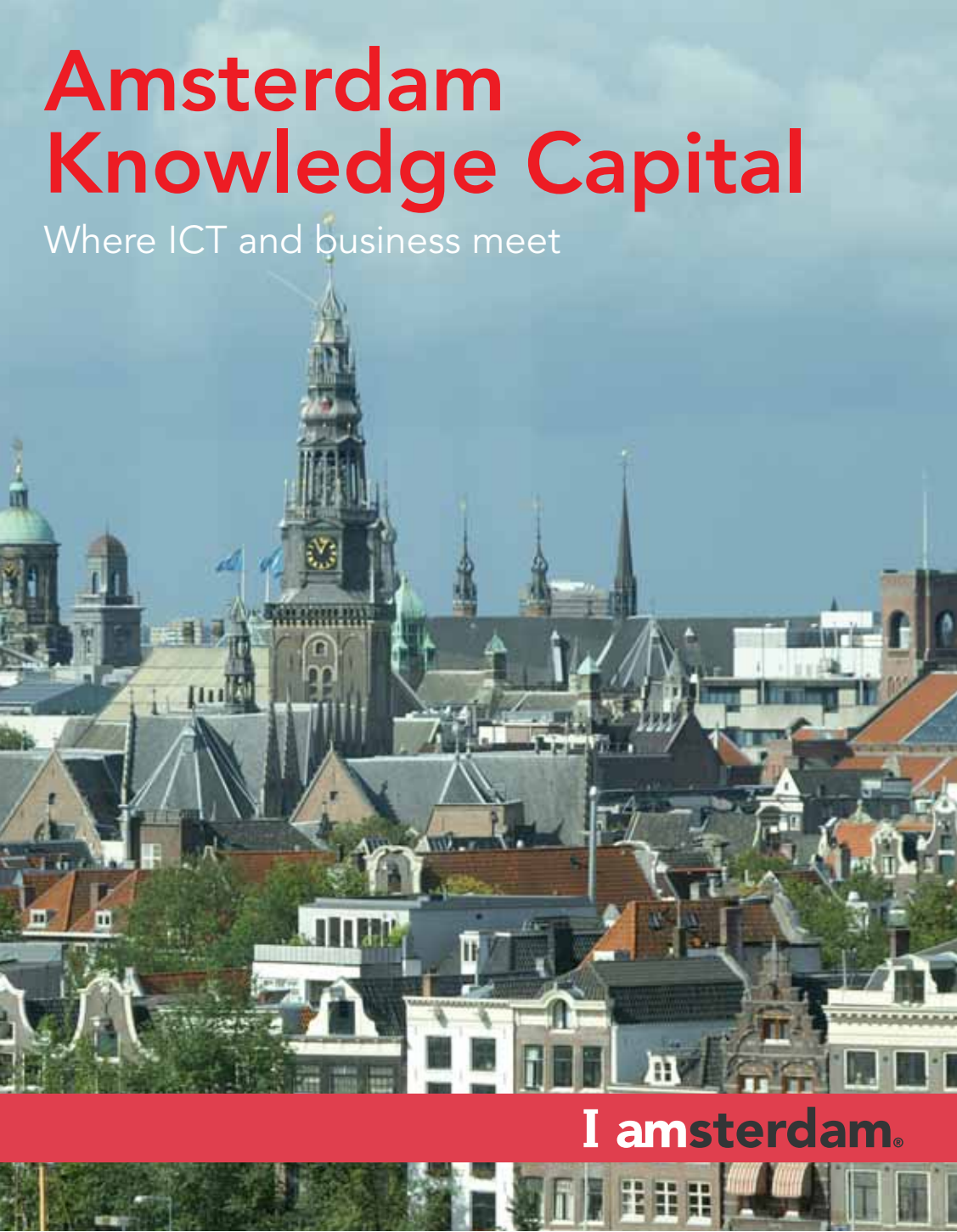
Amsterdam Knowledge Capital

Where ICT and business meet



I amsterdam®

Amsterdam Knowledge Capital

Where ICT and business meet

Contents

Introduction

Amsterdam, the capital of the Netherlands, is an excellent business location. This brochure brings together the key facts and figures about the city as a knowledge and business centre, with the focus squarely on ICT. While Amsterdam is not the only city dedicated to building a solid base in the knowledge economy, it nevertheless has assets that are difficult for its European rivals to match. Over the next few pages, you'll discover the highlights of Amsterdam's ICT strengths. We hope that you'll enjoy getting to know Amsterdam, the knowledge capital.

An Inspiring City
Amsterdam has a strong tradition as a city of inspiration. It was already leading the way in trade and creativity by the end of the Middle Ages. The city may be relatively small in size, but that didn't stop it becoming one of the world's most powerful cities. Down the ages, Amsterdam has always been a centre for global trade and manufacturing. In fact, in the 17th century, the Netherlands (under the leadership of Amsterdam) was an economic giant. Back then, the Netherlands occupied a position comparable to that of the United States today.

In the 17th century, for example, the Netherlands had half of the world's merchant ships, as well as the world's biggest navy. The Amsterdam Stock Exchange was founded way back in 1602. In fact, the world's very first shares were issued in Amsterdam, in 1606. The Netherlands had overseas possessions on four continents – from Indonesia in Asia, all the way to New York City (then known as New Amsterdam) in North America.

Intellectual and Artistic Riches
On top of this, Amsterdam has long been blessed with a rich intellectual and artistic climate. Among the city's most famous natives are the scholars Spinoza and Grotius. Amsterdam was also home to great artists like Rembrandt. An interesting fact that speaks volumes: half of all of the books published in the world in the 17th century came from the Netherlands.

When people talk about Amsterdam, they often mean the historic city centre, which is indeed a marvellous place. But new and exciting economic, cultural and real-estate developments are now happening all over the city – often in the lesser-known parts of town – and in the wider Amsterdam Metropolitan Area.

International Orientation
Amsterdam has a strong international orientation. It is an open, welcoming city with its sights firmly fixed on the future. Local residents hail from all corners of the world. In fact, almost half of the local population has its roots in foreign countries. Most of the population can speak English. Moreover, Amsterdam also attracts millions of foreign tourists. Indeed, the city is now Europe's fifth-biggest tourist destination.

Amsterdam has many attractions, most of which are within walking distance of each other. Just one example is the Van Gogh Museum, devoted to one of the world's best-loved painters. And of course, the Rijksmuseum, which displays works by Rembrandt, Vermeer and other Dutch masters. The city is also home to the Concertgebouw Orchestra, the Dutch National Ballet and the Netherlands Opera.

The entire historic city centre is itself one enormous attraction – packed with graceful and historic buildings, picturesque canals, elegant bridges, world-class museums, and a wealth of art galleries, shops, restaurants, English-language movie theatres and other entertainment venues.

Amsterdam invites and welcomes you as a visitor and a business partner.

1 Knowledge Capital Amsterdam

With a strong tradition of developing and applying knowledge, Amsterdam has long been a knowledge capital. Centuries ago, the city's trade guilds were already beginning to establish and develop knowledge from an entrepreneurial perspective.

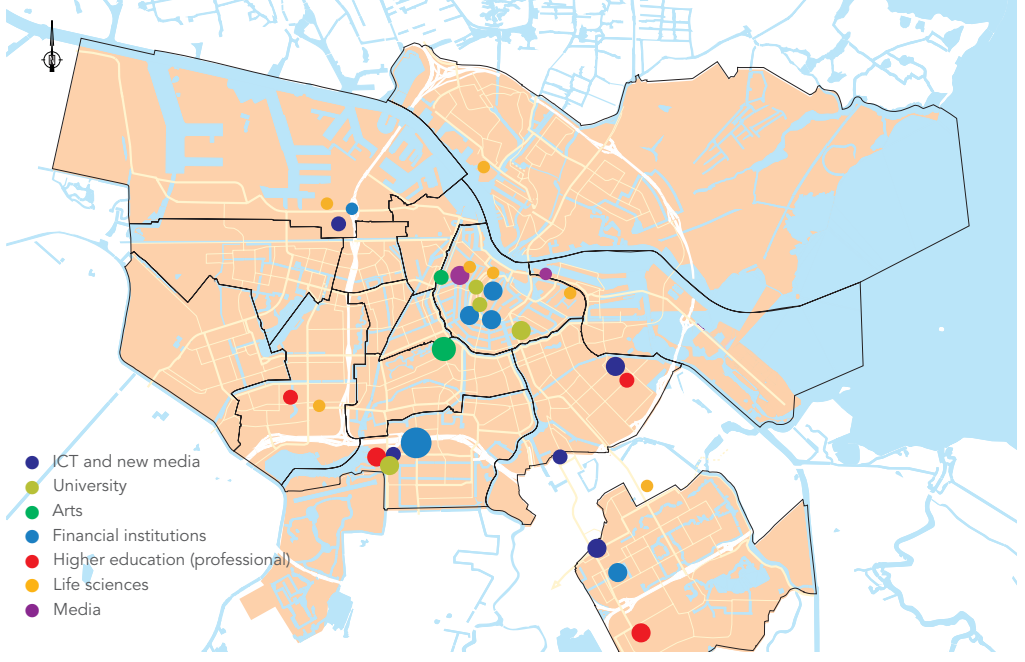
Amsterdam, the city of the philosopher Spinoza (1632-1677), was also the city of Jan van der Heyden – the 'Dutch Leonardo da Vinci'. In 1672, Van der Heyden invented the hose fire extinguisher, a hydraulic pump which achieved a constant pressure. His idea for street lighting using oil lamps found a ready market, and was soon found everywhere from Paris to the Japanese island of Deshima.

Nowadays, the applications have changed, but Amsterdam is still in the top league of science. From complex grid technology to the first transatlantic lambda connection, and from computer based HIV-simulation to the most advanced GPS applications, it's all happening here in Amsterdam.

Knowledge Clusters

There are still discoveries to be made

Figure 1
Amsterdam's wide diversity of knowledge: the main knowledge-intensive clusters by location (Source: O+S/AIM)



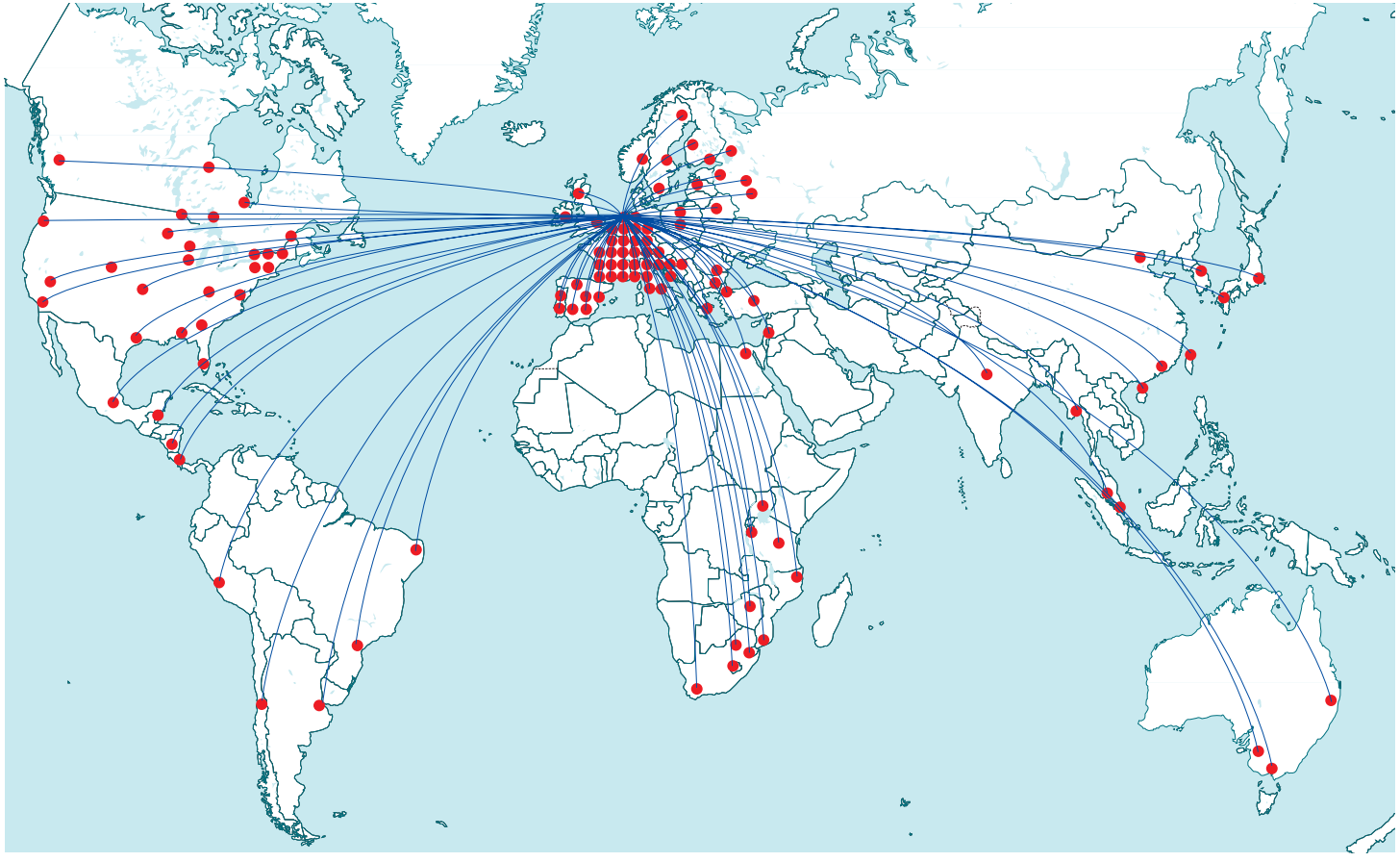


Figure 2
The figure above shows the international partnerships of the Amsterdam universities

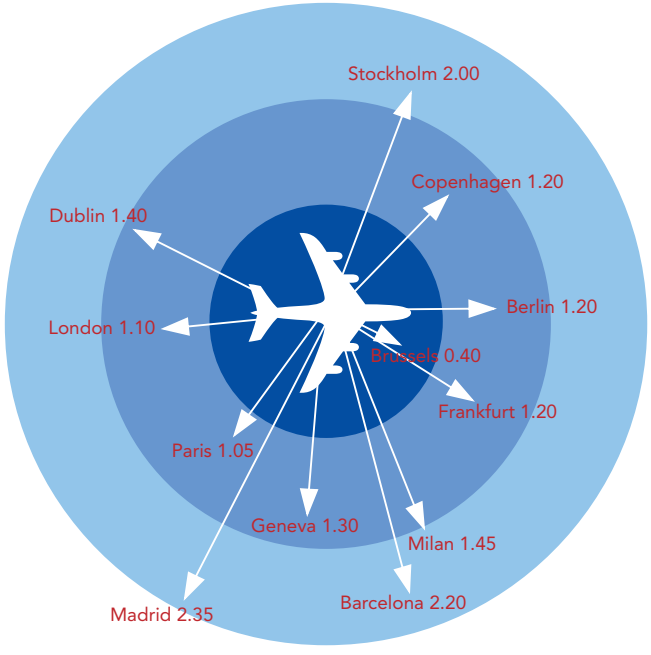


Figure 3
Travel times to Amsterdam Airport Schiphol, in hours and minutes (Source: KLM)

and knowledge to be acquired in Amsterdam. 'Knowledge is power', according to the familiar aphorism. Yet knowledge alone is no longer enough: in the 21st century, it is the development, exchange, application and commercialisation of knowledge that spell success for economic regions. Today, any knowledge capital worthy of the name needs more than knowledge-developing universities. It must also have close cooperation between the city council, businesses, academia and the remaining 'knowledge clusters' (see fig. 1) to make this knowledge accessible and to commercialise it.

The strength of Knowledge Capital Amsterdam is based on its variety of research fields and multi-disciplinary approach to current scientific challenges. This results in a good climate for innovation with regard to business solutions. The Netherlands holds a top ten position in the INSEAD list of the world's most innovative countries.

All of this is made possible by the presence of a good supply of knowledge workers, an international orientation, and excellent physical and technological infrastructure. A broad range of facilitating companies is another essential factor.

International Orientation

One of the key reasons for the economic and scientific success of Amsterdam over the last five centuries is its international orientation. Amsterdam is the most international city in the world. Its inhabitants include the world record of 177 different nationalities, and there are companies from all over the world based in the region. When Thomas Friedman argues that The World is Flat, he is noticing something that has been clear to Amsterdammers for centuries.
This international focus is a key characteristic of the city's research institutes, which have always figured prominently in international networks in all types of field. This results in all kinds of exchange programmes for students, but also in extended scientific networks with their crystallisation point in Amsterdam.

Infrastructure

Amsterdam is a multi-purpose hub, and Amsterdam Airport Schiphol is one of the largest airports in Europe. Schiphol employs around 58,000 people, and 42.5 million travellers pass through the airport every year. There are connections to all the world's regions, and yet the city centre is only 20 minutes away.

Amsterdam also has excellent international train connections to

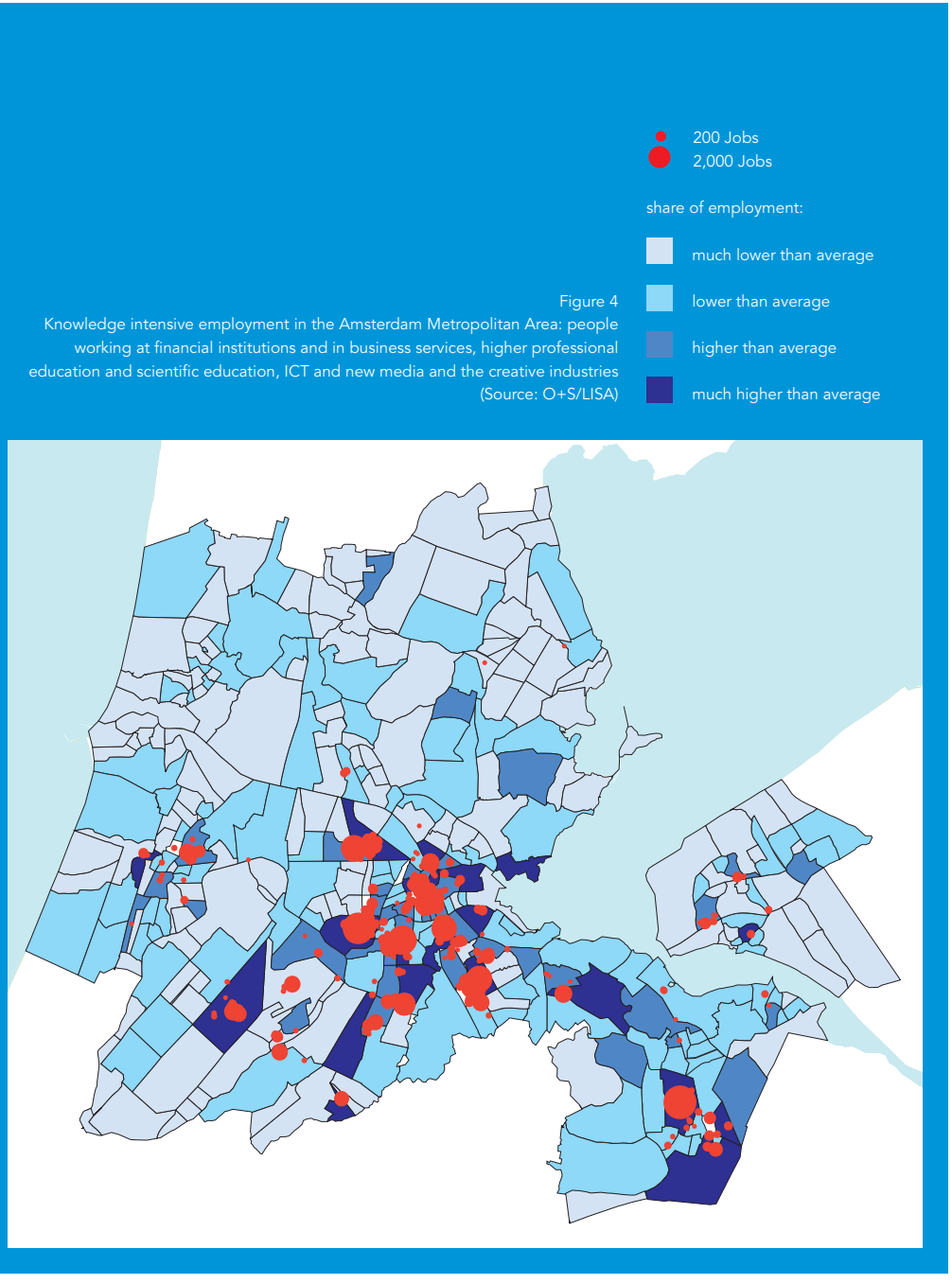


Figure 4
Knowledge intensive employment in the Amsterdam Metropolitan Area: people working at financial institutions and in business services, higher professional education and scientific education, ICT and new media and the creative industries (Source: O+S/LISA)

Germany and (as of 2008) a high-speed line to Brussels and Paris. Furthermore, a network of roads and waterways links the region to the rest of Europe. Finally, Amsterdam also has an innovative port: the first in the world to have a covered terminal and a container terminal where transhipments can be loaded on one side, and unloaded on the other.

Business and Financial Services

Some of the largest financial institutions in the world, plus an assortment of supporting service agencies, have grouped themselves in Amsterdam's Zuidas area. Of the 24 companies that determine the AEX, 15 are located here. For this reason, it is the prime place in the Netherlands for internationally oriented companies to base their headquarters, with Amsterdam Airport Schiphol practically on the corner and international train connections a short stroll away.

Knowledge Workers

The Amsterdam Metropolitan Area has 2.2 million inhabitants, two universities, six professional universities, two academic hospitals, 40 independent research institutes, and over 100,000 students in higher education.

The city offers high-tech companies a large pool of highly educated and well-trained professionals. Of the people working in Amsterdam, 44% have been in higher education. Knowledge-intensive businesses account for 330,000 jobs, amounting to one-third of total employment in the region. The academic environment is international, with English as the classroom language. Scientists and technicians have extensive job opportunities in the region, both in research institutes and with innovative companies.

In the next chapter, we'll focus on the position of ICT in the region of Amsterdam. You shall see that Dutch people have ICT in their blood, making Amsterdam a true ICT capital and a natural, and accessible, gateway to Europe.

2 Amsterdam: ICT Capital

Amsterdam is the ICT capital of the Netherlands: the city is well known for its unique mix of creativity, business, accessibility and high quality of life. In terms of location, the city forms a natural gateway to the European continent: a large part of Germany and all of Belgium is just a few hours away by car. Amsterdam city centre is only 20 minutes from Schiphol Airport. Amsterdam is also a digital gateway: the capital boasts Europe's biggest Internet hub, and 20% of all ICT activities in the Netherlands take place in the Amsterdam Metropolitan Area. Of all Forbes 2000 companies active in ICT, 60% have an office in Amsterdam. What's more, the region has long been a centre for innovation and knowledge in the field, with three universities, two professional universities and several research institutes in the field of ICT.

In the Amsterdam area, ICT companies can find everything that they need for business success. Because in addition to its solid digital infrastructure, the city can offer an educated and multilingual workforce. Another factor in the city's favour is the sizeable Dutch home market: the Netherlands is the world's number nine economy – and if you count Dutch-speaking Belgium, it rises to number seven. Thanks to its history

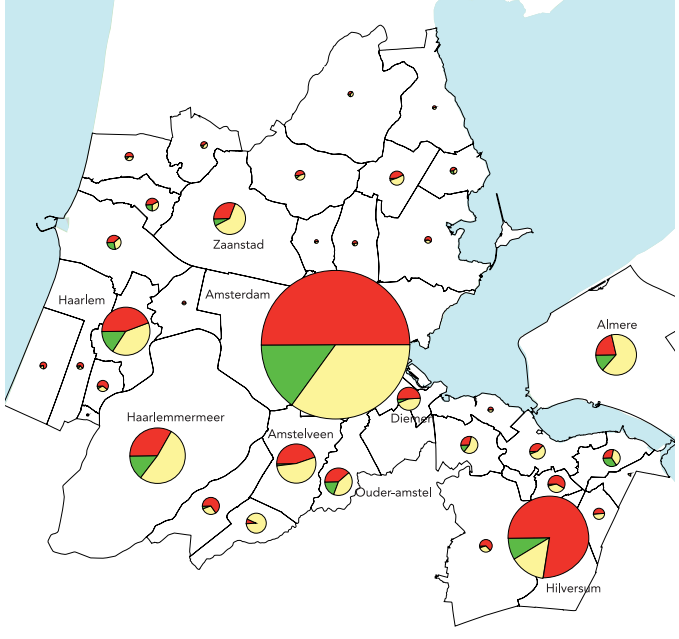


Figure 5
ICT in the Amsterdam Metropolitan Area

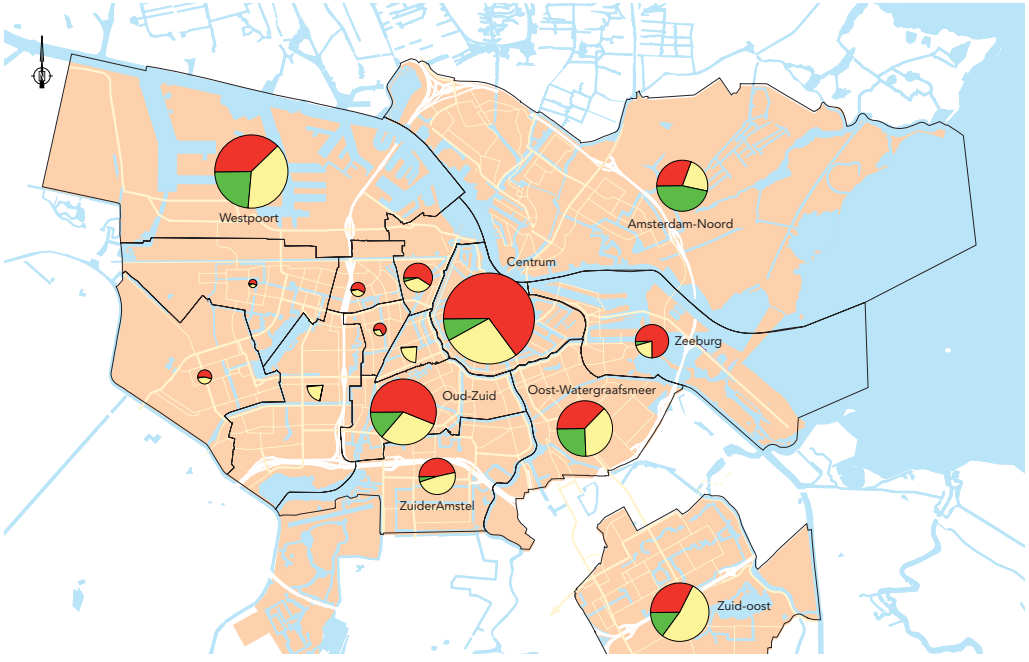


Figure 6
ICT in Amsterdam

of internationalism, Amsterdam is a logical choice for many foreign companies seeking to establish themselves in Europe. This also applies to research: Dutch research institutes are generally found at the heart of international research fields, frequently forming a crystallisation point for knowledge.

A wide range of companies comprise the Amsterdam ICT sector. All the big international companies are represented in the city: Microsoft, Google, IBM, Cisco, HP, TomTom, Accenture, Tata, Wipro and Infosys. There are several reasons why these international companies are successful in Amsterdam. An important factor is the presence of the head offices of many multinationals, including ING, ABN AMRO, Philips, Akzo, Ahold and Heineken, which together make up a large market for service providers.

But the wider network (from small innovative companies to a sizeable creative sector) is also a major reason why people choose Amsterdam, on account of its pre-eminence as a place where new services and technologies can easily emerge. Think for example of TomTom's navigation systems, Endemol's interactive TV and KPN's mobile applications.

ICT in each Sector

From retail to food, and from logistics to utilities, banking, and life sciences, ICT is part of every industry. In almost all big companies, the emphasis is on developments in the field of ICT. Large Dutch insurers and banks such as ING and Rabobank are highly progressive in their ICT-based services – a recent example being mobile banking. Moreover, Dutch businesses have been early adaptors in outsourcing their ICT activities. Companies like Heineken, Shell,

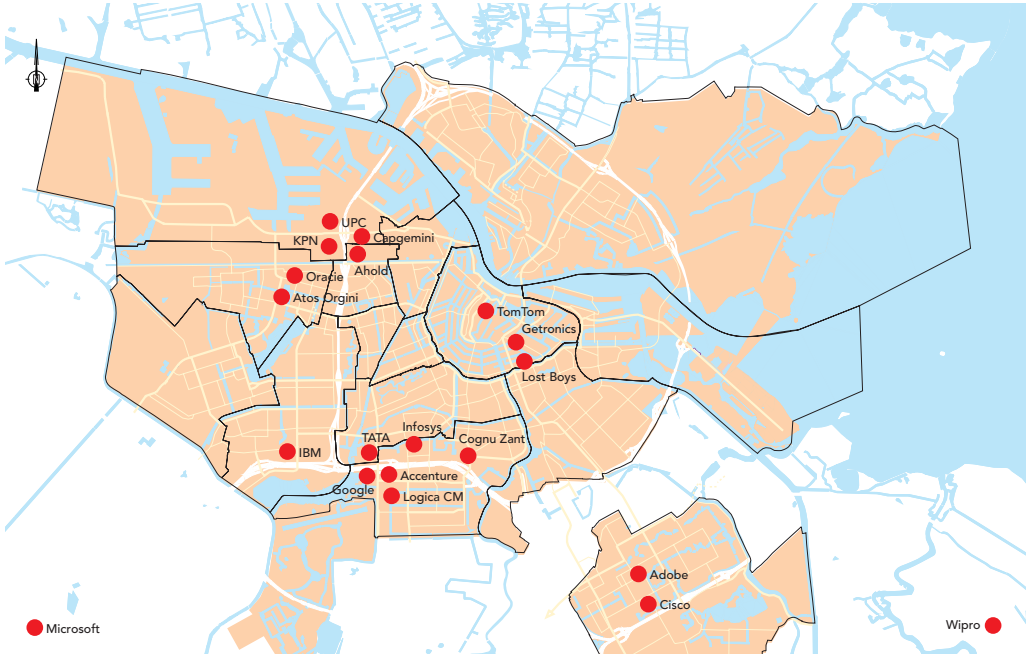


Figure 7
Top 20 ICT companies in Amsterdam metropolitan area

Lee Feldman Blast Radius

Chief Creative Officer

'When Blast Radius started working for clients in Europe, Amsterdam was on the top of our list. Besides the practical, including the ability to be one hour from all of our clients in Europe, there are many other reasons.

The city was built for commerce, and has a deep-rooted sense of networking. For us this means an environment ripe for new business ideas to happen. Amsterdam attracts a vast amount of well-trained creative minds in all disciplines. There is a sense of experimentation, a willingness to take risks. You notice this in the architecture and in the new ways of communication.
The people we hire have this spirit of experimentation ingrained, which helps us bring new ideas to our clients.'

Blast Radius is a digital marketing agency with its European headquarters in Amsterdam since 2000.

www.blastradius.com

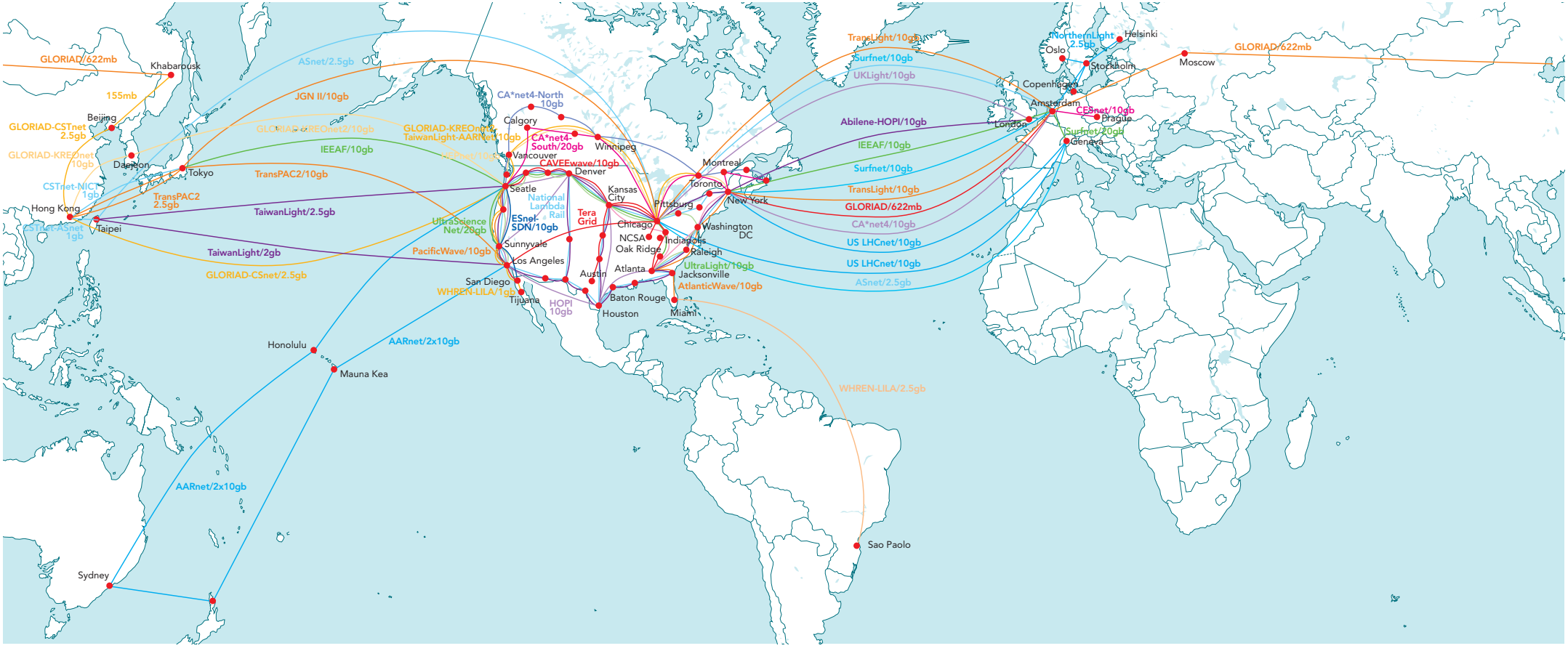


Figure 8
Amsterdam Netherlight: glassfibre connections

Fortis, ING and ABN AMRO have largely outsourced their ICT departments to specialised companies.

ICT Infrastructure

Amsterdam has a superb ICT infrastructure: the European heart of information technology can be found on the ring road. SARA Computing and Networking Services is located here, along with the national supercomputer Huygens, the academic network SURFnet, and the virtual reality facility, the CAVE™. Along with the Amsterdam Internet Exchange (AMS-IX), SARA is one of the world's largest Internet hubs. Amsterdam is also working on the 'Glass to the Home' project, bringing fibre-optic networks to the living room of every citizen. This, plus the city-wide seamless WiMax network, means that all the ICT infrastructure facilities a company needs are readily available.

Amsterdam is an active member of INEC, the International Network of E-Communities. This is the organisation of the most advanced broadband cities in the world.

Creative Amsterdam

Amsterdam has developed in the field of new media to become an international testing ground for new interactive formats and cross-media production techniques. The content industry is currently more active than ever, offering all sorts of possibilties for creative (and business) talent. Formats developed for television become successful as mobile games; traditional broadcasters publish high-quality live content; and advertisers develop their own themed digital channels.

The games sector grows by about 10% every year, and includes internationally operating companies such as Guerilla Games (a developer of Playstation games) and the Spillgroup, which develops games and online games portals worldwide. Moreover, the application of gaming is increasing strongly in other sectors (such as education, advertising, and logistics). With its internatioanal orientation, Amsterdam is eminently well suited to the localisation of games for the international market.
In the wake of all this new development, numerous new services are evolving in the field of technical support, hosting, (international) rights and marketing. Amsterdam has a lively e-culture and with international events such as IBC, and the cross media week PicNic, it makes an inspiring environment for multimedia talent.

ICT Services and the Dutch

In the Netherlands, and in Amster-dam in particular, practically 100% of the population has access to the Internet. This means that every Dutch person is aware of the online possibilities of the modern world. Telebanking, mobile e-mail and navigation systems have become commonplace. From several research studies, it is clear that the Netherlands scores extremely highly on E-readiness* and this is not about to change in the coming years. Infact the city is working hard on its fibre-optic network (the 'Glass to the Home' project), and Amsterdam has the first seamless WiMax network in Europe.

* IBM 2006

Girish Ramachandran,
managing Director of TATA consulting Europe

With a view of the corporate buildings of ABN AMRO and ING banks, and a little further away are the shining brand names of Philips and banking and insurance group Fortis he says:

"For us it is strategically important to be located close to our clients. We started out as an IT applications developer, but today we have evolved into an IT services provider with a full service concept. The largest part of our turnover comes from advising our customers on how they can further improve the efficiency of their businesses, and from developing and implementing solutions to support this. Our clients require us to be able to give them direct support, and to be familiar with their markets and working environments.
This is why we chose Amsterdam. Not only are most of the large European companies based or represented here, it's also a good base from where to better serve the European continental market"

www.tcs.com

Andrew Lockhart Cisco Systems

Vice President Northern Europe

"Amsterdam and the Netherlands offered clear advantages over other European locations we investigated. The Netherlands has a long tradition of trading and commerce. That commercial spirit can be seen in investments in the IT infrastructure around Amsterdam. The talented people we hire benefit from such a quality working (and playing) environment.
"The Dutch are open to innovation. The success of our academy in Amsterdam says a lot about the openness of the local educational system to new ways of learning and working, such as Internet technology. It allows us to invest in the future skill base, which is important, because Amsterdam will be one of our biggest offices, with extensive e-learning facilities, acting as a showcase for the latest Cisco technologies."

Cisco Systems built its first corporate campus outside the US for its European operations, including logistics and ordering, in Amsterdam.

www.cisco.com

3 ICT Research and Development

The Amsterdam region has two universities, two professional universities and several research institutes. Of these, the University of Amsterdam, the VU University and the CWI (the national research centre for maths and data processing) are especially active in the field of ICT research and development.

University of Amsterdam (UvA)

The University of Amsterdam is one of the largest universities in The Netherlands and has a broad range of research, varying from financial services to theoretical chemistry.

www.science.uva.nl/ii/home

Currently over 26,000 students are studying at the UvA.

The university's computer science research is concentrated in the Informatics Institute, which is located in Amsterdam Science Park right next to SARA, the facility housing the Dutch supercomputer, Huygens.

Within the Informatics Institute, research is focused in three laboratories. These laboratories all have their own field of research. The laboratories of the Informatics Institute are the HCS, CSP and ISLA, outlined below.

Human Computer Studies Laboratory (HCS)

The Human Computer Studies Labo-ratory (HCS, chair: *Prof. Dr Simon Jones*) addresses the issues of content and user experience raised by the Internet, Web 2.0, and the explosive growth in media-enhanced cellular phones.
It addresses these issues holistically, not as specific technical challenges seen in isolation, but as an integrated system of users, media, technology and culture. The laboratory has computer scientists, engineers, psychologists and philosophers working together on these topics. Its work is highly regarded worldwide, with many of its staff members having a high profile internationally. Furthermore, there are excellent links with industry via joint appointments with leading organisations such as LogicaCMG. The laboratory recently won first prize in the International Semantic Web Challenge (ISWC), for its work in museum advisor systems.

The laboratory's long-term record in ontologies and semantic web technologies has been recently supplemented by the arrival of new staff, including the Lab Head Prof. Dr Simon Jones from the MIT Media Lab. It is currently developing new models and exemplars of content creation, analysis and dissemination using hand-held technologies. The lab is now building on its long-running track record in deep technology computer science to advance into the new areas of user-generated content and experience that have been so much a feature of the present decade.

www.hcs.science.uva.nl

The Computing, System Architecture and Programming Laboratory (CSP)

The emergence of e-Science or cyberinfrastructure is profoundly impacting the scale and breadth of scientific inquiry. By flexibly combining distributed networks, computers, storage, databases, services and instruments, disciplines such as oceanography, geosciences, high-energy physics and biomedicine are starting to take a systems-oriented approach to understanding a broad range of phenomena. Technologies such as grids provide underlying foundation for solving these large-scale complex problems.

The research on (computational) e-Science conducted in the CSP-Laboratory (chair: *Prof. Dr Peter Sloot*) is organised along four core computer science research topics. These cover how to build complex distributed computer systems, how to program them, and how to process information on them. The laboratory consists of groups working on computational science, computer systems architecture, software engineering and systems and networking.

Computational Science

The computational science group studies the computational problems in the area of complex dynamic systems. For example, spectacular results were obtained recently with the development of an HIV-1 decision support system (patented in 2006), where information from 'molecule to man' is integrated that provides medical doctors with an automatic system to decide on individual-based medicine regimes.

Computer Systems Architecture

The computer systems architecture group is tackling significant problems spanning compilers, computer architecture and implementations as systems on a chip. The research includes embedded systems, where the group looks at study early design space exploration, as well as general purpose computing platforms that are called microgrids.

Software Engineering

The software engineering group has two research foci. On the one hand, it focuses on generating programming environments given a formal language definition, in particular the construction of generic user-interfaces and the development of generic methods for the textual and graphical representation of structured objects. On the other hand, the programme focuses on the development of a process theory and tools that can be used to specify and verify concurrent communicating or programmed systems.

System and Networking Engineering

The systems and networking engineering research group comprises optical networking research and generic security and trust in distributed systems.

www.science.uva.nl/ii/home.cfm

Intelligent Systems Laboratorium Amsterdam (ISLA)

The Intelligent Systems Lab Amster-dam (ISLA, chair: *Prof. Dr Arnold Smeulders*) performs fundamental, applied and spin-off research on systems which understand the content of the messages they process, and on systems which learn from their data.

At ISLA, hard scientific problems are studied from real data with real applications. On that principle, the data and problems for study are obtained from web crawls, dynamic feeds, or other large sets of text and video documents, as well as from search engine logs. Alternatively, it is obtained from networks of video cameras, mobile platforms, video archives or stocks of still pictures, in order to study pictorial content and situation awareness. Finally, data is obtained from mobile robots and question answering with the user to study behaviour.
Successful applications have been achieved in video search engines, delivering one of the top performers in the international contest for video search engines, in the face of competition from the United States and China.
ISLA is composed of three groups. Intelligent Autonomous Systems perceive their environment through sensors for goal-directed actions, even in dynamic situations. Information and Language Processing Systems, analyse text using the structure of documents to discover and track actionable meaning. Finally, Intelligent Sensory Information Systems create access to the content of digital images and video.

www.science.uva.nl/research/isla

VU University

The VU has a broad range of research areas, all with their own facilities and all linked to bachelor's, master's and PhD programmes. The VU is known for its cooperations with companies and research organisations, and almost 60% of its research is funded by external parties.

www.cs.vu.nl

Andrew Tanenbaum

Computer Scientist, VU

"The VU has a tradition in high-quality scientific research going back 35 years. The Computer Science Department acquired its first PDP-11 computer back in 1972 (with 16 KB of core memory). This machine was the second computer in the Netherlands to run UNIX. Since that time, the Department's research has mainly focused on systems-oriented research, although there has always been a small, but excellent, theory group. Among other projects we developed MINIX, which was the direct inspiration and platform Linus Torvalds used to develop Linux. The department has also made significant contributions in artificial intelligence, software engineering, and other areas.
"Currently, the department has evolved into a thriving research community. Active research areas include operating systems, security, parallel programming, high-speed networking, intrusion detection systems, distributed systems, grids, multi-agent systems, computational intelligence, the semantic Web, ontology engineering, business models for e-commerce, bioinformatics, software engineering, bioinformatics, and formal methods.
"This work has led to thousands of published papers, including many best paper awards, dozens of books, and numerous Ph.D. theses, and all are available for download on the VU website."

A native New Yorker, Andy Tanenbaum is a founding member of the VU's Computer Science Department, and perhaps the best-known name in Dutch computer science.

There is a clear focus on two interdisciplinary fields in which the VU has world-class researchers and ambitious research programmes. One of these fields is the Internet and Web technology programme; the other is the modelling of complex systems.

Internet and Web Technology

The Internet has a profound impact on our daily lives. It drastically changes the way people communicate and find information, but it also affects how companies do business and how scientists collaborate.
The World Wide Web is the predominant application of the Internet, but many others exist, such as virtual worlds, e-business, peer-to-peer file sharing of music and video, electronic markets, Internet telephony, radio and TV, and virtual laboratories. The Internet and the Web are clearly here to stay. Many other innovative applications will appear, especially as mobile and location-aware devices like smart phones get connected to the Internet.
Research on this theme covers a spectrum of topics related to the Internet and Web, ranging from social networks to computer networks and covering applications from consumer markets to business and science. The theme addresses fundamental research about communication, scalability, and security as well as more application-directed research.

Modelling of Complex Systems

Constructing models of observed phenomena is the key activity in science. Mathematics has traditionally been the language of choice for expressing such models, and such mathematical models have proven themselves well suited for analysis, composition, prediction generation, and so on. Since the advent of the computer, these declarative mathematical models have been supplemented with computer-based models, which provide the opportunity for computational analysis and simulation. A wide variety of modelling techniques have been developed in different branches of computer science. Some of these are numeric, but many modern modelling techniques use symbolic computation techniques instead.
The research bundled in this theme concerns a wide variety of modelling methods, such as logic-based models, multi-agent models, self-organising and evolving populations as a form of modelling, as well as the use of such modelling methods in a variety of other scientific areas, including cognitive science, economics, biology, social sciences, and the construction and behaviour of software itself.

CWI

Founded in 1946, the Centrum voor Wiskunde en Informatica (CWI) is the Dutch national research centre for mathematics and computer science, located at Science Park Amsterdam.

www.cwi.nl

CWI is currently providing extra room for talent, in the shape of a new wing for its building which will be ready in 2009. Affiliated with the Netherlands Organisation for Scientific Research (NWO), CWI is an incubator for senior academic researchers in the Netherlands. More than 170 full professors have come from CWI, of whom 120 are still active.

With its 160 researchers, CWI lies at the heart of European research in mathematics and computer science. Together with other top institutes such as INRIA in France and Max Planck in Germany, it helps to provide a firm foundation for national and European innovation. CWI closely cooperates with companies, universities and large technology institutes. It is a co-founder of ERCIM, the European Research Consortium for Informatics and Mathematics, in which 18 national organisations participate. CWI manages the Benelux Office of the World Wide Web Consortium (W3C). CWI concentrates on fundamental questions inspired by practical problems. Its strengths are the discovery and development of new ideas, and the transfer of knowledge within academia and to Dutch and European industry. A key focus is the strongly interrelated core of mathematics and computer science – a unique area of research in the Netherlands, in which CWI shows proven success. The results of its work are of continued importance for the economy, from payment systems and cryptography to telecommunications and the stock market, and from public transport to water management.

CWI concentrates its efforts on four broad, socially-relevant themes: earth and life sciences; the data explosion; societal logistics; and software as service – an area that provides a deeper understanding of problems across the health care, climate, communication, congestion, security and service domains.

Earth and Life Sciences

In geo- and bio-research, conventional experimentation is increasingly being replaced by modelling and simulation. In the coming years, these methods will be crucial in cell biology and in research into large-scale ecological systems.

The Data Explosion

How can relevant and compact information be found in a flood of data? There is a significant need for models, methods and techniques that allow the mountain of data to be mined, studied and exploited. CWI uses its expertise in data management and learning to play a guiding role in the development of technology that will manage the data explosion.

Societal Logistics

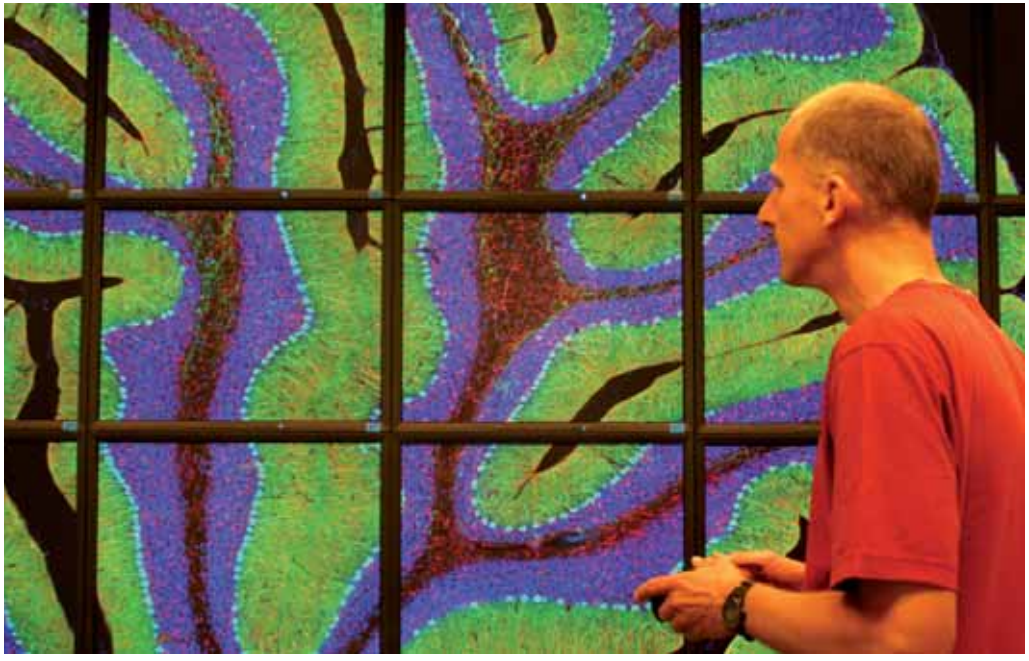
Our society depends on an efficient and flexible organisation of traffic and transport, commerce and public services. Fundamental research can yield principles and methods that can be broadly applied to these logistical processes. CWI will continue to contribute frontier research results that address the bottlenecks in our society, from train scheduling to traffic flows, and from patient waiting lists to communications networks.

Software as Service

With the rise of the digital services economy, software is evolving from a product to a service. The secure and reliable combination of loosely-coupled distributed applications is increasingly important to our economy, requiring a study of service-oriented computing. CWI studies classical software integration, as well as peer-to-peer architectures and semantic web technology.

CWI: Research for Science and Business

A better train timetable
The 2007 Dutch train timetable, starting in December 2006, has been improved with the help of Spinoza Prize winner Lex Schrijver (CWI and UvA), and CWI programmer Adri Steenbeek. Designing a timetable for the Dutch rail system – one of the busiest in the world – is highly complex. Thousands of interrelated constraints have to be satisfied, like desired frequencies, travel and change times, availability of rolling stock and distances between trains. In the 1990s, CWI developed CADANS, the combinatorial algebraic timetable algorithm for Dutch railways, which was extended and improved over the years. With this software, Dutch Rail (NS) can compare several aspects quantitatively, and choose a good balance between them – as in the 2007 train timetable.



SARA: ICT Innovation

SARA Computing and Networking Services is an innovative ICT service centre that supplies a complete package of high-performance computing, visualisation, networking, grid services, large-scale data storage and IT infrastructure services. Among SARA's customers are scientific, educational, and government institutions and the business community.

www.sara.nl

SARA is an independent organisation with offices in Amsterdam and Almere, and collaborations with many partners. SARA has unique expertise and provides state-of-the-art solutions for consultancy, facilities and management. Its product portfolio consists of: high performance computing and visualisation; facilities and services in supercomputing; data storage; grid services; visualisation and virtual reality; and high performance networking, including design, installation and management of advanced Wide Area Networks; plus ICT services including housing and management for third parties of critical infrastructures, systems, applications, on-demand services and connectivity.

SARA's Unique Selling Points

The most eye-catching activities and facilities of SARA are:

- The Dutch National Supercomputer Huygens, installed in May 2007, with a capacity of 60 teraflops. Since 1985 SARA has been responsible for supercomputer services for academic users in the Netherlands.
- The national computer cluster Lisa that provides computing capacity to a significant number of users, including both of Amsterdam's universities.
- The Network Operations Centre of the high-bandwidth SURFnet6 network. This hybrid network provides networking and lambda connectivity on demand to educational and research communities. Since the inception of the SURFnet network in 1989, SARA has been responsible for the technical and operational management of this innovative network for Dutch universities, science centres and educational institutes.
- The optical Internet exchange NetherLight which is connected to many National Research and Education Networks (NRENs).
- The Virtual Reality facility the CAVE™.
- SARA is one of the locations of AMS-IX (Amsterdam Internet Exchange), one of the world's largest Internet exchanges.

An important addition to the available facilities is SARA's extensive expertise and its consultancy and support activities.

On-demand services

Flexibility is an important characteristic of on-demand ICT services. SARA offers a range of on-demand services; primarily backup and data storage (on disk and on tape), but also connectivity and computing power. The advantage for clients is that on-demand services can seamlessly match peaks and changes in demand, as well as unexpected growth. SARA has established partnerships with various large suppliers, such as StorageTek, SUN, EMC2, Dell and HP, through which hardware can also be supplied on demand.

SARA supplies IT services that meet the needs of its clients. SARA offers excellent co-location facilities at two data centres, where clients can house their computer and network equipment. What's more, SARA is one of the locations of the Amsterdam Internet Exchange (AMS-IX), one of the largest Internet hubs in the world. This makes it exceptionally attractive for clients to house their equipment at SARA. All our services meet market requirements and have a service level agreement (SLA), in line with the well-known ITIL standards, such as those for problem management, change management and 24/7 services.

Grid Developments

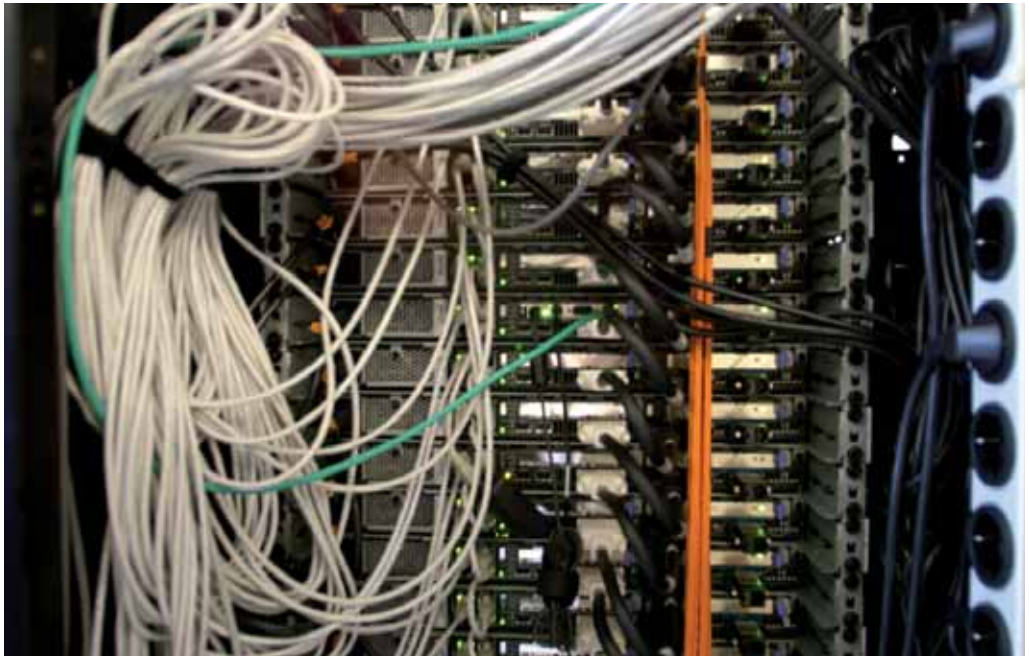
Grid services are of high importance for SARA, both within the Netherlands and internationally. Grids are networks and middleware that give users, companies and other organisations access to each other's infrastructure. The interest in grid services is increasing as more and more new applications are being developed. SARA participates in a large number of national and international grid projects.

The Future: e-Science Support Centre

SARA is developing from a national supercomputer centre into an advanced ICT service centre to support 'enhanced science'. It expects to become a supernode in the international science grid. SARA participates in a variety of research and innovation projects in areas such as network and grid technology applications, e-Science infrastructure and visualisation.

In addition, SARA works together with all partners of Science Park Amsterdam, making it the e-Science support centre of the Netherlands and providing e-Science support to all research institutes in the Netherlands and worldwide. A condition for this is that the current e-Science possibilities are converted into products, which SARA, as a systems integrator, can subsequently offer on the market.

Within the EU, various groups are working diligently on the development of a two-tier structure for supercomputer centres. This structure will be made up of a number of European petaflop supercomputer centres integrated within the existing network of national teraflop supercomputer centres. The aim is to significantly improve the possibilities of high performance computing (HPC) within Europe. These centres will develop into supernodes with a strong regional image. They will attract large numbers of high-tech companies that want to be associated with them and profit from their advantages. SARA intends to safe-guard the position of the Netherlands in this scenario, and profile Amsterdam as one of the most important supernodes in the European grid.



4 Amsterdam: City of ICT Events

When it comes to conferences and congresses, Amsterdam is one of the top ten cities in the world, and many of its events are devoted to ICT. It is therefore not surprising that the World Information Technology and Services Alliance (WITSA) has decided to hold the World Congress of Information Technology (WCIT) here in 2010. WCIT confirms Amsterdam's reputation as a congress city and as the Knowledge Capital of ICT. Other large annual conferences in Amsterdam are the International Broadcasting Conference (IBC) and PicNic Cross Media Week.

World Congress of Information Technology (WCIT)

WCIT is the world's biggest and most important international IT forum. The event, which is held every other year, brings together world leaders from business, government and science. In 2010, the 17th edition of this Olympic Games for ICT takes place in Amsterdam, with the theme, 'Challenges of Change'.

International Broadcasting Conference (IBC)

In 2007, the International Broadcasting Conference (IBC) was held in Amsterdam for the 15th time. Over the years, IBC has developed into the largest congress of its type: in 2007, it had over 45,000 visitors. It is principally known for its many presentations of spectacular new products and is the number one broadcasting conference in the world.

PicNic Cross Media Week

PicNic took place for the first time only in 2006, but its unique set-up has already made it an essential event for creatives. PicNic features demonstrations of the newest developments in the field of ICT, media and games, plus readings, network events, and more. PicNic acts as a convergence point for different disciplines, encouraging innovation and the emergence of new ideas.

Other Events

Amsterdam has hundreds of other congresses, seminars and conferences. In recent years, the city has staged events like the International Conference on Computational Science, the European Grid Conference, Next Web conference and Networks in Bio-informatics, to name only a few.

5 Amsterdam: Location for Business

The Amsterdam region offers a wide range of locations where companies can set up business. Naturally, for different companies, different factors play a role in selecting the location for an office. Some want to be close to the airport, while others prize proximity to universities, research centres or potential customers, for example.
In this section, you'll find an account of several locations that are perfectly suited for ICT-related companies. In the areas cited here, you'll generally find all kinds of possibilities – from the ability to rent accomodation at a reasonable price, to having the space to build a new corporate HQ. Figure 9 illustrates a number of the most popular locations for doing business – all of them within 40 km of Amsterdam city and Amsterdam Airport Schiphol.

In the following pages, you'll find more information on a number of locations.

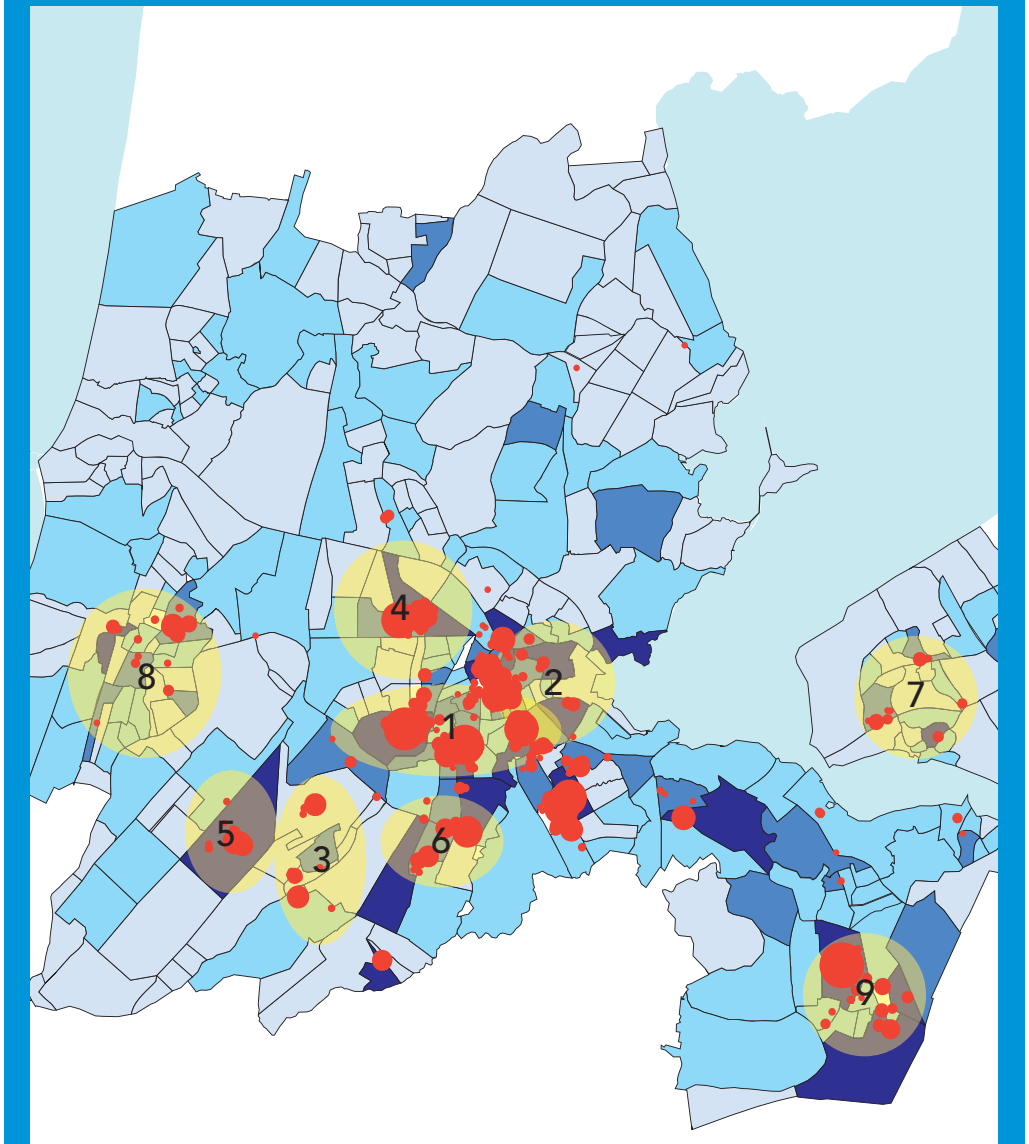


Figure 9
Business locations in the Amsterdam Area

Amsterdam Zuidas: ICT and Business

Amsterdam is building a new, well-connected urban centre called Zuidas, with abundant space for living, working and leisure. Zuidas is a unique hub on Amsterdam's southern axis, with high-tech offices, modern housing and high-quality facilities, a stone's throw from both the historic city centre and Schiphol Airport. Thanks to its mixed character, it's a lively area. Quality and liveablity are major considerations in the development of the Zuidas. The space for this urban development is being found by building on top of the existing infrastructure (the A10 ring road, train tracks and metro lines).

The excellent accessibility of its location ensures that Zuidas is a 'most wanted' location for many businesses seeking a base in the city. All traffic flows converge neatly on Zuidas: from pedestrian walkways and bicycle routes to intercity and high-speed trains, which take just six minutes to transport passengers to Schiphol Airport. Amsterdam's historic city centre is a ten-minute tramride away. In a few years, a new underground metro connection – the North/South Line – will link Zuidas with the centre of Amsterdam in even less time. This excellent national and international accessibility is borne out by research into the modes of transport favoured by employees in the area: approximately 50% take public transport, 25% cycle or walk, and only 25% take the car.

Zuidas boasts more than 2.5 million square metres of real estate – compare this with La Défense in Paris, which has around 3 million square metres. The intended mix in percentages of space devoted to living, working and leisure respectively is 40:40:20. So far, around 450,000 square metres has been realised since the finalisation of the Zuidas Master Plan in 1997. In 2006, the first housing complexes were produced. The coming years will see more housing and service facilities being built.

Clearly, the many aspects of development in Zuidas offer excellent possibilities for companies, whether large, small, international or domestic, to base themselves in dynamic, international surroundings.

www.zuidas.nl

Science Park Amsterdam: ICT, Research and Education

Amsterdam is currently building the largest science park in Europe. A mix of top companies, universities and research institutes are already taking advantage of its unique digital infrastructure and easy accessibility, as provided by its own purpose-built train station and a separate junction on the Amsterdam ring road. Science Park Amsterdam really is at the centre of Dutch ICT and computer science.

A number of knowledge institutes already call Science Park Amsterdam home. These include the University of Amsterdam's Faculty of Science, and internationally renowned research institutes such as NIKHEF, AMOLF and CWI, and SARA. In addition, over 70 knowledge-intensive companies have set up shop there, including Clinquest, Crucell, GX, BioGen idec, Tandberg, SupportNet, PickCell and AMT.

Over the next ten years, the University of Amsterdam, the Netherlands Organisation for Scientific Research (NWO) and Amsterdam City Council will be working together to develope Science Park Amsterdam into a truly international knowledge centre. It is already a place where the cooperation between scientific education, research and other knowledge-intensive activity is strongly stimulated and supported.

Science Park Amsterdam's lofty ambitions are entirely realistic, thanks to the presence of the country's fastest computer and its high-quality computational and network services. The park and its institutions are already world leaders in the field of grid technology. The combination of the Dutch supercomputer Huygens, plus continental Europe's largest internet exchange, the AMS-IX, and the world's biggest fibre-optic hub in the shape of Netherlight, ensure unique facilities in networking and computing services.

The area is developing into an environment characterised by cooperation and exchange. Science Park Amsterdam's 500,000 square metres include office space, laboratories, educational buildings, a hotel, congress facilities, sports and cultural amenities, hundreds of houses and flats, childcare facilities, and even its own train station. In other words, it's a world of science in a city of inspiration. Science Park Amsterdam is a place where high-quality education, research and entrepreneurship meet knowledge, talent and ideas: a perfect match.

www.scienceparkamsterdam.nl

Amsterdam Airport Schiphol: ICT and Mobility

The Business Park located at Amsterdam Airport Schiphol is extremely popular with ICT companies, especially those with a focus on international operations.
The park is strategically located within a perfect infrastructure that makes it the most easily accessible business location by train, road and air in the Netherlands – and probably in the world. Thanks to a wide range of facilities, from hotel and catering services to a supermarket, shops and parking space, its office premises meet every imaginable business need.

The result is a functional and spacious business park with its own special atmosphere. The buildings have magnificent panoramic views of the airport runways, and new, freestanding office and industrial buildings are situated along an attractive business boulevard. These come with plenty of parking space.

All of these factors explain why companies such as AT&T, BMC Software, Cisco Systems, Hewlett Packard, Juniper Networks, Microsoft Benelux, Nortel Networks and UPC Europe have chosen to be based in the Schiphol Area.

For companies based at Schiphol, the following emerged as the most frequently cited reasons for choosing this location:
- Outstanding technical infrastructure.
- Strategic locations near key markets and logistics networks.
- Favourable business climate.
- Highly qualified, flexible and creative workforce.
- Specialised professional services.
- Space for future growth.
- Best European airport.
- City of Amsterdam.
- Excellent logistics performance.
- Competitive property market.

www.aaarea.nl

Amsterdam Sloterdijk

The Amsterdam Sloterdijk business park is located in the west of the city. It is a popular choice for businesses needing plenty of affordable space. With its own train station and a location on the Amsterdam ring road, Sloterdijk has attracted a number of ICT companies, including KPN, Oracle, Yahoo! Atos Origin and Deloitte and Touche.

Hoofddorp

With its spacious business park, Hoofddorp offers excellent value for money as an office location. Its accessibility is also extremely good, thanks to its location near Amsterdam Airport Schiphol and the business park's own train station. Hoofddorp is a logical operating base for many companies, including TNT, LogicaCMG, Thomas Cook and INHOLLAND college.

Amstelveen

Bordering the south of Amsterdam, next to Zuidas, Amstelveen is right next to Amsterdam's most prestigious office location. For this reason, it makes an excellent operating base for ICT companies.
Expats find Amstelveen a pleasant place to live, and large numbers of Japanese and Indians in particular live there. Amstelveen is easily reached from Amsterdam by tram, metro or car. Companies like Canon, Ricoh, Fortis, and LogicaCMG are based in Amstelveen.

Hilversum

Hilversum is the centre of the Dutch television industry. The majority of Dutch broadcasting companies, large studios and TV-related companies have their offices in this city. Hilversum is easily accessible by train and car, and is only 30 minutes from Amsterdam.

Almere

With swelling numbers of both inhabitants and businesses, Almere is the fastest growing city in the Netherlands. For ICT companies, Almere is an attractive business location with many competitive advantages, including affordable office space and easy accessibility by car. In addition, Almere offers excellent facilities in terms of fibre-optic connections, hosting facilities and data storage. All of its business areas have been connected to the city's fibre-optic network since 2006.
Almere is just 30km from Amsterdam and 40km from Schiphol Airport.

Haarlem

At the west of the city of Amsterdam en right next to the Amsterdam Airport Schiphol, Haarlem is very popular for companies working in graphics, design and ICT-services. With picturesque facades including a lot of monuments in the city center and wide area's with industry and offices in the east, the Waarderpolder, Haarlem offers a wide range of office locations. This combi-ned with the high educated inhabitants makes Haarlem a popular place for international and national companies.

6 More Information

Throughout this brochure are a number of links to sites you can visit to find further information about the city, doing business here, and (especially) ICT companies, facilities and infrastructure. More information about Amsterdam is available on the Internet at www.iamsterdam.nl. If you have any questions regarding setting up business in the Amsterdam Area, then the Amsterdam Foreign Investment Office can help. If you want to know more about ICT-specific activities in the region, then please contact the Amsterdam Innovation Motor.

Contact Points and Further Information

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Expats

For Amsterdam, expats are more than just a useful extra: they form an indispensable economic driver for the city and are its most important ambassadors. Now, when the economy is becoming increasingly international, and the intensity of global economic processes increases, it is especially important that everyone feels at home in Amsterdam.
For this reason, Amsterdam will open a special Expat Centre in 2008. At the centre you can arrange everything necessary for staying in Amsterdam, quickly and easily. The Expat Centre offers a range of city council services to expats, in coorporation with the immigration service.

Colophon

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