Policy Debates

E-governance in Cities: A Comparison of Urban Information and Communication Technology Policies

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VAN DER MEER A. and VAN WINDEN W. (2003) E-governance in cities: a comparison of urban information and communication technology policies, *Reg. Studies* 37, 407–419. Throughout Europe, urban information and communication technology (ICT) policies are becoming more significant. Using examples from various cities, this paper describes and analyses the local manifestation and dynamics of the information society. In a conceptual framework, we make a distinction between three interdependent types of 'footprints' of ICTs in urban areas: access, content, and infrastructure. For each of these dimensions, we describe and compare current urban ICT policies. We focus on the way local governments involve other urban actors in the design and implementation of ICT policies. Although cities feel the need to engage in new types of strategic partnerships, they are struggling to find appropriate partnership models.

Information technology   ICT   Urban policy   Case studies

VAN DER MEER A. et VAN WINDEN W. (2003) Les systèmes de gouvernement électroniques: une comparaison des politiques de technologie de l'information et de la communication urbaines, *Reg. Studies* 37, 407–419. Partout dans l'Europe, les politiques de Technologie de l'Information et de la Communication (TIC) urbaines deviennent de plus en plus importantes. A partir des études de cas provenant de diverses villes, cet article cherche à présenter et à analyser les signes et la dynamique de la société de l'information. Dans un cadre conceptuel, on distingue dans les zones urbaines trois types de 'tracés' de TIC entrelacés: l'accès, le contenu, et l'infrastructure. Pour chacun de ces tracés, on présente et compare les politiques de TIC actuelles. L'étude porte sur la façon dont l'administration locale implique d'autres agences urbaines dans la conception et la mise en oeuvre des politiques de TIC. Bien que les villes éprouvent le besoin de s'engager dans de nouveaux genres de partenariat stratégique, elles ont du mal à trouver des modèles de partenariat qui conviennent.

Technologie de l'information   TIC
Politique urbaine   Etudes de cas

VAN DER MEER A. und VAN WINDEN W. (2003) E-Verwaltung in Städten: Ein Vergleich städtischer Bestrebungen betreff Einsatz von Informations-und Kommunikationstechnologie, *Reg. Studies* 37, 407–419. In ganz Europa nimmt Stadtpolitik betreff Informations- und Kommunikationstechnologie (ICT) an Bedeutung zu. Unter Zuhilfenahme von Beispielen verschiedener Städte beschreibt und analysiert der vorliegende Aufsatz örtliches Auftreten und Dynamik der Informationsgesellschaft. In einem konzeptualen Rahmen wird zwischen drei wechselseitig von einander abhängigen 'Fußspuren' typen von Informations- und Kommunikationstechnologien in städtischen Gebieten unterschieden: zwischen Zugang, Inhalt und Infrastruktur. Für jede dieser Dimensionen werden gegenwärtig verfolgte städtische ICT Bestrebungen beschrieben und verglichen. Die Autoren konzentrieren ihre Aufmerksamkeit auf die Art und Weise in der Gemeindeverwaltungen andere städtische Teilnehmer in Entwurf und Ausführung der ICT Bestrebungen miteinbeziehen. Obwohl Städte die Notwendigkeit einsehen, sich in neuen Typen strategischer Partnerschaft zu engagieren, fällt es ihnen schwer, passende Partnerschaftsmodelle zu finden.

Informationstechnologie   ICT
städtische Politik   Fallstudien

INTRODUCTION

The information society entails a number of funda-mental changes, many of which manifest themselves in cities. These changes affect urban structures (CASTELLS, 1996; HALL, 1998), forms (VAN DEN BERG, 1987; MITCHELL, 1999a), economies (HALL, 1998; STORPER, 1996; THRIFT, 1996) and societies (CASTELLS, 1996; SASSEN, 2001). The development and application of ICTs (information and communi-cation technologies) lies at the heart of these trans-formations. ICTs can be described as the melting of computer technology, telecommunications, electronics and media (VAN RIJSSELT and WEIJERS, 1997). Examples of new ICTs are the personal computer, but the Internet, mobile telephone, cable television and electronic payment systems are also included. In the last decade, innovations in communications and information technology have been introduced at rapid speed (FORRESTER, 1993; CASTELLS, 1996).

There is a growing literature about the way ICTs are changing cities. In this paper, we want to contribute to this debate. In our approach, we intend to move away from the abstract macro-idea of 'the information society', but instead stress diversity and the *'couleur locale'* of the information society, on the urban level. This approach fits in the newer strands of technology research in social sciences that focus on the context dependency of the uptake of technologies. New tech-nologies do not fall out of the blue sky into a homo-geneous landscape, and then change it completely; their development and application is embedded in existing economic, institutional, social and spatial struc-tures, and changes them in rather subtle ways.

The focus in this paper in on Internet related tech-nologies and services, as they are relatively new, and have the profoundest social and economic implications. Our starting point is that, for a number of reasons, the manifestation of the 'information society' varies considerably from city to city. To reveal this diversity, in the first part of the paper we present a conceptual framework that helps us to unravel the local colour of the information society in cities. We make a distinction between three manifestations of the information revolution: local electronic content; local access to new technologies; and local electronic infrastructure. We suggest that the interaction between the three mani-festations drives the dynamics of the local information society. We also suggest how policy – on several levels – may influence these dynamics. The second part of the paper is about ICT policy in a number of case cities. We introduce the concept of 'e-governance' to describe and analyse local ICT policy and the role of various stakeholders in it. We illustrate this with a number of examples. The cases show major differences in policy orientation, reflecting different policy priorities. They also reveal the importance of the national economic, political and legal contexts as determinants of the shape of the local information society. In this paper, we explicitly address the role of private ICT companies, with a focus on the impact of investment decisions of telecom firms on the local endowment of electronic infrastructure.

This paper is based on an international comparative study into 'e-governance' strategies. We have studied local ICT policies in six cities. Our case studies were: Barcelona (Spain); Cape Town (South Africa); Eind-hoven (The Netherlands); Manchester (UK); The Hague (The Netherlands); and Venice (Italy). For our purposes (showing and analysing the variety of local manifestations and policies of the information society) this is a good sample of cities. They are located in different countries, which may reveal the importance of the national context. They differ considerably in economic structure and performance. Some are very specialized, albeit in different sectors (e.g. Venice in tourism, The Hague in administrative functions), others have a more diversified economy. As could be expected, each of the cities has its particular focus in ICT policy. However, all the cities share a relatively high ambition level, and they expect much of the ICT policies.

For each of the cities, we started with an analysis of the available information on the local ICT situation, and official 'e-strategy' documents. After that, in each of the cities we have interviewed a number of govern-ment officials responsible for the local ICT policy, as well as private companies that are involved in the implementation of the policies. Also, we have inter-viewed ordinary citizens to hear their opinion as 'policy receivers'.

This paper is organized as follows. In the next section, we present a conceptual framework to analyse the local manifestation of the information society. In the third section, the concept of e-governance is intro-duced and elaborated. Then we describe and analyse local e-governance practices in our case cities. Finally, we draw some conclusions.

LOCAL MANIFESTATIONS OF THE INFORMATION AGE

How can the local manifestation of information society be described? We make a distinction between three types of 'footprints' of ICTs in urban areas: access, content, and infrastructure. In this section, we elaborate each of them, and suggest how they interact.

Access

The first and most basic manifestation concerns the degree of access to technologies by the urban popula-tion and its various segments. Access to ICT has several dimensions. It includes not only the ownership of hardware devices, but also the capabilities to use information technologies, and access to the Internet (MITCHELL, 1999b; SOCIAAL EN CULTUREEL

PLANBUREAU (SCP), 2000). On several geographical levels, we can witness varying degrees of access to new technologies. On a global scale, there is a digital divide between the developed world and the developing world (VLAM and WESTRA, 2002). Within countries (both developing and developed), there are substantial differences between large cities and rural areas, but also among large cities (DEPARTMENT OF TRADE AND INDUSTRY (DTI), 2000). Within cities, finally, there are large differences between districts (GRAHAM, 2000). There is now a rich and growing literature on the determinants of access to technology (see VAN DEN BERG and VAN WINDEN, 2002, for an overview). Most accounts point at education levels and income as key factors. SCP, 2000, finds that the adoption of PCs and the Internet is positively related to cognitive, social and material resources of individuals.

In our case cities, we have focused on the adoption levels of PCs and the Internet. We found the highest levels of access in Eindhoven and The Hague. The lowest levels are in Cape Town. The levels of access to technology reflect the national situations. Within cities, big differences exist. They are largest in the divided city of Cape Town, where entire slum areas do not even have landline telephone lines. But also in Manchester and The Hague, there is a substantial digital divide between rich and poor areas. In a later section on access policies, we will show that many cities focus their efforts on helping to get people online, or develop skills to work with computers.

Infrastructure

The second manifestation of the information society in cities is the electronic infrastructure. The various types of infrastructures (copper, coax lines, wireless networks, fibre optic lines) can be regarded as the transportation system carrying the bits and bytes of the information society. The infrastructure landscape in cities has changed dramatically in the last decade. Most notably, the number of electronic infrastructure networks has increased (several new mobile networks have been put in place in the last decade, but also high-bandwidth fixed lines and satellite-based systems). Second, the spatial differences in infrastructure endowment have become wider, due to telecom markets liberalization and a declining prevalence of universal service obligations.

The quality and availability of electronic infrastructure differs both within and between cities. Typically, because of market size, larger cities are better endowed than smaller cities or rural areas, and within cities, richer neighbourhoods and business districts have better infrastructures than poor neighbourhoods. In this perspective, GRAHAM, 1998, notes the emergence of premium network spaces. These are very localized areas in large cities (like London's financial district) that have superior connections both internally but also

Table 1. Speed of connection of different modes

	Download	Upload
ISDN	One way: 128 Kbps; Both ways: 64 Kbps	One way: 128 Kbps; Both ways: 64 Kbps
Power line	1 Mbps–2 Mbps	1 Mbps–2 Mbps
DSL	6–8 Mbps max	640 Kbps
Cable	27 Mbps	2·5 Mbps
Fibre optic	50 Mbps–20 Gbps	50 Mbps–20 Gbps

Source: BDRC, 2001.

with similar places in other cities. For the location of business, particularly information-intensive service companies, the quality of broadband access is a major location factor (HEALEY & BAKER CONSULTANTS, 2001). Broadband is different from 'narrowband' dial-up access in two important respects: first, it offers more capacity; and second, most broadband technologies entail an 'always on' connection – the user does not need to dial into a network, but is always online.

Copper telephone lines are almost ubiquitous, at least in Europe. This old technology is still the infrastructure for most Internet users. Telephone lines can even bring high-speed access, using various DSL (digital subscriber line) technologies. However, DSL is not available equally across space. Operators have to invest to make their networks ready for DSL, and prefer to invest first or most in areas where the likely number of users is highest and/or costs of updating the lines are lowest.

This has an impact on the spatial distribution of infrastructure and services. In the Netherlands and the UK, the supply of DSL is unequally spread; in some neighbourhoods, there is only one supplier, in others, there are several, and in some neighbourhoods, DSL is not available at all.[1] The situation for cables – constructed for television but increasingly used for broadband and Internet – is slightly different. In some countries (the Netherlands, for instance), the cable network has coverage of almost 100%; cable Internet is available in all the major cities, but not in several rural areas. In other countries (UK, France), there are big differences in coverage between large cities and rural areas. Within cities, some areas are cabled and others not. In Manchester, more well to do neighbourhoods have a cable network, but the poor borough of East Manchester has none. Mobile networks have now become available, throughout the 1990s, in all our case studies. In some areas of our cities, more people have a mobile phone than a fixed landline connection.[2] In the near future, when high-capacity UMTS frequencies will be put into use, mobile networks are likely to become more important as conveyors of data. Another promising new technology, still in its testing stage, is the use of the electricity network for broadband data traffic. Speeds are comparable to DSL technology. Nuon, a Dutch energy company, is testing the technology in 180 households in the City of Arnhem.

In Germany, the technology is tested in 20 areas. By the end of 2001, 5,000 people were connected, 2,000 of them in the city of Mannheim (*Algemeen Dagblad*, 2002). As every household has electricity, this has the potential of bringing broadband within reach for every citizen.

In our South African case, the infrastructure situation is inferior to the European one. Cape Town claims to be the 'best wired' city of Africa, but nevertheless, from an international perspective, the ICT infrastructure is poor. This is mainly due to the monopoly position of Telkom, the incumbent telecom operator. Prices are relatively high, and quality of services poor.

In several cities, grassroots initiatives are taken to speed up the availability of broadband infrastructure. In Sweden, several social landlords are putting broadband infrastructure in their apartments. In Manchester, residents in a local authority housing estate have worked together to create an intranet, with fast and always on Internet access (BAINES, 2002). In Amsterdam (but also in numerous US cities), individual broadband subscribers give each other access to their mobile home-networks, thereby creating a city-wide mobile broadband network.[3] Throughout Europe, there is now a debate going on about the role of local governments in providing broadband to its citizens. In a later section on infrastructure policy, we will see how local governments are starting to play a stronger role in broadband provision.

Content

As a third manifestation, we discern the quality and availability of local electronic content. What is local content? We define it as electronically available information, interactive services or other content related to or concerned with a specific locality. Examples of local content are the local newspaper on Internet, websites on the traffic situation in the city, information about events in the city, or the electronic services that the local administration offers to its citizens. It also includes the websites of firms or institutes that primarily serve a local market, such as community organizations, education institutes, and non-profit organizations. Finally, it includes local virtual communities, such as self-help groups, newsgroups, etc. Our case cities differ widely in the quality and quantity of local content. City administrations play a large role in the determination of the quantity and quality of local content, as they are one of the most important 'suppliers' (more on this below). But also, much depends on the local 'organizing capacity' of individual sectors to use the Internet as a new medium to communicate with clients or as a marketing tool. In Cape Town for instance, the tourism sector is very fragmented and does not cooperate in a joint website; tourist information is scattered over a large number of websites. The same holds for the Venice tourist industry. Other cities – good examples are Hamburg (www.hamburg.de) and Bremen (www.bremen.de) – score much better in this respect, and make it easier for tourists to find their way or even book on-line. Also, cities differ in the liveliness of area-based spontaneous on-line communities. In some cities, we found strong and vivid virtual local communities, where citizens meet to discuss all kind of issues related to their city or neighbourhood. The Hague's *'Digitale Hofstad'* website is a prime example. In the Hulme area of Manchester, inhabitants have created an always-on intranet, which forms the infrastructure for a lively virtual community. It is linked up to web cams that create a surveillance network for supervising children and watching out for burglars. Community members are also downloading music to a central server for all community subscribers to listen to. In other cities, such online communities are less active (Eindhoven) and (Capetown).

Interaction and dynamic

Cities are different in terms of content, access and infrastructure. Nevertheless, there are communalities in the way each of the three 'manifestations' have an impact on each other. There are strong indications that the three local manifestations of the information society are interdependent and sometimes mutually reinforcing (see Fig. 1). We suggest that its dynamics can be represented as a local 'digital flywheel', which functions as follows. If there are more ICT users (access) in a city, it becomes more interesting for companies or any other actors to develop new services (content). For instance, on-line grocers normally start their activities in areas where Internet penetration is highest. The other way around, more (or better) electronic services (content) may increase the number of local users. If there are better online products or services available, the Internet becomes more useful, and more people are likely use it. This interdependence between access and content is well known in the economic literature on technology adoption (see LEIGHTON, 2001). In many instances, a 'killer application' can speed up the adoption of a new technology very rapidly.[4] Probably, the quality of local content is not the key factor for individual's decisions to buy a PC and go to the Internet. Nevertheless, several studies suggest that local information and services are very important for citizens (ANTTIROIKO, 1998; SERVON and NELSON, 2001; BAINES, 2002).

The quality of the local electronic infrastructure is linked to both access and content. On the one hand, higher levels of access and more electronic services will increase the demand for bandwidth and make high-level (broadband) electronic infrastructure more profitable. Telecom companies are more likely to offer high bandwidth services in areas where demand is greatest. The other way around, if the quality of the local infrastructure is upgraded, this will evoke improved
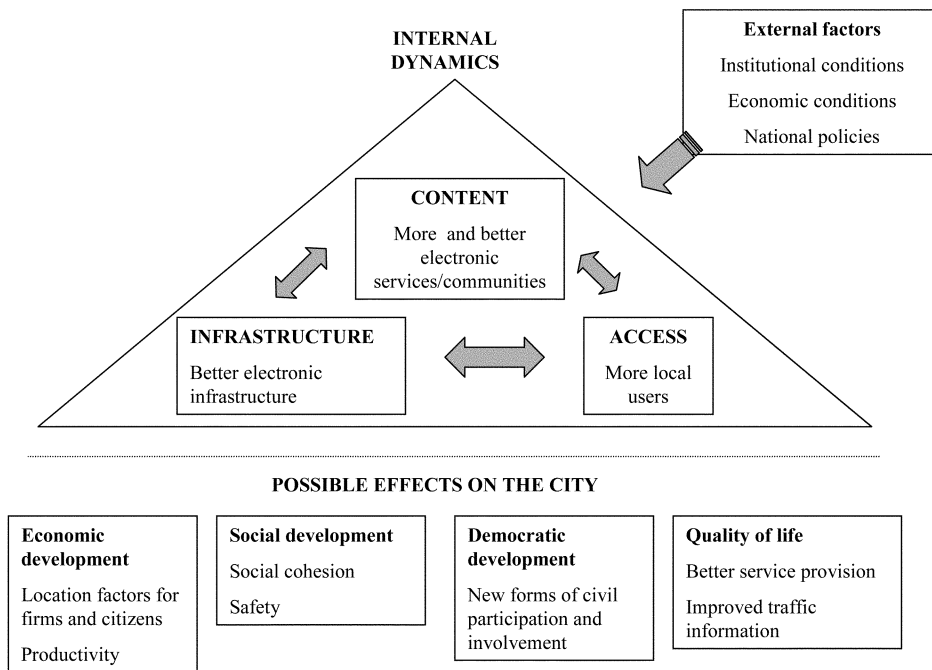
INTERNAL
DYNAMICS

External factors

Institutional conditions

Economic conditions

National policies

CONTENT

More and better
electronic
services/communities

INFRASTRUCTURE

Better electronic
infrastructure

ACCESS

More local
users

POSSIBLE EFFECTS ON THE CITY

Economic
development

Location factors for
firms and citizens

Productivity

Social development

Social cohesion

Safety

Democratic
development

New forms of civil
participation and
involvement

Quality of life

Better service provision

Improved traffic
information

Fig. 1. The 'digital flywheel'

e-services (those which require broadband) and attract again more local users.

For cities, 'turning the flywheel on' may bring benefits in several respects. Improved electronic services mean a higher quality of life for inhabitants: they have better access to improved amenities. E-government services may save public spending and reduce local taxes to the benefit of citizens and/or firms. With the public sector responsible for up to 50% of GDP in many Western European countries, the potential cost savings are clearly substantial. The quality of local electronic infrastructure is a factor of growing importance to attract or retain inhabitants (HEALEY & BAKER CONSULTANTS, 2001). Wired homes have the potential for being seen as more upmarket and desirable than others (BAINES, 2002). Virtual communities can contribute to safety, social cohesion and political participation (VAN WINDEN, 2001). High-quality infrastructure is also important to attract or retain firms in the region (HEALEY & BAKER CONSULTANTS, 2001). Furthermore, policies may bring 'first mover advantages'. If a region manages to create early mass in users and infrastructure, local firms may build an innovative edge. Especially, early critical mass of users may attract innovative companies and people into the city. The system takes off when a critical mass of users is reached.

A question that comes to mind is how local really is the 'local flywheel'? Clearly, its engine is not solely fuelled by local factors. External factors play an important role, too. In the first place, national institutional conditions matter. Our South African case study sug-

gests that it makes a big difference whether the telecom market is liberalized and competitive or not. And all other kinds of legislation influence the flywheel as well, for instance, electronic privacy and security legislation. Second, general economic conditions play a role. ICT use is strongly related to economic development levels. Richer countries and cities tend to have higher levels of access, more content to offer and a higher quality of infrastructure. Third, national policies can strongly influence the different parts of the flywheel. Regarding access, many countries have nation-wide programmes for ICT in education or access policies for disadvantaged communities. In the field of content, national policies may encourage cities or other public entities to develop e-strategies, and thus speed up the quantity and quality of content offered.

Despite all this, our study has revealed that there is still sufficient scope for urban policy makers to do something. In the next sections, we will describe and discuss what our cases studies are doing to turn the local digital flywheel on.

THE ROLE OF LOCAL GOVERNMENTS: THE CONCEPT OF E-GOVERNANCE

Public policy with regard to ICT is often referred to as e-government. SILCOCK, 2001, defines e-government as the use of technology by governments to enhance the access to and delivery of government services to benefit citizens, business partners and employees. The

term 'e-government' is strongly associated with administrative governing by a single actor. However, in this paper, we are not only interested in the uptake of ICTs by local government itself, but just as much in the role of local government in the processes of uptake of ICTs by local population, communities and businesses, and its role in infrastructure provision. It is clear that in these processes, local government has less direct competencies, and depends critically on cooperation with other actors, such as IT companies, local communities and local business sectors. It has to operate in flexible networks to get things done.

In this light, the concept of governance, developed in the institutional economic literature, is useful for our purposes. It puts less emphasis on the directive capacities of local government, and more on its ability to engage in networks with other organizations. MISTRI, 1999, defines governance as 'the capacity of local administrations, in a dialectic exchange with social organizations and firms, to guide the growth process'. JESSOP, 1997, describes governance as 'the complex art of steering multiple agencies, institutions and systems which are both operationally autonomous from another and structurally coupled through various forms of reciprocal interdependence' (p. 95).

In this spirit, we introduce the term 'e-governance' which can be described as the capacity of local administrations, in a dialectic exchange with social organizations, citizens and firms, to deploy information and communications technologies to achieve urban policy goals. An important element of this description is the representation of ICTs not as a means in itself but as instrumental for the achievement of policy goals. In line with our distinctions in the last section, we discern three dimensions of e-governance. First, *local content governance* is the capacity of local administrations to provide, create or promote user-friendly Internet or other electronic content related to a specific locality. Second, *local access governance* is the capacity of local administrations to provide access to new ICTs for the urban population at large. Third, *local infrastructure governance* is the capacity of local administrations to influence the provision and spatial distribution of electronic infrastructure (copper, coax cable, fibre, and eventually other technologies).

In different contexts, policy goals and orientations can be very different. This will have consequences for the form and focus of e-governance. Some local governments may design e-strategies primarily to promote social inclusion or fight 'digital divides', while others will target at economic growth and development. Also, for political (or other) reasons, cities differ in their degree of interventionism in technology adoption processes. 'Interventionist' urban leaders are more likely to see a role for public policies to counter undesirable market outcomes or promote more equity than 'laissez faire' local governments.

In our e-governance concept, the composition and quality of local networks deserves generous attention. Each dimension of local e-governance involves several partners or stakeholders; typically, these are local governments, citizens and technology suppliers, but also other parties may be involved such as other public agencies (municipal departments, financial service companies or other content providers). The different dimensions of e-governance (content, access and infrastructure) may require different approaches. In our framework, networks are not only a means to get things done with urban stakeholders, but can also be a powerful tool to influence the 'external factors' that influence the digital flywheel.

In each of the cities, we have checked how the private sector is involved in policies, how bottom-up initiatives in the city are aligned with general visions and strategies on the urban level, and how public agencies (within the city, but also on the national and international levels) cooperate in various ICT related policy fields.

GOVERNING LOCAL CONTENT

Table 2 summarizes the various 'content policies' that we found in our case studies. We will review them here, and discuss the way stakeholders are involved in the design and implementation of the policies.

The first and most widespread category in the table is the use of ICT by municipalities to improve electronic service provision. In a number of cities, it is now possible to submit online forms, for instance for permits or allowances, or process other routines by electronic

Table 2. Content policies

Governing content	Barcelona	Cape Town	Eindhoven	Manchester	The Hague	Venice
Bringing existing public services on-line	★★	★	★	★	★★	★
Create new integrated web products	★★	0	0	★★	★	★
Create mobile content	0	0	0	0	★	0
Create or promote local on-line communities	0	0	★	★	★★	0
Help local SMEs with introduction of e-commerce	★	★	0	★	★	★
Implement e-democracy concepts	0	0	★	★	★	0
Help/promote grassroots organizations to go on-line	0	★	0	★	★	0

Notes: **0** = no policy; ★ = modest policy efforts; ★★ = strong policy efforts. The scores are only rough indications, based on a study of policy documents and interviews with key policymakers.

means. Our case studies vary considerably in the number and quality of online services they offer.[5] But also within city administrations, big differences exist. In Manchester, for instance, the housing department is the leader of the pack. On the Manchester city council website, the housing department offers a 'home finder programme', which enables users to search and subscribe to houses, after typing in a number of search criteria. The site yields pictures of the homes, characteristics, as well as information on the neighbourhood. Tenants can report necessary repairs online, and book a date for reparation. The system links up with systems and agendas of suppliers (plumbers, carpenters, etc.). In The Hague, the local tax department has the most advanced services. Its website allows owners and users of real estate (citizens and companies) to check the value of their objects, to obtain the taxation reports, and eventually to respond electronically. Access requires a username and a password. It is a very practical service, and widely used and known by the general public.

In providing services on-line, some cities are beginning to make the shift from a supply-orientation (where individual departments of city administrations offer their content in an online form) to demand orientated and integral solutions (the second row in the table). In this way, they make better use of the added value the Internet offers. The Hague, for instance, is implementing electronic services from a life-events perspective. For people who want to get married, a site has been designed that shows all the localities in the city where the marriage can take place, and allows for on-line reservation. Eventually, private companies may take part in this initiative as well. This example suggests that the Internet may become a trigger for new kinds of public–private cooperations in service delivery.

In the borough of East Manchester, a web service has been set up that combines the content of a variety or organizations, including the City Council, the police, health care providers and job agencies. The underlying vision is to 'deliver online a wide variety of services to local residents in a manner that is appropriate to their situation and need, and which joins services up to suit individual customers and citizens' (MANCHESTER CITY COUNCIL, 2001). In other words, this is a service focused on local demand instead of what suppliers happen to offer. Among other things, the portal includes the ability to make payments (ranging from parking fines to commercial rents), to report crimes; it offers online advice, and it remixes information for specific target groups. The City Council expects substantial benefits from this initiative, not only in terms of improved service delivery for the citizens of the area, but also in terms of cost savings.[6]

Implementing integrated services asks for radical changes within city administrations. Evidently, it requires an integration of internal IT systems within the municipal organization.[7] But also, for the integration of services a reorganization of work processes within city administrations is a precondition. Generally, cities lack the knowledge and resources to manage these change processes. Therefore, they tend to engage in strategic partnerships with consultancy firms that combine expertise on ICT implementation/integration with that on organizational restructuring. The Hague works with Microsoft as key partner, Manchester with a consortium of ICL/Fujitsu and Deloitte & Touche, and Cape Town with Accenture/SAP. Our case studies reveal that cities have difficulties in finding the right partnership model. Key issues are how to share risks and returns amongst the partners, how to keep control of the change process (this is not easy for cities, as their commercial partners tend to have the better knowledge base), and how to avoid lock-in into a certain system or supplier. And, the commercial consortia are not always aware of political and bureaucratic peculiarities and sensibilities of the municipal organization.

When we compare the electronic service provision of cities with that of larger private companies in the consumer market, the performance of cities is rather poor. Little of the potential of the new technologies has been realized. Truly demand-oriented services are still an exception, and the quality of city websites is often poor compared to larger companies in the consumer market. This relative backwardness can be explained by a lack of market incentives, and the high quality requirements of public services in terms of privacy protection, identification and security. In all our case cities, national governments play a key role in setting legislation and standards in the fields of electronic identification, safety, responsibility, protection of data, etc. Some of our case cities (Venice, Manchester, The Hague) feel frustrated by the poor progress of their national governments in these fields, which hampers them to develop interactive services. Interestingly, the same national governments are increasingly providing incentives to cities to speed up e-government. In the UK, the national Labour government wants to have all public services online by 2005 (DEPARTMENT OF TRANSPORT, LOCAL GOVERNMENT AND THE REGIONS (DTLR), 2002). It encourages cities to do the same (in partnership models), and gives them money to do so. In competitive bidding processes, cities have to compete for national funds. In the Netherlands, three cities were appointed 'superpilots'. They get substantial national funds to experiment with innovative e-services.

Table 2 shows a number of other 'content policies' of local government. A relatively new phenomenon is the provision of mobile services to citizens. In The Hague, there is a mobile SMS-service that provides travellers with real time information on public transport. A popular policy is to help or support other urban actors to create electronic content. Manchester, for instance, supports an organization that helps local community and volunteer organizations to design and publish websites. The Hague supports SMEs

implementing e-commerce solutions, by giving them free consultancy days. Cape Town has established learning centres in public libraries, where small companies in disadvantaged communities are helped to use new technologies. Eindhoven has a noteworthy policy to promote the creation of broadband content by local companies. Software and application developers in the city can apply for investment subsidies when they design applications for broadband. This is part of the city's remarkable strategy to kill the broadband 'chicken and egg' deadlock; there is lack of broadband infrastructure because there is no useful content for which broadband access is needed, and the other way around.

The Hague actively promotes the formation of online communities. A web platform, 'Residentie.net', was initiated by the local government, as a platform for the creation of digital communities. Citizens can create thematic 'squares', for instance, a square for your own physical neighbourhood. The site provides very simple and user-friendly tools to create these squares, but also to make homepages and participate in newsgroups. The website offers local information on events, etc, as well as services. It also contains a virtual marketplace for second-hand goods, and serves as platform for discussions on issues that concern the city, such as urban development plans. Residentie.net is a joint initiative of the municipality and two telecom network operators: KPN (the incumbent telecom operator in the Netherlands); and Casema (a cable company). Despite the city's ambitions with the project, we found that it does not operate as expected. Visitor numbers are low, and the formation of 'digital squares' falls short of expectation; participation in online debates is modest, and the participation of private companies and local organizations is disappointing. Evidently, Residentie.net is not functioning as 'the' virtual city of The Hague. One of the key reasons is that the technology supplier in the project, KPN, has been given a role that does not fit its competencies, namely the exploitation of Residentie.net. Another issue is the lack of co-operation with Digitale Hofstad, an existing local community of heavy Internet users.

The city of Eindhoven wants to set up an online community of broadband users. Remarkably, private companies are interested in participating in it. The Rabobank, one of the largest Dutch banks, is one of them. It views cyberspace as a new domain where local companies and citizens interact in new ways. The 'e-city', with its envisioned 84,000 inhabitants always on line with broadband, could yield important lessons for the bank. It could show how interactions and transactions among citizens and companies may change in the future. For instance, banking services could become an integrated part of local e-commerce.

E-democracy initiatives are taken by several of our city cases. On a basic level, most of our cities put council decisions and policy documents on-line. Eindhoven broadcasts its council sessions live on the Internet. The Hague has used its Residentie.net platform to organize on-line discussions on urban renewal projects and, recently, on youth policy. The city had a hard job getting people involved.

GOVERNING LOCAL ACCESS

In most European cities, still only a minority of the citizens have a PC at home, or access to the Internet. Large groups lack basic ICT skills. Empirical studies confirm that particularly weaker social groups (unemployed, ethnic minorities, low-income groups, the elderly) show low levels of ICT adoption (SCP, 2000; DTI, 2000). People 'on the wrong side of the digital divide' lack access to information and services, and do not benefit from the new possibilities which reinforces their isolation and backwardness. Lack of ICT skills reduces their chances on the labour market. Many cities, including all our case cities, consider these low levels of ICT adoption as an undesirable situation, and try to speed up the adoption of ICTs. In this section, we describe what our case cities are doing to fight this digital divide, and which urban actors they involve in their policy design and implementation.

Some of our case cities have opened or supported special ICT centres, with the aim to help groups with low levels of ICT adoption to make the shift towards the information society. Table 3 shows a number of ICT adoption policies. Manchester has its 'electronic village halls'. They offer Internet terminals, where the Internet can be accessed free; also, numerous training and education programmes are offered at low fees. The Hague has similar ICT learning centres, based in public libraries.

Second, all our case cities put Internet terminals in public places (libraries or kiosks). This enables people who do not have a PC at home to access the Internet.

Table 3. Access policies

Governing access	Barcelona	Cape Town	Eindhoven	Manchester	The Hague	Venice
ICT centres for special groups	0	0	★	★★	★	0
Internet terminals in public places	★	★	★	★	★	★
PCs/Internet at schools	0	★	★	★	★	0
Reduced tariffs for ICT equipment/internet access	0	0	0	★	★	0
Broadband access promotion	0	0	★	★	0	0
ICT training at reduced fee	0	★	★	★	★	★

Notes: See Table 2.

It is a relatively low-cost type of policy. Third, many cities allocate resources to improve PC and Internet availability at schools. In Cape Town, many schools are poorly endowed with ICT equipment. The city invests in PCs, as this is considered key to improve the chances of children in poor neighbourhoods. At the weekends, some schools are opened to allow community groups to use the Internet and get IT-related training. In Cape Town, some large IT companies contribute to access policy, from a social responsibility point of view. In a community access project, an Internet provider offers Internet access for free, and a big computer company finances part of the equipment. The city of Cape Town wants to make optimum use of private companies' support in its policies. Using GIS (geographical information systems), it is carefully mapping the digital divide, to find out which areas are particularly poorly endowed with ICTs. The study will help the city to direct private initiatives into the areas where the needs are greatest. Fourth, some cities directly address the digital divide by offering ICT equipment at reduced prices. Manchester, in our study, promotes individual ownership of devices and home access. In a particular area in East Manchester, citizens can get a brand new internet-ready PC with monitor and colour printer for just €317, or a set-top box (enabling Internet access via TV) for free. On average, the hardware pieces are subsidized for an amount between €317 and €476 each. In The Hague, families living on welfare can get PCs for free. Also, the city offers free Internet to its citizens through the Residentie.net project.[8] Fifth, a relatively new type of 'digital divide' policy is the promotion of broadband access. Manchester and Eindhoven are doing this. The City Council of Manchester is building a wireless broadband Wide Area Network (WAN) in the deprived borough of East Manchester. This will enable people in the area (4,500 houses) to access the local intranet for free.

Eindhoven is promoting broadband use as well. In a designated area of 80,000 households, the city offers a demand subsidy to broadband users, regardless of the type of broadband connection (cable, DSL or wireless). With this policy, it hopes to establish a critical mass of broadband users in the city that will be an interesting test market for broadband content providers (see above). Finally, all our city cases promote the development of various ICT skills by its citizens. Interestingly, in the Hague, where courses are offered almost for free in public libraries, there is a shift in demand from basic courses (how to use a PC, how to surf on the Internet) to more sophisticated skills, for instance on web design. This marks the maturity of access in this city.

As this survey shows, cities are quite active in promoting access to new technologies among weaker groups of the population, with Barcelona a noticeable exception. In Barcelona, policy makers see no role for themselves in promoting access. In their view, commercial companies have already provided access for

all; the large number of Internet cafés in the city offers sufficient opportunities for every citizen to connect to the Internet or to use a computer at a low fee.

There is still a debate ongoing whether (local) government should have a role in promoting ICT adoption. It can be argued that the adoption of new information and communications technologies follows a similar path as that of other high-tech products such as the video-recorder or the television: the well-known S-shaped adoption curve (LEIGHTON, 2001). When a new technology is introduced, at first the number of users is low, and the prices are high. Next, with falling prices and improving user-friendliness of ICTs, the number of users/owners of the technology grows quickly. As time goes by, the market mechanism will provide for further adoption of ICT among people that derive value from it. Proponents of policy intervention, on the contrary, argue that ICT adoption can be of strategic importance for urban development in many respects. The returns of policy intervention to speed up adoption may, under some conditions, be high. What we can learn from the adoption literature is that efficient policies should preferably not be generic but targeted at non-adopting groups (see VAN WINDEN 2001; VAN DEN BERG and VAN WINDEN, 2002).

GOVERNING LOCAL INFRASTRUCTURE

In the provision of local electronic infrastructure, the role of cities is smaller than in content and in access. A few decades ago, this situation was different. Then, cities constructed and operated cable networks – sometimes in public–private partnerships – or operated local telephone companies. In the 1990s, however, the telecom sector was liberalized and privatized. As a consequence, the role of local governments has decreased substantially. Much of the electronic infrastructure is owned by a small number of multinational companies that take investment decisions based on market considerations. Nevertheless, cities try to influence the local electronic infrastructure situation in several ways (see Table 4).

All our case cities – with Cape Town as an exception – have linked municipal buildings with broadband lines. The reasons to do so are to save communication costs, but also to facilitate the exchange of large data packages. Some cities (Barcelona, The Hague) are considering extending their networks to libraries, schools, medical facilities and so on. These new networks could very well develop into open broadband networks that compete with the ones of existing telecom providers (see BAINES, 2002, for more examples).

Infrastructure is the cornerstone of Eindhoven's e-city plan. The e-city's key ambition was to connect 84,000 people (38,000 households) to broadband. Broadband was defined as 2Mbps minimum. The strategy consists of promoting demand by offering

Table 4. Infrastructure policies

Governing infrastructure	Barcelona	Cape Town	Eindhoven	Manchester	The Hague	Venice
Linking public buildings with broadband	★	0	★	★	★	★
Promote roll-out of new infrastructure	0	0	★★	0	0	0
Create new infrastructure	0	0	0	★	0	0
Influence national telecom policy	0	★	0	0	0	0

Notes: See Table 2.

discounts for broadband subscribers in the e-city area (€13·6 million is available) and by subsidizing the development of local broadband applications and services (see the section on governing local content). The city also encourages the supply of broadband by fixed, mobile and cable operators. At the launch of the project, in Spring 2000, several partners showed interest, and signed up as partners in the e-city project proposal. However, after Eindhoven won the project, it proved hard to get the partners going. For one thing, some of the telecom partners (UPC, KPN) had serious financial difficulties and became more reluctant to invest in broadband infrastructure. Another partner, the Swedish Bredband, decided to withdraw from The Netherlands and concentrate its efforts on the Swedish home market. UPC, the local cable operator, did not seem to have too much interest in investing in fibre to the home: it would cannibalize the cable Internet market. At the time of writing, KPN is unable to invest, given its precarious financial position. In sum, by the end of 2001, the prospects of Eindhoven's broadband strategy looked grim. Citizens grew impatient, because none of the promises seemed to be fulfilled.

Cape Town, our South African case study, is poorly endowed with electronic infrastructure. This is mainly due to the lack of competition in the market and the subsequent dominant position of the national telecom monopolist. There is not much that an individual city can do in this respect. Civil officers of Cape Town participate in a national advisory commission, to influence telecom deregulation and liberalization.

The city of Manchester is developing broadband infrastructure itself. In a very ambitious scheme, the City Council is now providing the deprived area of East Manchester with a wireless broadband Wide Area Network (WAN). This will enable people in the area (4,500 houses) to access the local intranet for free. This intranet will contain several services, including the Eastserve.com portal discussed above. People who want to go on the Internet need to pay the normal monthly fee to an Internet service provider, of around €24. Not only homes will be connected, but also community centres, schools and several public Internet access points. A private company will roll out the network. The maximum speed will be 10 Mbps. This is a high speed at low cost.[9] The idea behind the project is to give disadvantaged groups access to broadband Internet.

Broadband enables citizens to access and use rich content (like for instance, moving images), and more personalized forms of online service provision (for instance, using videoconferencing technology). Furthermore, it enables more advanced types of on-line learning.

CONCLUSIONS

Information technology is changing cities, but it is doing so differently in each individual city. In this paper, we wanted to highlight and explain differences in the way cities are developing into the information society. Our study confirms that cities indeed are very different. Many of the differences between our case cities can be explained not primarily by local conditions or policy but rather by differences in national conditions, such as the degree of telecom market regulation and general levels of economic development. This holds particularly for the dimensions of electronic infrastructure and access. Furthermore, national governments rather than cities set standards in the important fields of legislation on electronic identification, privacy, etc. Nevertheless, one of our key conclusions is that urban policy makers have a substantial influence on shaping the local information society.

In our framework, we discern access, infrastructure and content, as three different dimensions of the local information society. Together, they form a 'local digital flywheel'. The quality of content positively affects the number of users, and vice versa. Richer content creates a demand for high-quality (broadband) infrastructure which, in turn, invites content providers to create broadband content and makes the Internet attractive for a wider audience. Improving each of the three dimensions is beneficial for cities in several respects. High-quality content may make a city more attractive for citizens and companies, save costs, improve accessibility and make government service more efficient. Higher levels of access may reduce social exclusion and improve individual's chances on the labour market; high-quality electronic infrastructure is a factor of increasing importance to attract companies and inhabitants. Thus, cities can reap substantial benefits from 'turning the flywheel on'.

Cities are aware of this, and develop all sorts of ICT policies. First, cities are very active as providers of local content. They may create very practical and useful content that makes life easier for citizens. Our study also

reveals that cities increasingly play a role in promoting content development by other actors. They promote the use of ICTs by SMEs, semi-public agencies, community organizations, etc, thus speeding up the take-up of technologies in many sectors in the city. Some cities try to create or promote virtual on-line communities. Almost all our case studies try to improve levels of access, and fight the 'digital divide'. Infrastructure policies are less common, but clearly on the wax.

Our concept of e-governance is very useful to reveal and explain differences between ICT strategies and policies. Its main strength is that it addresses not only the role of local governments, but also that of various stakeholders (companies, citizens, community organizations, other governments). It takes into account that policy goals and orientations have an impact on the design and implementation of policies.

In our study, we found substantial differences between cities in their policy approaches. In some cities, reducing inequalities is the key idea behind its ICT policy. This holds for three of the most 'divided' cities in our study: Manchester, Cape Town, and The Hague. They put much stress on helping people to get online, and develop useful electronic content for the ordinary citizen. Other cities, notably Barcelona and Eindhoven, take a more opportunity based and future oriented approach. Barcelona regards a strong web-policy as an instrument for city marketing, and Eindhoven wants to build a lead as a region with top-level electronic infrastructure. Primarily, it has economic motives for its e-governance strategy. Venice uses ICT primarily to strengthen its tourist product.

Funding for local e-strategies comes from various sources. For some cities (Manchester in our sample), financial support from the EU is an important policy enabler. The wireless WAN in East Manchester is financed with EU funds. In the Netherlands and the UK, national governments strongly support local initiatives through competitive bid procedures. This way, they hope to invoke creative and innovative local policies which may later be applied on a larger scale.

On the local level, internal ICT budgets are being critically reviewed. During the last decade, ICT spending was justified by the general belief that ICT would make governments better: it would streamline internal processes, increase efficiency, reduce costs, improve services delivery, and enhance the quality and speed of decision making. Paradoxically, citizens throughout Europe seem to be less happy with the quality of their governments than a decade ago. This raises the question of how much has ICT really achieved. A longitudinal analysis of the quality of public service delivery could reveal this. Relevant questions could be: to what extent has ICT led to substantial improvements in public service delivery; to what extent has it reduced costs and improved efficiency; what successfactors can be found; how can mistakes be avoided?

Our case studies reveal that private co-funding of ICT policies is often officially promoted but hard to achieve. Even 'business oriented' projects like Eindhoven's e-city fail to engage companies in a risk-taking position on a large scale.

New information technologies typically offer scope for functional integration, on different levels. From this perspective, all our case cities are aware that they have to engage in strategic relationships with other actors. In offering electronic government services, they have to strategically cooperate with software companies and consultants, but also with other service providers; in creating web-portals, they have to organize many actors to deliver their content; in trying to influence electronic infrastructure provision, they have to work together with telecom suppliers. In each of these cases, the role of the city is different. Our study shows that cities are struggling to define partnerships models appropriately. Partnership approaches in technology policy raise a number of new questions on the extent of public domain and responsibility. On a local level, increased public–private partnerships in all fields of e-governance can be expected. Future research is needed into public–private cooperations in the different types of local technology policy.

City leaders think differently about their role *vis-à-vis* the market and the private sector. As a consequence, they differ in the degree to which they intervene in content, infrastructure and access. At the one extreme is Barcelona, which hardly interferes at all, from a strong belief in the working of the market. Other cities are much more active. Remarkably, in the field of electronic infrastructure, we witness a trend of reinforced intervention of local government, after years of declining influence of local policy. Two of our case studies – Eindhoven and Manchester – are already active in improving the quality of electronic infrastructure, but others are considering it. Cities are very much aware of the critical role of infrastructure as factor to attract companies, and increasingly dissatisfied with their lack of influence on its development. Some European cities (the Dutch city of Groningen is one of them) are considering developing 'open' broadband networks themselves, by extending the high-capacity optic fibre networks that link municipal buildings and engaging other actors (schools, libraries) as well. This may witness the emergence of a new kind of semi-public local telecom providers.

NOTES

1. Despite policies aimed at allowing more operators on the copper networks, the dominance of the former telecom monopolists in DSL broadband is still large. In the UK, in December 2001, British Telecom had handed over little more than 160 of its telephone lines for rivals to install broadband equipment for DSL (*Financial Times*, 2 December 2001).

2. This is the case in the deprived area of East Manchester. Many people were cut-off from the landline because they had failed to pay their bill, and have switched to pre-paid mobile phones.

3. A private company links up the wireless home networks of individuals, so creating a big wireless network. The network consists of people with a fixed broadband connection, plus a wireless network in their home. Members of the network have access to other peoples' network. The locations of the access points are published on the Internet and only accessible for members (*NRC Handelsblad*, 2002).

4. A recent example shows how a 'killer app' can speed up the use of technology. In the Netherlands, banks have been pushing consumers to use their bank cards as electronic purses. Despite huge marketing efforts, the uptake of the electronic purse remained very low for years. Recently however, in some cities you can only pay parking fees with the electronic purse. Since then, adoption levels have skyrocketed.

5. This confirms the findings of many e-government surveys (see, for instance, EUROPEAN COMMMISSION, 2001.

6. A total cost saving of €4·2m over a five-year period is expected. This sum is made up of a reduced number of calls to the housing call centre, fewer manual processing of payments, a reduction of back-office and support costs at the Council, and the possibility of pooling resources among the organizations that are involved in the project (MANCHESTER CITY COUNCIL, 2001).

7. Cape Town, for instance, has 270 different and often incompatible ICT systems.

8. Internet provision is for free, but citizens have to pay the telephone ticks.

9. An average ADSL user in the UK gets a speed of 512Kb/s for a monthly fee of €40.

REFERENCES

Algemeen Dagblad (2002) Digistroom: daad of droom? (Digital power: is it real or just a dream?), 6 November.

ANTTIROIKO A. (1998) Planting the seeds of economic growth and social welfare: local and regional governments in Finland and Korea facing the challenge of the Information Age, article prepared for the International Conference on Electronic Democracy EDI, Korea.

BAINES S. (2002) Wired cities, *Communications International*, April, pp. 21–25.

BDRC (2001) The development of broadband access platforms in Europe, BRDC Ltd, London (www.europa.eu.int/eeurope).

CASTELLS M. (1996) *The Rise of the Network Society. The Information Age: Economy, Society and Culture*, vol. 1. Blackwell, Oxford.

DEPARTMENT OF TRADE AND INDUSTRY (DTI) (2000) *Closing the Digital Divide: Information and Communication Technologies in Deprived Areas*, Report by Policy Action Team 15. DTI, London.

DEPARTMENT OF TRANSPORT, LOCAL GOVERNMENT AND REGIONS (DTLR) (2002) *E-gov@local: Towards a National Strategy for Local E-government*. DTLR, London.

EUROPEAN COMMISSION (2001) *Web Based Survey on Electronic Public Services*. DG Information Society, EU, Brussels.

Financial Times (2001) Broadband's failure to connect Europeans, 2 December.

FORRESTER T. (1993) *Silicon Samurai: How Japan Conquered the World Information Technology Industry*. Blackwell, Oxford.

GRAHAM S. (1998) The end of geography or the explosion of space? Conceptualising space, place and information technology, *Progr. Hum. Geogr.* **2**, 165–85.

GRAHAM S. (2000) Constructing premium network spaces: reflections on infrastructure networks and contemporary urban development, *Int. J. Urban & Reg. Res.* **24**(1), 183–200.

HALL P. (1998) *Cities in Civilization: Culture, Innovation and Urban Order*. Weidenfield & Nicolson, London.

HEALEY AND BAKER CONSULTANTS (2001) *European E-locations Monitor*. Healey & Baker Consultants, London.

JESSOP B. (1997) Capitalism and its future: remarks on regulation, government and governance, *Rev. Int. Pol. Econ.* **4**(3), 561–81.

LEIGHTON W. A. (2001) Broadband deployment and the digital divide, a primer, *Policy Analysis*, no. 410, 7 August.

MANCHESTER CITY COUNCIL (2001) *Invest To Save Bid, Round 3*. MCC. Manchester.

MISTRI M (1999) Industrial districts and local governance in the Italian experience, *Human Systems Mgt.* **18**(2), 131–39.

MITCHELL W. J. (1999a) Equitable access to the online world, in high technology and low-income communities, in SCHÖN D. A. B., SANYAL A. B. and MITCHELL W. J. (Eds) *Prospects for the Positive Use of Advanced Information Technology*. MIT Press, Cambridge, MA.

MITCHELL W. J. (1999b) *E-topia: Urban Life Jim, But Not As We Know It*. MIT Press, Cambridge, MA.

NRC Handelsblad (2002) Mailen in de zon en zonder draadje, 3 June.

SASSEN S. (2001) Debates and developments – impact of information technologies on urban economies and politics, *Int. J. Urban & Reg. Res.* **25**(2), 411–18.

SERVON L. J. and NELSON M. K. (2001) Community technology centers and the urban technology gap, *Int. J. Urban & Reg. Res.* **25**(2), 419–26.

SILCOCK R. (2001) What is e-government? *Parliamentary Affairs* **54**, 88–101.

SOCIAAL EN CULTUREEL PLANBUREAU (SCP) (2000) *Digitalisering van de leefwereld: een onderzoek naar informatie- en communicatietechnologie en sociale ongelijkheid*. SCP, Den Haag.

STORPER M. (1996) The world of the city: local relations in a global economy, School of Public Policy and Social Research, University of California, Los Angeles (mimeo).

THRIFT N. (1996) New urban eras and old technological fears: reconfiguring the goodwill of electronic things, *Urban Studies* **33**(8), 1,463–93.

VAN DEN BERG L. (1987) *Urban Systems in a Dynamic Society.* Gower, Aldershot.

VAN DEN BERG L. and VAN WINDEN W. (2002) Should cities help their citizens to adopt ICTs? On ICT adoption policies in European cities, *Environ. Plann. C* **20**(2), 263–79.

VAN RIJSSELT R. T. J. and WEIJERS T. C. M. (1997) Ouderen en de informatiesamenleving: Een verkenning van opvattingen over aansluiting en uitsluiting, Werkdocument 60, Rathenau Instituut, The Hague.

VAN WINDEN W. (2001) The end of social exclusion? On information technology policy as a key to social inclusion in large European cities, *Reg. Studies* **35**(9), 861–77.

VLAM P. and WESTRA A. (2002) Waterputten of Internetten?, *Computable* **20**, 52–57.