

Cold climate sustainability: Information Technology to develop a rural community

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Abstract

The challenge to society today is in keeping a high standard of living while using considerably less of its resources. A sustainable society is based on a comprehensive view that utilises both human resources and technical possibilities. Regional development between rural and urban areas in the “Four Corner Region” (municipalities Boden-Luleå-Piteå-Älvsbyn) northern County of Sweden provides special reasons to use IT in order to economise on resources. The idea behind this unique rural project is to show how it is possible, with the help of IT to achieve this in the small village of Lillpite with 751 inhabitants that belong the Four Corner Region. For obvious reasons, it is the aspects of communication (telematics and informatics) and its influence on traditional infrastructures that occupy the most prominent places in this particular project. This project concerns: local networks IT@Lillpite associated with work life, public service and education; as well as to contribute to a broad and deep basis of knowledge for the development of the region with its welfare and quality of life as a goal.

Keywords: Cold climate sustainability, information technology, community, local network, life quality

I Cold climate sustainability

In short, sustainable development implies economic development with the preservation of total productive capacity that also includes environ-

mental values. Luleå University of Technology has taken the initiative to start a research program to increase our knowledge and understanding of society-ecosystem relationships on a regional and local level. The aim is to create interdisciplinary work to suggest criteria and

principle solutions towards a more sustainable development of the Four Corner Region in northern Sweden. The following projects are included in the research program:

1. Seasonal storage of thermal energy.
2. Sustainable transport system.
3. Sustainable water and wastewater systems in a cold climate.
4. Planning indicators for creating sustainable development of the Four Corner Region.
5. Sustainable use of resources from woodland.
6. Ecological footprints of the Four Corner Region.
7. Sustainable development within food resource flows of the Four Corner Region from the perspective of Gender research.
8. Information technology to develop a sustainable Four Corner Region.

The research program will result in number of doctoral theses and master theses during the period of three years. The present project is one part of the multidisciplinary research program Information Technology to develop a sustainable Four Corner Region (see point 8 above).

The Four Corner Region ("4C Region") is inhabited by some 150 000 people and situated on the coast of the Gulf of Bothnia in the northernmost county of Sweden, Norrbotten, just south of the Arctic Circle (Fig 1.). Sweden is about 1600 km in length in a north-south direction, causing major regional differences in climate, etc. The annual mean temperature difference between northern and southern Sweden

is about 10 °C. The 4C Region consists of four local administrative units, municipalities, with the urban centres Boden, Luleå, Piteå and Älvsbyn. The population sizes are 35 000, 70 000, 40 000 and 10 000, respectively, and the population density is low even by Swedish standards.

The natural geography of this boreal region is characterised by a coniferous forest landscape with dominating river valleys from the coast in a north-westerly direction. The major land use is forestry. Agriculture, settlements, and therefore human activities are concentrated to the river valleys and to the coastal zone. The distance from Luleå on the coast to Boden is about 40 km along the Lule River. Piteå is situated about 50 km south of Luleå along the coast, and the distance from Piteå to Älvsbyn is about 60 km along the Pile River valley.

The climate of the region is cold with long winters and snow cover about 6 months of the year, and short summers.

The northern location also means a short period of daylight during winter days and almost 24 hours of daylight during mid-summer.

Today there are about 150 000 inhabitants in the region. About 80 % live in the four urban centres. At the end of the Second World War the Four Corner region had about 105 000 inhabitants and about 40 % lived in the countryside. This is not surprising. It was a development characteristic of all countries in the industrialised part of the world. People left the countryside for jobs in industries, the service sector, trans-

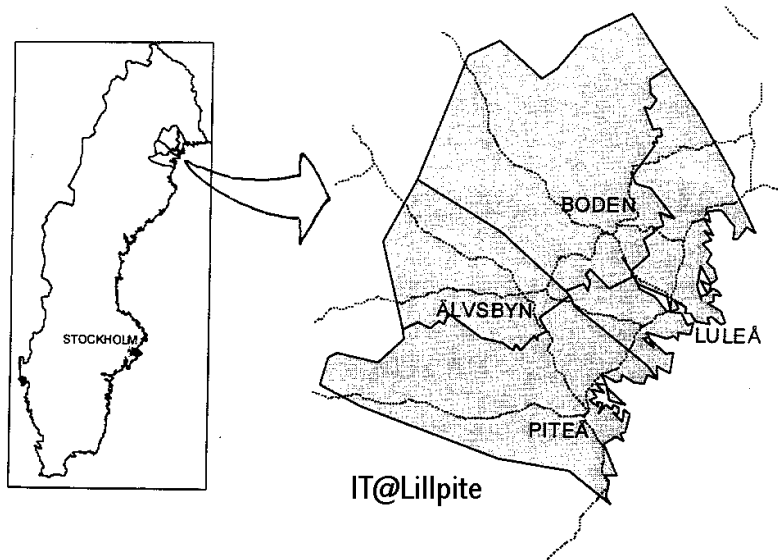


Figure 1. Map of Sweden, "Four-Corner Region" and place of village Lillpite.

portation, etc., and they changed their lifestyles and became materially well off. This development also had another side: a substantial increase in natural resource consumption and widespread pollution of water, air and ground. From a global point of view this has resulted in an alarming situation, the seriousness of which is difficult to assess.

In the previous agricultural phase of our society many resource flows were cyclical on a local scale, thus there was more efficient recycling of resource matter. Many of these "cycles" have evolved step by step over time to form the present linear flow structure. However, what these processes of change actually looked like and why they happened are not very clear on a regional and local scale

and in a cold climate. The role of technology, for instance, in these processes is obvious, but not satisfactorily understood.

The present industrial society is not sustainable in the long run. This is particularly true of certain spatial units, the urban areas, where population, resource consumption and environmental problems are concentrated. Urban areas depend on imported resources from surrounding land and water ecosystems of the region, nation and world. The impact of our cities and their inhabitants' lifestyles on the environment are very complex in space and time.

A sustainable development of our society must, therefore, be based on a solid functional systems understanding (including side-effects) of

these urban-rural systems' relationships in space and time: how resources are extracted from the environment, transformed and transported by technology, used and consumed by (mostly) urban people and finally returned to the surrounding environment as waste. Also essential is an understanding of how humans control these many processes through political and other values, organisational means, etc. Historical knowledge of how these relationships and their control have changed over time is also important.

A fundamental understanding of these systems and resource flow relationships on a *regional and local level* means that the range of solutions towards sustainability is broadened, increasing the possibilities of finding solutions that are highly adapted to specific regional and local conditions and, therefore, more efficient.

2 Information Technology

We are rapidly moving towards an information-based economy and society. The world is moving towards an information society -- a new society that will have a major impact on the way all of us live and work. It will affect both manufacturing and services; it will affect education and communication; it will change health care and it will change government. The information age has not so far contributed to a reduction of inequalities between people, regions and countries.

But how different will our future really be as a result of high technology, and particularly IT? Will it really help to preserve the environment? Will it really improve the basic elements of our lives? Currently, there are countless discussions about the impact of accelerated, structural change which is taking place throughout society.

To ensure that all people will have a stake in the information society, our vision of the Information Society is becoming one of a small Information Community in the countryside of northern Sweden. We are balancing the advantages offered to individuals with a renewed emphasis on the benefits for social groups, communities and societies.

Society depends on the way communities can co-operate, bridge differences, and work for mutual benefit.

A major result of the information age thus far has been the further globalisation of economic, and particularly, financial activity. Technology should fit the circumstances being not only technically and economically appropriate, but also socially and culturally integrated. The approach to the information society should be development that is focused on people.

We need a vision of what sustainable development would be for the information community in the countryside of northern Sweden. Different views are given as proof of the necessity of a particular strategy or action. A sample of this compromise vision is presented in Fig. 2.

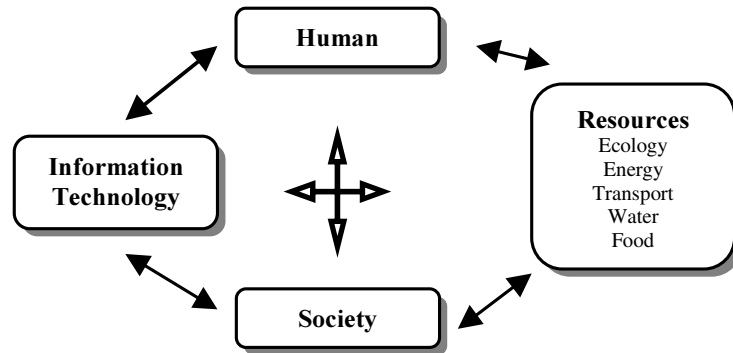


Figure 2. The components of sustainable development in the context of interaction between human-information technology-society-resources.

3 Information Technology to develop a rural community

Lillpите village is located on the Lillpите River, 18 km NW of Piteå in northern Sweden. There are 300 households and of the 751 inhabitants (356 female, 395 male), 408 live in the densely built-up area of the village. Trade, industry and organisations are well developed, adding up to 60 companies and almost 20 different associations. Lillpите is a village with an increasing population. As a result of the increasing number of children the school is now being enlarged (Fig. 1).

The Lillpите school, for pupils between 6 and 12 years of age, is very important for the development of the village. Already in 1989, a computer system for international

communication was installed at Lillpите school. In 1995, a server with a permanent connection to the Internet was installed. The children, therefore, have experience of modern Information Technology (IT). Through the children, the parents have also learnt something about this new technology.

3.1 The objectives of the project

The aim of the project is to develop a local area net for a small village with 751 inhabitants that belongs to the Four Corner Region.

The backbone of the project is an optic fibre net to which each household, company and association of the village could connect.

This contact net makes it possible to find new solutions for cultural development and to develop the village in a conserving and sustainable direction. More efficient communi-

cations with possibilities for distance education, distance work and trade promote the business climate and make the village more attractive for old and new citizens.

The experience of Lillpite will be scientifically documented and evaluated to guide similar projects in other places. We aspire to become an inspiring model for sparsely populated areas in Scandinavia and other parts of Europe.

3.2 Local Area Network of Lillpite

The optic fibre net connecting the village will support different planned applications. As soon as the net has been installed households, companies and organisations will be able to connect to the client server and thus, they will be able to send and

receive information, i.e. to use all the possibilities of IT, shown in Fig. 3.

Some examples of applications on the Local Area Network of Lillpite are shown in Fig. 4.

3.3 Expectations

The greatest benefits of IT will be obtained locally to influence the local economy and the economy of the households.

A Local Area Net that covers most people of Lillpite would have a lot of spin-off effects, since the project in itself is unique in Sweden. We are expecting a number of pilot projects to study especially older and disabled people, e.g. Tele medicine, local democracy.

Education and information about the technology and its possibilities will be available at the Citizens Of-

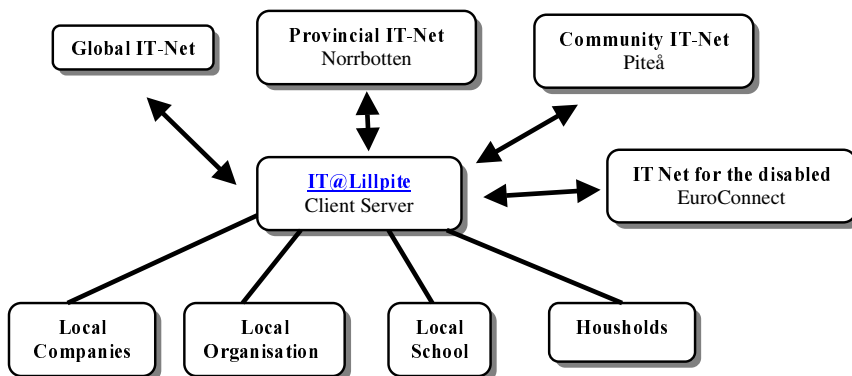


Figure 3. The Lillpite IT-Net.

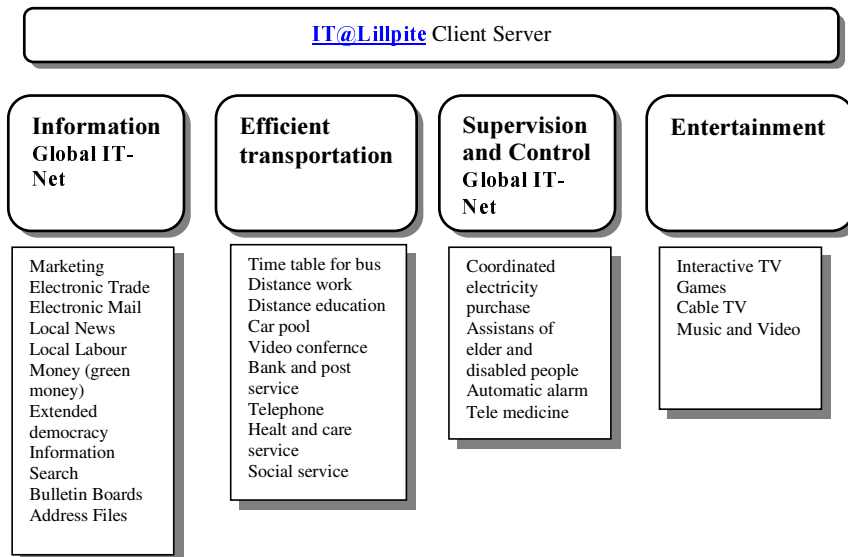


Figure 4. Applications on Local Area Network of Lillpите.

fice (CO) located at the Lillpите School. One of the main tasks is to attract potential users. Special efforts will be made to get younger women involved. This will be done in co-operation with the Lillpите Computer Association. The project group will work to attract women, the elderly and disabled people.

To access new information technology in co-operation with project EuroConnect (<http://alm.arb.luth.se>).

3.4 Education

Before the start of education; the users' computer skills and interests will be investigated. Special efforts will be made to attract retired people and women. The education will be based on classroom teaching and distance education.

Users are going to learn how to use Microsoft Office and Internet. Electronic mail, WWW and also the use of FTP, how to create home pages, advanced searches in databases. After the basic courses the participants, companies, associations can define their own requirements for education.

3.5 Evaluation

Several evaluation methods are selected to review the work from different perspectives and use. Such an approach and procedure is necessary to obtain a sufficiently reliable basis to achieve development, relevant improvements and changes during the project.

Objects of evaluation:

- The ambition is to maintain a high scientific level during the evaluation.
- The evaluation will be focused on the user perspective.
- Internal and external evaluations will be performed.
- The evaluation model will include; demand analysis, objective analysis, resource analysis, effect analysis and an overall analysis of the efficiency.
- Several evaluation methods will be used to study and measure the result of the project.
- The evaluations will be performed in steps following the steps of the project.
- Experiences of the project – mistakes and successes – will be documented during the work.
- The project results will be disseminated via presentations at conferences, seminars and scientific publication.

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