term unemployment at 59% being an area of particular concern. The region has identified problems with skills mismatches and local industry such as the garment and textile industry, experience recruitment difficulties. Those of Fermanagh's young people who leave school with good qualifications avail of educational and employment opportunities outside of the County. Today Fermanagh has a growing population of 55,400, One hundred years ago it had a population of 150,000. Fermanagh is the sixth most deprived district in Northern Ireland and the third most deprived rural district. 62% of the population live in deprived rural wards. Fermanagh has the highest dependency ratio in Northern Ireland with high concentration of the young and the elderly. High levels of housing unfitness, a low

industrial base and rural depopulation erode the social and economic base of the region and give emphasis to the need to develop the indigenous industrial base. Economic activity in the County is low compared to the rest of Northern Ireland but is average for the south west region.

Fermanagh is part of the West Rural region comprised of the five District Council areas of Cookstown, Dungannon, Fermanagh, Omagh and Strabane. These Councils have chosen to speak with a 'collective' voice and to plan for the future at a regional level responding collectively to the Northern Ireland Strategy for Development, Shaping our Future, (1997) with a sub strategy for the West Rural Region: a strategy for people, partnership and prosperity. The region as a whole has been experiencing population growth although Fermanagh has had a slightly below average rate. The total population for the area was 232,000 in 1991 or approximately 14% of the total population of N.Ireland and a growth of some 15,000 is anticipated by the Year 2025. This is still paralleled by a high rate of net out-migration, mainly among the better qualified of the regional population. Both ends of this spectrum are problematic in that the increasing population is leading to a growing working age group, labour supply exceeding employment demand and a jobs shortfall situation that is predicted to continue in both the short and medium term. Equally out migration continually erodes the skills base and investment in human capital made by the region. The West Rural region would have to experience a growth in employment between 10% and 15% (1995 - 2000) simply to absorb the increased numbers in the communities. Higher than average dependency rations exacerbate the problem. The proportion of the population of the West Rural Region living in 'deprived wards' is well above the N. Ireland average. As one might expect a significant number of jobs have been lost to

the region with the declining agricultural scenario. The West Rural region accounts for 35% of all the farms of N. Ireland but 85% of those farms are in Less Favoured Areas. The region will certainly need to avail of the proposed rural development funding and agri-diversification proposals of Agenda 2000. Accounting in population for 14% and in land mass for 38% of all of Northern Ireland, the West Rural Region sees itself positioned to take advantage of the future. The vision outlined in the strategy document is one of enabled small business; increased demand for quality products based on small units of production; and new rural activities. The vision is underpinned by "the dramatic changes in information and communication technology. These enable distance and transport to be transcended, creating direct links between businesses, areas and distant markets; encourage businesses looking for space and a lower rent to locate in rural areas and help in developing teleworking, offering new possibilities to a rural society. The report particularly highlights the potential of harnessing new technology. "In this context we regard the locational advantages of the West Rural Region with its young, well educated labour market as being particularly attractive to the further expansion of new technology rich enterprises. In addition, the advances in information technology have shrunk the distances between the production centres and customers. The emphasis is increasingly on quality of the support infrastructure and workforce in a local territorial based employment strategy". Returning specifically to Fermanagh, the county has been fortunate in having a very proactive and forward looking local authority. Over a period in excess of twenty years this has led to the development of an enviable network of community organisations. Community Development has many definitions. Internationally, it has come to connote the processes by which the efforts of the people themselves are united with those of government to improve the economic, social and cultural conditions of

communities, to integrate these communities into the life of the nation, and to enable them to contribute fully to the national progress. Community action in Northern Ireland pre-dates 1969 although it is in the last two decades that community economic development has assumed the importance it has today. The present system of organisation dates from the Moyle Report in 1975 which looked to the local authorities as the natural support basis for community development. Under the Moyle report District Councils would:

- Assist community groups financially with general advice, expenses and other relevant expenditure, including the wages of staff employed by voluntary groups;

- Give advice and support to community groups to enable them to establish themselves and administer their affairs;

- Be able to employ a minimum of one Community Services Officer (CSO) and provide or encourage any necessary training for both CSOs and staff employed by the voluntary groups.

The reality post Moyle was that some local authorities saw the appointment of a CSO merely as a way to employ another recreation and leisure worker. Fermanagh District Council however devised an alternative structure to support delivery of its community services provision. The Council employed a full-time Community Services Officer, two Community Relations Officers and one Research Assistant, all responsible to the Principal Officer (Policy and Resources) who in turn reported to the Clerk and Chief Executive. Fermanagh's structure led to the development of an Integrated Community Development Programme for the county, encompassing community services, community development, rural development, local enterprise, economic development and community relations. It seems reasonable now to deduce that the farsighted vision of the then Chief Executive Officer in Fermanagh in no small way contributed

to the development of the ethos of self help within the County which is so evident today. There are now over 400 groups in the region, some 80 of which take an active role in community economic development.

Involvement of the local authorities in economic development is a relatively new phenomenon. Councils had some statutory responsibility for aspects of tourism etc. from 1980 but it was only the Local Government (Miscellaneous Provisions) (NI) Order 1992, Article 28(annex 1) that gave Councils the right to spend 2p in the pound on the rateable value of the district on economic development explicitly. Reflecting the importance placed by the European Union on local economic development, the Northern Ireland Single Programme (NISP), Measures 2 & 7 focused on training and economic development with £14,000,000 being allocated for distribution from Structural funds between 1994 - 1999, £7,000,000 in the current period 1997-99, with matched funding coming from the local council rates. Each council was asked to prepare an Action plan addressing: job creation; unemployment; sustainability; additionality; and complementarity in the context of local partnership. Additionally each council had the opportunity under SPARD, the Sub-Programme of the NISP dealing with agricultural and rural development to adopt an area-based strategy and to establish Area Based Strategy groups (ABSAGs) to focus on sub-regions of acute disadvantage.

Local Economic Development

In 1994 Fermanagh District Council carried out an extensive community consultation exercise as the basis for devising a Regional Economic Development Strategy. It is worth noting that Fermanagh was the only region not to employ consultants to develop the regional strategy. The consultation resulted in the county successfully

drawing down EU Structural Funds under the Local Economic Development Measure of the Single Programming Document, £1,210,000 over two years. Five key programmes of action were identified within the Fermanagh Economic Development Strategy:

- **Local Industry**

- **Peripherality**

- **Agricultural Diversification and Rural Development**

- **Education and Training**

- **Physical and Social Development**

Thirty-eight projects were identified and of these, four were designated with flagship status because of their perceived importance to the local economy. The strategy aimed overall to realise an investment of £65.2 million and create 2140 job opportunities and 3400 training opportunities. In parallel Fermanagh drew down £1.5 million EU Peace and Reconciliation Funding A strategy for this spend was generated by Fermanagh District Partnership Board, again after extensive consultation and complements the Economic Development Strategy by concentrating on the marginalised and disadvantaged and the social and community reconciliation needs of the County. The key thrust of this strategy were:

- **Community Development and Reconciliation;**

- **Economic Development and Employment Creation;**

- **Environmental Enhancement and Protection;**

- **Education and Training.**

In addition to these strategies Fermanagh adopted a policy of sectoral partnership based on the following sectoral working groups - Angling Enhancement Company,

Fermanagh Local Action Group, Fermanagh Tourism Marketing Consortium, Fermanagh Crafts Consortium, the Erne East Area Based Strategy Group, Irish Central Border Area Network, Western Regional Energy Network, Fermanagh University Partnership Board. As already mentioned four flagship projects were identified within the Regional Economic Development Strategy. These were so designated because it was felt the impact of their development would be felt horizontally across all themes and underpin the economic development of the region. One of these flagships was the Interactive Technology Project. This has since become known as the Higher Bridges Project. Fermanagh first invested in telecommunications through the EU Special Telecommunications Action for Remote Regions (STAR). The STAR programme in Fermanagh was a joint venture with the University of Ulster .In line with Council strategy a sectoral approach was taken to STAR making the project quite unique within the wider STAR programme (O'Dubhchair and McGinley, 1996).

Over the last decade telecommunications has become an important factor in Fermanagh's economy, supporting local industry, attracting new inward investment and supporting the delivery of training and higher education directly to the region.
The original Fermanagh STAR Centre has been enhanced and upgraded several times and has become the Interactive Technology Centre (INTEC) supporting training, consultancy and community economic development through the use of information and communications technologies. Advanced telecommunications is seen as an area of significant importance with the added value of sustainability and the Council seeks to promote this field and wider technological developments. Recognising this potential has led to the integration of INTEC into a larger partnership project called

Higher Bridges operationalising the work of the Fermanagh University Partnership Board. "Higher Bridges will play a part in the regeneration of many facets of community life in Fermanagh. From the desire of young people for a viable and credible future in their own place, to the needs of struggling small businesses, it will provide links to new roles, products, services and possibilities which will turn Fermanagh's problems into advantages, and realise the potential as an area for continued growth. The Centre will confront existing inward views and turn them outwards to enable the community to engage confidently in a wider world". (For more detail on the concept of university community partnership and on the Higher Bridges Project see (O'Dubhchair, 1997), (O'Dubhchair 1998).

Outside of NISP one of the major sources of additional revenue has been the European Union Special Programme for Peace and Reconciliation (SSPPR) that provided 300 MECU's to N. Ireland and the Border Counties to address economic and social disadvantage. As in NISP the main delivery mechanism has been at Council level through a District Partnership. In addition to SSPPR many Councils have leveraged LEADER I and II funds targeting development of rural areas, and in the Border Counties, INTERREG funding. It is worth noting that a recent report, commissioned by the umbrella organisation for Local Councils (SOLACE), found that in 1997-98 the Councils spent £11million pounds directly on economic development and £14 million pounds on the associated area of tourism, a total of 9% of total Council expenditure and the equivalent of the annual budget of the Local Economic Development Unit (LEDU). The same report points out that the 1990's have been the best decade for the NI economy since the 1960' and that future forecasts indicate a continued growth of 2.5 to 3%. However, again in line with the Delors

Report it is emphasised that future economic prosperity will depend on the ability to compete in the global marketplace. Changes closer to home in increased devolution to regional level, particularly with economic development one of the key activities of regional government offices will also effect the N. Ireland economy with greater competition for inward investment opportunities.

In the context of this research it is fitting to note that the report concludes with the comment that Local Economic Development, previously dependent on 'hard' physical infrastructure will, in the future, be as dependent or even more dependent on the 'soft' Human infrastructure of people connected via information and technology.

6.2   Choice of participants

This work has evolved from a ten year relationship with the region of Fermanagh and the author has used this knowledge to make a judgement about an appropriate cross section of organisations to represent the region. The key regional organisations that are related to external central government agencies are shown in the following figures. As this is a rural region both the Department of Economic Development (DED) and Department of Agriculture (DANI) are involved in support for development. The social network chosen for this investigation reflects these two avenues to and from Fermanagh as the wider environment of the region.

Eight organisations were selected as representative of the region and these became the subject of in depth research.

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│      Department of Agriculture        │
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Figure 5

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│  │ Fermanagh Business   │  │ Fermanagh Women's    ││
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Figure 6

Fermanagh District Council – Economic Development

The principal and overall facilitator of economic development within Fermanagh is the District Council. As documented elsewhere Fermanagh is unique in being both a county and a District Council.

The District Council now has a direct remit for economic development. As noted above in 1994 the District Council prepared a Regional Economic Development Strategy. To a large extent this was a response to the Single Programming Document (SPD), describing how European Structural Funds would be used in Northern Ireland over the years 1994 to 1999. In Northern Ireland there are three Structural Funds: The European Regional Development Fund; The European Social Fund and the European Agricultural Guidance and Guarantee Fund. It is worth noting that the Structural Fund is a specific fund to address the needs of Objective 1 regions and, as a fund that will not always be available, to be valued and used to affect change. The priorities of SPD are:

- Promoting economic development and competitiveness;
- Investment in communities and people;
- Reducing the effects of peripherality;
- Development of agriculture, fisheries and the rural economy;
- Protection and enhancement of the natural and built environment.

SPD is delivered as nine sectoral programmes with fifty measures.Fermanagh's Regional Economic Development Strategy identified twenty-seven of these measures as appropriate along with six out of thirteen available community initiatives. The Strategy states that " the primary objective of the strategy will be to reduce social and economic disadvantage in the county by promoting equity and equality of access

to sustainable employment and training opportunities". The strategy goes on to say this will be achieved by:

- initiating, co-ordinating and supporting programmes that will generate economic growth in the County across a broad range of investment opportunities;

- targeting economically and socially disadvantaged groups by facilitating equality of access to training / employment opportunities;

- continuing to work in partnership with the public, private and voluntary sectors and progress other partnership arrangements that lead to investment and development;

- complementing, sustaining and developing both new and existing local industries and businesses;

- pursuing and encouraging the development of the physical and technological infrastructure of the area;

- building a continuing local capacity in the community that will create and sustain innovation , change and development in the County.

Facilitating the subsequent Action Plan for the Council to a large extent falls under the remit of the Economic Development Officer. Fermanagh has chosen not to take on the job of the administration but rather to present as facilitating partnership and having a co-ordinational role in bringing people together. To this end the Council has created a range of sectoral groups and several of these are included in this study. The role of Economic Development Officer is described by the incumbent as being to develop and implement an economic strategy for the county. The Economic Development

officer was also chosen in recognition of her key role in interfacing with various sectoral partnerships such as the Craft Consortium and the Tourism Strategy Group.

Fermanagh District Council – Local Governance

Given the importance of the role played by the District Council it was felt that not only would **the Economic Development Officer** be a key participant but that **the Financial Director and IT Coordinator** should also be included as a separate participant. The meaning of information technology internal to the Council and the FDC IT strategy, would obviously have a bearing on technology actions external in the wider community. Additionally the role of the Council is a changing one as part of the implementation of Information Society policy relates to the creation of more open government and FDC is responding to Government initiatives in this area.

Fermanagh Enterprise Ltd

Fermanagh Enterprise Ltd. is an enterprise agency funded by the Local Economic Development Unit (LEDU), the European Regional Development Fund and Fermanagh District Council. It is the largest of seven such agencies in the County, is managed by a General Manager with a staff of ten and directed by a voluntary Board chaired by the Chief Executive of Fermanagh District Council. The aims and objectives of the agency are to promote economic development in Fermanagh within the small business sector. The General Manager describes Fermanagh enterprise as 'working at the micro level', providing support, advice, counselling and training to people wishing to explore the possibility of self-employment. Typically businesses created provide a job for the owner and one other. Where a business proves to have a greater capacity for employment than this it will become a LEDU client and move out

from the Enterprise agency umbrella. Fermanagh Enterprise manages workspace and is an access point for information and training. It also assists in the day to day running of some of the other smaller agencies throughout the County. The agency has recently become part of a consortium of Enterprise agencies in the LEDU western area: Omagh; Strabane; Dungannon; Cookstown; Cole Island and Fermanagh. **The General Manager of Fermanagh Enterprise** was chosen as a participant to represent the other enterprise agencies and also this level of economic development effort.

Fermanagh Business Initiative

Fermanagh Business Initiative (FBI) was established five years ago to provide a service to small business in the Fermanagh region. FBI is aimed specifically at stimulating innovation and inward investment in this sector that is typified by the small family manufacturing business. FBI is managed by a Director responsible to a voluntary Board. As an organisation it has undergone quite a number of changes over the last five years reflecting the increasing remits of LEDU and Fermanagh District Council particularly for inward investment. FBI has a dual role in both enhancing support for existing and budding enterprise through US and European Partnerships and spearheading sectoral initiatives. One such example of the latter has been the development of a strategy for the Food Processing industry in Fermanagh aimed at improving sustainable profitability and employability. Fermanagh Business Initiative is also currently involved in the delivery of the Technology Enterprise Programme, development of a regional economic decision support system (The SHOW ME Project) and carrying out a regional technology audit. **The Director of Fermanagh Business Initiative** was therefore considered a key participant.

Kinawley Interactive Technology Enterprise (KITE)

As explained earlier in this report, Fermanagh has a record of investment in telecommunications over the last ten years and had the first ISDN line installed in N. Ireland. One of the most innovatory outcomes of that development was the establishment of Northern Ireland's first telecottage at Kinawley in the extreme west of Fermanagh. KITE is now an established organisation offering both a commercial service and a community service. KITE is managed by four directors: a Managing Director; General Manager; Technical Director; and Operations Director. KITE has now been operational for four years and currently employs nineteen tele-workers. By 1999 it is expected that this figure will grow to thirty-five. In addition to being an example of successful technologically based economic development KITE is also extensively involved in training projects within the County. In the latter KITE is in partnership with Fermanagh College and the Aisling Centre. Together they have delivered basic IT training to over 800 people, particularly women between 1995 – 1997. KITE is an innovative project applauded outside of Fermanagh and is looked to by many as an exemplar. For this reason **the Managing Director of KITE** was identified as a participant.

Fermanagh Local action Group (FLAG)

Fermanagh Local Action Group is an amalgam of fourteen groups who have come together with a common aim of advancing the local rural development agenda. The overall aim of the group is to "generate sustainable economic and social development especially employment whilst ensuring the conservation and protection of the natural and built environment". FLAG has six stated objectives:

- To promote diversification of the rural economy as a complement to agriculture;

- To promote initiatives for the regeneration of the local rural economy especially job creation;

- To empower socially disadvantaged groups and promote a sense of ownership, responsibility and partnership with other agencies;

- To encourage the growth of private enterprise in rural areas;

- To contribute to the provision of infrastructure essential for growth in the rural economy;

- To focus better the application of statutory and other services to the needs of rural dwellers and communities.

FLAG attracted a funding package of £850,000 from LEADER II triggering investment in excess of £2 million in the period 1996 – 1999. FLAG is run by a co-ordinator answerable to a Board representing the contributing groups and Fermanagh District Council and the Department of Agriculture. A third LEADER programme is anticipated and Fermanagh will bid to this as well. **The Coordinator of FLAG** was chosen as a key participant for this study.

Erne East Area Based Strategy Action Group (ABSAG)

A key component of the Department of Agriculture's overall Rural Development Programme 1994 – 1999 was the funding of nine special Area Based Strategy projects in some of Northern Ireland's most deprived rural communities. Area Based Strategies have four key objectives:

- To identify and respond to local needs;

- To encourage and facilitate socio-economic development;

- To support the provision of infrastructure necessary for rural economic growth;

- To better focus the delivery of services locally;

- The belief is that local involvement and local initiatives can make a critical difference.

Erne East is one of the nine designated ABSAG's. It is managed by a Strategy Manager and a Board representing Fermanagh District Council; The Rural development Council; KEDU; Sperrin Lakeland Trust (The Health Service); Northern Ireland Tourist Board; The Planning Service; NIE and local eight Community Associations. Erne East covers about 150 square miles in the south east corner of Fermanagh. Its border location adds to its remoteness and inaccessability. The marginal nature of the region is reflected economically. After widespread consultation Erne East identified three main themes. These are:

- Enterprise;

- Tourism;

- Access and Communication.

The ABSAG was given an initial grant of £1million from the Rural Development Council and expect to leverage £2.6 million against that, giving a total of approximately £3 million to be invested in the region. The initial period of funding is two thirds complete and, as with LEADER funding there are strong expectations that there will be another package of funding for the next three years. Erne East ABSAG can be seen as a microcosm of Fermanagh's society, reflecting extremes of rurality and as such **the Strategy Manager of the Erne East ABSAG** was chosen as a key participant.

Fermanagh Women's Network

In any rural community women tend to be one of the groups marginalised geographically and economically disadvantaged. Fermanagh is no different but has adopted a very proactive strategy of action. Fermanagh Women's Network brings together twenty-one women's groups throughout the county and is run by a network co-ordinator and full-time administrator. The groups are self-sufficient but draw on the network for initial training and support as necessary. The Network is funded from the Cadbury Trust, ERDF and FDC. On average groups have ten members and activity ranges from those engaged in traditional crafts to those up skilling themselves to rejoin the labour market. A particular area of interest is in upgrading of clerical skills. The Network connects with the WEA and Fermanagh College and also with many organisations outside of Fermanagh. As a significant grouping of those involved in community economic development Fermanagh Women's Network was selected to be part of this study and the **Fermanagh Women's Network Coordinator** chosen as a key participant.

There are many other partnerships in Fermanagh but it was felt that these seven organisations were indicative of those who would have a direct interest and influence on the use of technology for economic development.

Two particular omissions, from written documentation might appear to be the Interactive Technology Centre (INTEC) underpinned by The Fermanagh University Partnership Board, and the District Partnership for Peace and Reconciliation. The latter has, as it's primary aim, the creation of opportunities for dialogue with the objective of social inclusion of all members of the community. While economic regeneration is part of the action plan it is more an outcome or facilitating mechanism

rather than a primary aim. In the former case, the researcher is directly involved in this project and has been since its inception. In the nature of humanistic inquiry she brings this background to bear on this work. INTEC is dedicated to the diffusion of information technology and has stated aims of:

- Providing access to growth opportunities arising in the 'Super Highway' context;

- Providing a focus for trade development through inward investment, marketing and business support;

- Supporting increased export activity;

- Acting as a catalyst for rural and community development;

- Providing a gateway to significant expansion in education and training opportunities;

- Demonstrating the benefits of IT and telecommunications to local industry;

- Supporting innovative action across a number of sectors;

- Providing information services and data access.

In summary Fermanagh has been chosen as a region with a highly developed network of community groups and some experience of and commitment to the embedding of technology as a factor in economic development. Fermanagh has played a lead role in coalescing the five western counties into the West Rural region and in other networking arrangements such as the creation of the Irish Central Border Areas Network (ICBAN) and the Western Regional Energy Area Network (WREAN).

6.3   The Frame of Reference

The focus of this study is community informatics and it's interpretation in a rural community setting. Specifically the research is informed by the meanings and interpretations of key stakeholders united in a common goal of regional economic

development. The underlying assumption of the research is subjective i.e. that reality is subjective and at best understood in terms of the actor's meanings. The research study concentrates on seeing the reality of the technology through the eyes of those in the community who use it and who make decisions about the use of technology by others.

While having a qualitative and subjective philosophical underpinning the data analysis methods employed include some secondary quantitative work.

(Hicks and Porter, 1991,pp 459) suggest that the empirical approach is the enterprise of taking time out from science to see how science as an object is conducted. They go on to say that the use of empirical research in the Information Systems discipline is a "recognition of the importance of field based research in which data is gathered in the business context or social setting in which the practice occurs".

(Kuhn, 1970) analysed scientific revolution and emphasised the role shared beliefs and assumptions in the scientific community play in the development of paradigms. The social construction of technology uses three basic tenets: relevant social groups of people who interact with the technology; interpretative flexibility as the study of differences in meaning; closure referring to the consensus solution the 'group' finds to a problem. It is contested that these tenets are specifically applicable to the study of information technology implementation in the social organisation because IT is developed and used by a variety of groups approaching implementation from differing standpoints, (Sahay, 1994). IT also is particularly open to interpretation and reinvention. The theory of the social construction of information technology therefore

serves to provide a frame of reference for the study of community informatics as a factor in rural community economic development. Previous studies of the social construction of information technology have mainly focused on commercial organisations. The research of this thesis in a sense crosses a number of boundaries, empirical research, information systems socio-technical research of implementation, and community development research. In line with both the Grounded Community Development Research and the Social Construction of Technology the paradigm used in this thesis is inductive and makes minimum assumptions as to the nature of the attitudes, values. It is not within the scope of this study to consider the objective characteristics of the technology and of its implementation. These are of course important in their own right. But this investigation is based on the premise that as "a form of knowledge system, information technology is assigned social meaning by the groups interacting with it and all these social meanings are likely to affect the degree of success of the technology in an organisational setting".

6.4 The Research Paradigm

The literature review revealed an increasing shift towards the application of qualitative research methods in the study of information systems. There is a growing body of knowledge in this area. Little evidence however was found of studies where the focus was in the community as opposed to in a business setting. In the community organisational structures cross boundaries between informal - formal and employee - volunteer. The author of this study has considerable experience working in a community setting and specifically in technology transfer and community/regional economic development and was convinced, from the evidence in the field, that there was a need for a study such as this. The author was attracted to the work of (Sahay,

1994) on the social construction of information technology by the flexibility it afforded in sampling and by the potential for integration of more quantitative methods for participant selection, validation and verification.

The suggested use of triangulation through documentation was also felt highly appropriate and adopted as a strategy throughout. As Sahay points out " By choosing the assumption of subjectivity and relativist methods for research we are not stating that reality has no objective characteristics"(Sahay, 1994,pp 248). In relation to technology the objective characteristics tend to be highly definable and measurable. Rather this approach is taken to supplement traditional study by allowing specific exploration of the social meaning of technology in a community setting on the assumption that social meaning will affect success or otherwise of the technology. Therefore the Social Construction of Information Technology has been adopted as the primary paradigm. The fundamental concepts are highly relevant and have already been mentioned. Technology is specified, purchased, managed and used by different members of each group. In most instances a particular application may have been the motive for introduction but information technology lends itself to reinvention across groups and between groups. Community groups by definition have come together to address a collective agenda for common goals. They therefore will overcome internal differences and arrive at communal decisions regarding technological solutions and problems. The approach taken focuses on technical and organisational problems associated with the technology. These problems are studies over alternations and variations where choices have been made. The direction of this study is drawn from the work of (Orlikowski and Gash, 1994) and addresses three specific areas: nature of the technology ; technology strategy and technology in use. In line with the choice of a

pre-dominantly qualitative approach, this study has been conducted as inductive research. In other words the aim throughout has been to gather evidence and from analysis to generate theoretical commentary. Similarly the outcome of the study is 'grounded' in observation (Glaser & Strauss, 1967, Strauss & Corbin, 1990) and sits comfortably with the current directions in community development research. In adopting observation as part of the approach the work follows the tradition of humanistic enquiry and allows the researcher to be considered as part of the phenomenon under investigation (Hirschman, 1986). Given the fact that the researcher has a longstanding working relationship with the members of the study population she has at no time tried to adopt the position of the 'detached observer'.

6.5   Research Design

Sahay suggests a research design that allows comparison across formal groups and a flexible approach to sampling. This was considered particularly suited to the semi-formal organisational structures of the community groups under consideration and allowed early information gathering to inform subsequent choice of additional respondents. The objects of comparison were not tightly defined in advance and so the work is based on the principle of natural controls. Sahay also states that natural controls are most easily employed through the researcher's decision to select certain sites or organisations for study. He suggests sites should be similar to each other in aspects not under investigation while allowing the possibility for contrast in other areas. In accordance with the above the groups selected for the study in this research are similar in that they are all sited in the same geographical and political region within the European Union. They all therefore exist and are subject to the same external environment.   They also all have the same primary function and same main

goal of economic development. Additionally they all have indicated their interest in regional economic development and in enhanced use of technology to support impact assessment, strategic planning and decision making. However there are significant differences in size , in organisation and in sub-goals and the path each group has taken in engaging with technology has been totally unprescribed. The study confines itself to use of information technology and 'office' systems software and does not offer comparison across specialist equipment - " by controlling the type of technology stronger conclusions about the role that social interpretations play in the use of technology can be made"(Sahay, 1994, pp 251). The example given by Sahay is of Barley's studies of the use of tomography equipment in two UK. Hospitals, (Barley, 1986,1990). The comparative case study analysis employs replication logic and allows each study to confirm and dis-confirm information drawn from others. The research design employed in this study focuses first on the social network of the group. Background information on each respondent was sought to allow comparison on age, sex, educational qualification, formal training with information technology, experience in using information technology and role in the organisation.

Triangulation

In Chapter 2 we discussed the growing acceptance of the value of the use of 'mixed methods' in information systems research and the nature of triangulation. A frequently cited empirical example is that of the use of triangulation by (Markus, 1994) in the study of electronic mail. This work starts from selection as a by-product of quantitative data collection through survey instrument. The primary data gathering method is then the personal interview. To validate and substantiate the findings of each the interviews a strategy of data triangulation was adopted. In this study

documentary secondary evidence was sought for this purpose. Data analysis techniques employed are detailed in the next chapter. These included use of computer-based software to facilitate categorisation and use of the quantitative dual scaling method. This is employed to allow further explanations of hidden structure within the data. (Nishisato & Nishisato, 1984 and Sahay ,1994).

6.6   Research Aims and Objectives

The overall aim of this research is too advance understanding of the ways in which information and communication technology are interpreted by a community with a collective economic development agenda. By collating a 'thick description' of the technological frames of meaning we have created the basis for formation of some theoretical concepts. The research objectives outlined in the initial introduction were expanded to:

- **identify the relevant social network of those interacting with the technology in each case;**

- **examine the differences in meaning attributed to the technology;**

- **explore the means taken to achieve closure on technological problems in each case;**

- **derive conclusions about the role that social interpretations have played in the use of the technology in each case;**

- **compare and contrast the evidence gathered in each case;**

- **develop a contingency model of progress to a knowledge based community;**

- **identify suitable performance criteria for evaluation of progress.**

For each case evidence was gathered in six broad categories:

- **Importance**   The role of the technology in relation to remit;

- **Spread**   The use of technology throughout the organisation;

- **Control**   The basis on which technological decisions are made;

- **Obstacles**   Difficulties encountered;

- **Infrastructure**   Support through training and maintenance;

- **Regional Plan**   Long term strategic view.

Flexible open-ended interviews were held with each key participant. The transcripts of these were coded and analysed. The evidence gathered was validated against published strategies and compared with the results of a mail attitudinal survey of all the region's community economic development groups.

6.7   Summary

This chapter has established the frame of reference of the research study. The region chosen has common characteristics of many rural areas. It is however well developed and has made significant investment in the new technologies. It is therefore an appropriate region in which to study community informatics and address the key questions of this study.

In this chapter the research paradigm has also been detailed. This is a qualitative research study triangulated through existing documentation and some quantitative analysis. The social constructivist approach has been adopted and this choice will itself be reviewed as a contribution to the debate on identification of appropriate methods of evaluating the impact of information systems.

Chapter 7: Data Gathering and Data Analysis Methods

The institutions which our generation inherits may be very crude (...) He who would re-order them should first understand them.

A.W. Small

7.1 Overview

This chapter documents the approaches taken to implementing the research design as detailed in Chapter 6. For clarity the method of data gathering and the method of data analysis are described sequentially. Three different data gathering techniques were employed.

1. Open-ended interview

2. Attitudinal Survey

3. Documentary evidence

The results of these activities are described subsequently in Chapters 8 and 9.

7.2 Primary Data Collection - The Open-ended Interview

In line with the research paradigm of social constructivism the primary method of data collection was the interview of key actors in the social network of those involved in economic development. Relevant social groups were defined, as those influencing the creation, demand, production, diffusion, acceptance or opposition to the technology, (Bijker, 1987). Those chosen satisfied the criterion of belonging to a group of potential relevance. The relevant groups interacting in this capacity with external agencies were identified from documentation and by enquiry. This approach differs from the positivist position that would have called for unbiased, objective sampling from which to deduce generalisable characteristics. By contrast the method used deliberately identified those that it was believed, would offer insights into the use of technology and thus assist in the inductive building of a theoretical explanation.

Although the interviews were open-ended a set schedule of questions was prepared in order to guide the interview process within the topics of interest. The questions were clustered to focus both the interviewer and the interviewee and also to facilitate later analysis. Background information was gathered on each interviewee on age, education, training, and experience with the technology, position and responsibilities. Three specific areas were then explored. These were the nature of technology used, technology in use and strategic view of technology. The list of participating agencies is detailed in Appendix A. Each interview lasted approximately one hour and, with the interviewee's permission, was taped in its entirety. In accordance with Yin (1994) all data was transcribed as soon as possible after the interview and notes and impressions attached. Analysis and write up of the interviews is contained in Chapter 8 of this thesis.

7.2.1 Interview Data Analysis.

The underlying approach to data analysis is that of (Strauss & Corbin, 1990) which is in turn based on the original work on Grounded Theory (Glaser & Strauss, 1967). This approach allows the researcher to look past the specific questions to discover themes and meaning. The process of open coding was used to sort interview segments. While an original master-file of each interview was maintained, a composite file of all interview data was created, coded and manipulated to bring together all segments in the same category. Each segment coded was coded by category and by respondent. The process of bringing together similar segments in new groupings is referred to as 'axial coding', (Strauss & Corbin, 1990). This was dependent on defining a coding paradigm. A coding paradigm guides interpretation, conditions affecting interpretation and consequences of interpretation (Sahay, 1994).

Together with the results of the quantitative survey, policy and other documentary evidence this resulted in a 'thick' description of the phenomenon under consideration.

The measures of validity considered were those suggested by (Hirschman, 1986) and widely accepted: credibility; transferability; dependability. Credibility of the interview data was checked by both summarising the content of the interview and submitting it to the interviewee for verification and also by cross checking paper records against factual content. (Sahay, 1994) suggests that transferability is proven when a phenomenon manifests itself in more than one context. This study involved comparison across multiple sites. The results obtained indicate that the coding paradigm is transferable. Dependability is a measure of the reliability of the research instrument – in this case a combination of the schedule of questions and the researcher herself. The researcher brought to the study an in depth knowledge of the region and subject area. In addition considerable care was taken to ensure unprejudiced interpretations.

7.3   Validating the Primary Evidence – Secondary Methods.

Backing the qualitative analysis by triangulation using both the quantitative survey and documentary evidence confirmed the overall reliability of the findings. Validation of qualitative research is an area of concern to many in the research community. For many years the key words were validity, reliability and generalisation. (Kvale, 1995,pp21) says that the mainstream response to the qualitative interview has been comments such as, "The results are nor reliable, they are produced by leading interview questions"; "The results are not generalisable, there are too few interview subjects"; and "The interview findings are not valid, how can you know if you find out what the person really means?" However Kvale goes on to say that "in a post-

modern conception the understanding of knowledge as a map of objective reality, and validity as the correspondence of that map with the reality mapped is replaced by the social and linguistic construction of a perspectival reality where knowledge is validated through practice". Other researchers such as (Lincoln & Guba, 1985) use everyday language terms to discuss the value of findings – trustworthiness, credibility, dependability and confirmability. In the "lived" world reliable witnesses, valid documents and arguments are part of the social interaction. (Cronbach, 1971), perhaps the 'founding father' of discussions on validity, has extended the original definition of construct validity to argue that it is an open process where to validate is to investigate – validation is more than corroboration; it is a process for developing sounder interpretations of observations.

Qualitative research in information systems, within that discipline is a relatively new field and, as has been explained in the early chapters of this thesis, reflects quite a dramatic shift from the objectivist approach of much of prior work. To enhance its validity and also attracted by the potential of dual scaling to add to the overall findings, it was decided to incorporate this technique into the research.

7.3.1 Dual Scaling.

Quantification methodology of categorical data is a widely used approach in many branches of science. It is not a new technique having roots in the work of (Hirschfield, 1935). (Nishisato, 1990) points out that the topic is also referred to as "correspondence analysis and actually has a long list of alternative names. (Fielding, 1992) provides a review of the interconnections between the different versions. Phillips writing in the Social Research Update, notes that "Nonetheless, it remains the case that correspondence analysis has been relatively little used in social science research in the

United Kingdom and in the USA... Interest in the use of the technique seems to have remained low until the publication of Greenacres's text (Greenacre, 1984) and the easier availability of computer software", (Phillips, 1995,pp1).

(Nishisato, 1990) explains dual scaling as a technique that allows exploration of the hidden structures in categorical data such as that gathered from the open coding and axial coding stages of this work. If the groups obtained from dual scaling match the groupings identified through qualitative assessment, the results contribute to the validation of the researcher's interpretations. The technique has principally been used in marketing but was employed by (Sahay, 1994) in his work on the social construction of information technology. In this work the attraction to this technique arises because it offers the possibility of validating results drawn inductively from the qualitative analysis of interview data, and also the possibility of unexpected relationships emerging and further informing the study. From analysis of the transcripts eighteen meanings/potentials of information technology were identified. From these the 'experience distant' statements in Table 1, were produced and sent back to the eight respondents in the form of a structured questionnaire. Each respondent was asked to rank each of the eighteen points in order of importance. Each response then became a column in an eighteen by eight matrix. The elements of the row and column vectors were then calculated to give optimal row and column weights. This gave interval-scaled data. Testing was then carried out to reveal patterns of association between the respondents. The results of this work are detailed in Chapter 9.

- New employment opportunities for women

- Potential for enhanced local governance

- Greater social inclusion of the marginalised and isolated

- Potential for social equity between generations

- Improved business communications

- Access to remote markets

- A way to have the 'rural voice' heard nationally

- A way to bring the region closer to the decision makers

- Access to higher education

- An alternative to physical travel

- Access to global opportunities

- An opportunity to create a skilled IT labour force

- The potential for Fermanagh to stay at the forefront of regional development

- Enables new forms of social communication

- Empowers the community overall

- Reduces dependency on outside agencies and consultants

- Supports more professional management of community projects

- Offers potential for inter-community networking

Table 1 Experience Distance Items

7.3.2 The Attitudinal Survey.

In the discipline of computing a large body of research findings has been accumulated over the last fifteen years contributing to a deeper understanding of the effect's of attitudes and beliefs on individual's use of information technology e.g., (De Sanctis, 1983); (Reece & Gable, 1982); (Gressard & Loys, 1986); (Igbaria & Parasuraman, 1989); (Rivard & Huff , 1988); (Woodrow, 1991). Overall the results of these studies have been mixed, a factor that is now attributed to a confusion of terms. More recently researchers have sought to isolate measures of attitude from measures of anxiety or technophobia and both of these from measures of usability. The decision to conduct an attitudinal survey was made quite deliberately within this work. (Galletta & Lederer, 1989) suggest that attitudes provide people with a framework within which to interpret the world and integrate new experiences. This resonates with the finding by attitude theorists (Ajzen & Fishbein, 1977) that from attitude one can predict an overall pattern of response to the object. An attitudinal survey was considered appropriate because attitude is particularly important in relation to use of ICT in the community. In very few instances if any would use of a computer be obligatory. Ajzen & Fishbein also stated that an individual's attitude towards an object play an important role in determining their subsequent behaviour towards it - attitude being a learned pre-disposition to respond in a consistently favourable or unfavourable manner with respect to an object. Attitude to ICT was identified in both the LEADER and ESF evaluations as prohibiting development. It was considered beyond the scope of this research to test and validate a 'new' instrument for use within this section. Therefore a proven instrument was identified and applied. The chosen instrument is that developed by (Igbaria & Parasuraman, 1991). As a measure it encompasses cognitive, affective, and behavioural components and allows

consideration of the relationship of antecedent variables such as age, gender computer experience, user training and organisational support and also outcome variables such as system usage and user satisfaction. The authors say of their instrument that "it conceptualises attitudes toward microcomputers as representing individuals' predisposition to react in a certain way toward them" (Igabaria & Parasuraman, 1991,pp 570).

In their original study, working from a review of the literature and responses to a preliminary questionnaire the authors generated a list of 66 items. Three items were subsequently removed based on having extremely high intercorrelations with the other items. The remaining 63 items were factor analysed using SPSS-X.

Five factors were found to account for 51% of the explained variance

- Factor 1 – Perceived Utility – had an eigenvalue of 12.35 and accounted for 19.6% of the explained difference;

- Factor 2 – Limited Computing Power – had an eigenvalue of 6.36 and accounted for 10.1% of the explained difference;

- Factor 3 – Problems in Use – had an eigenvalue of 5.13 and accounted for 8.14% of the explained difference;

- Factor 4 – Time Requirements – had an eigenvalue of 4.72 and accounted for 7.49% of difference;

- Factor 5 – User Friendliness- had an eigenvalue of 3.63 and accounted for 5.77% of the difference.

Internal reliability of the five factors was also tested using Cronbach's Alpha Coefficient (Cronbach, 1951). The internal consistency reliability scores of the five factors were moderate to high and therefore statistically acceptable.

- Factor 1 – alpha = 0.90

- Factor 2 – alpha = 0.86

- Factor 3 – alpha = 0.75

- Factor 4 – alpha = 0.83

- Factor 5 – alpha = 0.74

Based on these statistics and the fact that this instrument focuses on specific technical features and information accessing capabilities rather than what have been called 'wonder' factors Igbaria and Parasuraman's survey instrument was adopted for this study. The only alteration made in its use was the change of microcomputer to computer throughout.

Eighty organisations, associations, and groups are listed by Fermanagh District Council as being active in economic development (Appendix B). These represent the community constituency of the participants in the qualitative study. Correspondingly a mail survey shown in (Appendix C) was sent to each of the eighty. The covering letter asked for the recipients co-operation indicating that this survey was part of ongoing research relating to technology and economic development (Appendix D). A five-point Likert scale was used throughout, varying from 1 = strongly agree to 5 = strongly disagree. Chapter 10 discusses the results obtained.

7.3.4 Documentary Evidence.

In order to triangulate the information obtained through interview an extensive study was made of policy documentation relating to Fermanagh and, where appropriate documents relating to all of N. Ireland. Where individuals referred to published strategies, copies were obtained and facts verified against them. In addition observation and informal communication were used to support written documentation.

7.4   Summary.

Mindful of the research questions, methods of data gathering and analysis were chosen to provide the maximum amount of evidence on the role of ICT in development in Fermanagh. Care has been taken to back purely qualitative evidence by quantitative secondary materials. Together these approaches have yielded a 'thick description' on which to base conclusions.

SECTION 3: RESEARCH RESULTS.

	CHAPTER	**CONTRIBUTION**
8.	Results of the qualitative research undertaken	Interviews Axial Coding Key Concepts
9.	Results of quantitative research undertaken	Dual Scaling Mail Survey Triangulation
10.	Conclusions and Reflections Theory generation	Research Outcomes – general, specific Reflection on methods used Future Directions
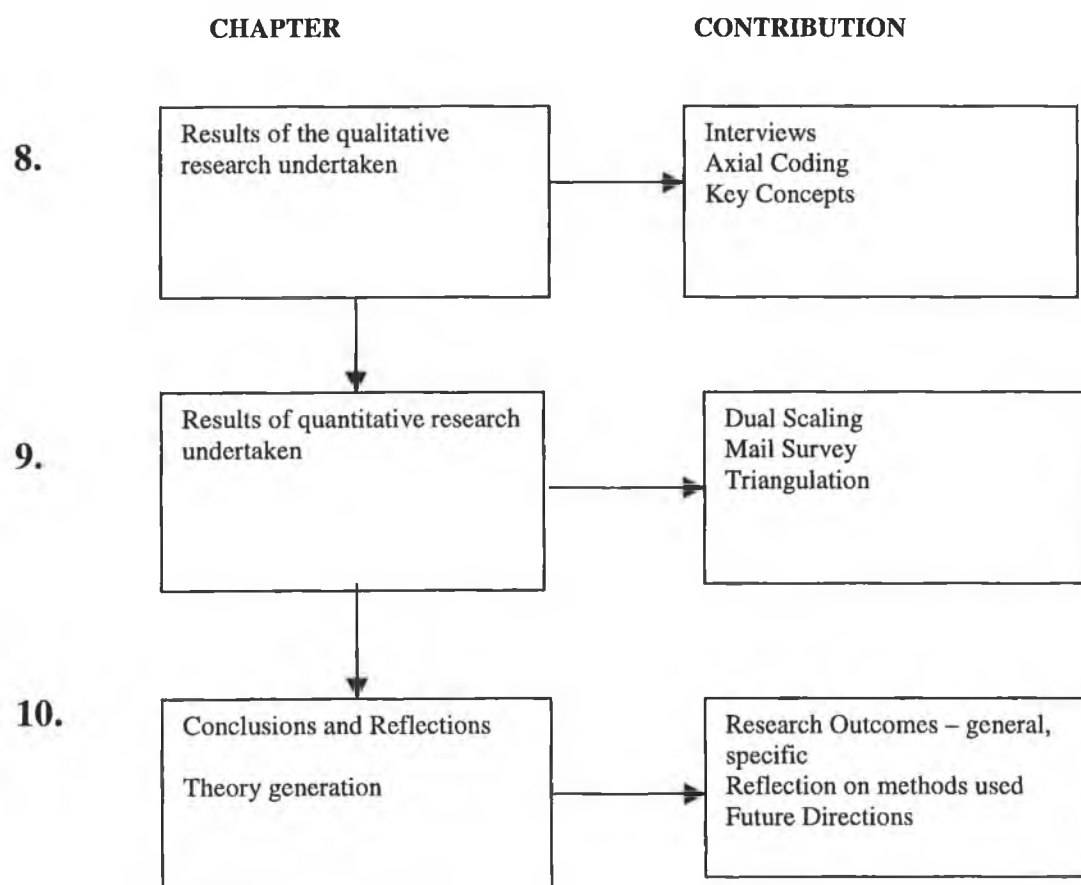
Introduction.

This section of the thesis documents the results of the research study. In Chapter 8 there is an in depth discussion of the output from each stage of the qualitative analysis based on open-ended interviews with key facilitators of economic development in the Fermanagh region. The process of open coding is reviewed, followed by the derivation through axial coding of the coding paradigm and the consequent development of key concepts of ICT in the context of rural development. These then are used in the next stage of research, being first validated through dual scaling and then extended and revised through comparison with the quantitative questionnaire data. These results form Chapter 9

Chapter 8: Qualitative Analysis Results.

Information becomes useful knowledge once its significance in its original context is understood.

Shum.

8.1 Overview.

The overriding aim of this research has been to build a picture of the meaning of ICT in the region of Fermanagh – the social construction of ICT as seen through those who are charged with facilitating development. As detailed in Chapter 6 eight representatives of key organisations in the economic development social network were interviewed and the transcripts of these interviews analysed extensively. What follows is a guide to that analysis.

8.2 The Nature of the Interview.

Each interview was scheduled to last approximately one hour and generally concluded after forty-five to fifty minutes. While discussions were allowed to flow freely an overall format was used in each case as follows:

Stage 1: Background.

- The interviewee was asked to say a little about their background: academic qualifications; previous work experience etc.

- The next question related to the individual's role in his/her organisation, the structure of that organisation and it's regional remit regarding economic and social development.

Stage 2 Technology in Use (individual).

- The interviewee was then asked if they had any formal training in the use of computers, the level of their current skills and how these had been acquired.

- The conversation then turned to use of the technology in terms of frequency e.g. daily, weekly, infrequently.

- The interviewee was then asked about the technology used: hardware and software.

- Any difficulties encountered were explored.

- Any additional requirements were discussed, including training requirements.

Stage 3 – Organisational Use of Technology.

- Each interviewee was asked to give an overview of the way in which the organisation they represented used technology – again in terms of frequency and particular items of hardware and software.

- The next question related to organisational policy regarding the use of technology

  - usage

  - purchasing

  - maintenance

  - Long term strategy.

Stage 4 – Influencing the use of technology by the community.

- Interviewees were asked to talk about the role they saw for technology with those groups with whom they worked.

- Training needs were also discussed.

- Interviewees were asked to highlight problems or limitations to further expansion of the use of technology.

Stage 5 – Strategic view of information technology.

The final section of the interview asked the participant to express his/her views on potential developments and opportunities for Fermanagh.

- To comment on the concept of the Information Society

- To identify sources of back-up information.

8.3 Analysis Strategy.

Each interview was taped and transcribed as soon as possible thereafter. Notes and annotations were added immediately. When all interviews were complete a process of categorical analysis was undertaken. A complete master file was created as well as working copies of each interview. Each interview was then analysed for key concepts. Each coded section was annotated with a reference to the original context and concept sub files were built. This process of open coding yielded a large number of categories related to the original interview structure, see below. A coding paradigm was then derived to make sense of the categories and regroup them using the researcher's perceived connections. This revised grouping then formed the skeleton for development of a model for understanding the interpretation and meaning of ICT within this setting.

8.4 Results of Open Coding of Interview Transcripts.

- Background and organisational detail;

- Use and nature of the technology from an individual perspective;

- Training past and future, maintenance problems and budgetary control;

- Views on the place of technology and it's role in economic development;

- Views on the wider regional / societal perspective.

Coding in qualitative analysis differs from coding in quantitative analysis. In the latter coding follows quite rigid specification of categories against which frequency of occurrence etc. can be measured. By contrast the starting point in qualitative coding is the text itself and the process is, as (Strauss, 1987) has said to 'fracture' the data and rearrange it into categories which facilitate deeper understanding. The key feature of

the qualitative techniques used here is that they are grounded in the data (Strauss & Corbin, 1990). Analysis of the interview transcripts using open coding involved examining each segment of text and asking questions about the underlying category of meaning in order to discover common themes. As explained above in 9.3 the code number was added to each segment as well as an interview identifier. This resulted in thirty sub-files of segments within different categories (See Table 2).

These were then studied for similarities or connecting context and regrouped using the process of axial coding (Strauss & Corbin, 1990). The coding paradigm used to make the connections and regrouping strategy is shown in Table 3.

Category of Previous Experience	Experience with e-mail
Qualifications	Experience with Internet
Formal Training in IT/computing	Attitude to e-mail
Overview of the home organisation	Attitude to Internet
Pattern of use of technology	Purchasing policy H/ware
Usefulness of the technology to the individual	Purchasing policy S/ware
Hardware platform used	Access policy
Software used	Group responsibility
Software/hardware wish list – future requirements	IT Decision maker role
Problems experienced with the hardware	Training initiator role
Problems experienced with the software	Personal opportunities
Solutions to software problems	Global opportunities
Training within organisation	Definitions of technology
Predicted training requirements	Strategic views
Attitude to training	Role in Econ.& Social Develop.
Solutions to hardware problems	Local opportunities

Table 2 Open Coding Categories.

A:	Contextual Background	Category of previous experience
		Qualifications
		Formal Training
		Overview of home organisation
B:	Technology in Use	Pattern of use of technology
		Hardware Platform
		Software Packages
		Experience with e-mail
		Experience with Internet
C:	Response to Technology	Attitude to e-mail
		Attitude to Internet
		Attitude to training
		Usefulness to individual
		Predicted Training Requirements
D:	Future Needs	Hardware/Software wish list
		Personal Opportunities
		Role in Economic Development
E:	Organisation Technology Strategy	Purchasing Policy Software
		Purchasing Policy Hardware
		Access Policy
		Problems Software
		Problems Hardware
		Solutions Software
		Solutions Hardware
		Training in organisation
F:	Influencing on Community	Group responsibility
		IT Decision Maker role
		Training Initiator Role
		Local Opportunities
G:	Strategic Insights	Global Opportunities
		Definitions of technology
		Strategic views

Table 3 – Axial Coding Paradigm

8.5 Building a Model of Understanding.

Each of the conceptual groupings identified above were then studied in detail with the aim of exploring differences, similarities and connections.

8.5.1 Contextual Background.

As one might expect the majority of those interviewed had a business background that had qualified them for a post in Economic Development. Where the title of the post was less explicit some of those in post had background or qualifications in community work. Five out of the eight posts have been funded as a result of support from the EU and have functional goals related to EU policy implementation. For these posts 1999 is a critical point with the reallocation of Structural Funds and the possible loss of Objective 1 status for the region. In terms of the wider environment, all of the contributing organisations have partnerships / connections outside of the region, some only within Northern Ireland, some in both Europe and the United States. Table 4 summarises the background information.

PARTICIPANT	A	B	C	D	E	F	G	H
Business Background	X	X	X	X	X		X	
Working to a Stated Strategy	X		X	X	X			X
Has Formal Training in IT	X			X				
Post is in the' 1999' cycle	X				X	X	X	
Has Regional Partners	X	X		X	X	X	X	
Has Northern Ireland Partners	X	X		X	X	X	X	
Has United States or European Partners	X		X		X		X	

Table 4 Comparison of Contextual Background.

8.5.2 Technology in Use.

Initially this group also contained the items now detailed under Response to the Technology. It now relates specifically to an analysis of the hardware and software in use by the participants. Two of the participants did not use information technology first hand on any kind of a regular basis. There was also considerable variation in the nature of the hardware platform, particularly the age of the equipment. Those who did use ICT frequently tended to have up to date equipment and, in particular to have a laptop as well as a personal computer. Somewhat surprisingly only two of the participants had direct Internet access and only three had personal e-mail accounts that they used frequently. These findings are summarised as Table 5.

PARTICIPANTS	A	B	C	D	E	F	G	H
Uses It on a Daily Basis	X		X	X		X	X	
PC 486 or higher	X		X	X		X		
Uses Microsoft Office	X		X	X		X	X	
Uses presentation Software and laptop	X		X	X		X		
Has personal email Account and uses			X			X		X
Has Internet access			X			X		

Table 5 Technology in Use.

8.5.3 Response to Technology.

This category was rather different to the two above in that responses were not 'hard facts' as such but rather 'experience near' expressions, (Geertz, 1983). In order to tabulate these responses and make comparison these have been translated to "experience distant". All participants acknowledged the usefulness of technology at

a general level but a variety of reasons why it's use was not judged particularly relevant were given as:

- Business in Fermanagh and the surrounding region is primarily local and so information and communications technology is not needed;

- Traditional businesses such as crafts do not have a use for technology;

- People in the community are not convinced of the benefits of technology;

- Job creation is mainly 'low tech' and involves very little technology;

- There is insufficient capacity in the community to know how to use technology;

- Navigating the Internet can be an enormous waste of time;

- Technology is just another 'flavour of the month' and will pass.

PARTICIPANTS	A	B	C	D	E	F	G	H
Advocated widespread Use of email	X		X			X		
Sees Internet as a community resource	X	X	X		X	X		
Would like advanced Database training	X						X	
Would like advanced Internet training					X		X	X

Table 6 Response to the Technology.

All but two participants expressed a desire to use e-mail as a means of networking and communication. Those who did not, interestingly, had access but did not seem to find it either desirable or a necessity. All participants recognised the Internet as an information resource for themselves as administrators of economic development. There was a considerably less definite response to use within the community. In relation to training for themselves the two areas identified as of interest were in

Database Management Systems and the use of the Internet. Those participants who currently make frequent use of ICT were confident of their own ability and had little interest in general level training. Those already experienced identified the need for particular specialist or advanced level training allied to the job function.

8.5.4 Participants' Future Needs.

Participants were asked to think about their role in economic and social development, the role ICT played in that, and how that role might best be developed. In each case this section of the interview led to an interesting conversation which revealed a lot about the way in which the individual interprets technology and the meanings attached to it. The nature of talking about the future of course led to discussion of current problems and obstacles as well and difficulties that had to be overcome. These varied from the obvious lack of resources inhibiting upgrading, to internal policy being restrictive, to the problems of external compatibility and skill level.

Identified Deficiency	Perceived Result	Potential Opportunity
Lack of e-mail access	Wasted Time	Networking
	Loss of face	Faster communications
Outdated Equipment	Limited job	Ability to use more up
	Performance	to date software
Lack of access to the	Inaccuracies on Web	Greater information
Internet	go unchecked	for community
Incompatibility of	Lost work	More efficient use of time
Equipment	Duplicate work	More sophisticated use of the technology

Table 7 - Problems and Opportunities.

When asked to articulate his/her own role within the field of economic development a variety of terms were used:

- Administrator;

- Facilitator;

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- Co-ordinator;

- Strategic Manager;

- Inter-agency Liaison;

- Entrepreneur.

8.5.5 Organisational Information Technology Strategy.

In talking about his/her own role in economic development in the particular organisation differences also emerged in the underpinning ICT strategy of that organisation. The amount of say one has in the decision making process would appear to greatly affect the motivation to use ICT and definitely the meaning one attaches to ICT. Where participants are exclusively managing a specific funded project there is a great deal of discretion. In these settings spend is ratified by a Board and there was no indication of any Board disputing a particular purchase or discussing it in the light of an ICT strategy. The guiding principle seems only to be that there are sufficient funds and that it can be classed as legitimate expenditure. In the three larger organisations there were specific procedures to be adhered to. It was encouraging to note that in all three organisations purchases were not made based on the latest technology but rather had to be justified as 'business decisions'. In two cases it was clear that there was felt to be a need to protect information in terms of data integrity and in terms of access. Another problem arose where policy was devised centrally at organisational head office. The experience of FLAG was notable in this respect. At the start of LEADER II funding the administering organisation, The Rural Development Council reserved an amount of funds to provide a central service and to create specialist software. FLAG has taken part in three pilots and now, entering the last year of the current programme there is still not a successful system in place. An associated issue is maintenance. All participating organisations used the INTEC Centre for advice as

they did for training. A number had had very bad experiences with supplier contracts. One participant spoke of an "8hr" agreement that in reality was a 48hr agreement. Several organisations depend on ad hoc arrangements with friends. The problem is highlighted by one comment, "We are largely dependent on technology but it tends to let us down badly".

8.5.6   Influence on the Extended Community.

With the exception of the Financial Director of Fermanagh District Council all participants interface with the local community – those already established in business or those seeking to develop in a particular sector. The group identified a number of roles. In many cases an individual saw themselves as wearing several hats e.g. delivering a strategy requires a lot of facilitation and co-ordination but also administration of funds and liaison with the funding agencies. It would however be fair to say that most people came down more heavily on one aspect of the job than others and this, in turn, influenced the nature of decision making and support given to the community. Where a participant identified predominantly with administration or management there was a parallel tendency to prescribe for the community. Where the predominant role was as a co-ordinator a more flexible attitude was evidenced. These points will be elaborated upon in the closing section relating to definitions of the technology. In conclusion in this section it is worth noting that all participants assume responsibility for initiating training for those with whom they work and again without exception, 'buy locally' in terms of a provider.

8.5.7 Strategic Insights.

It must be remembered that those chosen to participate in this study were so chosen because it was felt, from the author's knowledge of the context that they were representative of the social network of development in County Fermanagh. The

results of this first stage of the research have proved that to be true. To illustrate this more clearly this section starts with a summary of the reasons given for use of information and communication technology. Where appropriate actual comments are given to help the reader get a feel for the interpretation of the technology by a particular participant. For completeness a similar summary and some comments are also given of the less favourable feelings reported.

8.5.8 Reasons to Use the Technology.

- To bring the region closer to the decision making process,

  Decisions are made in Dublin and Belfast. There's a sense of geographical isolation. IT can bridge the gap and get rid of the excuses.

- To cut down on time wasted on roads,

  Cutting down on travel. A lot of organisations constantly have to travel.

- To give women opportunities for employment,

- To deliver a better service to the ratepayer,

- To keep up with the next generation,

  Children are so computer literate…it's a new language.

- To participate nationally and be part of networks,

- To overcome isolation,

  In terms of breaking down the isolation issue it is very important.

- To up skill the community,

  There should be a pool of skilled people there ready to take up opportunities of IT employment in Fermanagh.

- To empower the community,

  I would like to see women starting to see technology as a source of power and information by which they can progress themselves.

- As a means of access to information,

- To increase communication possibilities,

  We had a one-day "chat room" – we should do more of it (vidoeconferencing).

- Because it is such a powerful tool,

  Technology is a tool to be used whatever the objectives.

  Communities feel technology is something they must grasp.

- To make the world smaller,

  We deal with Belfast, so to shorten the road to Belfast and on a global scale make the world smaller.

- To reach new markets,

  People in the States expect you to be on e-mail.

- To end dependency on consultants,

  Rather than pay a consultant a fortune we could do it ourselves.

- To make communications faster,

  I have a lot of people I have difficulty getting to – but if I could leave an e-mail it would be more efficient than leaving a message for someone to phone and knowing they won't.

- For better project planning,

  Funders are becoming more sophisticated in order to meet their demands technology could help us and make us look good.

- To raise our standards,

  If I had access I could have checked it – (information on a website).

  IT literacy is needed nowadays for even the most mundane work,

- To stay ahead,

Fermanagh has been in the forefront – technology can keep it there.

8.5.9 Inhibiting Factors

- Business here is local,

  There is no need for e-mail when all your customers are in Ireland.

- Traditional industries don't involve technology.

  No one ever made anything by chasing a 'mouse' around the table.

- The community are not aware of the benefits of technology,

  The community doesn't look to technology as a way of employing people.

- Most start up jobs here are low tech and do not involve technology,

  Most of the start-up businesses are low tech – I would not see a great demand for computer technology from that end of things.

- People do not have the skills or awareness to use IT fully,

- Using the Internet wastes time,

  I have a go on the Internet if I have nothing else to do – it wastes time.

- Technology is just a passing fad,

  It used to be tourism and now it's technology.

Amongst the group there were a number of concrete suggestions of the ways in which IT might be further exploited in the region as:

- An Internet based Information Resource Centre;

- A Business Planning Service;

- Videoconferencing Chat Rooms;

- Project Management;

- Remote Marketing;

- Access to Remote Databases;

- Interorganisational communications;

- Electronic local Governance;

- Independent Advice Agency.

8.6 Summary.

This chapter has documented the outcomes and interpretations of the open coding process of data analysis of the interviews held. For research to have credibility it must be validated. As indicated earlier in this thesis the approach in this study is to use mixed methods. Data analysis here was triangulated by policy documents etc. Each interviewee corroborated the accuracy of the material collected. A rich picture was presented of a very diverse interpretation of the technology. Not all the outcomes were predictable. On the plus side the results indicate recognition of the potential of ICT to:

- Overcome the disadvantages of peripherality and isolation;

- To support the creation of new job opportunities;

- To support effective and efficient communication;

- To support management of change;

- To enhance democratic participation.

The more negative comments seem indicative of:

- Lack of awareness of the potential of ICT;

- Lack of skill in using the technology;

- An inability to grasp the changing nature of society and the difference between the industrial or agricultural model and a new knowledge-based model.

Chapter 9 details the secondary data obtained to validate these findings and in Chapter 10 the overall findings are applied to the research questions.

Chapter 9:   Quantitative Analysis

The world that we have made as a result of the level of thinking that we have done so far has created problems we cannot solve at the level of thinking at which we created them.

Albert Einstein

9.1 Overview

The primary research method of this thesis is qualitative but this has been extended and validated through the use of quantitative methods. Firstly the principles of categorical analysis, dual scaling, were applied to the results of analysis of the 'open ended' interviews. Separately a mail survey was applied to eighty community organisations and the results analysed. What follows are the results of these activities.

9.2 Categorical Analysis

The principle outcome of the qualitative data analysis phase was a set of 'meanings' of technology derived from the transcripts of interviews with a group of professionals working in economic development in the region. To substantiate and verify these it was decided that the principles of categorical analysis should be employed. As outlined in Chapter 7 this approach was suggested by (Sahay, 1994) and draws on the work of (Nishisato, 1990) and others. There were eighteen suggested meanings given to information and communications technology. These were distributed to the participants and they were asked to rank them in order of importance.

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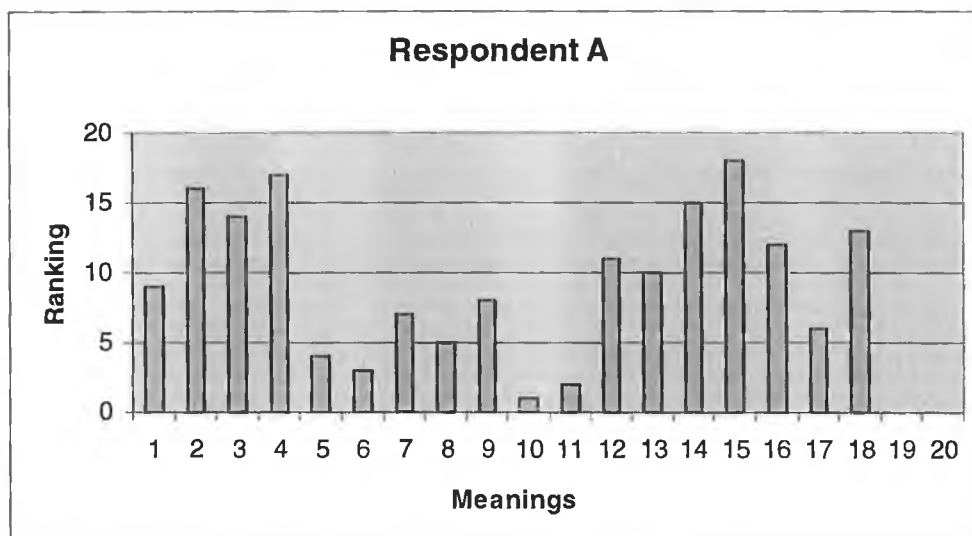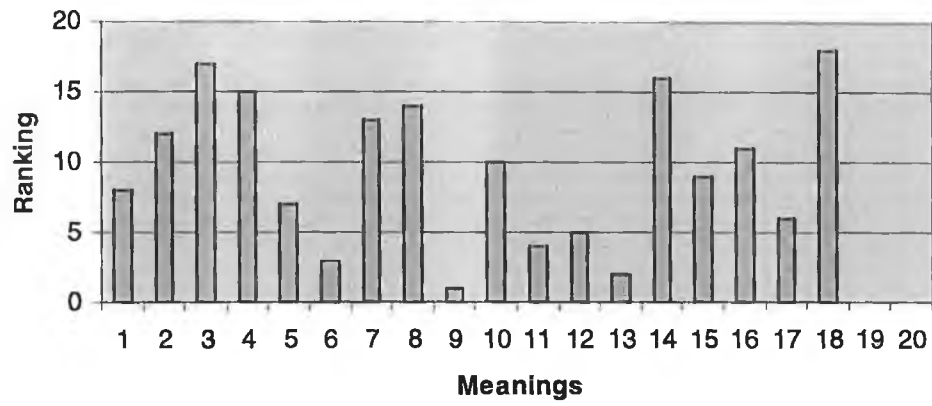
Respondent C

Respondent D

Respondent E
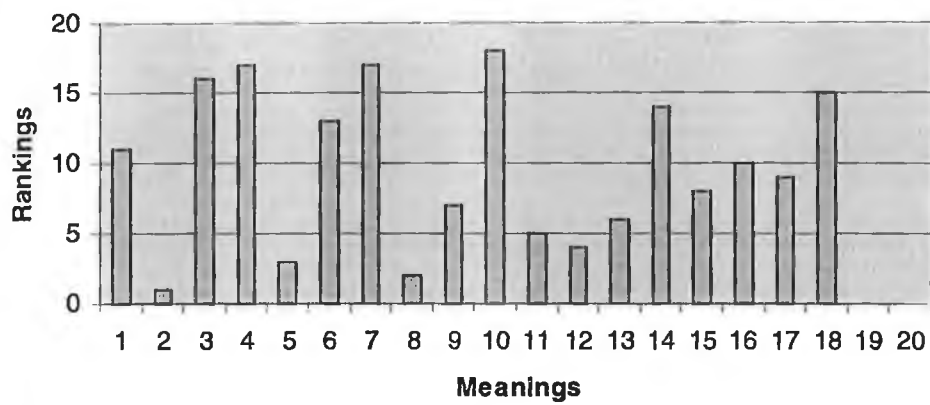
Respondent F

Respondent G
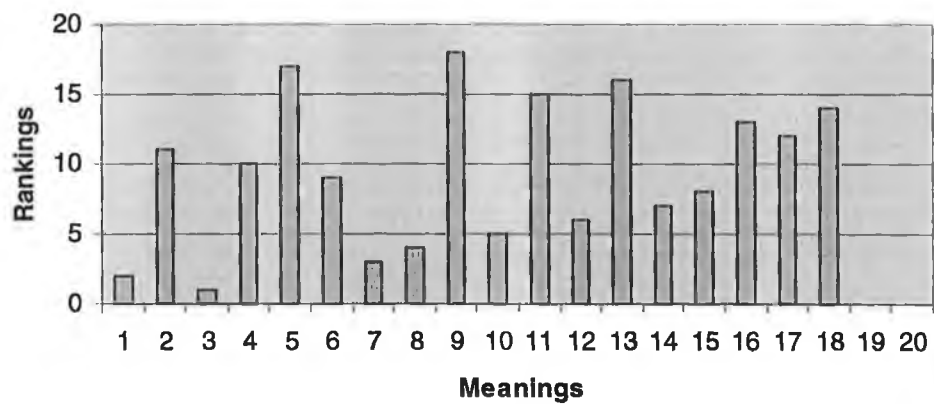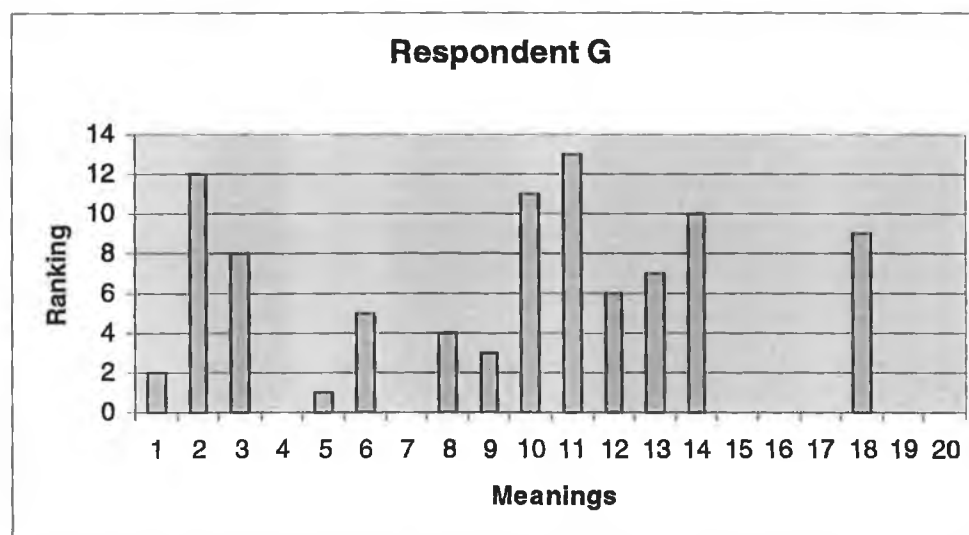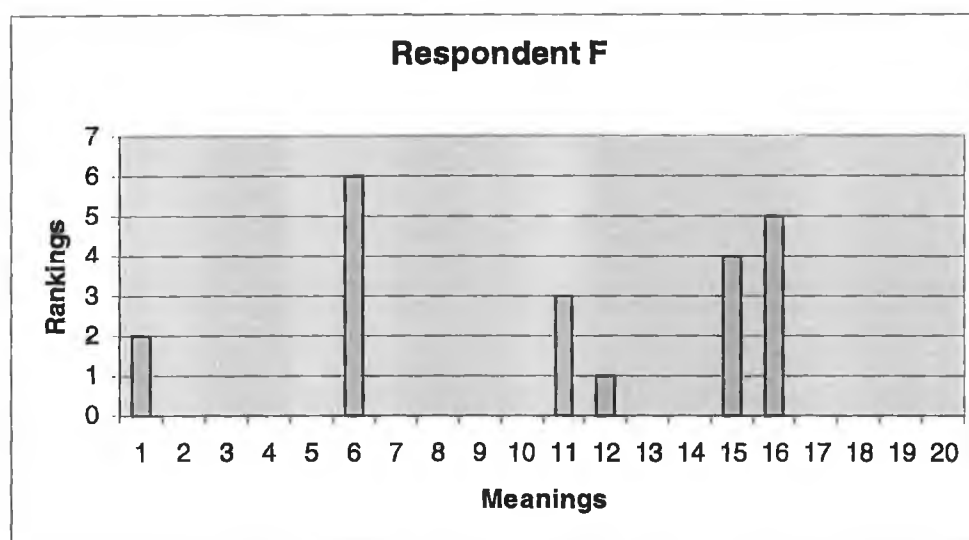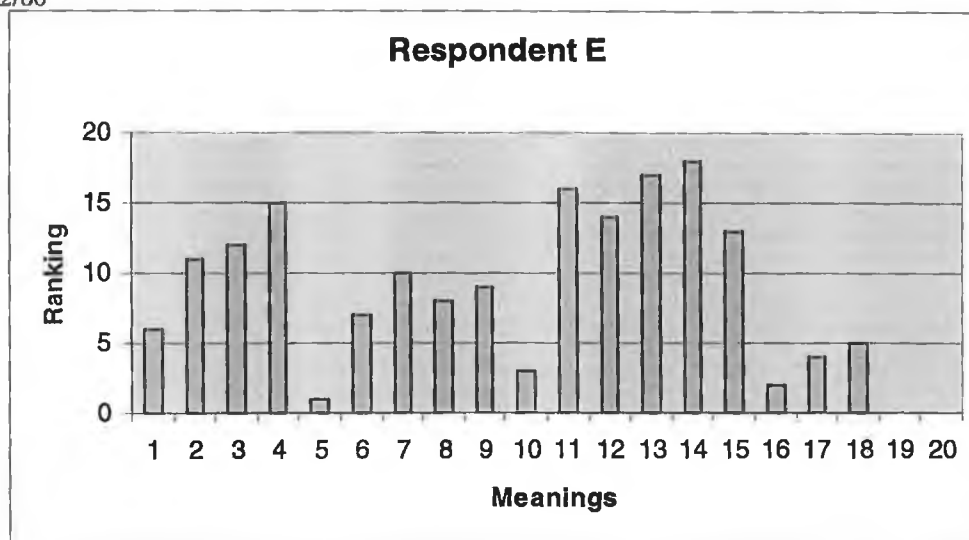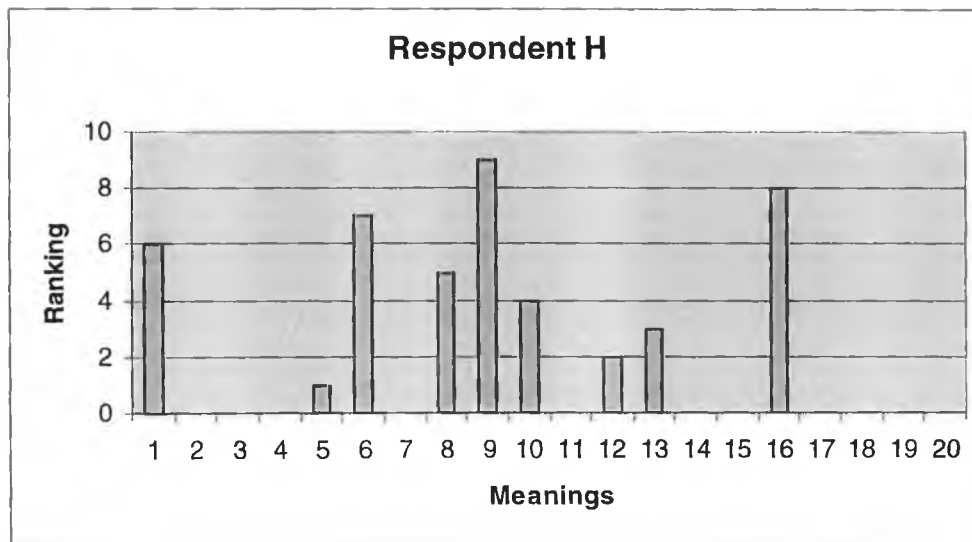
Figure 6 : Individual Meanings

Based on simple averages the ranked meanings were as follows:
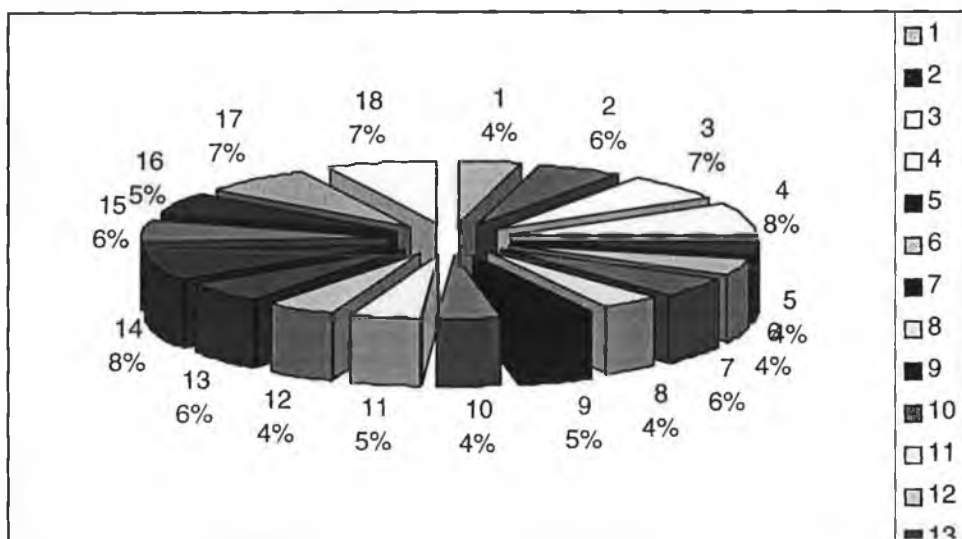
Figure 7 Ranked Meanings

Five participants completed the ranking exercise, three did not rank all possible places or meanings. These participants were contacted and indicated that they had each placed the only meanings considered relevant. This was accepted as a valid position. Given eight respondents and eighteen meanings, an eight by eighteen matrix was subjected to the dual scaling technique with the aim of producing a visual representation of the relationships between the row categories and the column

categories in the same space as a two dimensional map. Relative frequencies were calculated for each of the row and column profiles. Multiple configurations were developed of subjects and meanings in such a way that each subject ranks the closest meaning highest. The total information in the data set was accounted for over eight solutions. However after solution three the variations were no longer significant (Figure 8). It was therefore felt that a joint plot of solutions 1 & 2 effectively projecting the meanings into the subject space would give the clearest picture of true meaning. When this was done (Figure 9) the results showed both subjects and variables scattered in the two dimensional space and yielded considerably more insights than the initial simple average ranks.

Solution	1	2	3	4	5	6	7	8
Correlation Ratio	0.1194	0.0855	0.0581	0.0412	0.0285	0.0136	0.0105	0.0095
Maximum Correlation	0.3455	0.2925	0.2411	0.2031	0.1690	0.1167	0.1025	0.0974
Delta	32.58	23.34	15.86	11.25	7.79	3.72	2.87	2.59
Cumulative Delta	32.58	55.92	71.79	83.04	90.83	94.55	97.41	100.00
NB:- The variations amongst the variables were comparatively stable after the second solution.								

Figure 8   Dual Scaling Correlation

Full details of the process can be found in Appendix E. Figure 10 is a joint plot of solutions 1 & 2. From the graph Subjects C and D are almost opposite in their ranking with C prioritising meanings 5,9,13,11,12,17,8,18 and D prioritising 3,4,14,7. Subjects A,B, E, H are similar all being close to meanings 5,6,11,13,9. Subject G and

F are very similar and close to meanings 6 and 10. Subjects C and D viewed

information very differently. Subject C highlighted access and opportunity and use of

ICT for communication. Subject D saw information much more as a commodity or

to be protected and was unconvinced of the need or value of electronic

communication or the Internet. Subjects A, B, E and H deal directly with economic

development. F & G are involved with inward investment and direct development of

the software industry. They also tend to deal with the same agencies and statutory

bodies.
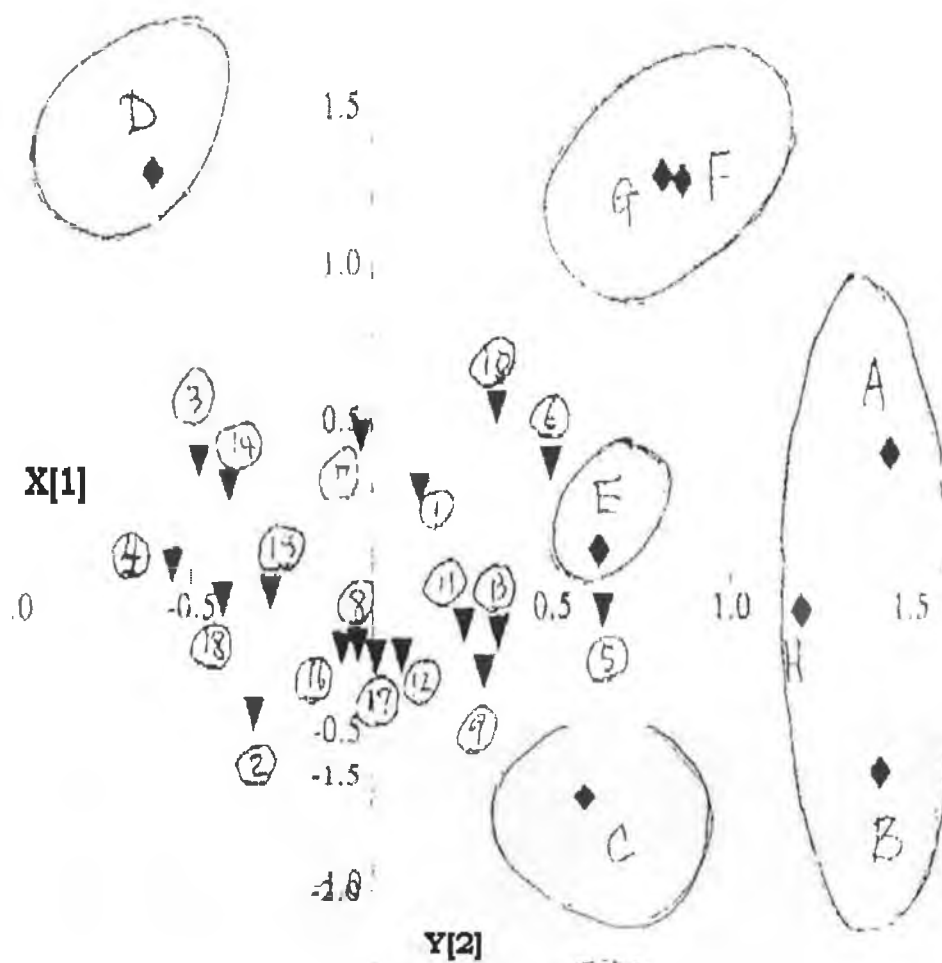
Figure 9 Joint Plot of Subjects and Meanings

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Overall the results of the dual scaling exercise validated the qualitative findings and lend credence to the need for this kind of research as an aid to better understanding of the meaning of ICT at the community level.

9.3 The Attitudinal Survey

The attitudinal survey was distributed by mail to eighty community organisations. The names of these organisations were supplied by Fermanagh District Council and classified as those 'active' in economic development. Thirty-five replies were received. Two replies were not completed and could not be used. In one case the respondent indicated that she was 'already using computers in her organisation'. In the second case the respondent indicated he was unemployed, over fifty and in a voluntary capacity and did not feel able to help. There were therefore thirty-three valid responses (42%) eligible for analysis. The data from the questionnaires was individually tabulated and analysed using the statistical computer package, SPSS. X.

9.3.1 The Demographic Profile

Of the total population, 63.65% of respondents were male, and 36.36% were female. There were respondents in all age ranges: 12.12% between 20 – 30 yrs.; 42.42% between 30 – 4 0 yrs.; 21.21% in the 40-50 yrs. range; an d 24.24% in the 50 + yrs. range. The breakdown of age and sex is shown in Table 5.

Age Range	Male	Female
20 – 30	3	1
30 – 40	6	8
40 –50	4	3
50 +		8

Table 8 Breakdown of Age by Sex

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Respondents were asked to indicate their previous computer training. 45.5% indicated None, 27.27% indicated that they had taken 'short courses'. A further 27.27% indicated that they had formal training ie. award bearing training. The latter figure appears high and it may be that there was a degree of uncertainty over what constitutes a 'short course' or a 'formal course'. Table 6 shows the pattern of training by age and Table 7 training by sex.

AGE				
Training	20-30	30-40	40-50	50+
None	2	3	4	6
Short Courses	1	6	1	1
Formal	1	5	2	1

Table 9. Training by Age

SEX		
Training	Male	Female
None	11	4
Short Course	6	3
Formal	4	5

Table 10. Training by Sex

The results showed that almost seventy percent of the study group had little or no training in the use of computers. This 'lack' of training was proportionally higher for males and in the older age groups, the latter as one might expect. The higher scorings

for females in the 30 – 40 age bracket, indicating having had training, is felt to be indicative of the strong emphasis placed in Fermanagh on 'Women Returners'. A number of programmes of self-development for women include IT skills and lead on to more formal qualifications. Equally, women may become involved with community groups in a voluntary capacity when other job opportunities are unavailable.

0.3.2 Main Scales

The instrument as designed has five scales:

- Perceived Utility

- Limited Computing Power

- Problems in use

- Time Constraints

- User Friendliness

9.3.2 Perceived Utility

Based on cumulative averages male respondents (scoring 49.14) were less convinced of the utility of computers within their organisation that female respondents (scoring 37.0). Analysis of the individual question results show however, that this is more a 'less positive' response than actually a negative response. In other words men tended to agree rather than strongly agree. The average score for men was 2.37 compared with an average of 1.81 for women. Respondents in the lowest age range, 20 – 30, were much less convinced of the utility of computers than those in the other age ranges, while those in the 30 – 40 age range indicated that they clearly felt computers to be of use to them.

Age	Training	X Scores Utility Male	Female
20-30	None	3.18	2.25
	Short	1.38	0
	Formal	1.38	0
30-40	None	3.24	1.46
	Short	2.67	1.86
	Formal	4.14	1.63
40-50	None	1.86	3.17
	Short	1.62	0
	Formal	0	1.29
50+	None	1.52	1.21
	Short	1.47	0
	Formal	2.75	0

Table 11. Average Scores on Utility Attitudes

.Predictably those who have formal training are more convinced of the utility dimension. Those who have little or no training express less definite agreement.

9.3.4 Limited Computing Power

The response to this section was quite muted, characteristically questions drawing a score of 3, indicating neither strong agreement or disagreement. The most positive group being those who had had formal training and, therefore were in a more informed position.

Table 12. Limitations

Age	Training	X Scores Hardware/Software Male	Female
20-30	None	3.1	3.6
	Short	3.08	0
	Formal	2.93	0
30-40	None	3.07	2.97
	Short	3.33	3.31
	Formal	3.1	3.07
40-50	None	2.84	3.03
	Short	2.67	0
	Formal	0	3.03
50+	None	2.81	3.07
	Short	3.06	0
	Formal	3.2	0

This would seem to say more about the questions than about the respondents' views on the subject or infer that most respondents found the standard PC more than adequate for their needs.

9.3.5 Problems in Use

Averages in all questions and for all groups tended to be in the '3' range with standard deviation around 1.2. Comparison by sex showed the female respondents to have slightly stronger conviction that computers would not add to problems or negatively affect managerial style or image. There was considerable difference on Question 37: 'I wouldn't want to use a computer because it would reduce my interaction with people.' Male respondents averaged 3.2381 with standard deviation of 1.4108 while female respondents scored 4.0 with a standard deviation of 1.2247. Similarly in Questions 40 and 43 where image and job distraction were queried the female respondents had very high scores around 4.5 while their male counterparts were had lower scores in the high '3' range. This would appear to indicate that women are more inclined to assimilate the use of the computer into their role and not feel threatened by any perceptions.

Age	Training	X Scores Problems Male	Female
20-30	None	3.3	3.2
	Short	3.6	0
	Formal	2.9	0
30-40	None	3.2	2.9
	Short	2.97	3.6
	Formal	3.6	3.83
40-50	None	3.23	2.5
	Short	4.1	0
	Formal	0	3.95
50+	None	3.68	3.7
	Short	3.6	0
	Formal	4.2	0

Table 13: Average Scores on Attitudes to Problems

By age the youngest respondents were most in agreement with the questions and showed the greatest concern for the affects of using a computer. The answers indicated particular concern with Q37 and Q38: 'I wouldn't want to use a computer because it would reduce my interaction with people'; 'Using a computer would result in a tendency to over design simple tasks.'

As one might expect those who had some training or formal qualifications in computing, strongly disagreed with statement intimating that computers created additional problems in the workplace

9.3.6   Time Constraints

Overall the responses here were quite negative veering towards an average score of 4 – disagree. However the questions are testing whether the respondent is opposed to using computers because the task would have a greater time transaction cost eg. 'By using a computer I would spend more time translating my wants and needs to others.'

		X Scores	Time
Age	Training	Male	Female
20-30	None	3.27	3.36
	Short	3.59	0
	Formal	2.82	0
30-40	None	4.27	4.09
	Short	3.64	4.09
	Formal	3.32	3.86
40-50	None	2.91	3.59
	Short	3.09	0
	Formal	0	4.36
50+	None	3.74	3.27
	Short	4	0
	Formal	4.18	0

Table 14. Average Scores on Attitude to Time

9.3.7 User Friendliness

The questions on user friendliness are positively expressed in the questionnaire and so the expectation is that respondents would strongly agree ie. they would return low scores of 1-2.

The last two questions of this set are expressed negatively, giving reasons not to like using computers. The expectation that these would be scored highly and not in line with the rest of the set proved true eg. Q62. Stated: 'I don't like using a computer because it is not easy to understand computer documentation'. Answers to this were in the 4-5 range with standard deviation less than 1.

Overall respondents demonstrated a positive attitude to computers. This response was more pronounced amongst those who already have some training and therefore would be supportive of the case for continued investment in capacity building. The response was less positive amongst men rather than women – presumably a direct result of the various initiatives used to stimulate use of computers by women. Equally the 30 – 40

Age	Training	X Scores Usage Male	Female
20-30	None	2.88	3.25
	Short	2.81	0
	Formal	2.86	0
30-40	None	2.86	2.25
	Short	2.94	3.08
	Formal	2.56	2.81
40-50	None	3.12	3.19
	Short	3	0
	Formal	0	3.69
50+	None	2.87	2.25
	Short	2.87	0
	Formal	2.57	0

Table 15. Average Scores on Attitude to Usage

Equally the 30 – 40 and 50 + age groups were more positive than their counterparts less than 30 or 40 –50

9.4 Summary

Quantitative methods are used in this research as a secondary vehicle to substantiate the results of the qualitative exercise. Interviewee survey and dual scaling confirmed the ranked importance of information and communications technologies amongst those facilitating economic development.

The results of the mail survey of community economic development groups indicate a readiness to engage with ICTs and the return on the significant investment in ICTs Fermanagh has made. In Chapter 10 conclusions will be drawn from these results married with the qualitative findings of Chapter 8.

Chapter 10: Conclusions.

*The end of all our exploring will be to arrive where we started
and know the place for the first time.*

T.S. Eliot

10.1 Overview.

This thesis has focused on an area of growing interest in the field of computer science, community informatics: the application of ICT in the community setting and the implications of ICT for different sectors of society. The research has been undertaken as a contribution to the manner in which ICT is interpreted and assigned meaning. In particular this research considers the role of ICT as a key component of the information system driving economic and social development to knowledge-based society. The approach has been interpretative and inductive treating ICT as the infrastructural delivery mechanism of community information systems. Practically, the researcher has attempted to gain an understanding of the context of such a system and the process by which the system is influenced and is influenced by that context. Chapters 5 & 6 have established the case and validity of such research and also the novel nature of the approach in using the social constructivist method already tested in the private sector. While the qualitative element predominates in this research, its strength is extended through quantitative validation and comparison with additional quantitative data. Examining the meaning of technology through the eyes of those leading economic and social development reflects the emphasis now placed on community partnership and on the role of the facilitator rather than the administrator. A facilitator seeks to guide, influence and support the wider community working to a collective agenda. The study fits into the wider policy debate on the changing nature of local governance, rural development, and the transition to an Information Society. Earlier chapters of this thesis have painted a backcloth of current EU policy directions

in relation to the Information Society, Agenda 2000 and rural development. To some extent this work deliberately sets out to contribute to the explosion of the 'myth of information technology'. Perhaps more importantly the desired outcome is to prove the value of a community or region establishing a 'base line' understanding of the manner in which ICTs have been interpreted in order to inform their subsequent regional planning and sustainable development. In providing such a baseline the research also reinforces and highlights points made in programmatic evaluations, particularly the need to close the 'feedback' loop and mainstream lessons learned.

In summary the following synopsis is offered both of the literature and policy context and of the findings of the fieldwork undertaken.

Knowledge generation is a spiral and iterative process whereby local and universal knowledge are combined to extend the existing knowledge resource. In this process people are at the centre. Increasingly technology is a given and the questions to be asked are – what is the best information source and what is the optimum mode of communication? Overall indications are that future development is centred on a change-oriented society based on a bottom-up model, underpinned by partnership.

Current policy perspectives resonate with this theme of local knowledge, participation and partnership. Both Information Society initiatives and Rural development policy place great emphasis on the potential of technology as a tool to bring advantage. However it is equally clear that there is an equal and opposite possibility of reinforced divide. Attitudinal problems are highlighted, as is the need for sustained learning and capacity building. Recent evaluations of community based programmes recognise

individual success but decry the lack of feedback and iteration in the policy arena. Planned community informatics must include both evaluation and feedback and also derivation of generic tools and techniques for wide spread dissemination.

In seeking to test methods of analysis of a typical community information system or systems, a rural community such as Fermanagh has a number of advantages. It has a similar socio-economic profile to much of Europe and, as a rural community it has certain inherent strengths such as a ready collective agenda and a self help culture.

In computing terms data, information, and knowledge are all stages of a process. An information system is made up of component sub-systems. Together they form an open system reacting with and influencing the wider environment. Community informatics is the implementation of community information systems. As a rule information systems are analysed from the top down, the overall system being sub-divided down into constituent parts. Applying this in the context of a regional information system it is clear that there are a wide variety of users interacting with the system. As such a socio-technical soft systems approach is best suited to requirements analysis.

Within the Information Systems discipline there is a recognised need for this kind of study to advance understanding of this new domain and as a first step in the derivation of a community informatics methodology. The approach used in this fieldwork has been tested in a number of organisational settings. This adds to the credibility of the outcomes.

Fermanagh has had over ten years of investment in ICT at different levels – by the District Council, by private sector, in community projects and in education. All documentary evidence confirms a commitment to ICT and a belief in the role of ICT in regional development. Over 2000 people took place in a parallel project to create an economic database to support community decision support. Forty business sectors were involved under the guidance of a Community Advisory Panel (CAP). There were twelve members in the CAP and of these, eight key organisations were chosen as subjects for this research.

We live in an era of contradictions. In relation to communities the catch phrase 'think locally act globally' captures some sense of this necessity to preserve local identity and yet respond to global forces and opportunities. Local communities have increasingly less control over resources and knowledge and are subjected to decisions made outside their boundaries. On the other hand the same communities are being asked to play an increasing part in local decision making and have ownership of the community's strategic vision. Whichever side of the dichotomy you favour, information is undeniably a key component and by association information and communications technologies are likewise key factors.

From the selected cases eighteen very different interpretations of the role of ICT in regional development were revealed. Initial comparison across education and background was varied and the role each participant felt he/she played in the process ranged from administrator / manager to facilitator / co-ordinator. Quantitative analysis allowed further analysis of the rankings of the eighteen items of importance and confirmed the differences between the participants. It is clear that some prioritised

information as a commodity or asset while other placed more emphasis on the potential of new forms of communication.

The attitudinal survey of associated community groups yielded results that indicate a much lesser appreciation of long term benefits of ICT. Training to date shows through but is patchy and amongst specific age groups. A conservative attitude to change was also evident confirming the findings of other evaluation reports referenced.

Drawing on experience with these groups, with the Community Advisory Panel and with the participating agencies conclusions have been drawn about a continuum of activity differentiated by scope. Later in this chapter these conclusions from the basis for derivation of basic information requirements. These have then been developed into a model that can encompass all levels of activity in the region and map them against information and communication requirements and long term objectives.

As a conclusion to this work, this chapter starts with consideration of the overall results against recent evaluations of EU programmes and further developments of Information Society and Rural Development policy. In doing so the strategic relevance of the work is reflected on as a contribution to the ongoing systematic development of policy and practice. Based on the evidence gathered a theoretic contingency model is proposed and possible community indicators offered for consideration. Given the specificity of the study, the results also have a significant local relevance and in the second section of this chapter these are summarised and presented as a 'base line' for the region. This section makes a series of recommendations for Fermanagh to further promote ICT and economic development. Finally the last section the theoretical basis for the approach is revisited and reflection

offered on the method employed. The chapter concludes with a critical appraisal of each component in terms of the transferability.

10.2 Policy Implications.

The divergence of interpretation reported above supports the concept of this period as one of societal change and resonates with the spectrum of initiatives associated with EU Information Society policy. It is also clear that there is a difference in the application of ICT in a community setting as opposed to a sectoral or organisational setting. New forms of government, decentralisation and an increasing global marketplace all offer potential opportunities at the community level and particularly to rural communities. However, a region's capacity to take advantage of these opportunities – and its chances to survive and thrive in the 21st century depends, in a large part on its ability to manage knowledge pertinent to sustainable development, (Johnson, O'Dubhchair, Scott 1998). Managing knowledge in the community setting implies that knowledge must be recognised as a key resource to be garnered and grown. In essence the technology must become transparent and the focus be on information that, applied in the local context, will add to the local knowledge base. At the recent Annual Conference of the Regional Information Society Initiatives Regions, Minister – President Simonis (Simonis, 1998,pp1) of the Land of Schleswig-Holstein emphasised that "The digital age held chances for a higher degree of mutual activity, more democracy and more employment." However she went on to add that economic poverty must not be joined by technological poverty. The aim of the Regional Information Society Initiative is to stimulate a process. That process is the transition to the information society and Minister – President Simonis went on to say that "This process may look different in each single region of the European Union – according to its economic structure and traditional communications culture." The

process however offers four main challenges: the potential of the digital age to offer new employment opportunities; the creation of an Information Society which is ecologically friendly and offers mobility based on 'bits instead of petrol'; a society which takes everyone along and is marked by increased participation; the opportunity for democratic changes and new possibilities for participating in the political process.

This study comes to completion at an important time as the EU and the Member States governments debate the framework of the next period of structural funding, 1999 – 2006 and seek to build on the achievements of this period, 1994 - 1999. Understandably many aspects of work to date are being reviewed. In Chapter 3 two specific reports were considered to position the findings of the thesis and the strategic significance of the work. Recurring themes of planned activity within a strategic framework, of local action feeding back into policy making, of mainstreamed results and of open and inclusive dialogue predominate. Where can work such of this research contribute to the advancement of these themes? It would appear to sit as a pilot in 'closing the loop'. The outcomes reported below for the local area concur with the findings both of the ESF Evaluation Unit and the LEADER Groups. Given that it is clear that the methods employed offer a novel method for the collection of what has already been referred to as 'consensual evidence' objectively verified. Given the repeated acknowledgements that the bottom-up approach by definition will reveal multi-perspectives views and outcomes it becomes essential that methods be piloted that likewise capture that 'rich' picture and allow easy translation of it back to the policy fora.

10.5 The Timing Issue.

Before turning to consideration in detail of the research outcomes it is relevant to consider the current situation at the level of the EU. At an administrative level the latter half of 1999 will see both a new Commission appointed and a new Parliament elected. It is expected that the new Parliament will assemble earlier than normal in late July and that the vetting procedure for the Commission should be complete by September. Policy work that has been on hold is expected to recommence by autumn and allow business to be back on track for 2000. A framework for allocation and disbursement of the Structural Funds is a major agenda item. It is also worth noting that the Treaty of Amsterdam, effective from 1st May 1999 significantly increases the role of the Parliament as co-decision makers. Finally it must be remembered that a significant factor in derivation of future policy is the need to create structures that will work for the Accession Countries and assist in political and economic transformation. On 1st January 2000 the Special Accession Programme for Agriculture and Rural Development (SAPARD) will come into effect with an annual budget of 0.5bEuros/annum. The 'horizontalism' of ESF and EAGGF structural measures to date should be revisited in the light of demands they make on poorer countries for matching funds. There are many constraints facing an enlarged Europe as it tries to compete globally and ensure an equitable economic future for all its members. Budgets should follow policy priorities not the other way around.

10.6 Developing a Model of a Knowledge-based Community

Research outcomes confirmed commentary from the literature. New technologies are pivotal in ongoing local development. In beginning to understand this in depth an initial strategic framework is suggested based on a continuum (shown in Table 16). Activity ranges from initial community engagement and development through empowerment of local groups, organised community economic development, local

planned economic development with government agencies and authorities, to regional

economic development and influence on national policy.

- **Community Development**

The starting point of community activity centres on initial mobilisation and

motivation of that community to pool their social capital and address a collective

agenda. This may not necessarily be an economic agenda. This group empowerment

can be best served by communication and access to other communities and external

resources. Interactions are in real time and the number of people involved may be

low. An advantage to the process is a minimum level of computer literacy and access

to appropriate community information networks and electronic bulletin boards.

- **Community Economic Development**

A further stage of development has a specific economic focus at the immediate local

level. Groups or partnerships come together to foster regeneration. Decisions and

transactions tend to be immediate and the scope is narrow. Information becomes a

necessary resource. This may be simple record keeping, further experiential learning,

written communications or budgetary requirements. An asset at this stage is a degree

of informacy based on generic application software and local information systems.

- **Local Economic Development**

Stage 3 implies a wider remit with a number of groups coming together or represented

in partnership. There is a degree of co-ordination of activity and the time frame of

planning is lengthened. The scope of the collective agenda is also wider and there is a

need to receive and assimilate information from the external environment. As the

group(s) move into strategic planning a high level of informacy becomes a necessity.

Community informatics can offer some form of community management information

system underpinned by a community/regional database or community memory.

Processes must be established for shared decision-making, summary reporting and exception reporting. The community must become committed to learning, assessing risk and adapting to change. There must be wide participation and partnership

- **Regional Development**

At the fourth and final stage the scope moves beyond the local to the region and beyond response to the external environment to the ability to interact and influence the external environment through policy. Community informatics must now be used as a fully-fledged group support system. As such ICT will provide opportunities for distance and time independent participation in the decision process. Universal and tacit knowledge will be equally valued and combined in community memory. Global changes will be considered locally with environmental, social and economic implications assessed and alternatives evaluated. Long term planning will be supported. CDSS will be available through tailor made interfaces and be widely accessible to all citizens. There will be an ethos of learning and developing and a knowledge infrastructure to support the process.

Table 16. Continuum of Community Development

STAGE	Community Development	Community Economic Development	Local Economic Development	Regional Development
ACTION	Empowerment	Regeneration	Strategic Planning	Policy Influencing
IS LEVEL	Computer Literacy	Informacy	Community Management Information Systems	Community Decision Support Systems
IS SUPPORT	Community Information Networks	Community Information Systems	Community Memory	Knowledge Infrastructure

The fieldwork of this study indicates that all these levels of activity may, and probably will be, going on in a region at one and the same time. Any model to be used as a planning tool for an ongoing information and communications strategy must therefore allow for all stages of development.

From this research key parameters that have emerged are :

Rate of participation;

Degree of partnership and collective planning;

Range of issues addressed i.e., local to global;

Level of human capital i.e., number of people equipped to deal with change and technology;

Extent of the supporting knowledge base;

Sophistication of the underpinning technological infrastructure.

This in turn leads to the derivation of a contingency model for the development of a 'Knowledge' community and consideration of the developing structure as a community moves along this continuum. Many readers will be familiar with the "management pyramid" of the private sector reflecting a structure where decision making moves from: operational – tactical – strategic – visionary. Information needs and temporal characteristics can be mapped in parallel. At the factory or shop floor level there is a need for real-time transaction processing, record keeping and computer systems offer the advantages of volume and accuracy. One step up the pyramid, at a supervisory level, tactical decisions are based on control and summary reporting over appropriate time periods – end of week, end of month etc. In the strategic and

visionary levels fewer people are involved, internal information is supplemented by information from external sources, the time frame is longer and moves to futuristic.

In developing a model of a knowledge-based community the findings of this study lead to a proposal that the model above be virtually inverted to form a Community Knowledge Cone, (Figure 10). Desired changes identified from the literature and particularly as published policy aims include:

1. Increased democracy and greater involvement by community members in the decision making process;

2. Strategic planning at the local level integrating local, regional and global;

3. Social cohesion and inclusion;

4. Preservation of identity and celebration of diversity;

5. Job creation and regeneration;

Study of the Fermanagh region has confirmed these as of recognised importance. Each item translates into a knowledge-based requirement:

1. A wide spread level of informacy and a means of access to information on issues and input of views;

2. Access to appropriate information databases, facilities for integrating information into the planning context, facilities for impact assessment and alternative selection;

3. A universal service and equal access to educational opportunity for all;

4. Marriage of technology and culture, communications with other cultures;

5. Access to new opportunities using ICT, skill to develop knowledge-based products, access to technological resources to extend creativity.

A knowledge-based community will be outward looking, inclusive and continuously learning. It will be a community with the courage to take risks but those risks will be calculated. It will be a community with a vision, a vision that is shared and owned by all, but a vision that is dynamic and growing. It will be a community that has adapted the potential of ICT to its requirements. It will be a wise community.

Development of a community into a knowledge-based community involves a move in scope from local to global. This scope reflects both problems and opportunities. As scope widens measurement along four other parameters must go from low to high. Different communities will prioritise these according to their unique identity but the status of a knowledge-based community could only be given to those exhibiting a high degree of all four.

- Participation and Partnership – equality of opportunity.

  In a knowledge-based community all citizens should have the opportunity to be involved in the decision-making process. Some may opt not to avail of that opportunity but it should be a possibility for all. This decision-making process will encompass both governance and democracy and sustainable development.

- To have this degree of participation and the ability to use knowledge as a commodity and as a right will require highly developed social capital. The opportunity must exist for all citizens to reach a high level of informacy. Over time a pool of skilled people will develop within the community.

- A co-ordinated knowledge base must underpin development. As a knowledge-based community there will be widespread recognition of all forms of knowledge as a prime asset. Processes will be in place for the articulation of tacit knowledge and for the capture and updating of secondary data sources.

- Finally there will be progression to a sophisticated technological infrastructure embedded in the non-technological social institutions and in community interaction and affording accumulation, assimilation, distribution and communication.

In the early chapters of this thesis it was established that ICTs are part of a community information system. This information system will include all the recognised sub-categories of systems: Basic transaction processing systems; information networks; decision support systems and expert systems. It is suggested that the basic components to support these and the Community Knowledge Cone will be:

- **Community Memory.**

This can be thought of as a multimedia database. In fact any information in any form is legitimate. What is required is that it be maintainable, easily accessible and interactive and has the potential for information integration and knowledge generation.

- **Community Communication Support System (CCSS).**

A knowledge infrastructure underpins a group support system. Current thinking on communications tends to be limited to facilities such as e-mail etc. From the literature review in Chapter 5 it is clear that there is still much to learn about the communication in a group, especially if that group encompasses a whole community with many internal groupings from families right through to statutory bodies and government agencies. The CCSS of a knowledge-based community should support internal and external communication within and between all types of groups and apply the 'best fit' in ICT terms to any particular communication.

• **Community Process Support System (CPSS).**

Early theorists in studying group work advocated 'Group Support' to increase group effectiveness and help avoid 'process losses'. GSS software is available and provides help for many of the process tasks groups undertake: agenda setting, identifying problems, generating alternative, recording meetings. However research studies indicate need to take account of task type, information richness requirement and choose communication media and support packages accordingly. At the community level a CPSS would interact with the group to allow selection of support software to best facilitate effective, high quality outcomes.

Figure 10. Community Knowledge Cone.

The concept of a knowledge-based community is an attractive one. It implies a community that has found a way of interacting both internally and externally that ensures preservation of all that is best within the community while allowing it to compete successfully in economic terms. Measuring progress towards that goal is the

challenge. In Chapter 1 the concept of indicators was discussed. In particular it was noted that at the community level an indicator should be rooted in a vision. Fermanagh, as a typical European region, has a vision that embodies preservation of the natural beauty of the area and the quality of life that that offers with development. Development that provides employment for young people, development that offers access to education for all, development that fosters innovation and development that reinforces partnership and peaceful coexistence. There are many other communities who would share that vision. Reflecting it the following factors are offered for consideration as community indicators as follows.

Job Creation – 'Knowledge Based Employment'
- Number of 'high tech' micro start ups   - Number of SME's employing IT person for first time   - Number of 'high tech' inward investment new jobs   - Number of IT posts created in Public Services   - Number of IT posts created in Community Groups   - Size of skilled workforce

Distance Independent Opportunities
- Number of companies using remote marketing   - Number of Internet enquiries on County site   - Number of distance education registrations   - Use of videoconferencing   - Community representation on international networks

Enhanced Professionalism of Community Development
• Percentage of community workers trained in community informatics • Number of community groups on-line • Percentage of community facilitators trained in CDSS

Increased Participation in Decision-making Process
• Percentage of local government business electronic • Number of decision-making partnerships • Number of people involved in decision-making partnerships • Number of opportunities for public participation in policy debate • Number of public information access points

Greater Social Inclusion
• Percentage of targeted training opportunities • Number of access points for the physically disabled • Geographical spread of access points • Percentage participation in decision making by: Class; gender; religion; disability • Extent of access i.e. to what networks

Table 17 Proposed Community Indicators

10.7 Constructing a Base Line in Information & Communications Technology.

Fermanagh as noted in earlier chapters is a community that has been committed for the last decade to the idea of ICTs as a tool for regional development. That commitment has manifested itself primarily in training and capacity building and in pockets of specialised activity such as KITE or the Interactive Technology Centre (INTEC). The net result to date is that there is a sense of maturity in relation to uptake and use of ICTs. It appears as an assumed factor. It seems analogous to the response of a region that has moved from a poor physical infrastructure to a region with first class roads. Roads no longer appear as the focus of conversation, but rather here is an awareness of the potential that has been opened up. However the analogy can only be taken so far. Fermanagh may have an excellent electronic infrastructure but it still has a pressing physical infrastructure problem and one does not negate the other. No matter how advanced the electronic infrastructure it odes not remove the fundamental local need for good roads.

10.7.1 The Importance of ICT to Economic Development.

Five years ago an extensive consultation exercise was carried out in Fermanagh in order to formulate the Regional Economic Development plan. 'Access through telecommunications' emerged as a cross-sectoral overarching theme and the development of the INTEC centre as a flagship project. In the intervening time INTEC has received high priority and all goals set have been achieved. In turn it has been instrumental on the ground in delivering enhanced 'access' facilities to many sectors of the community. Amongst those involved in economic development the results of this study indicate focus on traditional sectors of economic activity in Fermanagh. Technology is not defined as a separate sector nor is it apparent that any

agency sees it as their role to promote it as such. Use of information and communications technologies is recognised within most sectors. Notable exceptions are in agriculture and in small/micro business.

10.7.3 Spread or diffusion of ICTs.

The quantitative research results and secondary documentation indicate widespread use of information technology but lesser use of communications technology. Given the emphasis placed on access to opportunities this was surprising and suggests that there is a job to be done in convincing people that the investment in time and money will give a worthwhile return. The Community Group survey corroborated insights drawn from the qualitative study.

It is obvious that the heavy investment in initiatives focusing on women has had a significant impact in creating positive attitudes amongst this group. Not withstanding the obvious employment potential of the Kinawley Telecottage, it is apparent that this impact has had a ripple affect in community groups where women are often involved in a voluntary capacity or as a first step on the 'return to work' path.

Also those who have taken either short courses or formal training in computing showed more confidence about the role of computers in their activity.

10.3.4 The Strategic View.

Overall the positive benefits accruing to technology can be categorised, in order of importance, under five headings:

1. Job creation;

2. New distance independent opportunities;

3. Enhanced professionalism of community economic development;

4. Increased participation in the decision making process,

5. Greater social inclusion.

There was also significant interest and evidence of increasing recognition of the potential of electronic mail and video conferencing in negating distance. Widespread use is, however, still a thing of the future. Similarly recognised but not yet widely operationalised was the concept of information as a resource underpinning local decision making, new modes of local governance and input and access to central decision makers. Social equity between generations and social inclusion of the disadvantaged ranked high as desirable outcomes and there was an interesting example of an innovative venture with farming families and subsidised equipment acquisition and training.

In Chapter 8 and 9 the detailed outcomes were given. What emerges, as an overall pattern is a very holistic approach to the potential of information and communications technologies, in many ways the epitomy of the balance needed between: information as a commodity and information as a right. The meanings that emerged in this study are important both individually but also collectively as they reflect an unconscious degree of maturity amongst the community in the emphasis on 'information' and not the technology per se.

There also was a noticeable undercurrent of frustration with 'information technology as the answer to everything'. It is important to remember that societal change is a slow process and that new ideas have to earn acceptance and prove worthy of adoption.

10.8 Enhancing the Local Network of Economic Actors.

In previous chapters detail has been given about the choice of participant, the interviews held and the subsequent coding algorithm applied. In drawing conclusions about the local economic development network one is immediately struck by the fact that the group is not electronically networked. All participants meet in partnership roles additional to their primary function and all would be seen as contributing to overall regional development. In fact the majority are currently preparing an Integrated Regional Strategy. There also seems to be a striking dichotomy between the documented recognition of ICTs as a key factor in regional development and the lack of a co-ordinated drive on this front. Based on the interpretation of the open interviews and the findings of the associated mail surveys the following interventions are suggested. The first recommendation is:

That a virtual community, in the form of an Intranet, be created amongst all those facilitating economic development with a view to shared information and support.

From discussion it would appear that all participants were convinced of the benefits of and potential of the Internet as a resource. However, either for organisational or time reasons the majority did not make regular use of the resource. Arising from comments made by the majority of participants a second recommendation is:

That an advanced Internet course be made available to those acting in the role of facilitating or administering economic development.

Fermanagh is renowned for it's internal community network and it is obvious from the interviews that the County has many external links and partnerships. The nature of local government activity is such that there are specific regional and national links and in addition Fermanagh appears to have many connections in Europe, the United

States, Australia and New Zealand. It is suggested that these links be strengthened by adoption of two related recommendations:

The creation of a Fermanagh Economic Development web site

and enhanced overseas email contact and community network.

To underpin the first four recommendations it is also suggested that:

There should be targeted capital investment, at the regional level, in hardware and software to ensure compatibility and capacity for all participants.

As pointed out in earlier chapters, Fermanagh is very progressive and, more than many other regions has at the conceptual level recognised the potential for ICTs and correspondingly invested in infrastructural and capacity building initiatives. There is however, evidence of a clear distance between what is subscribed to 'as a thing of the future' and the reality of job creation and wealth creation on the ground in 1998. There is a growing enterprise culture but the new enterprises tend to be 'low tech' and quite traditional. With the exception of one commercial participant there was no evidence of a concerted drive to promote new technologically based services or industries. There are pockets developing but these are very random and almost accidental to the main plan. Initiatives such as the INTEC Centre and Higher Bridges project will help this situation. Nevertheless a sixth recommendation would be that:

A regional task force be established to drive economic developments based on ICTs e.g. teleworking, call centres etc.

All participants reported that their role included advising others on training needs in information and communications technologies. There is some evidence that this is done in conjunction with local training providers but in an individual and arbitrary fashion. It is therefore recommended that:

Within Fermanagh University Partnership Board education and training providers should be asked to prepare and make available a suite of accredited programmes to create the skilled workforce necessary for the activities outlined above.

Maintenance and bad experiences with maintenance providers were recurrent themes in each conversation. While it is not reported as such there would appear to be a dependence on 'good will' contacts. As the level of usage expands throughout the region the need for readily available maintenance and service agreements will increase. This in itself could be a meaningful commercial activity. It is therefore recommended that:

Existing local computer hardware and software providers should be encouraged to enter the maintenance arena and should be supported in attracting and training technical support staff.

In addition if technology diffusion and use is to become more widespread there is need for independent advice and guidance similar to that offered within the financial services sector. It is therefore recommended that:

As a "not for profit" organisation the INTEC Centre could be commissioned in this role and develop a facility to assist members of the community in the selection and purchase of appropriate hardware and software.

The final recommendation relates specifically to Fermanagh District Council who undoubtedly, plays a pivotal role in the ongoing development of the region. The

District Council is well positioned to lead the way in the adoption of ICTs as a "modus operandi". It is therefore recommended that:

FDC continue to expand the use of ICTs for internal and external communication and explore initiatives for the development of electronic governance and increased citizen participation.

10.9 A Theoretical Basis.

In post-modern philosophy knowledge validated against objective reality is no longer the dominant view. Rather as (Kvale, 1995) says it has been replaced by a 'perspectival reality' where knowledge is validated through practice. In the spirit of postmodernism Kvale quotes (Rosenau, 1992) rejecting universal truth but accepting the possibility of specific local, personal and community forms of truth within the focus of a local narrative.

This research has focused on the social construction of information and communications technology. The social construction of valid knowledge is through construct validity and the tracking of theoretical constructs. Validating such constructs is a process of corroboration and a process of developing sounder interpretations. In the research community such output is not offered as an established proof but rather to stimulate and advance discussion. The particular constructs investigated here were: the perceived importance of technology in relation to economic development; the spread of technology within the defined sector; the locus of control of decision making about ICTs; obstacles and difficulties encountered or perceived; and the overall strategic importance attached to ICTs.

The issue of what is valid knowledge has always involved the question of truth. Truth traditionally has three criteria of definition namely, correspondence, coherence and pragmatic utility. In research such as this based on perspectival reality there must be a similar shift in emphasis from concentration on the correspondence of knowledge with the objective world to the coherence of the approach and more importantly, the relationship of each knowledge statement to its practical consequences. Verification is based on observation but also on iterative conversation in the community of study and within the interaction of the local network. In drawing conclusions in this study each knowledge statement has been considered in terms of the practical consequences for the study region and possible action suggested. But this thesis has been undertaken on the premise that this region is typical of many in Europe and this therefore has allowed conclusions to be drawn at the policy level.

The desired outcome then is to raise new questions and encourage more answers. Miles and Huberman (1994) suggest that detailed tactics include: checking for representativeness, triangulation, verifying the evidence, checking the meaning of outliers, following up surprises, looking for negative evidence, making if-then tests, ruling out spurious relations and getting feedback. Later in this chapter these tactics are used as a template against which the overall method is reviewed and assessed.

To validate then is to theorise. In this research an attempt has been made to extend the concept of validation by the research community to include verification by the subjects in the community at large with an emphasis on the local context. Pragmatic validity looks beyond truth to associated action, aiming to interpret in order to understand and change. The ultimate test of the credibility of a report is the response

of the decision -makers and information users to the report. The final validation of this work will therefore rest with the local community – the information users, the community of policy makers at national and EU. Level – the decision-makers and the information systems research community. (Lincoln & Guba, 1990) talk of enquiry enhancing the level of understanding of the participants and their ability to take action and be empowered. So the 'acid' test of a thesis such as this is whether interventions based on the interpretations presented may actually be translated into changed behaviour.

10.10 Reflections on the Methods used.

In earlier chapters the need for understanding of the role of technology in the community has been emphasised. The gradual shift in information systems research towards the more qualitative methods of the social sciences has also been explored. Likewise the similarities between these methods and those of grounded community development has been highlighted. In concluding this piece of work the question that remains to be asked is the extent to which the research methods have proved appropriate to the task. Reflecting on that question leads to articulation of suggestions made both for amendments or extensions and for future work. In Chapter 6 the objectives of this study were set as to:

1. Explore the phenomenon of the introduction of ICTs in the real life context of the community in Fermanagh;

2. Gather evidence and from that generate theoretical commentary;

3. Create a 'thick description' of the technological frames of reference over – importance; spread; control; obstacles; infrastructure and regional plan;

4. Provide reflections on - the nature of the technology, technology in use, and the strategic view of technology.

Criteria 1 was addressed by focusing the study in a region in which there was a considerable interest in the use of information technology and, more importantly on regional development. The approach used to study the social construction of information technology amongst the chosen facilitators of economic development provided insights that addressed Criteria 2 and 3. Criteria 3 was further developed by the use of secondary data and by the quantitative methods used. Criteria 4 drew on the early part of each of the in depth interviews and was reinforced by the analysis of the results of the community group survey. Earlier in this chapter the work of Miles Huberman was referenced and suggests a template for assessing the appropriateness of the manner in which the research methods have been applied. This is summarised in follows:

- **Checking for Representativeness** Choice of participant and comparison with community survey;

- **Triangulation** Use of secondary data sources such as published strategies and backing of qualitative data by quantitative;

- **Verifying Evidence** Checking of findings by the respondents and categorical analysis;

- **Checking Meaning of Outliers** Attention given to all results;

- **Following up Surprises** Free style open ended interviews, diverging from strict structure, follow-up telephone conversations;

- **Looking for Negative Evidence** Positive and negative meanings assessed both in qualitative and quantitative work;

- **Making 'if then' tests** Reflection on all possible interpretations;

- **Ruling out spurious relations** Statistical analysis of results;

- **Getting feedback.** Ongoing involvement of researcher in the community.

In terms of amendments to the approach taken it would have been useful to have included some more 'traditional assessment' of IT usage by the community groups. The attitudinal survey administered could only be said to test 'technology in use'. This was not inappropriate but given the tendency to look for 'hard' facts, if this approach were to be adopted for more widespread use this extension could be beneficial. A specific adaptation of the attitudinal survey could be prepared for community use. Similarly future research would involve testing this method across different sectors within a region to ascertain if it is appropriate as it was here for all groups.

10.11 Summary.

In conclusion this research has revealed a rich vein of findings to inform a more comprehensive understanding of the embedding of technology in the wider community. In the era of globalisation and knowledge based activity information and communications technologies have a key role to play in providing a supportive infrastructure on which new interpretations can be discovered. However that role must be supportive in every respect and it is vital that we define and determine new ways of understanding that role in the context of the lead player – information and it's role in social and economic development.

APPENDIX A

PARTICIPATING ORGANISATIONS

FERMANAGH DISTRICT COUNCIL

FERMANAGH ENTERPRISE LTD.

FERMANAGH BUSINESS INITIATIVE

EAST ERNE ABSAG

FERMANAGH LEADER ACTION GROUP

KITE

FERMANAGH WOMEN'S NETWORK

APPENDIX B

COMMUNITY ASSOCIATIONS

PROJECTS & PARTNERSHIPS

Fermanagh District Council, Townhall, Enniskillen

ADOPT – Association for the Development of Pettigo/Tullyhommon

Aughakillymaude Community Association

Ballinamallard Development Association

Bannagh Community Project

Belcoo and District Community Association

Belcoo and District Development Group

Belcoo Enterprises Ltd

Belleek Community Development Trust

Belleek Community Association

Boho Community Association

Brookeborough & District Community Development Association

Camphill/Aghagay Tenants' Association

Carnmore Community Tourism Project

Cashel Community Development Association

Cavanacarragh Community Association

Cavanaleck Residents Association

Citizens' Advice Bureau (Enniskillen)

Cleenish Community Project

COA Community Association (Enniskillen)

Coonian Community Development Association

Cornagrade Community Association (Enniskillen)

Derrychara Community Association

Derrygannon Community Association

Derrygonnelly and District Development Association

Derrykerrib Island Community Association

Derrylin and District Community Development Association

Donagh Community Association

Drumbeg Community Association

Edenmore Tenants' Association

Ederney and District Community Association

Ederney Community Development Trust

Enniskillen Community Development Project

Enniskillen Together

Fortlea Tenants & Owners Association

Garrison and Melvin Community Development Association

Hillview Community Association

Irvinestown Community Association

Irvinestown Fairs and Markets Trustees

Irvinestown Trustee Enterprise Co Ltd

Kesh Development Association

Kesh Enterprise Co. Ltd

Killesher Community Development Association

Kilmacormick Community Association

Kilmacormick Site 2 Community Association

Kinawley Community Study Project

Knocks Community Association

Lack Community and Development Association

Lisbellaw Development Association

Lisnarick Residents' Association

Lisnaskea Community Development Association

Lisnaskea Fairs and Markets Trustees

Lisnaskea and Clones Economic Development

Maguiresbridge and District Community Development Association

Magheraveely Community Development Association

Mullaghdun Community Association

Mulleek Community Association

Mullcovet Mill Development Group

Netwonbutler Development Association

Roslea Community Association

Roslea Enterprise Ltd

South-West Fermanagh Development Organisation (Teemore)

Tempo Development Association

Tullyvogy Community Association

Upper Lough Erne Community Group

Windmill Community Association

CHURCH SPONSORED PROJECTS

Aisling Centre

Barnabas Trust

Centre Care Project

Clogher Care

PROJECTS

Dooneen Community Education Centre

Friendship and Caring Trust (FACT)

KITE (Kinawley Information and Technology Enterprises)

Northern Ireland Tenants Action Project (Fermanagh Branch)

Roslea District Community Projects

PARTNERSHIPS AND STRATEGIC BODIES

Community Connections (Cross Border Community Network)

Devenish Partnership Forum (Enniskillen)

Erne Shannon Community Tourism Group (Cavan & South West Fermanagh)

Fermanagh Business Initiative

Fermanagh Rural Community Network

Fermanagh Women's Network

Fermanagh Local Action Group (FLAG)

Lakeland Community Care (West Fermanagh)

Lakeland Community Transport Initiative (West Fermanagh)

Lisnarick/Irvinestown/Kesh/Enterprise (LIKE)

Slieve Beagh Initiative (North Monaghan & South East Fermanagh)

Trillick/Irvinestown/Tempo/Ederney (TITE) Caring Partnership

APPENDIX C

COMMUNITY QUESTIONNAIRE

Background Information

Sex	Male	___
	Female	___
Age	*20 – 30*	___
	30 – 40	___
	40 – 50	___
	50 +	___
Voluntary Worker		___
Employee		___

Survey Data

1   Using a computer would increase my   1   2   3   4   5
accessability to information.

2   I think that using a computer at work   1   2   3   4   5
would improve my productivity.

3   A computer would give me more timely   1   2   3   4   5
access to needed information.

4   Using a computer would reduce the time   1   2   3   4   5
I now spend waiting for important
information.

5   A computer would be a valuable aid to me   1   2   3   4   5
in organising my work.

6   Using a computer would give me the   1   2   3   4   5
capability to generate reports quickly and in
varied formats.

7   A computer would benefit me because few   1   2   3   4   5
management issues are answerable in
black and white.

| 8 | I'd like to use a computer because it provides me with summary reports and statistical analysis. | 1 | 2 | 3 | 4 | 5 |

| 9 | Computers can provide valuable assistance to managers in tasks such as budget planning and preparation, tax planning and preparation, and others. | 1 | 2 | 3 | 4 | 5 |

| 10 | I'd like to learn about ways that computers can be used to aid management tasks. | 1 | 2 | 3 | 4 | 5 |

| 11 | A computer would give me more opportunities to obtain information that I need. | 1 | 2 | 3 | 4 | 5 |

| 12 | Using a computer could provide me with information that would lead to better decisions. | 1 | 2 | 3 | 4 | 5 |

| 13 | A computer helps to reduce manual calculations. | 1 | 2 | 3 | 4 | 5 |

| 14 | A computer helps me to increase coordination | 1 | 2 | 3 | 4 | 5 |

| 15 | Using a computer can increase coordination between divisions. | 1 | 2 | 3 | 4 | 5 |

| 16 | Using a computer can relieve me of some menial tasks. | 1 | 2 | 3 | 4 | 5 |

| 17 | I can save overhead expenses for my company by using a computer. | 1 | 2 | 3 | 4 | 5 |

| 18 | A computer easily provides management decision makers with reports. | 1 | 2 | 3 | 4 | 5 |

| 19 | A computer provides information interchangeability. | 1 | 2 | 3 | 4 | 5 |

| 20 | A computer helps me to trace and to control costs and expenses. | 1 | 2 | 3 | 4 | 5 |

| 21 | Using a computer would give me much greater control over important information. | 1 | 2 | 3 | 4 | 5 |

Section 2

22   I'd like to use a computer because of the   1   2   3   4   5
      wordprocessing capability it would give me.

23   I'd like to use a computer because there are   1   2   3   4   5
      many application packages commercially
      available.

24   I'd discourage my company from using   1   2   3   4   5
      computers because of the redundant
      capabilities that would result if too many
      were purchased.

25   Computers are primarily just toys, much as   1   2   3   4   5
      video games, so they can't be of much real
      use to managers.

26   Using a computer would give me the   1   2   3   4   5
      capability for faster analysis of information.

27   A potential problem with computer use by   1   2   3   4   5
      managers at work is the proliferation of
      incompatible programs within an organisation.

28   A computer would be of use to me because   1   2   3   4   5
      it would allow for faster production of charts
      and graphs.

29   I'd discourage my company from acquiring   1   2   3   4   5
      computers because most application packages
      would need to be modified before they could
      be useful in our specific situation.

30   A computer would be of no use to me   1   2   3   4   5
      because of its limited computing power.

31   I wouldn't use a computer because it is   1   2   3   4   5
      impossible to enjoy using it.

32   A computer would be of no use to me   1   2   3   4   5
      because of the limited availability of application
      program packages.

33   A computer would be of no use to me   1   2   3   4   5
      because of its small storage capacity.

| 34 | I'd use a computer because I can use spreadsheets to do calculations for me. | 1 | 2 | 3 | 4 | 5 |

| 35 | A computer has graphic software that I can use. | 1 | 2 | 3 | 4 | 5 |

Section 3

| 36 | Using computers might cause a problem of inconsistent data or duplication of data on the various computers within the organisation.. | 1 | 2 | 3 | 4 | 5 |

| 37 | I wouldn't want to use a computer because it would reduce my interaction with people. | 1 | 2 | 3 | 4 | 5 |

| 38 | Using a computer would result in a tendency to overdesign simple tasks. | 1 | 2 | 3 | 4 | 5 |

| 39 | Using a computer might cause me to answer queries too quickly, without applying sufficient judgement. | 1 | 2 | 3 | 4 | 5 |

| 40 | I wouldn't want to have a computer at work because it would distract me from my normal job duties. | 1 | 2 | 3 | 4 | 5 |

| 41 | I wouldn't favour using a computer because there would be tendency to use it even when it was more time consuming than manual methods. | 1 | 2 | 3 | 4 | 5 |

| 42 | I'd hesitate to acquire a computer for my use at work because of the difficulty of integrating it with existing information systems. | 1 | 2 | 3 | 4 | 5 |

| 43 | If I personally used a computer at work, it would damage the managerial image that I want to protect. | 1 | 2 | 3 | 4 | 5 |

| 44 | I don't like to use computer because its fast speed make people impatient to the slowness of human beings. | 1 | 2 | 3 | 4 | 5 |

| 45 | I feel frustrated using a computer. | 1 | 2 | 3 | 4 | 5 |

Section 4

46	Computers break down, causing adverse effects	1	2	3	4	5

47	I could save time by using a computer.	1	2	3	4	5
48	I wouldn't use a computer because programming it would take too much time.	1	2	3	4	5
49	I wouldn't use a computer because its too time consuming.	1	2	3	4	5
50	Using a computer would take too much time from my normal duties.	1	2	3	4	5
51	Using a computer would involve too much time doing things like inputting data to allow enough time for managerial tasks.	1	2	3	4	5
52	By using a computer I'd spend more time translating my wants and needs to others	1	2	3	4	5
53	I'd discourage my company from acquiring computers because getting service takes time	1	2	3	4	5
54	I'd like using a computer because it is easy to write my own applications	1	2	3	4	5

Section 5

55	I'd like to have a computer because it is so easy to use..	1	2	3	4	5
56	I'd like to use a computer because it is oriented to user needs	1	2	3	4	5
57	A computer would be of no value to me because I don't know how to write computer programs	1	2	3	4	5
58	It is easy to retrieve or store information from or to a computer	1	2	3	4	5
59	It is easy to access and store data in a computer	1	2	3	4	5
60	It is easy to use a computer in forecasting	1	2	3	4	5

61	I don't like using a computer because it is not easy to understand computer documentation	1	2	3	4	5
62	I don't like using a computer because it is not easy to insure personal privacy	1	2	3	4	5

APPENDIX D

Higher Bridges
Regional Studies Centre
Woodburn House
Magee College
University of Ulster
Derry
BT48 7JL

12/10/98

Dear Colleague

As you will be aware the Regional Economic Development Strategy identifies telecommunications as an overarching theme across many economic development initiatives. In planning further developments in information and communications technology it is therefore important that we ascertain the current position and the opinions of those actively involve in economic development in the region.

I would be grateful therefore if you could complete this short questionnaire. It should only take a few moments of your time but will be of real help to the process.

Your answers will be treated in complete confidence and no group or individual will be identified from this.

In each case there is a scale from:

1 = **Strongly Agree** to **5** = **Strongly Disagree**. Simply circle your choice.

A stamp addressed envelope is included and I would be grateful if you could return the completed form within the next week.

Thank you for your co-operation.

KATE O'DUBHCHAIR

APPENDIX E
DUAL SCALING DATA AND CALCULATIONS

*** INPUT DATA ***

```
 9  16  14  17    4    3    7    5   8   1   2  11  10  15  18  12   6  13

 8  12  17  15    7    3   13   14   1  10   4   5   2  16   9  11   6  18

11   1  16  17    3   13   12    2   7  18   5   4   6  14   8  10   9  15

 2  11   1  10   17    9  3.5  3.5  18   5  15   6  16   7   8  13  12  14

 6  11  12  15    1    7   10    8   9   3  16  14  17  18  13   2   4   5

 3  14 9.5 9.5  1.5  1.5    6   17   5   4  13  15   7   8  12  17  17  11

10  16   9  17    8    2    1   14  15   4   3  11   6   5   7  12  13  18

 6  14  14  14    1    7   14    5   9   4  14   2   3  14  14   8  14  14
```

NB:- Tied ranks and unranked variables are all adjusted!!!!!!

*** DOMINANCE MATRIX E ***

```
  1  -13   -9  -15   11   13    5    9    3   17   15   -3   -1  -11
-17   -5    7   -7

  3   -5  -15  -11    5   13   -7   -9   17   -1   11    9   15  -13
  1   -3    7  -17

 -3   17  -13  -15   13   -7   -5   15    5  -17    9   11    7   -9
  3   -1    1  -11

 15   -3   17   -1  -15    1   12   12  -17    9  -11    7  -13    5
  3   -7   -5   -9

  7   -3   -5  -11   17    5   -1    3    1   13  -13   -9  -15  -17
 -7   15   11    9

 13   -9    0    0   16   16    7  -15    9   11   -7  -11    5    3
 -5  -15  -15   -3

 -1  -13    1  -15    3   15   17   -9  -11   11   13   -3    7    9
  5   -5   -7  -17

  7   -9   -9   -9   17    5   -9    9    1   11   -9   15   13   -9
 -9    3   -9   -9
```

If subjects do not differ, the simple column averages would suffice;
with the presence
of individual differences, however, we must differentially weigh
subjects to come up with the most discriminative values of the
columns (18 variables).

*** THE TOTAL INFORMATION TO BE ACCOUNTED FOR = 0.3664
***

The total information is the sum of all the eigenvalues, that is, the
sum of the component
variances.

*** SUMMARY STATISTICS ***

```
 8 12 17 15  7  3 13 14  1 10  4  5  2 16  9 11  6 18

11  1 16 17  3 13 12  2  7 18  5  4  6 14  8 10  9 15

 2 11  1 10 17  9 3.5 3.54 18  5 15  6 16  7  8 13 12 14

 6 11 12 15  1  7 10  8  9  3 16 14 17 18 13  2  4  5

 3 14 9.50 9.50 1.5 1.5  6 17  5  4 13 15  7  8 12 17 17 11

10 16  9 17  8  2  1 14 15  4  3 11  6  5  7 12 13 18

 6 14 14 14  1  7 14  5  9  4 14  2  3 14 14  8 14 14
```

*** RANK 1 APPROXIMATION ***

```
  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

 12.00    5.00    2.00    1.00   18.00   17.00    9.00    8.00   14.00   15.00
13.00   11.00   16.00    4.00  6.00    7.00   10.00    3.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00

  7.00   14.00   17.00   18.00    1.00    2.00   10.00   11.00    5.00    4.00
  6.00    8.00    3.00   15.00
13.00   12.00    9.00   16.00
```

*** RANK 2 APPROXIMATION ***

```
  6.00   17.00   16.00   18.00    2.00    1.00    8.00   11.00    7.00    3.00
  5.00    9.00    4.00   14.00
13.00   12.00   10.00   15.00

 10.00   12.00   18.00   17.00    1.00    5.00   14.00    8.00    2.00   11.00
  4.00    6.00    3.00   16.00
13.00    9.00    7.00   15.00

 12.00    6.00   18.00   14.00    7.00   13.00   16.00    8.00    1.00   17.00
  5.00    2.00    3.00   15.00
10.00    9.00    4.00   11.00

  5.00   15.00    1.00    6.00   18.00    9.00    2.00   11.00   17.00    4.00
 13.00   14.00   16.00    3.00
  8.00   10.00   12.00    7.00

  6.00   16.00   17.00   18.00    1.00    2.00   11.00   10.00    5.00    7.00
  4.00    8.00    3.00   14.00
13.00   12.00    9.00   15.00

  4.00   18.00    9.00   17.00    5.00    2.00    3.00   12.00   10.00    1.00
```

SOLUTION	1	2	3	4	5	6
7 8						

		1	2	3	4	5
CORRELATION RATIO	0.1194	0.0855	0.0581	0.0412	0.0285	
0.0136 0.0105 0.0095						
MAX. CORRELATION	0.3455	0.2925	0.2411	0.2031	0.1690	
0.1167 0.1025 0.0974						
DELTA	32.58	23.34	15.86	11.25	7.79	
3.72 2.87 2.59						
CUM. DELTA	32.58	55.92	71.79	83.04	90.83	
94.55 97.41 100.00						

!!!!! The last row (cumulative deltas show how much the total
!!!!! information is explained by
   solutions up to that point. For example, solution 1 accounts for
   32.58% of the total information, solutions 1 and 2 together
   55.92%, and so on.

!!!!! Although the first two solutions leave some 44% of information
!!!!! unaccounted for, I examined
   the graphs of plotting solution 1 against solutions 2, 3, 4, 5,
   6, 7,8, and noted that the variations among 18 variables are
   comparatively stable after the second solution. So, perhaps, you
   can report "CUM.Delta" of all the solutions, but interpret only
   the first two solutions.

!!!!!The following are the coordinates of all the variables on 8
!!!!!dimensions.
   The rows are in terms of normed weights (standard coordinates)
   and the columns are then projected onto the row space, thus are
   projected weights(principal coordinates).

*** NORMED & PROJECTED WEIGHTS ***

NORMED WEIGHTS (STANDARD COORDINATES) FOR SUBJECTS

                    SOLUTION

SUBJECTS	1	2	3	4	5	6	7
8							
1	1.4401	0.3926	0.4592	0.5783	1.3559	-0.2966	
-0.8553 1.6027							
2	1.4114	-0.6259	-0.8289	-0.3181	0.0169	-1.4340	
1.6572 -0.1579							
3	0.5896	-1.5896	-0.4908	1.1184	-0.2743	1.7865	
0.4535 0.4012							
4	-0.6047	1.2985	0.1004	1.9349	-0.5890	-0.3473	
1.1864 0.5654							
5	0.6281	0.0793	2.2477	-0.0368	0.4978	0.5543	
0.9910 -1.0043							
6	0.8656	1.2624	-0.1077	-1.3255	-1.2361	1.1117	
0.4952 0.9379							
7	0.8084	1.2762	-1.2537	0.4714	0.8840	0.7773	
-0.2298 -1.5765							
8	1.1931	-0.1120	0.4641	0.7676	-1.7838	-0.6295	
-1.2763 -0.7430							

PROJECTED WEIGHTS (PRINCIPAL COORDINATES) FOR STIMULI

                    SOLUTION

STIMULI	1	2	3	4	5	6	7
8							

```
 1      0.1326   0.2770   0.1455   0.0934  -0.2394  -0.0149
 0.1855   0.0731

 2     -0.3299  -0.4417  -0.0303   0.0462  -0.0472   0.1936
 0.1031   0.0502

 3     -0.4790   0.3712  -0.0021   0.0858  -0.0328  -0.0094
 0.0251   0.0182

 4     -0.5525   0.0333  -0.0044  -0.2755  -0.1360  -0.1347
-0.0688   0.0919

 5      0.6387  -0.1138   0.2473  -0.1256  -0.1376   0.2709
-0.0782  -0.0430

 6      0.4957   0.3571  -0.0606  -0.0955   0.0458  -0.0462
 0.0845  -0.0062

 7     -0.0327   0.4510  -0.1230   0.1074   0.1684   0.1585
 0.0452   0.0100

 8     -0.0426  -0.2227   0.2151   0.5184  -0.0228   0.0382
-0.1136   0.1402

 9      0.3107  -0.3103  -0.0099  -0.3482  -0.0672  -0.0665
 0.1059   0.1364

10      0.3478   0.5422   0.2738   0.0524   0.0395  -0.1180
-0.0843  -0.0190

11      0.2547  -0.1607  -0.4169   0.0216   0.3990   0.0034
-0.0840   0.0910

12      0.0804  -0.2597  -0.1607   0.3402  -0.2305  -0.1749
-0.0151  -0.0408

13      0.3514  -0.1852  -0.4017  -0.1138  -0.1913  -0.0713
-0.1259  -0.0695

14     -0.3975   0.2908  -0.3188  -0.0635  -0.0277   0.0784
-0.1193  -0.0292

15     -0.2833  -0.0563  -0.2606   0.0099  -0.0180   0.0591
 0.1621  -0.1718

16     -0.0869  -0.2356   0.3160   0.0197   0.1015  -0.0567
-0.0345  -0.2601

17      0.0081  -0.2625   0.2012   0.0186   0.3394  -0.1393
 0.1228   0.0022

18     -0.4158  -0.0740   0.3901  -0.2914   0.0570   0.0296
-0.1105   0.0265
```

!!!!!!The DUAL3 then shows approximations to the input data by solution
!!!!!!1 only (order-1
approximation) and by solutions 1 and 2 (Order-2 approximation) and so
on. I will put only a few examples, rather than many pages of the
output.

*** SUMMARY OF INFORMATION RECOVERY ***

*** INPUT DATA ***

 9 16 14 17 4 3 7 5 8 1 2 11 10 15 18 12 6 13

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