TIMELESS TRANSPORT:
TELECOMMUNICATIONS AS A STRATEGIC FACTOR FOR CITY DEVELOPMENT

F. le Clercq

Amsterdam Physical Planning Department
Wibautstraat 3
1091 GH Amsterdam,
The Netherlands.

1. INTRODUCTION: THE EMERGING CASE OF INFORMATION SYSTEMS AND TELECOMMUNICATIONS AS A FACTOR IN THE ECONOMY OF A CITY.

This paper is about the ways in which local government can stimulate information systems and telecommuncication (IST). It concerns the field of what in France is called 'telematique' (telematics), that is telecommuncations facilities and related information services supplied to businesses and individual consumers. Examples of IST include teleports, the minitel experiment (information on a T.V. screen, which is selected by telephone), and advanced business services, like airline reservation systems and a number of E.D.I. (electronic data interchange) applications in logistics. We shall come back to a number of applications in the course of this paper.
The problem to be addressed is: what policies and actions can government pursue to stimulate these advanced facilities.
A preliminary question is whether government should play a role at all in this sector of infrastructure and related services, because it might be argued that most of the examples concern private sector operations and related commercial efforts. The privatisation of telecommunications operators in a number of countries seems to have passed the lead to the marketplace.
It can be observed, though, that governments are still very active in this field. The French case has already been mentioned, the Dutch national government has a stimulation program, and there are numerous examples from Japan. There, various national governmental departments seem to compete in offering the most powerful programs to stimulate local government to start concrete actions. (examples are included in 1)
An explanation for these efforts by governments of all levels may be the awareness that telecommunications facilities may become the new competitive weapon for the future, the role played by other means of transport in the past to profile regions. Peter Keen, for instance, has taken the perspective of timeless communications to explain the emerging importance of telecommunications for business. He called his book: 'Competing in Time' (2)

The Amsterdam city government has also decided to make telematics a task-force in city development. There were three causes for beginning this policy:
First it became clear, some five years ago, that Amsterdam is the leading city in the Netherlands with respect to the location of computer industry headquarters. At that time about 60% of employment in the computer sector in the Netherlands

was registered in Amsterdam.
Second there was the emergence of the teleport concept. A telephone company and a real estate developer working together had suggested to the city government the development of a vacant site for teleport facilities, similar to the Staten Island Teleport project in New York City.
In the third place, the Dutch national government announced its first stimulation program for information technology. The Amsterdam local government has organized a meeting place for business people to develop proposals, because it liked its local industries to be involved in the national and European programs as well.

Since then, many efforts have evolved.
Recently these efforts have been assessed from the point of view of international businesses: 'The Use of Telecommunications as an Element of Competitive Strategy by the City of Amsterdam' (3) The assessment distinguishes efforts aiming at a sustainable competitive advantage and temporary advantages. The latter include all technological facilities needed to implement applications. A sustainable advantage, though, may only be achieved by incorporating information systems and telecommuncations facilities in the basic economic activities of a region. For instance, in the same way a harbour evolves as the basis for a region's economy, when trade firms enter the scene. Thus a symbiosis is created between technical facilities (the port) and human innovations (trade activities), but in a mutually dependend way.

This paper takes the Amsterdam case and related examples as an emperical starting point. It generalizes these examples by a supply/demand model explaining the emergence of information technology systems on the market. The main emphasis in the paper, which is elaborated in the concluding chapter, is the question of government action and intervention: what can and should local governments do to support the incorporation of IST in a city's economy?

2.IST EFORTS IN A CITY REGION: THE AMSTERDAM CASE

The following examples of information systems and telecommunications developments concern Amsterdam based activities (4). They are presented to provide an idea of what IST activities may imply. The next chapter will be more systematic about the role of the various activities in an integrated IST policy.

2.1 Networks

1. The PTT optic fiber network. It connects main activity centers in the Amsterdam Metropolitan Area.
Only main switches are linked by optic fiber. Communication between residential or commercial buildings and main switches is effectuated by copper cables.
2. The cable television network (KTA Ltd), a coax-cable network for TV signal transmission. It is the largest TV cable system in Western Europe, with 450,000 subscribers. The city of Amsterdam is the major shareholder. KTA also transmits its signals to many other municipalities and companies in the northwestern part of the country. The linking network is owned by Dutch PTT. In the long run telecommunication and TV networks may be integrated into one broadband-ISDN.

2.2 Real estate developments incorporating telecom-facilities.
1. Teleport Amsterdam. Originally advertized as the ground station for transmiting global telecom signals by satellite, but now mainly a real estate development.
At present it comprises initiatives by the Municipality, PTT and a private developer to facilitate telecom services in office buildings on a specific site (near the Amsterdam railway station 'Sloterdijk'). In the long run 4 million sq feet of office space can be developed at the teleport.
2. The Amsterdam World Trade Center. Here PTT runs a video conference center for public use. It also has a demonstration center for advanced telecom services. There is a studio for T.V. broadcasts.
The Amsterdam WTC has 800,000 sq feet of office space.
3. Informatics House on the river IJ and the business building for incubators at the site of a former inner-city hospital location supply space to small I.T. companies. Demand exceeds supply.
4. Schiphol/Amsterdam International Airport also plans to offer integrated telecommunication services in buildings on the airport premises.
Schiphol Airport runs the message system CARGONAUT which aims at linking the various company-owned systems dealing with aircargo.

2.3 Institutional structures
1. Frequent consultations between local government, PTT and private sector.
The consultations aims at harmonizing development plans of the city (city extensions and office parks) and marketing and investment activities of PTT.
2. TCA/ARIT (Telecenter Amsterdam/ Amsterdam Advisory Council for I.T.). Members include: individuals from the private sector, the Amsterdam Chamber of Commerce, the two Amsterdam Universities; The Amsterdam Industrial Association; Labour Unions; PTT; Municipal representatives; national government representatives.
It is intended as a platform to initiate (innovative) I.T. activities and projects.
3. The national government conducts a stimulation program (I.N.S.P., Innovation Stimulation Program), which is at present being reviewed and evaluated. Two of the conclusions are that there should be greater emphasis on education and that the attention should be shifted from technological developments to applications od IST.
4. The City of Amsterdam also has a Bureau for the Stimulation of I.T. applications. It aims at initiatives to be taken by the various agencies in the local government in the IST field.
2.4 Some major IST applications.
1. The Stock Exchange and the Option Exchange have invested considerable sums in facilities for advanced use of telecommunications in the city center.
2. The AMRO-bank, the second-largest Dutch commercial bank has constructed an optic-fiber link between its two main office buildings in Amsterdam and its trading-room for global money and capital trade.
3. In the agricultural sector, the United Flower Auctions in Aalsmeer (near Schiphol Airport) have direct satellite connections with trade-partners, and guide their products all over the world.

2.5 Education and training
There is a lack of personnel, both technical and commercial, trained to work with informatics and telecommunication.
Companies try to bridge this gap by offering training opportunities to their personnel either in-house or externally.
So over the last few years quite a number of educational and training services have been set up. The universities have also set up courses in this field. One example is the 'Academy for Informatics' initiated by the Universities of Amsterdam and Utrecht. Its program aims at people who already have jobs. These people are supposed to spend one day a week at this institute, for a period of eighteen months. An initiative that failed was the creation of a full-time post-graduate course for top managers.

2.6 Notable facts
1. Amsterdam is an international Distributor Center due to Schiphol Airport (fifth in passengers, fourth in freight in Europe), and its multi-purpose seaport. The port of Rotterdam (first in the world) is at 40 miles distance. A considerable number of efforts are being made to develop logistics supporting information systems: INTIS for sea freight, CARGONAUT for air-cargo, SAGITTA for customs services, HERMES for rail-bound freight, etc.
2. Sixty percent of computer-trade-related companies in the Netherlands have their headquarters in the Amsterdam area.

3. A CONCEPTUAL MODEL FOR IST DEVELOPMENTS

The conceptual model will be developed in three steps, starting with the diffusion of information usage in society, to be called the demand side, then moving to the rapid expansion of IST technology and provisions, the supply side, and rounding up with the third step with the relationships between demand and supply. The role of government will be elaborated in the next chapter.

3.1 The demand sided
1. The diffusion of information (systems) usage in society is a noticeble development. After a period when only experts profited from the advantages of information systems, companies are now incorporating IST in their operations, and today, information services are required by the general public. An illustration of this very brief historical characterization is:
At first only specialized sections of organizations were applying information systems, such as the accounting department, or some planners.
Then companies started to apply IST in their dayly operations: computer controled manufacturing, just-in-time production and inventory systems, management control systems etc. Now numerous production and logistic processes rely on information systems and telecommunications to a great extent.
The general public has also discovered IST. Not only through the introduction of the (consumer oriented) micro (personal) computers, but also through the consumer information and service systems. The most eloquent examples in this context are those of the French minitel and client applicable automatic banking systems in the Netherlands.

So, the diffusion pattern shows stand-alone expert usage, followed by network usage to link operations within or between companies, resulting in consumer information usage.

3.2 The supply side

Expansion of information systems and telecommunications technology has followed a similar pattern: from huge stand-alone computers, the supply side, requiring centralized processing and operations control, via stand-alone single-purpose application systems, to computers linked in networks. And even further to the supply of specialized services and products to the general public, which are computer-based, but cannot recognized as such by the consumer. The consumer only requires the information, he does not want to be bothered with technological difficulties, such as running a computer program.

3.3 Relationships between demand and supply

Together, demand and supply developments can be sketched in the following fan-shaped figure. The figure is intended to illustrate by its shape the expansion of information from isolated applications towards being a general resource in economy.

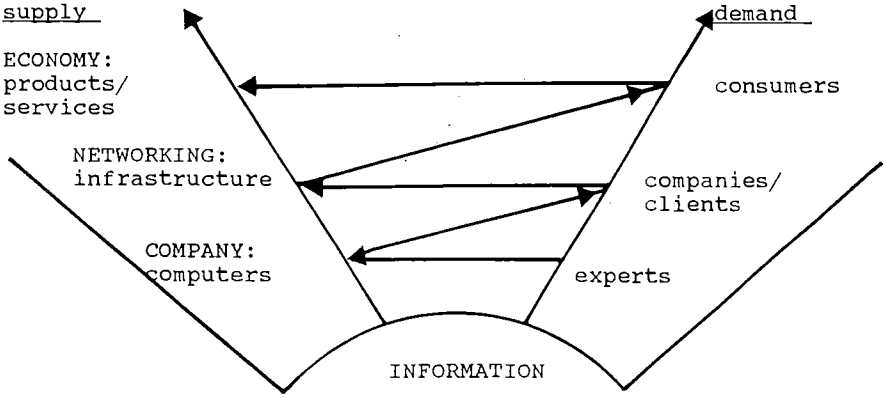

Figure 1. The Exploding World of an IST Economy

The 'explosion' of demand and supply, as it is called in the illustration, is stimulated by demand pull as well as supply push, together causing a spiral-shaped development pattern:
the supply of computers has caused experts to invent new applications, which in turn demanded new technology, such as networks. The new technology, however, affected the operations of companies, their mutual dependencies and their relationships with clients. In their turn, these advances have created new services and products available to the general public as well.
This development pattern seems to be finite, as the spiral ends when the economy

functions in the same way as for any other commodity.
So, one could wonder what the role of government should be: should it only speed up the spiral movement in order to end up in general economic policy as soon as possible and in a first position to likely competing regions?, should it not intervene at all? or will it have to be active continously?
The likely governmental efforts will be considered in the next chapter.

4. GOVERNMENTAL POLICIES WITH RESPECT TO IST POLICIES

This chapter will first describe governmental actions in IST, considering Dutch examples. Then it will continue with a more normative consideration of what governments' roles might be, taking into account likely goals.

4.1 The role of government

The role of government can be fourfold as the Dutch case shows:
1. to promote integration of new skills in education and public awareness of new developments;
2. to stimulate the development and the adoption of new technological advances by the business world.
3. to provide telecommunications infrastructure;
4. to provide incubator sites.

ad.1. Governments use to have a role in education, to teaching skills.
The Dutch experience has shown that government was reluctant to pick up this role at the time when companies needed highly skilled people to manage the expansion of the information systems, needed at the second level of the figure in ill.1. At that time, the private sector had to take the initiative itself to provide academic courses. This was very unusual in the Netherlands, where the organization of education is almost a state monopoly.
The emphasis in education in the Netherlands is on what may be called 'citizen informatics': that is teaching students about the likely role of information in society, as part of which school children are trained to operate computers on an elementary level.
In the previous model, this kind of education can be interpreted as creating the future consumer.

ad.2. The first informatics stimulation program in the Netherlands aimed at the private sector, to help innovating technologies and information systems. It was supply side oriented. Evaluation of this first program led to the recommandation to shift the emphasis to the demand side: that is, to subsidize proposals that aim to meet requirements in the market.
The program can be interpreted as an effort to speed up the process of making IST a mature element in the functioning of economy.

ad.3. Traditionally the role of government in telecommunications is concerned with telephone services as a public utility.
After the privitization of PTT in the Netherlands, this role was restricted to the provision of physical networks for message transmissions. PTT must supply and

maintain access to the network for every subcriber who wishes to use it. Information services, however, to be transmitted by the network can be supplied by anyone on a competitive basis.
Other countries, the U.S. for instance, have free supply of networks as well on a competitive basis, but government-controled fare systems.
Anyway, as for other types of public infrastructure, the role of government in telecommunications begins with the supply of sufficient technology to facilitate societal advances.

ad.4. The creation of specific places in the city of Amsterdam where advanced IST companies can be located together, such as the Teleport site and the Informatics House, can be interpreted as an effort by the local government to stimulate corporate synergy. Interpreted within the framework of the previous model it is a supply side effort, because it only aims to facilitate the functioning of companies, irrespective of market needs.

Figure 1 is completed by these examples in figure 2, in order to demonstrate clearly government's likely roles.

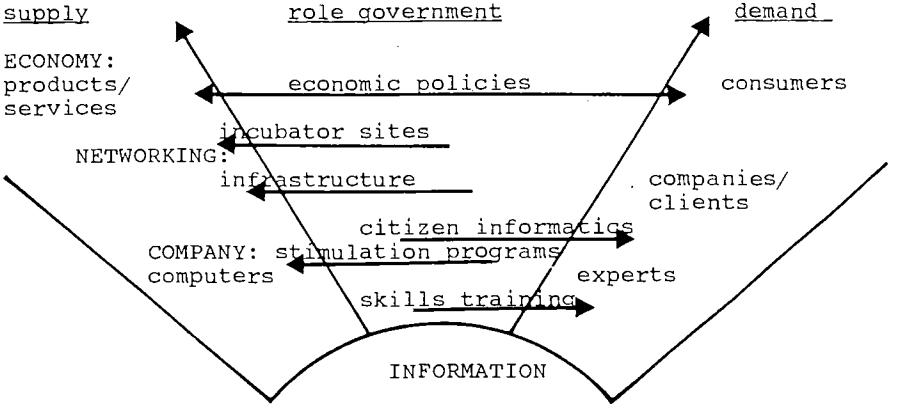

Figure 2. Governmental roles in supply and demand of IST

The role of government is mainly directed at the supply side, but as soon as the field evolves, it will be dealing with balancing demand and supply. It does so, on the one hand by regulatory measures as part of an economic policy, on the other hand by the inclusion of the new economic elements in public education.

4.2 Regional IST development policies
What can be done on the regional level to make applications of IST an element in regional development?
Three stages of development will be distinguished:
1. creating the necessary IST (mainly telecommunication) facilities: networks,

digital switches, EDI services.
2. stimulating incubators to apply these systems;
3. having existing business adopt the new systems and technologies to improve existing processes and to create new products and services.

The previously used example of a port, as a new element in regional economic development can be used again to illustrate the meaning of the three stages.
The construction of a port is only a neccessary condition for handling sea freight.
If there are no port related activities in the region yet, new business initiatives are needed to make the port operational. Starting a new business, though, is risky, therefor starting companies will be small (incubators).
If companies already exist, but are not yet related to the port, they will have to be stimulated to integrate this new facility in their operations, such as changing logistical operations, offering new services, starting new production processes depending on raw materials shipped from over sea, etc.
This kind of integration process may work by the purchase of successful incubators by existing companies.

This example showing how regional economy adapts to new technologies, indicates the need to relate the new IST facilities to the strengths of existing business to obtain a sustainable competitive advantage.
In Amsterdam some research has been caried out into the adoption of the new IST opportunities by existing companies. The question is: to what extent have selected sectors of business created new products and services?
The findings are quite remarkable. Companies can not report about new services and products. They can only recognize process innovation, but this is reported as a quite logical step. For instance in printing, it is reported that newspapers are now printed at low-cost location far away form the editing staff. People in the industry are hardly aware of the fact that this kind of process optimization has been possible due to telecommunication and information advances!
The main problem reported was a lack of skilled people to operate the advanced technological equipment.

This emperical research yiels some information about the adoption of IST in a mature economy:
- beside the necessary technical conditions, an innovative and entrepreneurial business climate is needed to take advantage of the new opportunities;
- having skilled people available is a permanent condition for process innovation;
- new products and services are rarely invented, they mostly evolve out of existing operations;
- incubators may play an important role as catalysts in products and service innovation processes. They have to set the scene.

Repeating that the third stage of IST integration in a regional economy is the most desirable situation, one may wonder what likely policies are.
Based on information about existing policies, the American, the Japanese and the Dutch approach will be distinguished:

The American model states that stage three can only be achieved by letting the marketplace work. The two previous stages should develop freely from there: if there is a need for technological facilities, these will be provided by private initiative.
The Japanese model is to set an IST task-force and to support the supply of facilities very strongly, but with a huge commitment of the private sector.
The Dutch model is to do both, as has been illustrated above: the government supplies the basic facilities (e.g. by giving PTT a public utility monopoly), business is encouraged to innovate, and society is made aware of changes in economy, in order to make changes acceptable.

Nevertheless the two previous stages can be final purposes themselves: the first stage may end up in being the national switch point city for 800-services (Omaha, Nebraska), and the second stage may be a very powerful intermediate and necessary stage in the creation of a new economy.

5. SUMMARY AND CONCLUSION

In this paper it is shown by means of a conceptual model and examples from Amsterdam how an Information Systems and Telecommunications (IST) policy can be developed for a region.
A successful policy has to deal with supply and demand factors. Some supply factors are information technology, networks and the stimulation of product innovations. Demand factors may concern acceptance by the general public and training of skills to integrate the systems in business operations.
It should be recognized that developments will have to pass through a number of stages, depending on both supply and demand, before a sustainable stage of a 'new' economy of information products and services can be achieved. Preceding stages include the stimulation of within-company applications of information systems and networking (by means of telecommunication) of these systems among companies and their clients.
The best policy is to develop the new services in addition to existing economic strengths in a region. The creation of IST facilities, either by the government or the private sector is a necessary condition to achieve any IST objective. Stimulation of incubator business may be an intermediate step towards having IST advances adopted and developed as a new element in regional economy.

6. LITERATURE

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