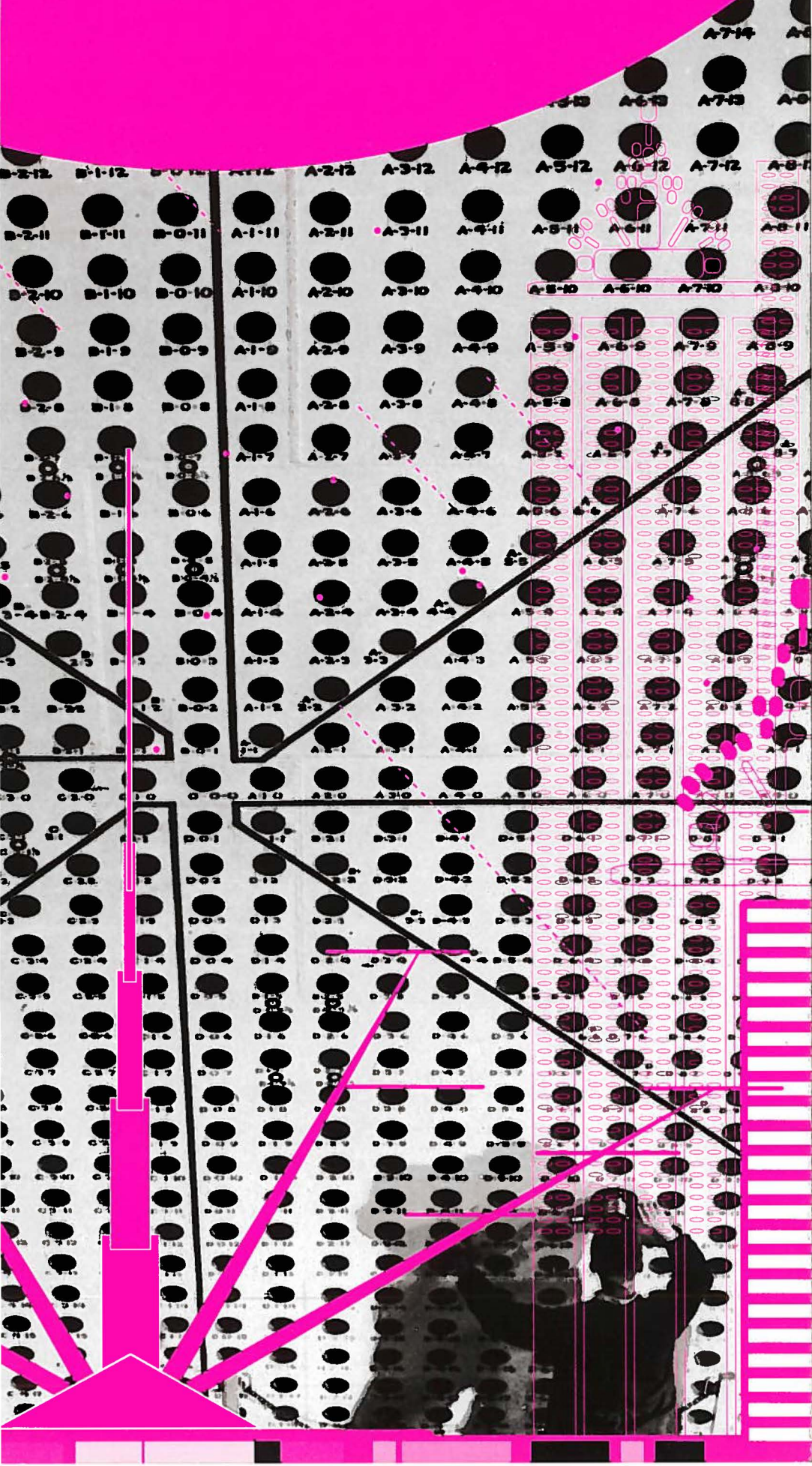
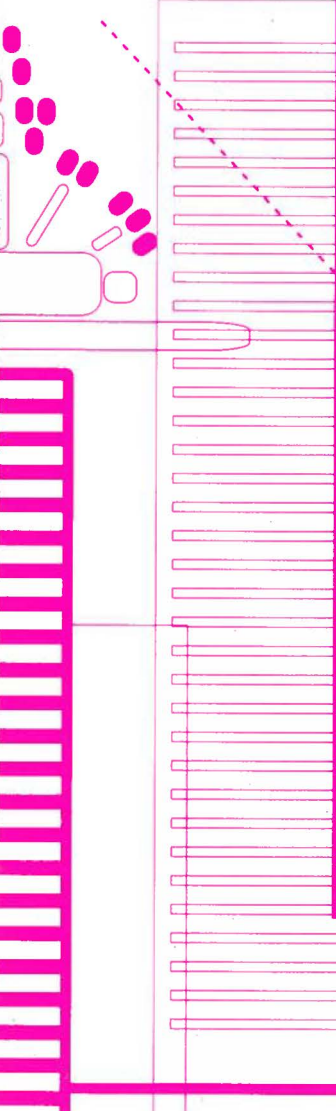
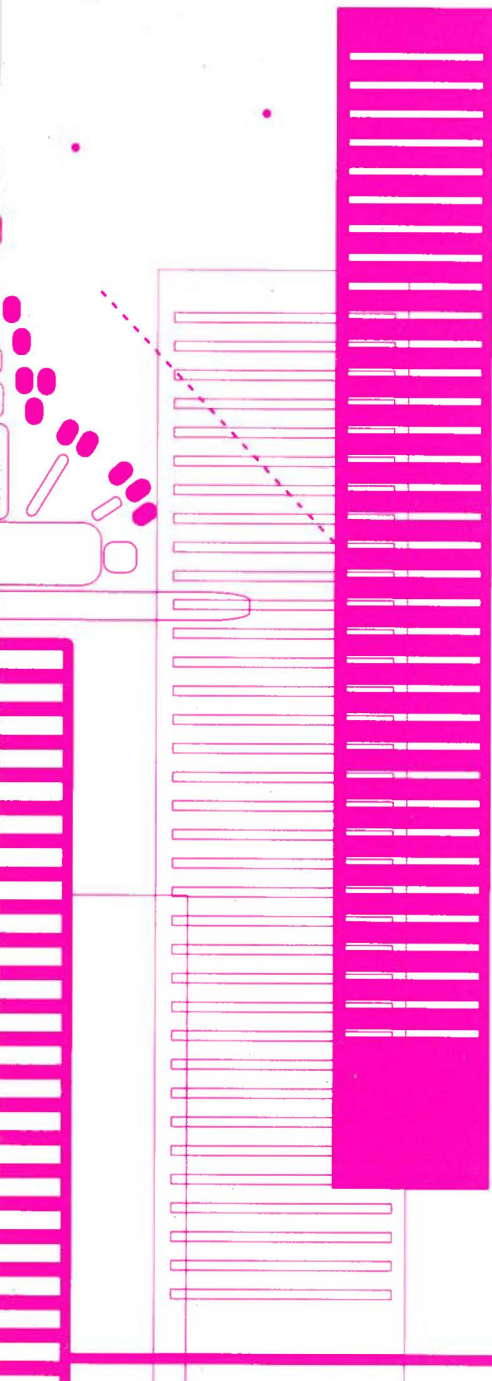
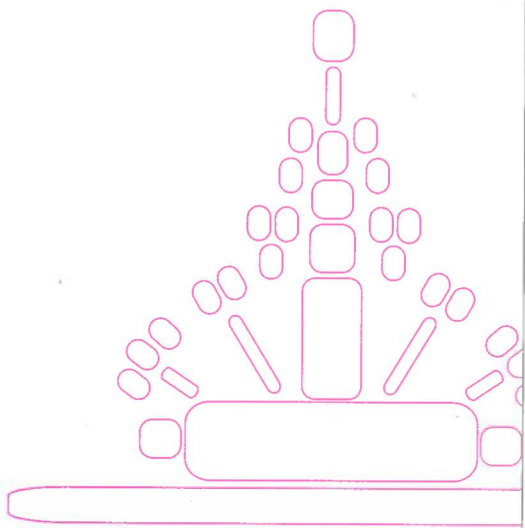


# telecom.beyond

communication worlds in 2016: a source of inspiration





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# telecom.beyond

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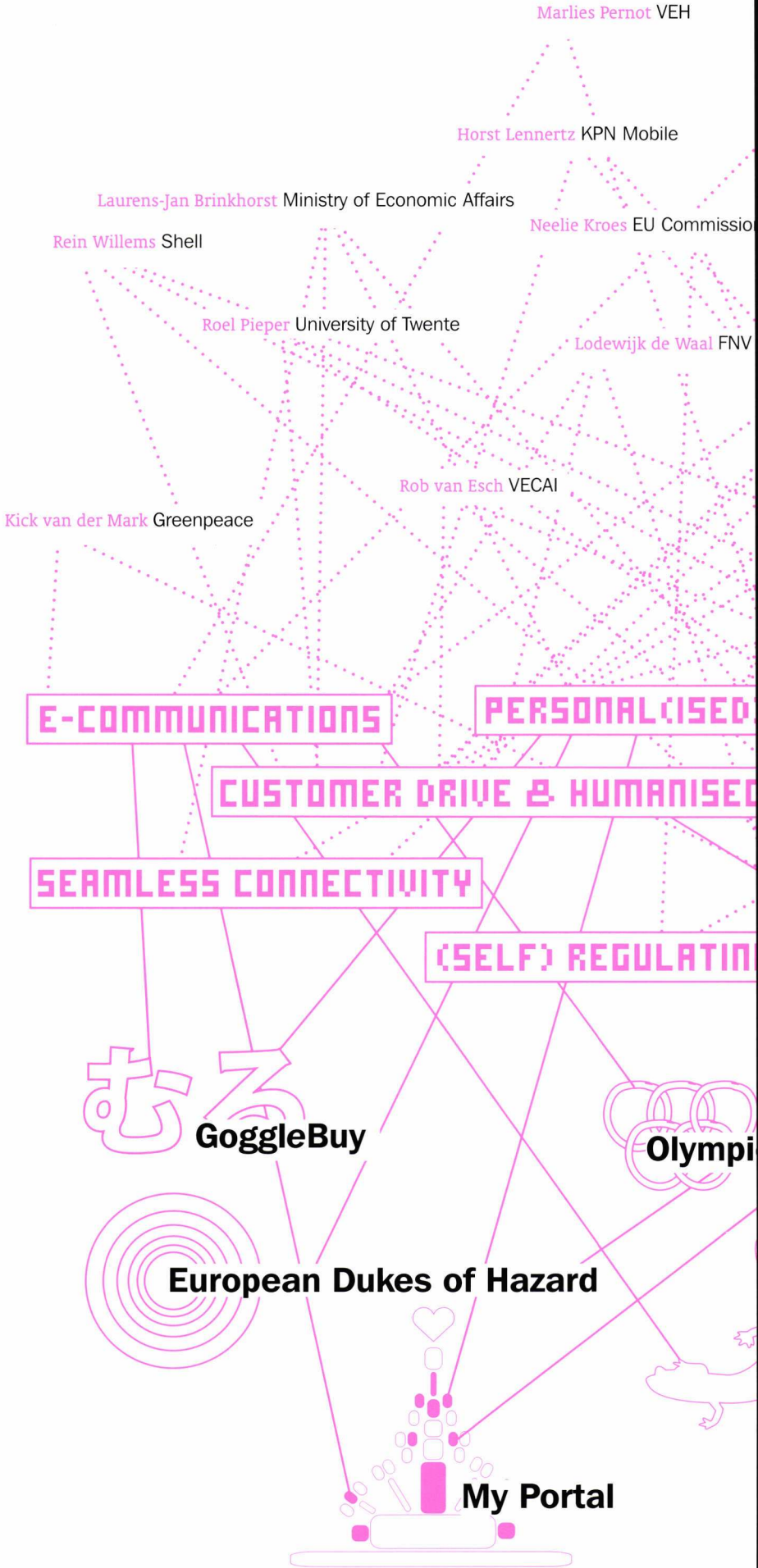
# Overview

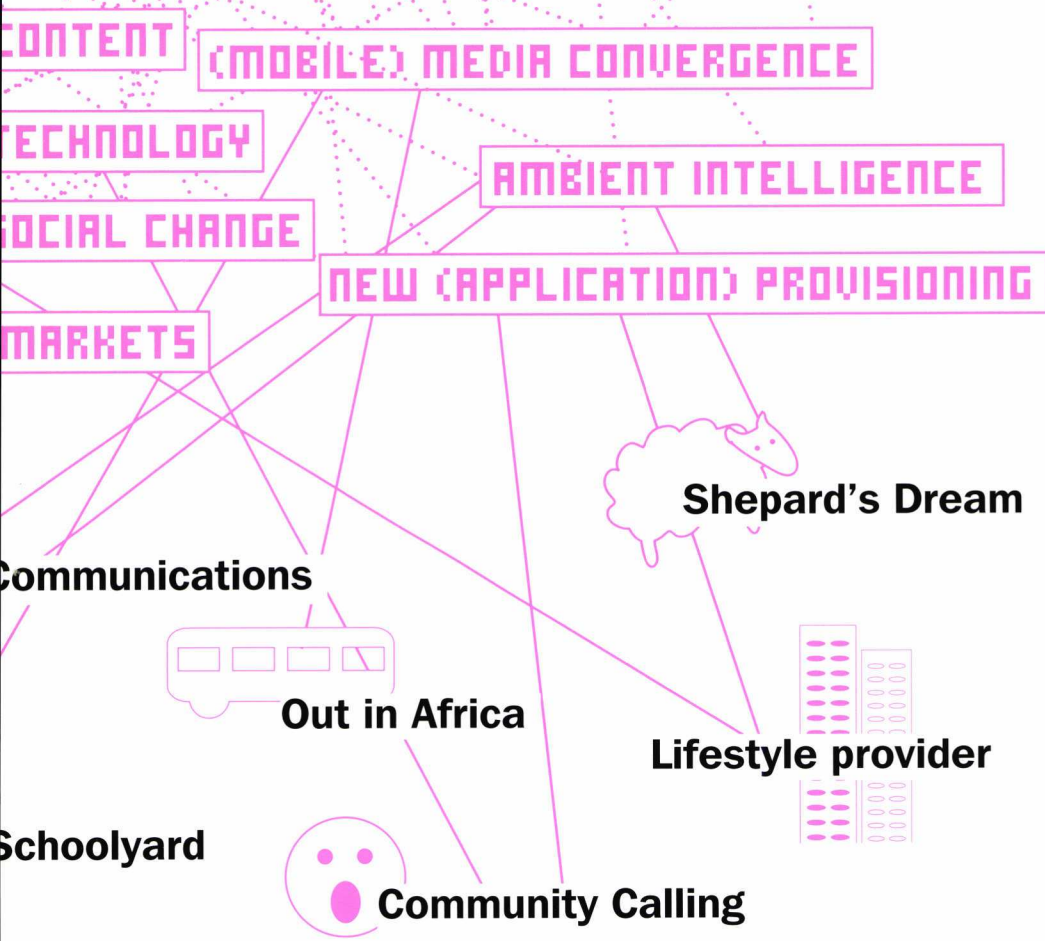
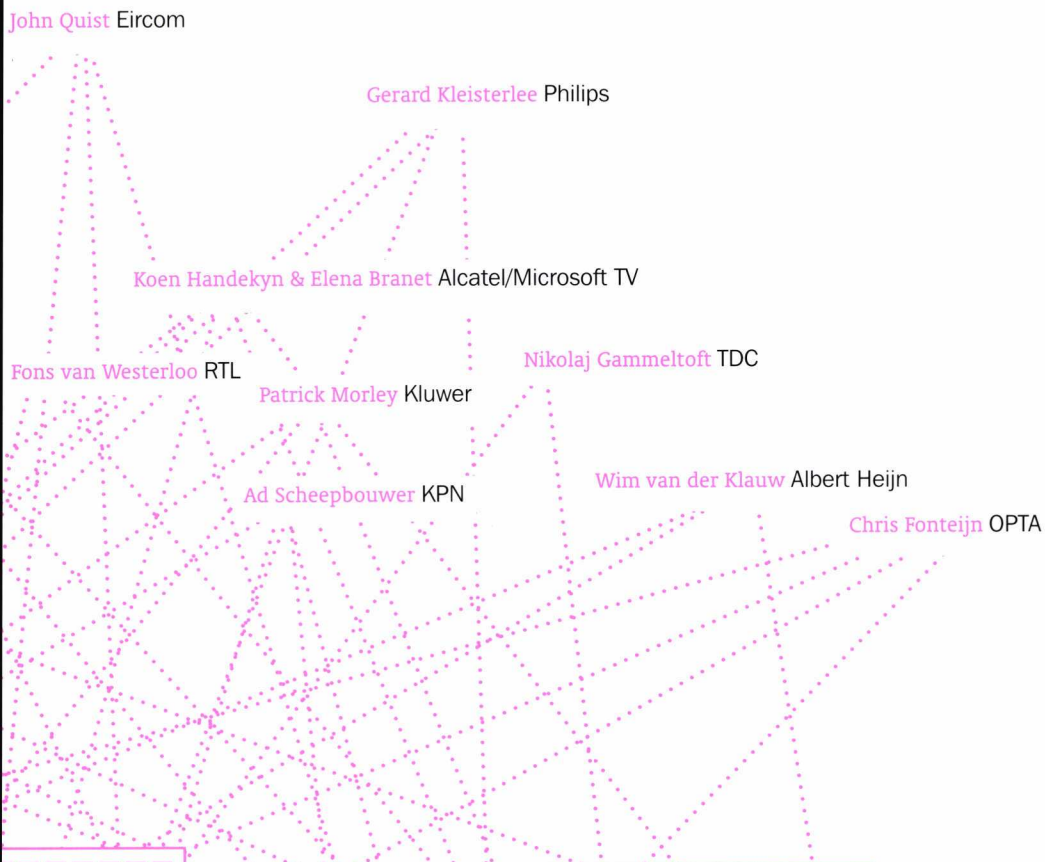
all future visions connected to 9 central themes

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# Foreword

Ask a few people and you get opinions, ask many and you get a trend. That is the power of 'telecom.beyond'.

The trend is clear: blurring borderlines with other industries, convergence in technologies and a permanent drive for customer experience. Easy said, but now what? The search for new realities and opportunities will drive organisations outside their comfort zone. It will require different skill sets but more difficult even, a different mindset. Opening up for those challenges requires leadership beyond what the industry has seen so far. It will question the fundamental set of value creation that has served us for so long.

It is fascinating and scary and the stakes are high. Starting the journey early is a great idea. So this booklet will help in that respect. It is a source of inspiration we all need preparing for what we only can describe in vague terms.... till the next wave comes.

**Ben Verwaayen**

Chief Executive BT Group plc

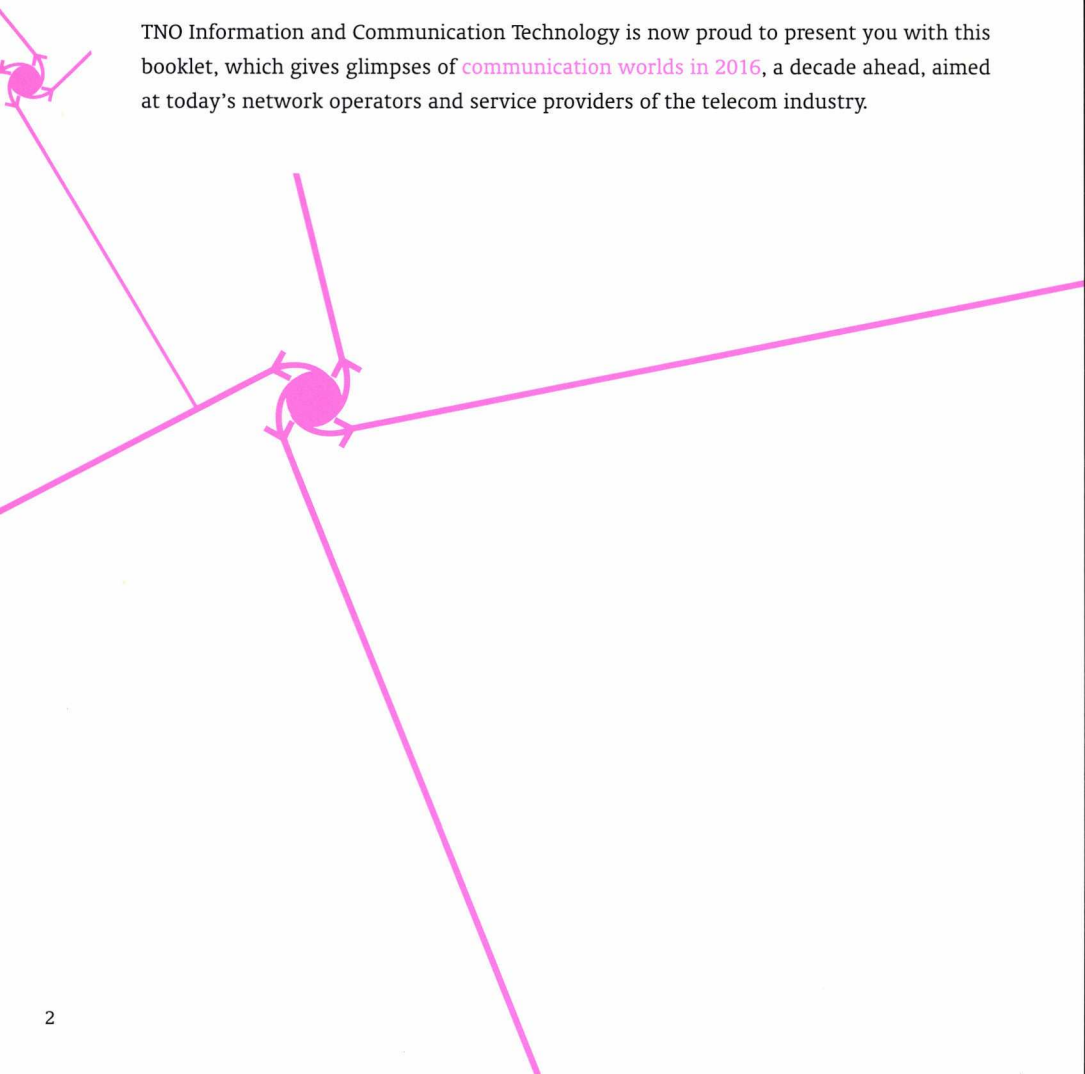
# Introduction

Imagine the world ten years from now, in 2016. From Jules Verne, H.G. Wells, George Orwell, Martin Luther King, John F. Kennedy, John Lennon through to Steven Spielberg, “imagine” has brought us many visions of future worlds that were fantastic, frightening, enlightening, as well as sometimes perfectly useless and sometimes surprisingly fruitful.

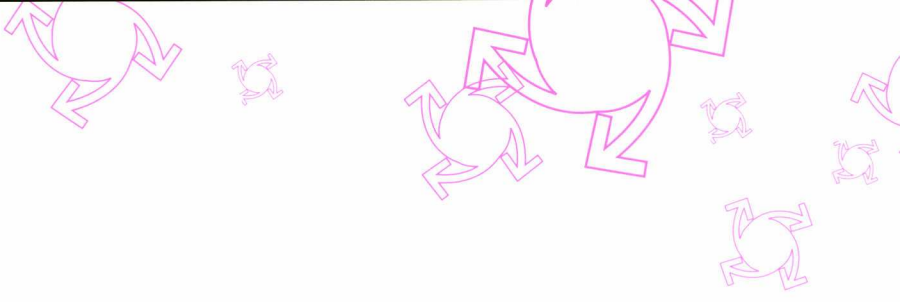
Today, we have developed methods and tools enabling us to envision future worlds that might well come to pass. This area of expertise and research go by names such as “Future Studies” or “Scenario Planning”. It is this expertise that enables organisations to adapt to scenarios for plausible future worlds.

Not always are we smart or willing enough to act upon future visions, and sometimes this is fortunate. But at the height of the Internet bubble in the year 2000 for instance, we carried out a broad future study. In one scenario we envisioned an impending economic recession in Europe might become a reality within five years. As incredible as it may seem now in retrospect, that future scenario was largely ignored if not ridiculed. This attitude almost cost some telcos their existence.

TNO Information and Communication Technology is now proud to present you with this booklet, which gives glimpses of **communication worlds in 2016**, a decade ahead, aimed at today’s network operators and service providers of the telecom industry.







## Reading guide

The concept of this booklet is straightforward:

- *TNO's 9 communication contexts in 2016*

On the black pages, you will find nine **visions of the future written by TNO authors**. These visions have a special format that we have dubbed "**communication contexts**". Communication contexts are in essence small stories of everyday private or corporate life, in which people use technology within their home, work or collective (social) contexts. A communication context therefore envisions the meaning and use of technology in every day life and business. The nine communication contexts are representing future worlds from three perspectives: customers, (future) application providers and (future) network operators.

Note that all characters or organisations in the communication contexts are fictional.

- *18 future visions by different contributors*

TNO's future contexts are intertwined with eighteen **visions of the future as imagined by a variety of people**: captains of industry, government officials and other individuals who enjoy status and respect both within the present telecom industry and outside the industry. We are delighted that these respected individuals have cooperated in making this booklet reality and we are grateful to them.

- *The Daily News Feed of March 3, 2016*

In the last part of the book we added '**newsfeed headlines**' in 2016. These future headlines represent possible states of affairs in the future inspired by the future visions in the booklet.

We do hope you will enjoy reading **telecom.beyond**









# SHEPHERD DREAM

## THE NETWORK IS ALL

Finally, John Shepherd's dream has come true. He has bought a new house which isn't your standard family, mom-dad-two-kids garden variety. Why was this so hard? The whole planet is now "fiberised" but apart from two or three fibre wall outlets, new houses are normally not exactly up to the minute as far as connectivity is concerned.

It all started when Shepherd was planning his new home. He purchased a piece of land, just outside a development estate. Being a professional project manager, he wanted to play the part of director of the building process. He didn't want to give up his day job so he had to go organise things very carefully. The building contractors were willing to invest in a proof of concept: the totally connected and intelligent construction and implementation of *intelligent houses*. They were forced to, as the supply and demand balance shifted towards more supply, because of the decrease in population in the Western world. John arranged cooperation suppliers of communication and IT services to prove his concept.

John started with issuing *intelligent tags* to all but the smallest building materials, including prefab walls and ceilings. These tags alert any nearby network to their presence, identity, status and availability. In accordance with the building planning, they can automatically schedule transport and warehouse facilities through the network without human interference. Not just the building materials were tagged. The construction workers' tags were upgraded to interface with the same system. Scheduling and execution of both workers and materials would coincide organically. All devices and tags were connected to the Nets by a multimodal agent, so all relevant information became available anytime, anywhere. Human intervention in this process was



# RD'S



limited to exceptions instead of the rule. The third component was financial planning. Working out precise schedules in real-time, John was able to secure materials and labour at either the lowest cost or the highest quality or even both. John's parameterisations are constantly used by intelligent bots to source the matching supplies. The resulting *multidimensional real-time matching process* resulted in the best bargains at the right times.

After John's new home was completed, he chose to reprogram all tags and bots to achieve maximum *home automation*. In addition, the tags in the building materials now monitored structural integrity and maintenance needs. In a few years, maintenance will automatically be scheduled with contractors based on John's latest needs in the form of adaptable parameterisations. Recently however, John discovered to his great shock that someone had reconfigured some of the intelligence in his home to eavesdrop on him. But John simply reset all devices to their prior state and repeated the reprogramming. This time he added the latest intrusion protection software. The new experience John is very pleased with, is all rooms being suited to adapt to the moods and personal state of mind of its occupants, making use of colour, sound, temperature or fragrances tuned to one's personal taste.



# AD SCHEEPBOUWER

## TELEPHONY IS IRRELEVANT IN TERMS OF BITS AND BYTES

One thing is certain: we will see many changes in the world of telecommunications. In fact, many of those changes are already taking place. KPN will evolve from a traditional telco into a **multimedia company**. Voice-over-Broadband will be one of many applications and, furthermore, the least demanding in terms of connection capacity. In terms of bits and bytes, telephony is irrelevant. In some respects we will remain a traditional telco, because people will always want to communicate, and we want to deliver the services that enable them to do that.

Everyone is talking about **person-based communication**: people will always want to talk to each other, anywhere, anytime, and the type of network (hotspots, UMTS, Wimax) won't matter. Communication will move from telephony, to the Internet, to television images. We are already making use of technologies such as narrowcasting, and a range of chip-based technologies (e.g. RFID), which will play an important role.

Between now and 2010, KPN will undergo a metamorphosis. The fixed division will be completely transformed, and the mobile division will also undergo radical change. Fixed and mobile will converge into a single platform that will be initially geared towards services for business customers who demand 'one-stop-shopping'.

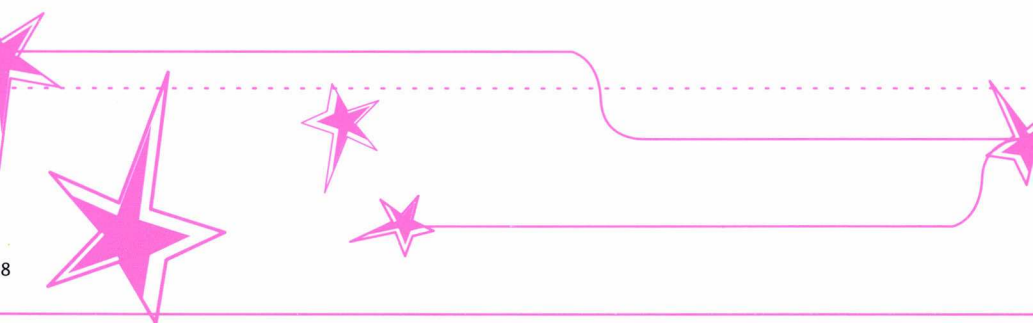
KPN will soon consist of two divisions, one of which will control all assets and makes them available for KPN's consumer and business markets. We will also open up these resources to third parties – voluntarily, but also in compliance with the requirements of liberalisation!

Intelligence will shift from devices back into networks, particularly in the light of the move towards 'All-IP' networks. In the space of just a few years, we are investing 1.5 billion euros more in the IP network than we normally would in a traditional market in which turnover is falling. Thanks to new IP services we see volumes increasing. If we don't make these investments, we will miss the boat. There will be fewer infrastructure operators, more virtual operators, and more free riders; market players that cannot exist on their own.

In the future, ICT will have a **significant impact on society** in areas such as care, security and education. There is a great deal of potential for ICT innovations in these sectors, which are not moving very fast at the moment. But it must be done – in some cases with pressure from the government – otherwise self-interest will prevail in these sectors.

With new technologies, it is usually the case that one development has hardly matured before the next one is knocking at the door. You have to look ahead – not in your rear-view mirror.

KPN's core activities are telephony, data and TV services through KPN's Fixed Network in the Netherlands, mobile telecom services in the Netherlands, Germany (E-Plus) and Belgium (BASE), and data services in Western Europe. KPN is the market leader in the major segments of the Dutch telecom market.



UNIVERSITY OF TWENTE  
PROFESSOR OF E-COMMERCE

# ROEL PIEPER

## FROM INTELLIGENT DEVICES TO INTELLIGENT NETWORKS

At macro-level, two important developments are taking place in the current world of telecom and ICT: intelligence is moving back into the network, and we are moving towards services that are genuinely demand-driven.

“I still believe in ‘ambient intelligence’; intelligence is moving back into the networks”. Devices will no longer develop in the way we’re used to today: faster and ever-smarter telephones and PDA’s with more and more functionalities. Instead, devices will become smaller, cheaper, simpler and more generic. And they will be used in a much more implicit way. Simply by entering a room, they will be activated and services will be delivered.

With the evolution of a fully integrated IP network, markets will become interwoven in a way that is difficult to envisage today. Initially, it will be the players in the markets for services and applications who respond to this development, rather than the owners of infrastructures. We can expect ‘virtual IP service providers’ to launch their services very quickly. A directory service and payment facility in a large shopping centre is just one example.

The second important development has been discussed for many years but finally, in the years to come, it will become reality: the telecom market really will be demand-driven. Even recently, companies don’t have a clear picture of who their customers are. But by 2016, they will know who 99% of their customers are. Then services really can begin with the customer and end with the system, rather than vice versa. “I hope that telecom providers will soon stop ‘providing’ telecommunications, and start offering demand-driven services”.

After a career with Software AG, AT&T, Tandem Computers and Philips, Roel Pieper is now Professor of E-commerce at the University of Twente. He is also the founder of Favonius Ventures, an investment fund focusing on e-business software and mobile software applications for companies.

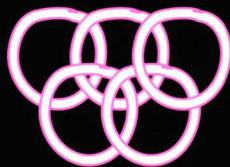


# OLYMPIC COMMUN READY TO FIT CASTING

The Dubai Olympic Games will start in a week and Donatella is the principal director of news cast agency ArabSport that will cover all Olympic events for Europe. This will be the first Olympics to be held in an Arab country. Because of climate conditions, these are also the first summer games to take place in the spring instead of summer.

ArabSport will distribute all casts to local stations in Europe; the local stations 're-make' the casts to suit their own markets. They offer their subscribers time shifted consumption. Donatella has to do a lot of conferencing with her customers to make sure that the right transmissions reach the right local stations at the right time. To achieve this, she will make many virtual appearances to meet her clients. ArabSport has invested heavily in the latest PAN and WAN networking to pull it all off. These technologies enable Donatella to access all relevant information and related content at any one time. From one small handheld device she can send casts to their customers in real time, without worrying about network switching and bandwidth requisitioning: her network goes with her wherever she is. Her device also enables her to communicate with her crews and Olympic officials.

Donatella now prepares for a TV interview with Olympic jockey Sheik Raidallah Alves about the new, much debated demonstration sport Camel Endurance Race. The Race will stretch out over the duration of the Games. Every camel can be individually followed by personal narrowcast; neck collars are equipped with camera, GPS and satellite uplink. Virtual overlays show the position of each camel on the track. The jockey and camel that get the most views and are betted on and discussed most, are awarded an extra 'people's medal'.







# ICATIONS

With a simple voice command, the local netnode is instructed to arrange a secure and high quality-assured connection for the transmission. Three backup channels are secured via other providers for quick handover in case other connections fail.

All type of services make use of the latest profiles in the MPEG/ITU video codecs. They allow devices that have a limited screen size or processing capabilities to show a small version, while HD receivers use all the available information to produce a High Quality experience. Also **synthetic and personalised content is seamlessly mixed** with the natural content in the broadcast or on-demand stream.

All this puts providers in a vulnerable position: they are responsible for seamless, high quality broad- and narrowcasts while at the same time competing with the many live visitors doing their own vidcasting. One thing is certain: it will result in unprecedented bandwidth consumption requiring many different parties such as network and application providers as well as TV stations from many different countries to cooperate in an unprecedented way.



# FONS VAN WESTERLOO

## TV VIEWERS OPT FOR MULTIMEDIA CONTENT - ANYTIME, ANYWHERE

The traditional role of telecom operators is changing at a breathtaking pace. Voice-based services still generate sales in the order of billions of euros, and are the most important cash cow in the telephony sector. By 2016, in the battle to win customers, voice-based services will be offered below cost price – or even free – as part of a much larger package of services.

This development is forcing future telcos to make a complete U-turn in terms of their business models, shifting the focus towards providing a **broad service package** that comprises, at the very least, Internet, TV and telephony services.

The first steps along this path have already been taken. Versatel and KPN already have the technical resources to deliver a package of TV stations to the home. In 2005, Versatel secured exclusive rights to broadcast live football, and KPN acquired Digitenne, which means that users will soon be able to receive broadcasts on their mobile phone. These are just two examples.

In 2016, our customers – viewers – will want **greater freedom** to choose what they watch. Naturally, general-interest channels such as RTL 4, 5 and 7 will still exist and will still attract very large audiences, but viewers will prefer to choose from an à la carte menu rather than ‘eat what’s going’. There will be a huge increase in the demand for content that can be watched or listened to anytime, anywhere – in the car, train or supermarket, through a mobile phone, fixed telephone line, PDA or laptop – it won’t make any difference. By 2016, the telcos will have made sure that we can watch any programme, wherever and whenever we choose.

The bundling of Internet, TV and telephony services by telcos will speed up the full **integration of TV and Internet**. TV will evolve from an entirely passive medium into an interactive medium. Viewers will be able to participate in television programmes as they watch, simply by switching to the Internet. Thanks to the Internet, viewers already have access to a wealth of additional information on television programmes. Film soundtracks can be purchased online while the films are being shown.

This revolution will bring enormous challenges for RTL. How will programmes on the new platforms look in 2016? Will programmes on a mobile platform last only 30 seconds? Will RTL make programmes only for a specific audience of a very limited size? Will subscribers take the place of advertisers? Will RTL deliver its programmes direct to the consumer? How will PVRs influence viewing habits? Will viewers switch in their droves to video-on-demand, or will they simply continue to sit back and watch passively?

RTL Nederland SA (until Augustus 2004: RTL/de Holland Media Groep SA) is a Luxemburg-based commercial broadcasting company owned by the RTL Group, the television and radio division of the German Bertelsmann concern. With its TV channels RTL 4, RTL 5 and RTL 7, and its radio station RTL FM, RTL Nederland is a key player in the radio and television market in the Netherlands.

VECAI

MANAGING DIRECTOR

# ROB VAN ESCH

## BROADBAND IS CHANGING OUR WORLD

“10 years ahead? Even one year is a long time in this market!”

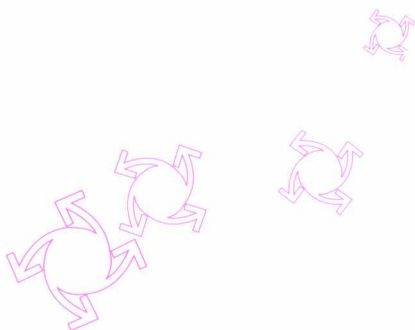
We are on the verge of **major changes in the telecom industry**: intense competition between various infrastructures, convergence and economies of scale ... The distinctions between telecom and cable providers will gradually disappear. Technologies themselves will in the end offer few competitive advantages, so the key to success will be service and marketing. The rapid penetration of broadband is still an underestimated phenomenon. Broadband has brought fundamental changes to the various industries, and is a valuable tool for many people and organisations - the travel industry and the impact of Marktplaats.nl (a successful Dutch start-up, recently bought by eBay) are just two examples.

In 2015, broadband will be everywhere and we will have access to any content we require, wherever we are. We will use services much more actively. Everything will be available to us, but it will have its price: when talking about video-content, we will be able to choose between free programmes with a lot of advertising, or ‘clean’ programmes for a fee.

As far as the **convergence of television and PCs** is concerned, television and the PC still play different roles in households. Watching television is very much a **social activity**, while exploring the internet is often very personal. This is an obstacle to interoperability and exchangeability. In due time however, television and the PC will become increasingly integrated. That is already happening with digital television, where an electronic programme guide enables people to find the content they are looking for. Younger generations will bring new habits in communication, such as SMS and MSN. But youngsters will also expand their influence in television. Interactivity will be a normal element in television programmes, while at the same time “old fashioned broadcasting” will not disappear. Look at Idols, interactive and broadcast at the same time, giving us a start of insight into the future.

Regulations in the field of **copyright** play a crucial role. Cable companies are still paying 70 million euros – without a ‘specification’ breakdown – to copyright organisations. Steps are being taken at European level. We want to buy clean products from all parties. That will lead to quite a few complicated discussions in the years to come - but the wheels are in motion!

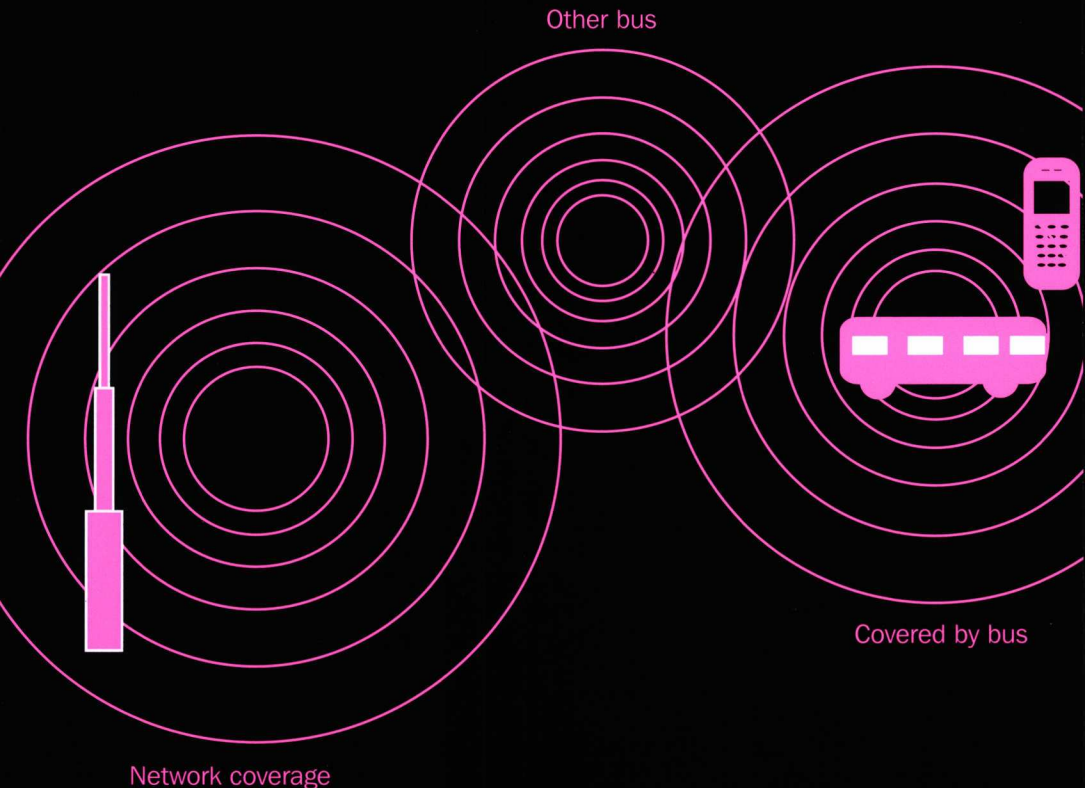
VECAI is the sector organisation that represents the interests of cable companies in the Netherlands. VECAI’s activities include lobbying for improved legislation and regulations, and promoting the standardisation of technology and communication throughout the sector.



As on every other day, Mr. Roongta is on his way from home in the suburbs to the city centre. His **company's shuttle bus** picks him up close to his home. Mr. Roongta's ride passes through pleasant downtown areas and several rather unpleasant slums. As a convenience for the employees, the shuttle bus has **NetConnect** installed. Wide-area wireless coverage is only infrequently available along the bus route. The bus' internal server has cached Mr. Roongta's email before the departure. During the commute, he marks news articles of interest, which the bus retrieves at the next possibility. At the apartment complexes, the bus' network connects to the company's access points. During the ride, it connects to any NetSpot along the route or to any other shuttle bus close by as coverage extension with multi-hop networking. At the occasion, the bus' server logs into the company's network over a secure connection. If no **NetSpots** or shuttle busses are available or the available ones are unreliable, the server connects to the corporate network via the more expensive mobile network for email synchronisation. For personal use the on-board system connects passengers **directly to the Nets**. This is less hassle because encryption is not required. As a direct Net connection can also be achieved via prepaid satellite link, it does not have to be cached.

On the way to Mombassa's city centre, the shuttle bus takes over a public bus. Like the shuttle bus, the public bus has a relation with NetWork, a company that offers network access and mobility management using various standards. Besides mobile terminals, NetWork sells "pimp my bus" packages, where a bus company can upgrade its means of transportation, communication-wise. The public bus has a more modest lay-out and does for instance not use the expensive mobile network.

# OUT IN NETWORKING ALL THE MOMBASSA



At traffic lights, nearby shops such as video rentals, groceries, retailers, etc. transmit commercials that the bus server filters and relays to passengers according to their respective profiles. Mr. Roontga plans to cook for his wife and watch a movie with her tonight. He already connected to his home network and downloaded his wife's favourite recipes and a listing of all missing ingredients. Mr. Roontga's plan causes the latest movies and grocery ads to appear on his notebook. He makes reservations.

At reception of the final order, the movie download is scheduled to Mr. Roontga's home media server at the specified (IP-)address. Just before Mr. Roontga arrives at home, he receives a request to open his outside refrigerator box.

Once he's at home, Mr. Roontga compiles a message for his wife including a preview of him preparing tonight's meal and a nice dinner table, together with a trailer of the movie.



# LODEWIJK DE WAAL

## DEMOCRACY THROUGH TELECOMMUNICATIONS

Communication technologies are facilitating democratisation on a global scale. They are facilitating the **spread of knowledge** and creating greater **social cohesion** than ever before.

Telecommunications are essential to the economic and social 'fabric of society'. The fax, and later e-mail and the Internet, have vastly extended the reach of organisations. Internet provides a window onto the world – and so many contacts! A trade union in Brazil can contact the FNV about a redundancy at the local Philips factory. But telecommunications cannot replace all face-to-face contacts. When you visit a country you learn so much more from what you see there - you learn who you can and can't trust, for example.

In 2016, telecommunications will be **much simpler**. We'll be much more adept at using them, thanks to intelligent systems that help us to organise things. Young people today already communicate in a different way. The members of Young ABVAKABO (a youth network of the FNV) hold far fewer meetings than in the past. They only meet to discuss specific subjects, and many matters are dealt with through remote communication. And my children, for example, do their homework with their friends via MSN.

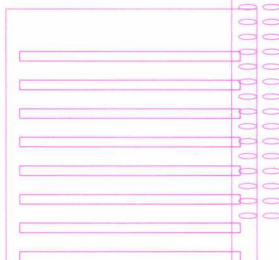
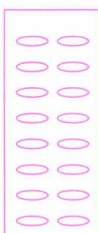
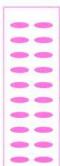
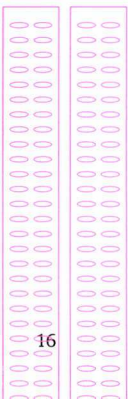
As people will have easier access to information, organisational structures will become flatter. In 2016, the 'hotshots' will be the people who are able to interpret, sort and use information.

New technologies are providing a huge impetus for social systems such as the care sector. Communication will help to solve staff shortages, for example by making work discussion more efficient or

facilitating electronic patient administration. Systems technology enables the CWI (Centre for Work and Income), for example, to customise its service provision because the technology is giving people more opportunities to provide a personalised service. In such contexts it is important to strike the right balance between technology and the human aspect. We are now in a **transitional phase** in terms of the way the private sector thinks about technology. We're moving away from the principles of classical economics, towards a new era with new networks, knowledge dissemination and services (including commerce), in a high-tech society.

All over the world there are still areas where large groups of people have no access to telecommunications. In African countries in particular, telecommunications would help to **improve local economies** and social cohesion. Organisations in the private sector – operators included – can commit themselves to sustainable business practice by investing in these areas together with governments and NGOs.

The FNV is a confederation of 16 independent trade unions from all sectors of society. The foundation 'Stichting Humanitas' provides person-to-person services in the field of welfare, living and care. Humanitas works with several hundred professionals and thousands of volunteers throughout the Netherlands to provide services based on humanist principles.



# HOMEOWNERS' ASSOCIATION 'VERENIGING EIGEN HUIS'

CHIEF EXECUTIVE OFFICER

## MARLIES PERNOT

### TELECOMMUNICATIONS – A DRIVER OF SOCIETY

In terms of homes and how we use communication technology, the year 2016 seems a long way off, but we'll be there before we know it. The pace of change is so fast that it is almost impossible to predict the future.

Advances in communication technology will influence many areas of our lives, including the integration of our work and home environments. Telecommunications will have penetrated all corners of the world and it is inconceivable that, in certain areas, people are unable to communicate freely with others.

The other side of the coin is that technology has become invasive; 'quiet time' is a thing of the past. This is giving rise to a **counter-movement**. People prefer to sit around the kitchen table together. We have a growing need to experience something real, to touch or smell something, because we are in danger of losing that. Perhaps there will be a ban on communicating electronically in public, just as smoking is banned today.

Technology is speeding up our lives. Associations such as 'Vereniging Eigen Huis' have become digital organisations with new ways of interacting with members. Thanks to ICT, we can provide services on a scale that was not possible in the past. For example, for many years Vereniging Eigen Huis has compared mortgages. Now that the process has been automated, we can compare some 2,500 products in a fraction of a second and select the right mortgage for members. This keeps the service affordable.

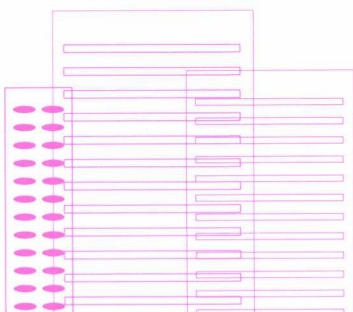
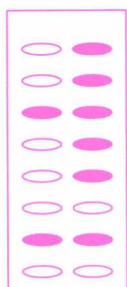
Another example is the **transparency** that modern ICT brings. It means that monopoly positions are being eroded. In the property market, many opportunities remained 'hidden', until the advent of platforms such as Funda, the main property website in the Netherlands. Even though it is not a medium everyone can make use of yet, it may be a start breaking monopoly positions regarding information. Ultimately, the power will rest with those who really understand the technological side of communication – it's the key to big business.

In 2016, our homes will be basically the same as they are today. Homes will still be built for the 'average' family, and housing stock will have a life of 50 to 60 years. This situation will not change until the supply side of the market (i.e. the construction industry's perception of housing needs) is more closely attuned to the demand side.

The structure of neighbourhoods will also change as a result of advances in communication technology. Innovations will travel around the world much faster, and this will influence the housing industry.

Telecommunications are a key component of the social infrastructure, and access must be as low-threshold and attractive as possible for everyone.

'Vereniging Eigen Huis' is a consumer organisation for current and future homeowners, with more than 660.000 members in 2006. The association represents their interests and is an important source of advice for its members, who make frequent use of this facility.



# GOGGLE

Rating based on quality, availability, price

Rating	Company	Tarief	My Profile
1	company A	€ 15.00	additional services, quality demand
2	company B	€ 11.50	
3	company C	€ 27.30	frequency, search categories
4	company D	€ 16.00	average cost





# BUY KING OF INTERACTION PROVISIONING

Samièra Kaya, managing director of an international trading company, currently stays at a hotel in the Chinese city of Shanghai. Early in the evening she occupies one of the interaction spots in the recently restyled hotel lobby. The past quarter costs and turnover figures haunt her thoughts. Something doesn't add up, but she can't quite put her finger on it. She decides she needs the controller of the European office for consultation. At the **interaction spot** Samièra activates GoggleBuy, the major **interaction provider**.

Samièra's grants GoggleBuy access to her user profile. She issues the command "conference, schedule controller European branch: Q:high ,T:00:30, secure, business search". GoggleBuy duly responds with different choices of high-quality, 30 minute **peer-to-peer conference links**. An overview of her and others' previous experiences is also available. Communication functions are listed according to quality, availability and costs. The somewhat obsolete AsiaCom hotspot is listed at the top, with very reasonable costs and good but not exceptional quality. Second is ECC, EasternChinaCable. Further down the rating is Wireless Shanghai. Costs are even lower but quality is unpredictable. Samièra usually discards the sponsored links. In her experience these are expensive in relation to the offering. Further, she receives a listing of the match of both calendars, taking into account time zones, presence information and meetings that may be overruled. Fortunately, the controller should be available within half an hour. Samièra receives an update of all information rescheduled half an hour ahead and chooses "AsiaCom at first opportunity".

Together with the controller, Samièra requests GoggleBuy to supply them at once with all the relevant figures. **GoggleBuyBusinessSearch** compiles the internal figures from the company database with external data. An intelligent agent integrates both sources and quickly identifies responsible content owners, possible problem areas and other notable discrepancies. The corresponding alerts light up on both Samièra's and the controller's screens. At once it has become clear where the problem lies. Samièra's intuition has once again proven correct. She instructs to arrange another virtual meeting with the heads of all branch offices around the world to resolve the situation.



## EUROPEAN UNION

EUROPEAN COMMISSIONER FOR COMPETITION

# NEELIE KROES

## THE TELECOM INDUSTRY NEEDS COMPETITION ABOVE ALL

Telecommunications influence man, society, products and business processes. Mobile and broadband communications are taken up because they correspond to **values of our societies**, such as our needs for being loved, maintain relationships and express commitment. Forecasting the technology and services of 2016 implies replying to the question how people will work and live over the coming years.

Engineers have a tendency to extrapolate future trends from current technological successes. But they do not realise that, in the short and medium term, consumer needs can be served with limited improvements of the current technology. Finding out how to best serve consumer needs is a 'trial and error' discovery process provided by competition.

Enterprises and public authorities will continue to **spend increasing amounts in ICT** as long as they are aware of the potential of new technologies. The growth of small 'smart' business will likely continue. The web will increasingly provide self-employed workers the possibility to act as subcontractors of larger organisations. This will increase flexibility of the latter and improve their global competitiveness.

Ten years ago, most players in the sector were predicting the demise of **copper wire** in favour of fibre. Today, copper remains the key infrastructure. In spite of migration to IP-based new generation networks, most of the current telecommunications technology infrastructure will still be in use in 2016. As long as the consumer is not ready to pay for additional capacity there will be no business case for huge infrastructure investments.

Governments have a key role to play to allow the sector to grow and the users to benefit from that growth. For instance to allow to buy and sell usage rights to spectrum and in managing rights of way on public land to allow the roll out of new networks. Another issue is that of market power, where competition could play a greater role.

The sector was liberalised in 1998, but there is not yet **true deregulation** in sight. The main problem is that one operator inherited the former monopoly network. In the absence of a structural remedy, like the divestiture of the basic network, regulators are indispensable to define and monitor behavioural remedies. This comes at a high cost: delay innovation and investments by incumbents out of fear that they would have to allow entrants. Sector-specific remedies should not be extended to Greenfield investments. "My greatest wish is that possible exclusionary behaviour in new markets should be dealt with under Competition law".

As European Commissioner for Competition, Ms. Kroes promotes a fair and free European business environment. This work contributes directly to the Barroso Commission's number one strategic objective – the drive for economic growth and better jobs, for a sustainable standard of living and social welfare in Europe.

# CHRIS FONTEIJN

## UNIVERSAL BROADBAND ACCESS IN A SELF-REGULATING MARKET

In 2016, electronic communications will be characterised by **universally available broadband access** to IP networks, including the Internet. Broadband access will be available at any level of quality and in many forms (e.g. WiMAX, WiFi, G4 mobile networks, cable, fibre-optic or copper). Consumers will be able to purchase low threshold broadband access of the quality and type they require.

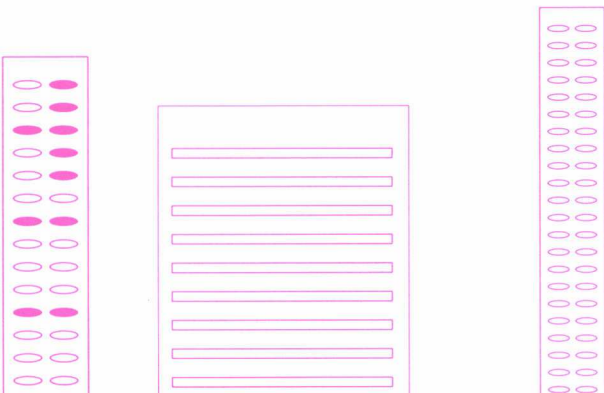
Broadband networks will deliver every conceivable type of electronic communication service and Internet application. Services such as telephony and RTV will no longer exist in their current form; they will have been replaced by Internet-based (IP) applications such as VoIP and IPTV. This means that both the availability and production of content can be **customised**, and any type of content can be produced – even for the smallest niche markets. In theory, anyone will be able to create content if there is a demand for it.

As the regulator of the communications market, OPTA's role is to facilitate the transition to the future. This means that OPTA must allow sufficient scope for innovations and closely monitor changes in market positions (resulting from service bundling, for example). During the transition it will be important to **create a level playing field** for alternative infrastructures. OPTA will gradually take on a less active role as infrastructures become more competitive. However, many of the market players that can generate infrastructure competition are international players, so OPTA's role will also depend on regulations in other European countries.

The main threat to the success of the developments outlined above is the abuse of the Internet, for example through 'malware' (spam, viruses). The success of advances in broadband and IP depends on acceptance by end-users. OPTA can play a key role in this respect by providing effective protection for Internet end-users. Ensuring **internet security** will require co-operation with countries outside the Netherlands, and even outside Europe. The nature of the Internet is such that, in the future, even global co-operation may be necessary to prevent malicious practices.

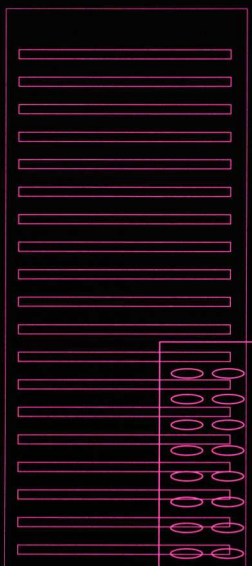
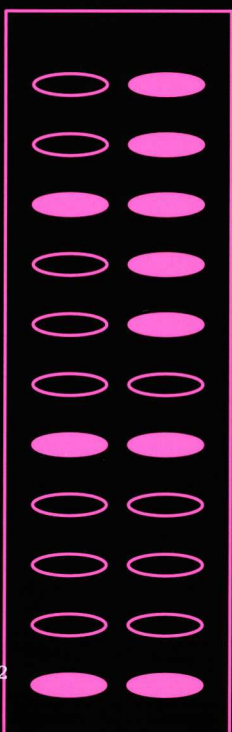
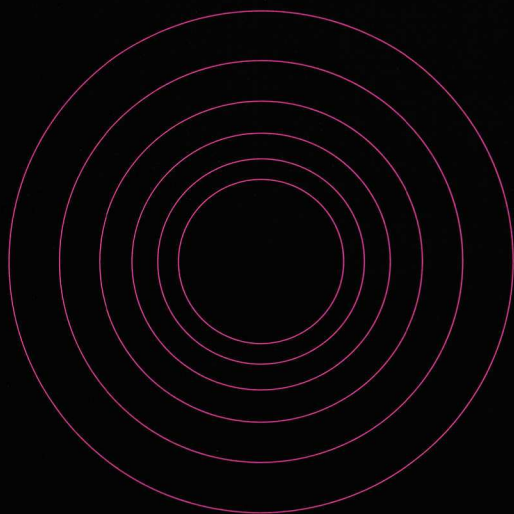
The ultimate aim of OPTA is to create such **effective market mechanisms** that the market no longer needs to be regulated. The need for sector-specific supervision will then depend on how effectively the sector itself, on a world-wide level, is able to protect end-users against malicious practices involving new forms of electronic communication.

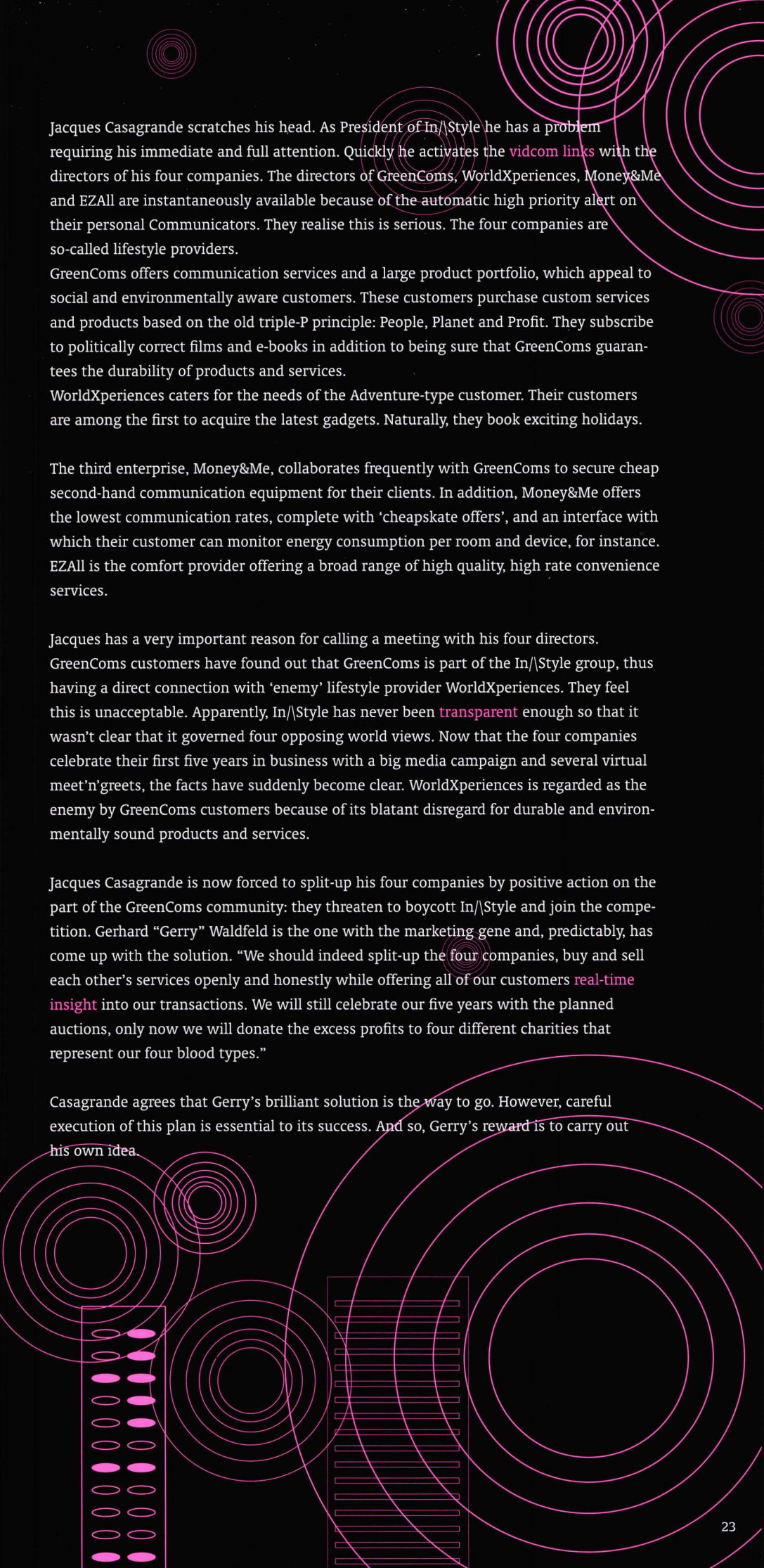
OPTA (Onafhankelijke Post en Telecommunicatie Autoriteit) is the independent regulator of the postal and telecommunications markets in the Netherlands. OPTA supervises compliance with legislation and regulations that are intended to promote competition in these markets, thereby ensuring greater choice and fair prices for consumers.



# LIFE- STYLE PROVI- DER

CLASH OF WORLD  
VIEWS





Jacques Casagrande scratches his head. As President of In\Style he has a problem requiring his immediate and full attention. Quickly he activates the vidcom links with the directors of his four companies. The directors of GreenComs, WorldXperiences, Money&Me and EZAll are instantaneously available because of the automatic high priority alert on their personal Communicators. They realise this is serious. The four companies are so-called lifestyle providers.

GreenComs offers communication services and a large product portfolio, which appeal to social and environmentally aware customers. These customers purchase custom services and products based on the old triple-P principle: People, Planet and Profit. They subscribe to politically correct films and e-books in addition to being sure that GreenComs guarantees the durability of products and services.

WorldXperiences caters for the needs of the Adventure-type customer. Their customers are among the first to acquire the latest gadgets. Naturally, they book exciting holidays.

The third enterprise, Money&Me, collaborates frequently with GreenComs to secure cheap second-hand communication equipment for their clients. In addition, Money&Me offers the lowest communication rates, complete with 'cheapskate offers', and an interface with which their customer can monitor energy consumption per room and device, for instance. EZAll is the comfort provider offering a broad range of high quality, high rate convenience services.

Jacques has a very important reason for calling a meeting with his four directors. GreenComs customers have found out that GreenComs is part of the In\Style group, thus having a direct connection with 'enemy' lifestyle provider WorldXperiences. They feel this is unacceptable. Apparently, In\Style has never been transparent enough so that it wasn't clear that it governed four opposing world views. Now that the four companies celebrate their first five years in business with a big media campaign and several virtual meet'n'greet, the facts have suddenly become clear. WorldXperiences is regarded as the enemy by GreenComs customers because of its blatant disregard for durable and environmentally sound products and services.

Jacques Casagrande is now forced to split-up his four companies by positive action on the part of the GreenComs community: they threaten to boycott In\Style and join the competition. Gerhard "Gerry" Waldfeld is the one with the marketing gene and, predictably, has come up with the solution. "We should indeed split-up the four companies, buy and sell each other's services openly and honestly while offering all of our customers real-time insight into our transactions. We will still celebrate our five years with the planned auctions, only now we will donate the excess profits to four different charities that represent our four blood types."

Casagrande agrees that Gerry's brilliant solution is the way to go. However, careful execution of this plan is essential to its success. And so, Gerry's reward is to carry out his own idea.





# HORST LENNERTZ

## TELECOMMUNICATIONS WILL BECOME ONE OF THE COMMODITIES IN LIFE

In another ten years, there will be three or four major players with own infrastructure per country, while the incumbents of today will have an average revenue market share of less than 50 percent. The new players will originate from the IT and content world as a result of the **All-IP revolution**. They will have the window of opportunity to manage telecommunication only with combined products and services. IP will become a burden in costs for the incumbents because they have to run two parallel networks during the next 10 years. The fixed network players will be under high pressure. Another issue for the existing operators is the non-availability of rich content.

The future customer is expecting telecommunication services with a strong and fresh brand. **Brand and content richness** will be a differentiator. Alternative operators and Service Providers will create a significant market share, driven by new services and cheaper prices.

In the future, mobile network operators will be consolidated to a maximum of three players per country. They will offer simple European tariffs as national tariffs and extremely cheap tariffs for special segments. The slogan of the future will be "**Media on the move**". These customers will have only one handset offering the same functionalities as at home. "In 2015 we expect to have mobile networks with a download speed in the range of 50-100 mbit/sec, making use of high intelligence software and technology". There will be new operators with local networks based on different technologies with similar services. The only differentiation will be real mobility. The own network infrastructure will be on one hand a strategic asset for each operator to offer advanced services, but on the other hand it is an open and shared low cost platform for competitive providers.

On the long run innovations will be boosted by Asia, esp. China. In Europe, we have to evoke more enthusiasm for natural sciences already in schools and universities in order to get more engineers with high level education. Telecommunication services will become a commodity in the future, just as gas, water, clean air or electricity.

The drivers of future growth will be pushed by the entrepreneurship of small size companies creating new functionalities and services.

The real technology breakthrough within the next years will be the introduction of high definition television in the wireline market and as a spin-off digital TV on handsets.

**'Intelligent triple/quadruple play'** will be the future solution for the telecom operator: customer focus, better services, high quality and low costs.

Main question based on the up to now not really visible synergies in international partnerships is: "Is it a must or not to have an international footprint?"

"My wish for the future is that the telecom industry will gain back the leadership in Europe with regard to technology and innovation."

Mr Lennertz is co-founder and formerly Managing Director of E-Plus Mobilfunk GmbH & Co. KG. Today he is Personal Adviser of the Board of KPN N.V. since 2005.



TDC A/S

VICE PRESIDENT, CORPORATE BUSINESS DEVELOPMENT

# NIKOLAJ GAMMELTOFT

## TELECOMMUNICATIONS AS CATALYST

In 2016, the telecommunications industry will be much more expansive. Access and bandwidth will become commodity products, the technological development will reduce entry barriers and new players will enter the market, e.g., utility companies. The emphasis will be on services and using telecommunications as a catalyst for other industries, i.e., access to any information or content from anywhere on any device. Telecommunications players will become **key partners** in particular for the service industries such as entertainment, media, healthcare, education, transport and government. It will support new ecosystems of small virtual businesses, each focusing on their own niche markets.

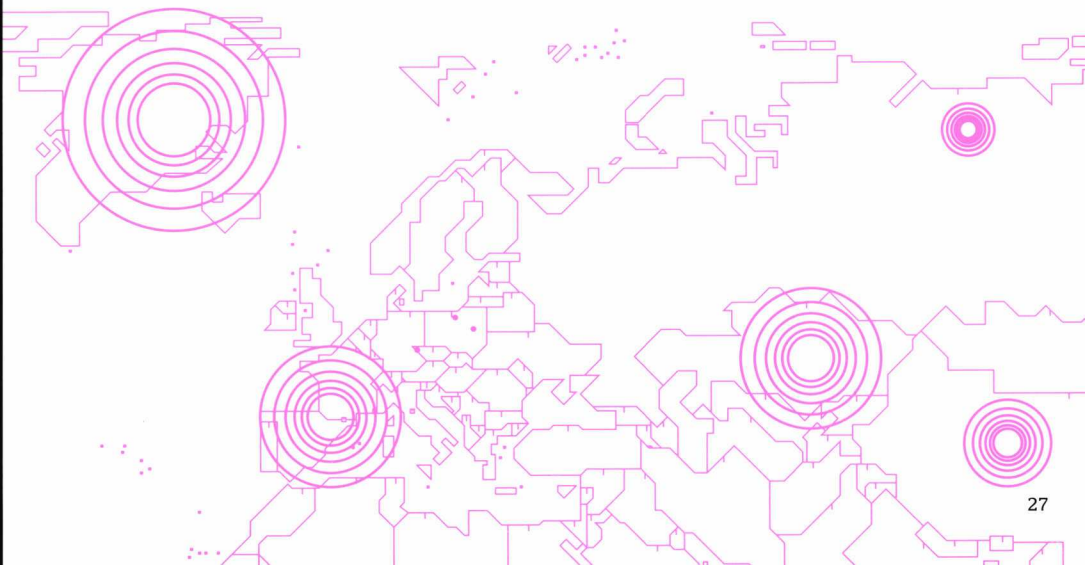
Communication solutions will drive the future **societal behavior** (i.e., less clear distinction between work and personal life, emergence of subcultures and virtual communities) as well as satisfy **societal demands** (e.g., health care applications for the elderly to allow them to remain independent).

New services will continue to emerge, many of which we cannot envision today due to technical limitations or prohibitive costs. Their market success will be heavily influenced by early adopters, creative marketing and word-of-mouth.

In order to deliver on this, telecommunications companies will have to develop their business model and internal operations continuously. Telecommunications companies will need to invest in advancing technologies and demonstrate tangible benefits from communications solutions. Internally, their operations become more flexible to allow faster provisioning of services across access forms in quality levels that are designed to suit the given service. The name of the game will be **integration** and **convergence**.

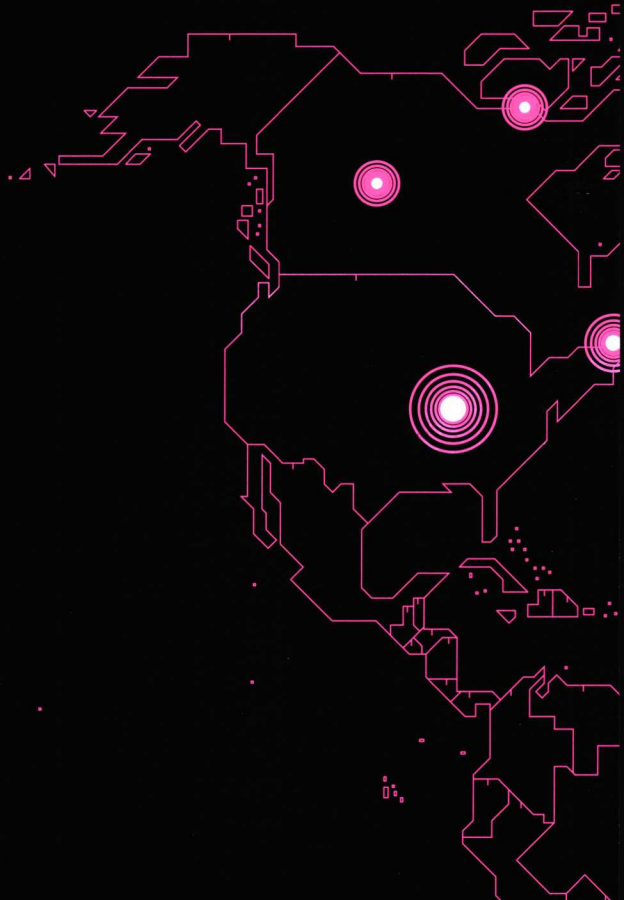
**Scale** continues to become a necessity to deliver cost effective, quality services. Hence consolidation will continue to take place, focusing on the mass-market services. The development and introduction of new services will come from smaller entities much in the same way as now.

TDC is the leading provider of communications solutions in Denmark, the second largest telecommunications provider on the Swiss market, and has a presence in all Nordic countries and other Northern and Central European markets.



# EUROPE DUKES OF HAZARD

INTELLIGENT  
MONITORING  
HAZARDOUS  
TRANSPORTS



# AN

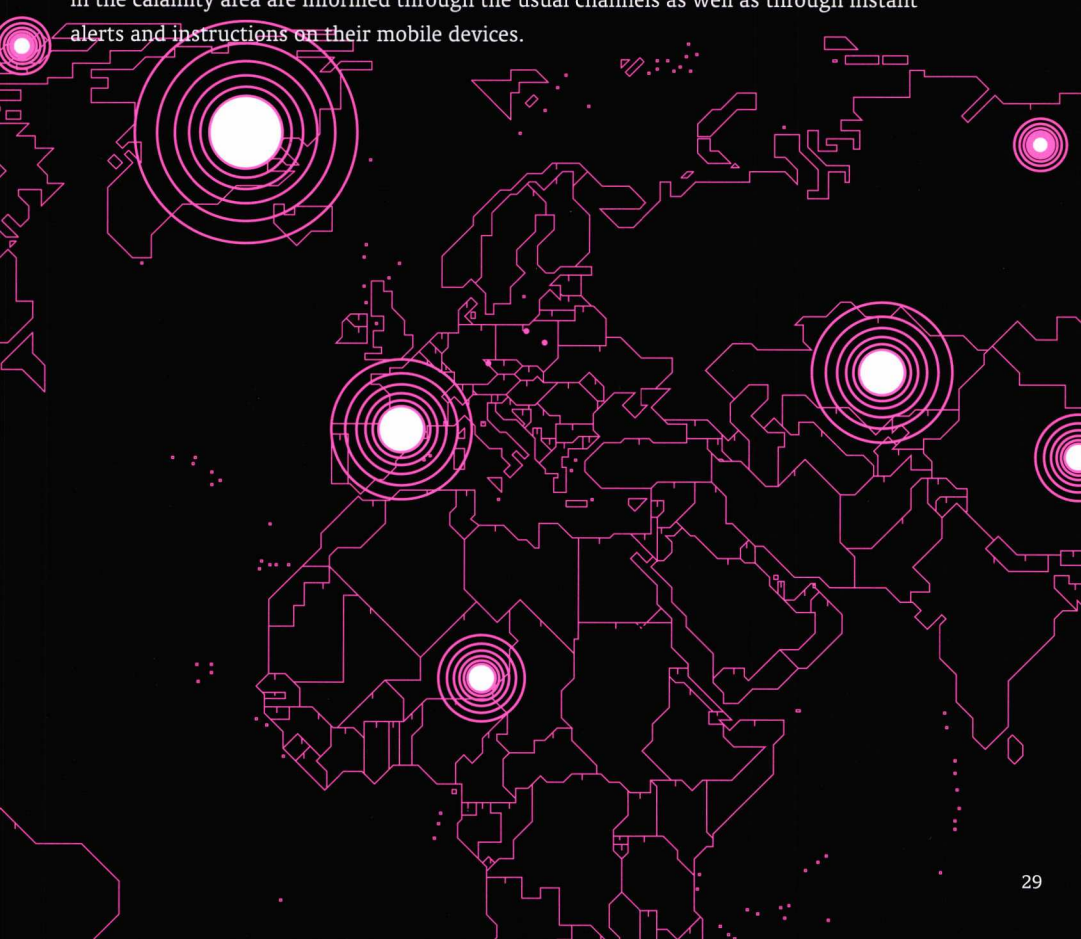
John Yong Ho is “hazard manager” with the Dutch branch of the European Transport Service for Hazardous Substances. After the near disaster with a chlorine transport in the Spanish town of Toledo in 2008, the European Union prioritised the forming of one consolidated European service for **monitoring all transport of hazardous substances**. Each member state does retain its own service, however, to communicate with the authorities effectively and in accordance with the local culture.

The control room is equipped with large wall displays giving John an **instant view of all** transport movements of hazardous substances. John can easily adjust the details of his views. Be it road, tube, waterway or air transport, everything is known: vehicle, carrier, crew, cargo, permits, destination and even the complete route. Information about carrier, shipping agent, owner, and permits are **electronically available**, to eliminate complicated paperwork for instance in through fare.

All vehicles can be localised in real-time. Sensors keep track of the cargo's shake and roll motion, temperature and humidity and alert transporters and driver in case of abnormal conditions. Intelligent chips enable automatic identification of companies and staff responsible for loading the cargo in the vehicles.

In case of calamities, John Yong Ho instantly asks for an immediate connection with the driver to discuss safety procedures and decide how to solve the problem. This is always recorded and John can add his personal opinion. Simultaneously appropriate authorities are informed. Through the control centre of the Service for Hazardous Substances the authorities involved, the carrier and the agent exchange all relevant information. Cameras installed in the transport vehicles register the calamity itself, enabling everyone to access **real-time actual information**. According to the danger involved, John Yong Ho ultimately can be **authorised** to overrule local operations, but this has never been the case yet.

If necessary, other road users are automatically advised of alternative routes. Civilians in the calamity area are informed through the usual channels as well as through instant alerts and instructions on their mobile devices.



## SHELL NEDERLAND B.V.

PRESIDENT

# REIN WILLEMS

## THE HUMAN FACTOR WILL ALWAYS PLAY A VITAL ROLE

ICT is an instrument that serves the organisation, but it must never replace interpersonal contacts. Technology must not be allowed to take over; people must always remain in control.

ICT can bring cost-efficiency benefits, for example through the convergence of telephony and the Internet. We are currently conducting an internal experiment with communication via a single system. We should be able to fully implement the system in about a year's time. Within ten years, everyone will be using the smartphone. In a worldwide organisation such as Shell, where managers and their teams are not always in the same location, ICT can bring the boss 'virtually closer' – but the human aspect must never be overlooked.

A key consideration for Shell is closer and much more direct customer relationships based on the use of real-time information. Shell Chemicals has more than 2,000 industrial customers worldwide, and approximately 35 percent of orders are now processed electronically. This is expected to rise to 40 percent in 2006. Shell realises system management and inventory control for customers, which means that customers' logistics processes are now more closely integrated with those of Shell. In relationships with third parties, technology presents both a danger and a challenge that we should be aware of. As technology allows Shell to integrate its processes more closely with those of the customer, it is important to preserve

the interpersonal side of the relationship. If the human aspect is sacrificed, juridification is a real danger if problems arise.

In core processes, such as those at the oilfields and refineries, ICT plays an important role in terms of optimising oil production and information processing. Shell does not believe that it is possible to implement full remote operation of these processes, due to the stringent and specific safety requirements involved. It must be possible at any time for operators to control processes manually and safely.

In the retail context, namely the relationship with motorists at the pump, real-time information can be used to deliver convenience. For example, cars could be equipped with sensors that tell Shell when a car needs petrol. Shell then delivers the fuel at a convenient time and location agreed with the customer. Obviously this has implications in terms of permits and municipal regulations (on safety, for example) and this will need to be addressed.

Shell Nederland B.V. is active in all five divisions of the Group: Oil products, Chemicals, Gas & Power, Exploration & Production, and Renewables. Shell has 11,000 employees in the Netherlands, representing ten percent of Shell's total workforce worldwide. Shell's activities in the Netherlands contribute, on average, fifteen percent to the group's result.

# ALBERT HEIJN

MANAGING DIRECTOR INFRASTRUCTURE EUROPE, ROYAL AHOLD

## WIM VAN DER KLAUW

### CLOSER TO THE CUSTOMER THROUGH PRO-ACTIVE TELECOMMUNICATIONS

“Ahold has seen a great many changes in recent years. Business and IT priorities have been reassessed worldwide, and IT operations have been outsourced”.

Albert Heijn has several roles when it comes to telecommunications: it is a user, a mobile provider (‘AH mobiel’) and a distribution channel for other providers.

Telecommunications play an important role in retail, particularly with regard to offering **value-added services**. Trials are already being carried out with payment applications, for example. The question is how far they will be accepted by consumers.

In terms of internal business processes, telecommunications are important to Ahold on an international level. Developments in recent years mean that the company can now cover the **entire supply chain**, from supplier to consumer, and respond directly to customer needs. And we’re expecting further advances with RFID in this area. We’re already able to supply shops virtually real-time and manage the process more efficiently, also in terms of food safety. This means that we can stock fresh daily products. The introduction of RFID will vastly improve efficiency because time-consuming barcode scanning won’t be necessary. If more user-friendly applications can be offered, this will be more interesting for consumers. One example is self-scanning, which has already been introduced in a number of Albert Heijn shops. Convenience and efficiency for customers are important aspects, but knowledge of customers that can be used for customised promotions, for example, is also important.

**Mobility** is another important factor, for customer contacts (rise of multimedia) as well as internal **business processes**. However, with regard to the last point, the fixed-mobile integration that would facilitate this has been discussed for years, but the telecom companies are slow to act. The potential is enormous. The telecom industry should focus more strongly on pricing and pro-active investment.

Much of the technology is with us already. Obstacles often relate to costs and the fact that standardisation is not sufficiently advanced for an integrated approach. In the telecom industry, too few companies are seeking to **innovate in partnership** with other (IT) providers and customers. The role of telecom operators is still restricted to that of carrier, an area where competition is intense. There is a lack of coherency in networks and there is too little transparency, for example in pricing at the national level – let alone at international level.

In 10 years’ time, **fixed-mobile integration** will surely be a reality. There will be a single standardised, user-friendly interface that will replace today’s different platforms, and telecom providers will bring Albert Heijn applications much closer to the consumer.”

Ahold encompasses an international group of local food retail and foodservice operators that do business under their own brand names. With over 200,000 associates, the company is one of the leading food providers in the United States and the most prominent food retailer in the Netherlands, Albert Heijn.

# SCHOOL PRODUCE, CONSUME YARD





# AND PERSONALISE

Marit is very excited when she travels home from school. She almost cannot wait to check her portrait on the Nets. Like all her classmates Marit uses the **ConnectorTab**. The device filters, ranks and publishes all relevant and permitted information and **personalises** this information. It is a very helpful tool to communicate with each other, but also to plan and perform schooltasks. The ConnectorTab is very well protected. While at school, connections outside the regular Schoolweb environment may be reported. If a person with a ConnectorTab passes the virtual fence around the school area, direct connections are made with either parents or other responsible grown ups involved. Marit already noticed that her Mom's working at home and that she is informed that Marit is on her way.

At home her ConnectorTab automatically connects to the home net. Marit has more privileges now.

Yes! For the fifth day in a row she has been voted the most popular girl. She shows her mother and forwards the news to her friends. She also sends them a collectioners item as a thank you and adds some quick comments. She does enjoy listening to all the messages involved. Unfortunately, there are also a couple of unfriendly messages and one is even hateful. Marit decides to connect this particular one to the Schoolweb to be checked. The school organised a **guiding system** to prevent misbehaviour. A parent or schoolcoach and the person involved will receive a warning, which is also registered.

Most children of Marit's age, she's almost nine years old now, have their **own spot on the Nets** where they keep records of their escapades as a collection box and diary. Some really make a big fuss out of it! Bart is obsessed with salamanders, for instance. He collects films, games and pictures, and two of his own pets have their own show in which Bart lets them tell all kinds of stories about their lives. The film clips are being watched the world over.

Marit uses the nano screen (nanocoating on the windows) in her room to scan for the latest music and clips she traded on the schoolyard. She discusses a film they made last weekend, together with two of her girlfriends. They exchanged all individual fragments that Marit compiled into one. They decide to add some music. Marit sends the clip to her own station **MariTV**.

From the **new content** the bots have found her, Marit selects a funny game made by someone in India. She plays the game together with two online contacts. The best bits she puts on MariTV. For others, like others do for her to pick from. After dinner she watches some friends' films and updates her portrait. Will she be a winner again tomorrow?

KLUWER NEDERLAND

CHIEF EXECUTIVE OFFICER

# PATRICK MORLEY

## SEARCH TECHNOLOGY HAS MATURED

The Internet is becoming increasingly important for publishers. Internet reliability will improve rapidly from best-effort delivery to a level of 99.999 percent, which is usual in the telephony sector. Publishers and clients will be much more confident and adventurous when it comes to **web-based services**.

Today, **mobile real-time solutions** are not a major part of the Kluwer portfolio, but this will change in the long term. For example, lawyers in the courtroom will require fast access to jurisprudence. This type of technology will not develop as rapidly as the Internet, but it is important for several lines of work, including police work. There is a wealth of potential applications that could be linked to Kluwer's legal expertise.

In the education sector, the combination of books and Internet technology will really take off. Both these channels will exist in parallel, but possibly in a different form.

Kluwer will be able to give authors direct access to their content-management system.

This will require new telecommunication solutions.

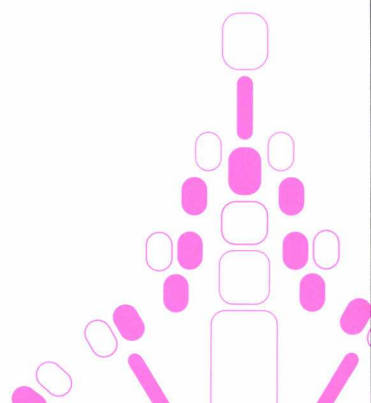
Among Kluwer's clients, there will be an increasing demand for **federated search facilities** that enable them to search several different information sources. They will require integrated content, delivered in a well-structured format. Kluwer will work in partnership with other organisations to test new search technologies whereby intelligence is built into content in order to improve the **retrievability** and **linking** of information.

The message for telcos is: stay with what you're good at. Don't shift the focus to content. Combining content and distribution will lead to strategy conflicts.

"My dream for the future is to be able to source and organise all relevant content for professional users, and deliver it to their desktop as they need it".

Kluwer is a professional publisher with approximately 1,300 staff, specialising in the following areas for the Dutch market: legal, fiscal, financial, governance, HRM and management.

Kluwer is part of Wolters Kluwer, a leading multinational publisher and information services company with offices in more than twenty-five countries.





# ALCATEL-MICROSOFT TV

BUSINESS DEVELOPEMENT / SENIOR MARKETING MANAGER

## KOEN HANDEKYN & ELENA BRANET

### RICHER COMMUNICATIONS AND EXPERIENCES

Voice (mail), video (mail), email, SMS and chat are key communication means available today. New forms of complementary communication means are expected to appear that will support **richer communication**, allowing us to share mood, interests, activity and location in a secure and appropriate way **with peers or full social networks**. As bandwidth and compression technology will continue to evolve and ambient intelligence will gradually find its way into our lives, we will find ourselves communicating in high fidelity with our peers just as if they would be right next to us without the hurdle of visible terminals where extended notions of presence (location, activity) will help us choose appropriate means of addressing someone more naturally. We might find our TV proposing to watch some show together with a group of remote friends, as future applications will understand our **social context**. While peer-to-peer applications will continue to foster, real peer-to-peer communications networks (like WiFi neighborhood or car-to-car networks) can even be expected.

IP will continue to change the face of world. Today's technology advancements can help the **IP enabled television** to deliver a new richer experience that puts users in control of what, when and how they watch content. In our vision, consumers can connect from the TV to the rest of their personal environment, so they can control and enjoy multi media content either at home or on the go. Our technology will enable you to program a television recording from your mobile, watch TV and communicate at the same time together with friends located in different places. As a next step, our infrastructure will allow you to push your personal content to the television sets of your friends and family where it can be consumed in the most natural way.

Where the digital world is mostly disconnected from the world surrounding us, new user terminals are expected to link both worlds, allowing the user to effectively **browse the real world**, providing instant information on places, buildings or objects in his or her neighborhood. Personal digital media can be logically linked to physical objects and places and will be easily shared. As an example, digital post-it notes can be linked to statues, signs, toys and all the tangible things around us creating a kind of digital graffiti that allows end users to **blog in the real world**. Vice versa, real world objects start themselves to digitally log and publicly share usage and sensor data. Mobile search technology will help you **search the real and digital world** to find friends, services and extract knowledge in and from your neighborhood.

In this evolution towards tangible media and warm communication, the user and his social context should play the central role. The challenge ahead is **experience-centric applications** that provide users the freedom to experience an application anywhere, anytime, on any device. We are leading the industry to "think big, start small and move fast" by working with partners to get basic services right, then helping our customers to upgrade these experiences as these new technologies allow.

Alcatel and Microsoft TV (part of the Entertainment and Devices Division) collaborate on the development of IPTV. The partnership aims at delivering a complete and integrated IPTV service delivery solution that includes network infrastructure, IPTV software and development and services integration.

# MY NETWORKED IDENTITIES

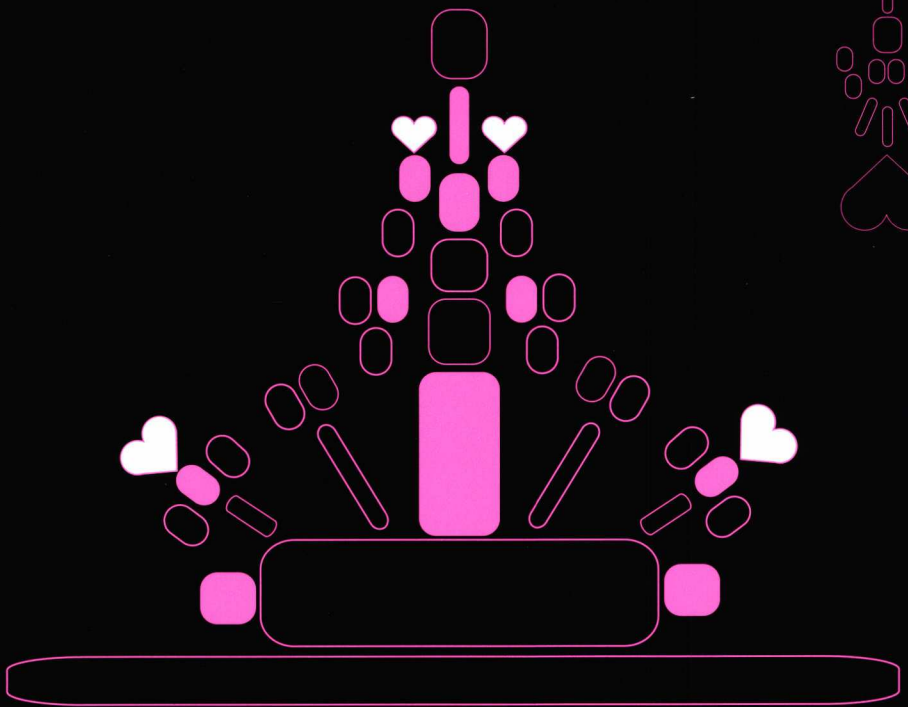
Jane has recently married. It was a very **special occasion**. A huge vidwall in the party hall connected the guests with Jane's grandparents living in the Portuguese town of Coimbra and with friends from all over the world. At the same time, the outside walls of the building were completely covered with their first wedding picture, kissing each other right after the 'yes, I do'. The holographic pigeons Jane and William set free were the next projected spectacular high point, after which both vidwalls and the outside walls displayed deafening fireworks exploding from the wedding cake. All guests received the 3D pictures and the vidcast with the **highlights** and all dedicated composed music. They all will be automatically authorised to access the weddinglog.

Now that the wedding is over, it's mostly business as usual. However, Jane needs to arrange things before going on a honeymoon in three weeks time. She deals with the last items on her to-do list using her **personal portal**. She confirms the change of her marital status, thereby updating automatically her sub files such as the municipal files, her company file and her tax returns. Digital agents update files from parties that are not yet linked to her personal portal. **PayBot** informs her of a few overdue bills. She acknowledges PayBot's query to make the payments. She also receives alerts reminding her of several other tasks, but she decides to finish these later. For instance that her annual health check up is due within two months and that she has to exercise more frequently.

Jane goes home early today. While underway an alert shows up from the security box that **monitors her house** and its communication and energy facilities. It is only to inform her that her eldest child has arrived home and is playing in the living room with a friend. She allows to reset the central heating.

Jane also programs her portal to schedule streaming some high-resolution content concerning her favourite Internet-soap to watch tonight. She has 15 minutes travel time to spare so she **connects** to the 3D cam on the building site of her new house. Pop-ups on the screen display the latest text and video messages from the builders. Apparently they ran into some difficulties during the build, probably leading to a significant delay. Jane accepts a virtual meeting proposal from the main contractor for further information about the development.

# PORTAL



# MINISTRY OF ECONOMIC AFFAIRS, THE NETHERLANDS

MINISTER OF ECONOMIC AFFAIRS

## LAURENS-JAN BRINKHORST

### CONNECTED HOLLAND

In 2016 the Internet has become so important that we hardly use the term anymore. IP is integrated in everything that surrounds us. Internet connects people and objects, always and everywhere. We have reached the goal to put or keep users (private as well as corporate) in the driver's seat. Their communication possibilities are almost unlimited. Anyone who creates a program, an application, a service or new content can easily distribute what he or she has created and anyone interested can use it (for a reasonable price). And, most importantly, the different (societal) sectors will have succeeded in benefiting from these developments: we have better health care, better education and enhanced mobility.

Looking back, the main actions the Ministry of Economic Affairs of The Netherlands undertook to help this societal transition to take place were these:

- **Technology:** we started organising interoperability, standardisation and open access in a way that benefits the user most.
- **Market:** we realised in time that Internet is a disruptive technology. We didn't panic when we saw 'established' companies collapse, jobs disappear and economic activities go abroad. We developed a policy of empowering the unemployed, improving the employability of people and enhancing their e-skills. At the same time we stimulated new companies to profit from the excellent infrastructures for electronic communications in the Netherlands.

- **Society:** ten years ago, we started a program called Societal Sectors and ICT, in which we focused on a large scale implementation of new ICT-services in the sectors of education, health care, mobility and security. The scale-dimension of the plan brought about the changes in ways of working, organising, governing and living. The successes soon spread out to market sectors.

In 2005 Holland was number two with regard to broadband connections in the world. We were proud of this, but also realised that to reap the benefits from this pole position and to improve social goals, it was just a small first step. Ten years later we can be even more proud, because Dutch healthcare has been chosen as one of the best and most efficient in the world, powered by using ICT in a human way.

The Dutch Ministry of Economic Affairs stimulates sustainable economic growth. The Ministry defines, implements, and regulates the enforcement of economic policy. This is done centrally by Economic Affairs, but also through eight agencies and two independent administrative authorities, the CBS and OPTA.

# ROYAL PHILIPS ELECTRONICS

PRESIDENT AND CEO

## GERARD KLEISTERLEE

### SENSE AND SIMPLICITY ARE IMPORTANT TO CONNECTED CONSUMERS

Communication and interaction are among our most fundamental needs, as is our growing appetite for information. The increasing digitisation of images, music and other content, and the diversity of devices for storing and exchanging them, are enabling the 'connected consumer' to fulfil those needs. Mobile telephones in particular are evolving into digital all-rounders that we can use to make payments, watch programmes, access the Internet, etc. The worlds of consumer electronics, information technology and telecommunication are converging, and the traditional playing fields of the various industries are changing with the arrival of technologies such as Voice-over-IP.

Interesting opportunities for true innovations are presenting themselves in areas where there are advances in digitisation and connectivity. In healthcare, for example, we are looking at possibilities for checks, diagnosis and treatment provided remotely, thereby enabling people to receive extended treatment in their home environment, and easing the pressure on health services. In the car industry, concepts such as car-to-car and car-to-road(side) connectivity are generating interesting ways in which to make cars safer and more comfortable.

In emerging economies, innovations in telecommunications combined with progress in other areas can create specific solutions that help these countries to advance and, at the same time, create interesting growth markets. In India, for example, we have equipped a truck with diagnostic and communications equipment, making it possible to take health-care services to people who would otherwise have no access to them. The success of this type of project depends not so much on the level of technology, but much more on the correct application of a well-chosen business model.

There is no doubt that, in the coming ten years, technology will continue to advance at the same pace and will deliver faster data speeds, better standards, further miniaturisation and improved connectivity availability. There is no doubt that this can enrich our lives, but in many respects it will also make our lives busier and more complex. The challenge, apart from realising this technology, is to translate it into practical and user-friendly applications that people perceive as useful.

Royal Philips Electronics of the Netherlands is one of the world's biggest electronics companies and Europe's largest. With activities in the 3 interlocking domains of healthcare, lifestyle and technology and 161,498 employees in more than 60 countries, it has market leadership positions in medical diagnostic imaging and patient monitoring, colour television sets, electric shavers, lighting and silicon system solutions.

# COMMUNITY CALLING

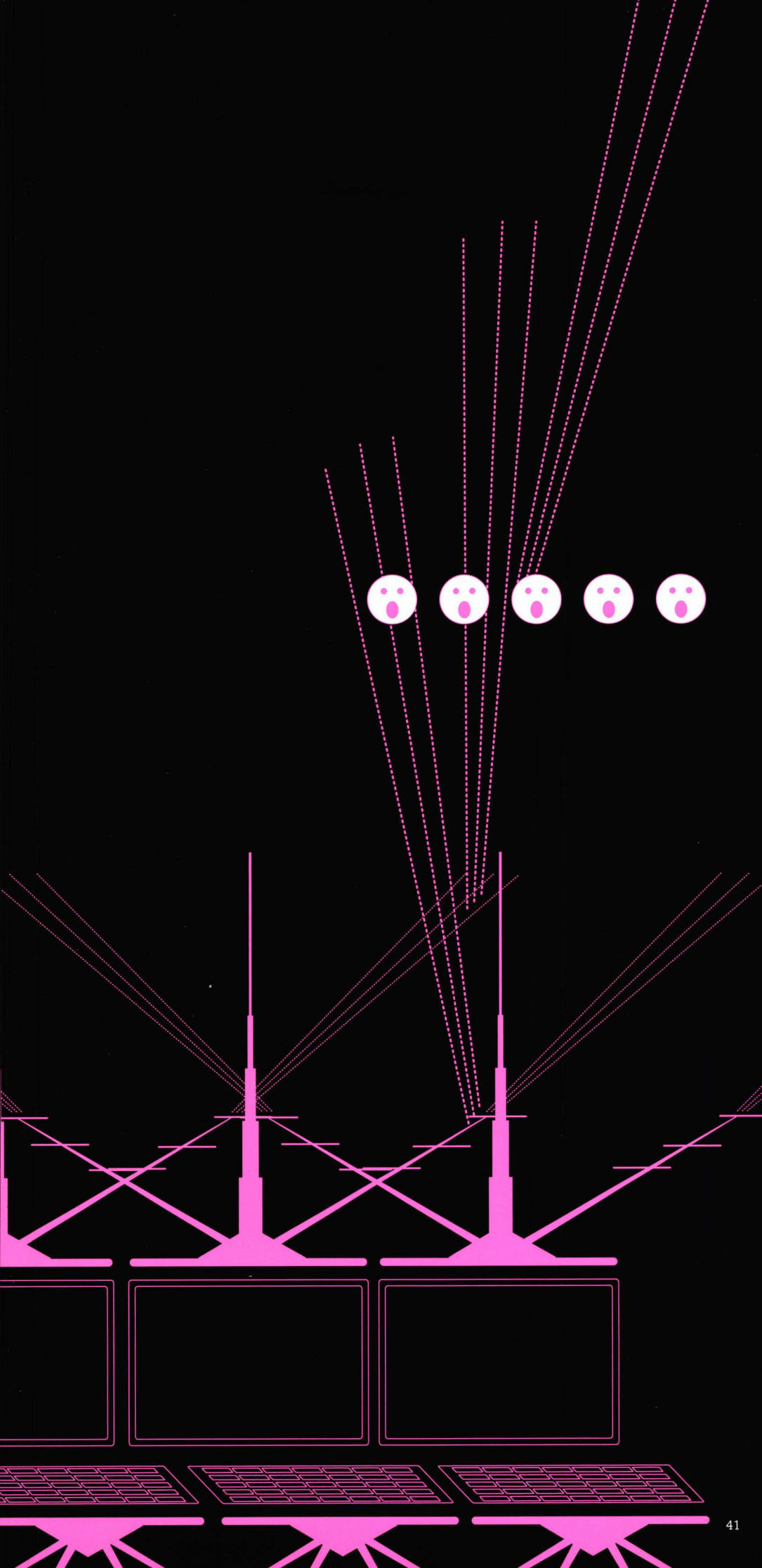
## YOUR VIRTUAL PRIVATE OPERATOR

John Collins arrives at his home office after closing the final contract with his local bank. The bank loans him the necessary 20,000 as capital to set up his own VPO (Virtual Private Operator). John already runs several successful regional virtual communities. Now he extends his business to small scale communication operations, in the wake of the demise of the big Telco's of the past. He provides bottom rate telephone facilities to the members of his communities. Particularly active members even enjoy free telephony with a maximum of 150 calls per month. No video calling or data exchange, however, just speech and connections are limited to within the European countries. Immediate communication between members had already been implemented when John started his business 4 years ago.

John posts a message on all his communities to announce his new service. Joining is easy, he explains. Members only need to update their personal community profile and grant John's company permission to collect the fees automatically. After that, everything is automatic. The personal profile downloads in real time the appropriate software and settings to the members' Interaction Boxes that control all communication between member and the outside world: the Nets, TV, security, electricity, and communications, to name but a few. Existing devices, including mobile devices, can be used with Community Calling without either hardware or software modifications.

Community members may sell time on John's virtual network: they earn CPs (Community Points) with which they get discounts with retailers connected to John's value web. They can also make use of the virtual network to exchange services, products or these CPs. John's VPO software takes care of everything else. A control program lets John monitor activity on his virtual network. As he starts up the control program on his rollable net, the system informs him that 12 calls have been within 30 minutes of his announcement of the new service. John leans back contently: it seems to him that making a decent living has never been easier.

There's just one worry left. A member of the Stainless Steel community automatically passes on a number of bills to a company that employs him, even for transactions that may be used for private affairs. John found out because it doesn't match his personal profile; the profile agent alerted him to this. His next move is to contact the revenue service's Ethical Committee to ask for clearance to track this member's information and communication.



## JOHN QUIST

### REACHING OUT FOR EACH OTHER

It's some year in the future. Personalisation and individualisation is all pervasive. At the same time the home has become a **haven of communication and security** for the individuals living in it. Fixed line technology and mobile technology have become complementary technologies to support the same personalised applications, and people use their hardware and applications without even knowing whether it uses fixed or mobile.

Technology in the home has changed. Most homes have a **Broadband hub**, attached to a fixed line network with virtually unlimited bandwidth. This hub also acts as the security device for the household, it stores files, photos, video files, physical security system and camera files, status of appliances in the house like heating, lights and household appliances etc. From the hub there is a wireless network that connects all screens in the house, PC's, palmtops etc as well as household appliances. Remote diagnostics has become widespread for all appliances.

All **screens** in the house are **multitasked**, so they can perform as TV screen, computer screen, video telephony screen, remote surveillance screen or whatever. Individuals in the home have a remote control like device that can activate screens on an individualised basis, with built in protection of that person's files and applications. TV channels don't exist anymore, but are all individualised. The advertising industry is in catch up mode to be able to individualise advertising.

Security is key. A multi billion industry has evolved to help individuals to protect their privacy and information in a never ending fight against those who want to do the opposite. All applications can be used on mobile devices as well, partly restricted (screen size, power consumption, bandwidth).

**Internet has** become an integrated part of life, based on which physical outlets of knowledge based industries have almost disappeared like mortgage shops, bank branches, travel agencies, etc.

Working from home has finally taken off, and a large percentage of people combine working from home with physically going to an office. Schools slowly start to embrace a combination of classical teaching with internet teaching.

The percentage of one-person households is still on the rise as well as the percentage of people over 65. A paradox is emerging, because although everyone can communicate to anyone at any time, people feel more lonely and isolated than ever. **VRS (Virtual Reality Syndrome)** has grown to epidemic proportions, especially in the age group under 16, based on which homicide and suicide amongst children has grown dramatically. People start to react to the all pervasive individualisation. Community TV channels grow, dialects are cherished, 70's discos have become very popular.

Technology evolution is unstoppable, but the big question is: how can it make people happier?

eircom plc is Ireland's leading provider of telecommunications providing a range of advanced voice, data and Internet services. The company was formerly known as Telecom Eireann, a semi-state company until July 1999. In 2001, its mobile telecommunications business eircell, was purchased by Vodafone.





## GREENPEACE NETHERLANDS

COMMUNICATIONS DIRECTOR

# KICK VAN DER MARK

## ‘GREEN’ COMMUNICATION?

“Telecommunications – what an old-fashioned term! It’s also a very narrow term. We associate it with analogue telephony, but the market encompasses so much more now that technologies and the roles of market players are converging.”

The **falling price** of communications services means lower costs for Greenpeace, an important consideration for an organisation that does not accept donations from corporations or governments. At the same time it is a constant challenge. Technology changes so fast and organisations need to keep pace with it.

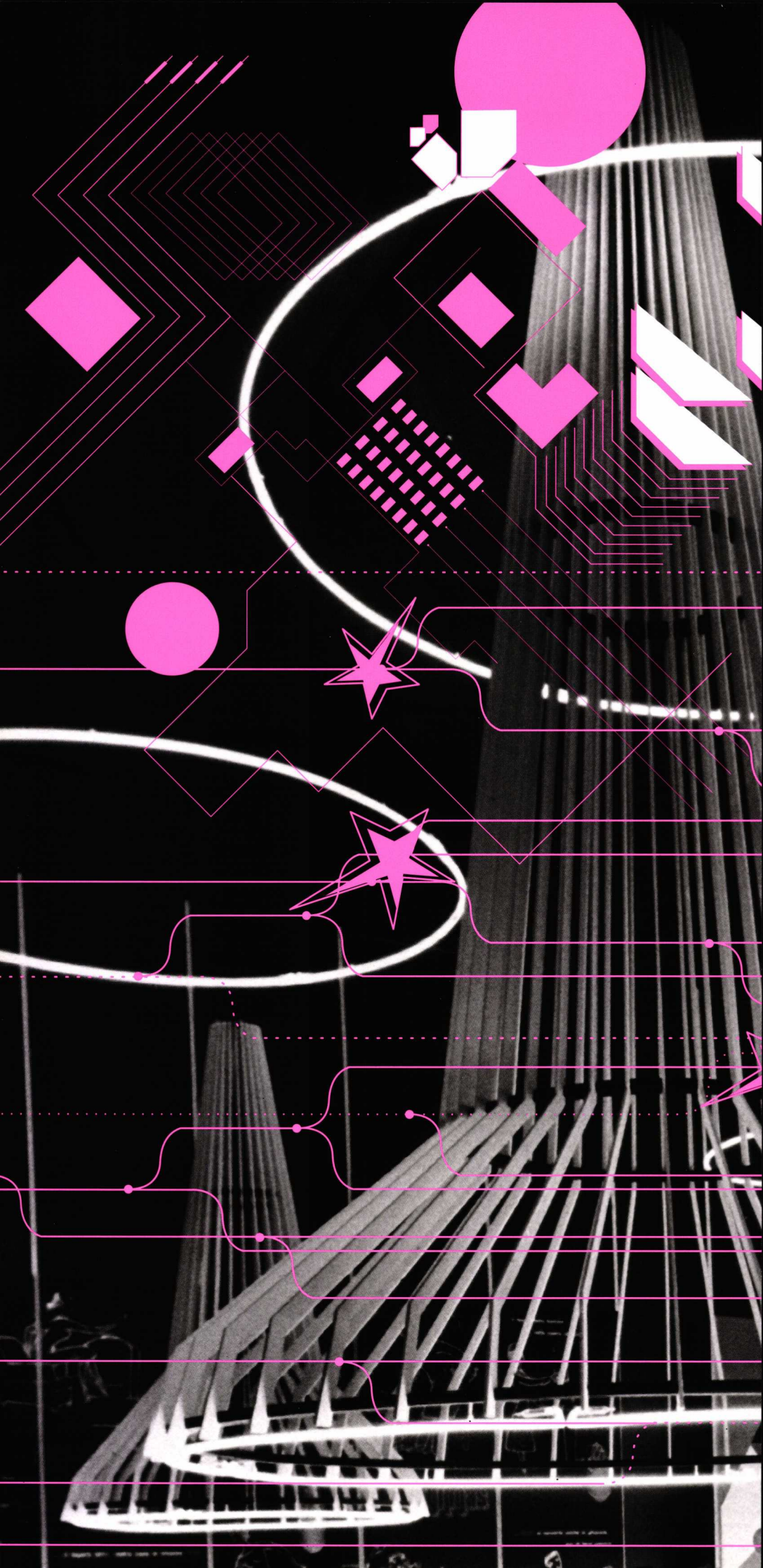
An important development is **the speed and globalisation of news delivery**. Thanks to the Internet, news scoops travel around the world much faster, and organisations like Greenpeace can and must respond much more quickly. Cyber-campaigns and viral marketing are new tools that enable the voice of Greenpeace to be heard, just like blogs and web-TV.

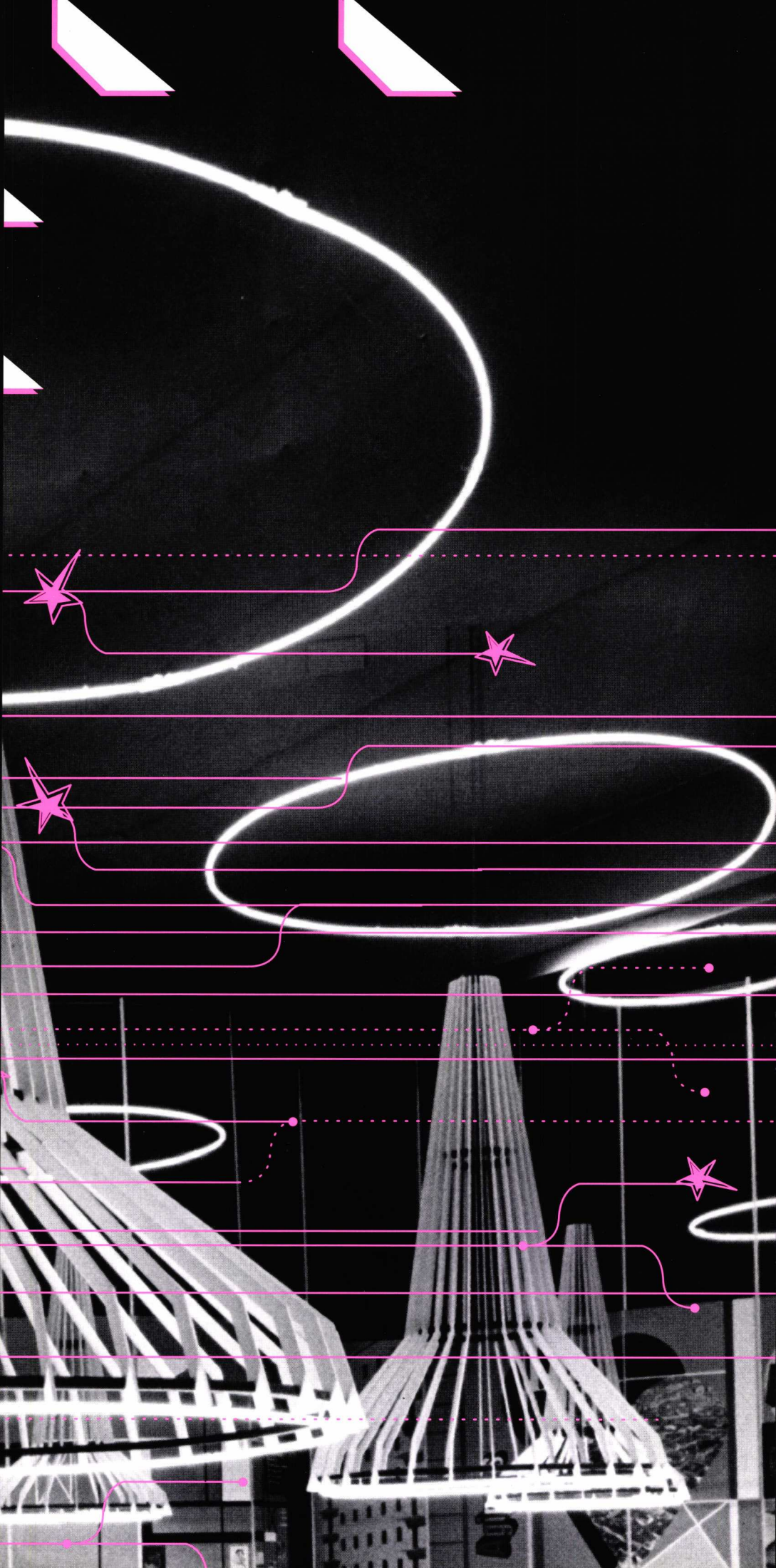
Today’s communication technologies mean that we can be contacted anywhere at any time, but this also has a downside: people do not always want to be reachable 24x7. From time to time they simply need to maintain radio silence and enjoy some **‘downtime’**.

New forms of communication are having a major impact on how people work. From the perspective of environmental friendliness, Greenpeace sees opportunities for significantly reducing the environmental impact of travel in the future, especially

air travel and car travel. As the pace of climate change accelerates, Greenpeace expects to see greater emphasis on **consumer awareness** with regard to energy consumption in the home. The need for **sustainable development** in the telecom industry will also result in more legislation and regulation. Energy consumption and the use of toxic materials must be reduced, not least in the developing countries. The hope is that, in countries where new infrastructures are built, sustainability will be a priority from the outset.

Greenpeace is an independent environmental organisation dedicated to tackling environmental problems worldwide in order to create a sustainable equilibrium between man and his environment. Greenpeace Netherlands is based in Amsterdam and employs 93 staff in 72 full-time equivalent positions.





# Afterword

How will the world of human communication and interaction look in ten years' time? How will we then use the communication services and resources that are available to us? What are the implications for the telecom sector – which may not exist in the form we know it today, and may be known by another name? And what does the future mean for you?

## Future scenarios as a source of inspiration

Technology, economies and culture will no longer evolve separately; they will influence and reinforce each other. This will make life increasingly complex. A clear vision for the future, modified as developments unfold, will help organisations to stay 'on course'.

However, we often tend to focus too heavily on the present, while the future requires a new approach. The future is not what it used to be. By looking at things from the “**outside in**”, and by looking ahead, we become aware of new developments and we see the world in a new light. That means letting go of the present.

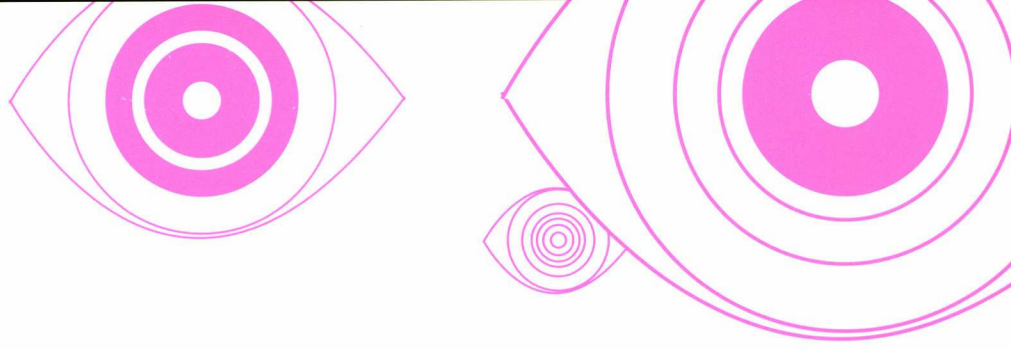
This booklet is a collection of future scenarios and visions. Each vision is a piece of a puzzle. Together they form a picture of how our world could look in 2016. The key themes in the future world of telecom will be: e-Communications, customer drive & humanised technology, social change, personal(ised) content, media convergence, ambient intelligence, seamless connectivity, selfregulating markets and new application provisioning models.

If you have thought about the future, you may already be familiar with many of the issues discussed in this booklet. But we do not all need to be visionaries. We can draw inspiration from the visions of others, and apply them to our own situation. We hope that telecom.beyond will be a source of **inspiration** for you and those around you, and encourage you to look at the world from a new perspective.

## The power of future scenarios

Our introduction began: “imagine .....”. “**Imagination** is more important than knowledge: knowledge is limited, imagination encircles the world” (Albert Einstein). By looking ahead, we are actually taking a step towards the future. Dreams and visions of the future are a powerful instrument for combining and focussing energies, and motivating those involved to take their organisation into the future.

We can use images and visions of the future to activate our powers of imagination and actively address questions such as: “what implications will the situation have for my organisation, my customers, my products?” These are the first steps towards a pro-active approach: **anticipation** is a strategic weapon. On that basis, we may well come to the conclusion that our current vision, strategy, portfolio or approach is no longer satisfactory, and that we have to decide on a new course, new concepts, etc. Or we may see a window of opportunity; chances that we did not see before.



Finally, vision must be translated into **resolutions**. This can be done by focussing on alternative futures that reflect defined ambitions and goals, and then working backwards to the present in order to assess their feasibility. Methods such as backcasting or roadmapping are used for this purpose.

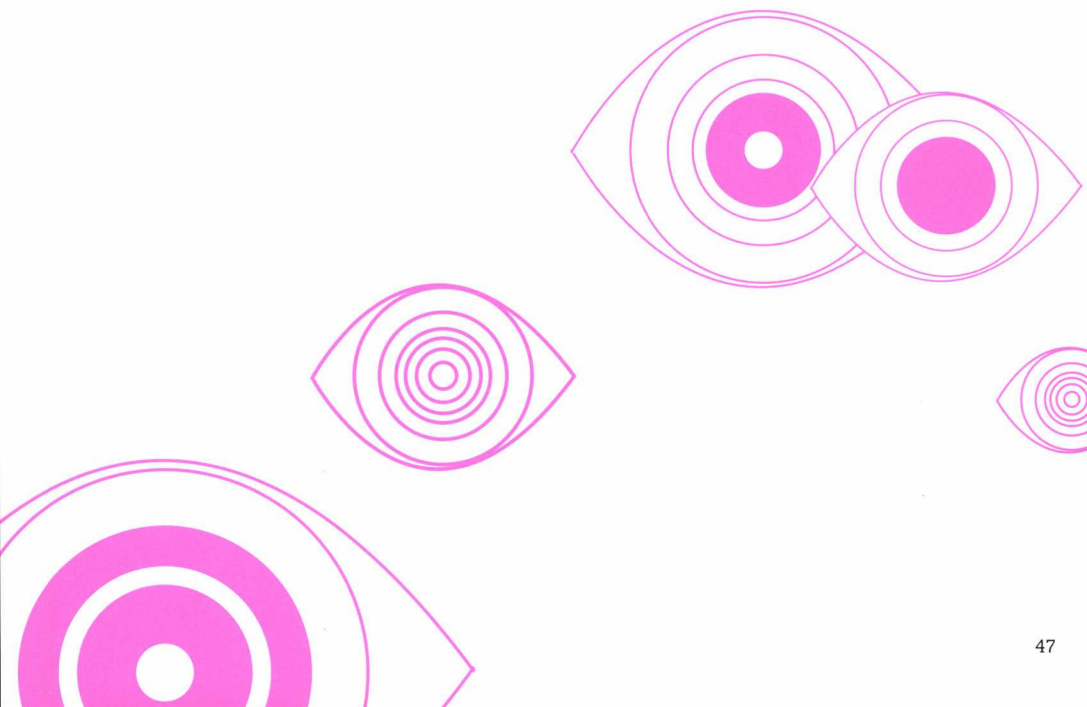
### **Innovate together**

In today's business environment, it is clear that no organisation can innovate by itself; co-operation and innovation are the keys to success. Innovation is something that organisations should focus on together. Team visions are much more effective than individual visions. Scenarios can be developed with existing or potential partners. Often, future scenarios also have a communicative function.

Organisations can co-operate with other parties, or, if they wish to explore several alternative futures, they can draw up their own scenarios. Your organisation or partnership will become more flexible, and your decisions will be more future-proof.

### **telecom.beyond**

Will these glimpses of the world of communication in 2016 ever become reality? The short answer is: some will and some won't. But, as with so many things in life, there are very few short answers. At the very least, these visions of future worlds should inspire your own visioning and help you to prepare for the future. **telecom.beyond** by TNO Information and Communication Technology invites – and challenges – you to be inspired and to improve your innovative skills. And we would be glad to help.



# THE DAILY NEWS FEED OF MARCH 3, 2016. . . . .

The future headlines in The Daily News Feed of March 3, 2016 represent 27 fictional but possible statements of states of affairs in the future, inspired by the combination of all future visions in the booklet.

**People are parallel processors** Recent research has proved a trend that started early this century and was first observed with college students. These students appeared to be doing other things instead of concentrating on the lecture: e-mailing, chatting, net and co browsing or even writing a paper on a different subject. But to the amazement of their teachers, in actual fact they were performing these tasks in parallel. Clair Johansson reports...

**Africa has the brightest communications future** In the past, Africa had little communications infrastructure. The average economic growth of more than 11 percent in the past three years, has led to unprecedented investments in communications technology. These are state of the art as there is little or no legacy to contend with. According to a spokesman from...

**Identity is digital** No longer can people use paper documents to prove their identity, their license to drive or date of birth. As of today, only digital ID's are legally accepted as proof of...

**Newspeak: communicationalism** the latest edition of The Oxford Pedia incorporates many new words and expressions. An example of this is 'communalism' (addiction to communicating), others include...

**Everyone is a publisher** Publishing used to be a good and profitable business. Nowadays it is a commodity and for the biggest part, free of charge. At one time or other, everyone publishes something to the net...

**US elections thwarted** The electronic election voting for the American presidency has been sabotaged by environmentalists to clinch the awareness of electronic pollution and technology addiction.

**Teachbots take over education** Every first-grade student has its own TeachBot based on his or her unique psychological, social, talent, and intelligence profile. TeachBots now realize Plato's ancient dream of one student, one teacher.

**Virtual co-shopping reaches record turnover** The latest fad in shopping, virtual co-shopping, has grown by a staggering 80 percent in the past year, as recorded by market researchers SEO.

**Biggest growth is expected to be the market for holographic devices** Today, HoloMorph reported record growth and profits for the last quarter of 2015. Furthermore, they announced the first holographic devices for the consumer market...

**Satellite system features realtime traffic congestion warning and routing, coupled with motor management control of individual vehicles.** The European Committee is drawing up legislation to force vehicle manufacturers to incorporate compatible motor management software in order to...

**Intelligent**

**codes hidden in public objects (e.g. statues, road signs) will narrowcast their customised messages if a profiled user is in the vicinity** United Consumers today announces InfoMag, information of interest in public objects such as lamp posts, statues and the like. This wide-ranged information may point to nearby houses for sale, cheap car repairs or may warn of ghetto gangs and smog alerts...

**Information has become the network** The American Library of Congress has taken issue with the US government legislation to abolish paper and digital books as a means of education in public schools, saying that a long-standing tradition...

**Virtual experiences have surpassed authentic experiences** Social researchers conclude that people between the age of 8 and 32 now prefer virtual experiences (such as virtual zoos or virtual concerts) to real-life experiences, mostly stating that real-life has no added value and is safer...

**Customer care is fully automated** There is not a company on this earth that you can call and be answered by a human being. This provocative statement by Hester Spooky caused a stir during the annual meeting of the Global Marketeering Guild...

**Games cannot be visually distinguished from the real world** Advertisement: Tonight on MTV27 – Virtual Brasil vs Virtual Italy. Any time between 19:00 – 02:00. Participation first hour free of charge. Don't miss it!

**The newest generation of drugs are virtual, digitally distributed electronic mind manipulation widgets** Vienna police officers have confirmed the infiltration and rounding up of a Chinese drugs gang that was selling a new type of drug popular among young Europeans. Reports indicate that usage of the drug can lead to insomnia and amnesia. Police captain Joe Brown...

**Goggle is the world's biggest temp agency in the world** Goggle spokeswoman Josée Vanderbeecke told The Daily Newsfeed in an exclusive interview that Goggle now has a market share of more than 27% in temporary employment. Moreover, she revealed Goggle's plan to offer internships, traineeships and adult education to underprivileged...

**The Mafia takes control by hijacking the national network** A criminal coup d'état took place in Borduria last night. For the first time in human history, this was not a coup by means of arms and combat but by means of hubs and hops. The current situation remains unclear as there are currently no means of communication with Borduria...

**The Net is a seamless and ubiquitous interaction**



**network consisting of many different autonomous subnets** Advertisement: Limited offer: One net, one fee. Voicedial 0800-ONENET for your personal offer. **A typical device retails at an equivalent of E\$ 3** Planet Aldi announced that all electronic devices will retail at E\$ 3 or less, starting tomorrow (Greenwich time zone).

**Technology advances empowers total self-care**

**For the elderly** Free: when purchased within six months of the trial period. Only one trial per registered residential family. Offer expires on April 1, 2016.

Advertisement: Buy RoboNurse for just E\$99.999,- now and be fully independent again! No more bathing by strangers, no more begging for company, no more house cleaning, and much, much more! Vidcall 0800-ROBONOW for a free\* one-week trial...

**Terrorist leader finally caught** Traveling sensors finally hunted down Marty Feldhof in caves far South. The planet's most wanted terrorist has been on the run almost nine years. Amin Al Shehna, inventor of the traveling sensor, proved his point: "I knew they were capable of achieving this. From now on, no one is safe from my sensors anymore!", he told our reporters with a big smile.

Meanwhile, back in Washington... **The Net is self-aware** Ambient technology and intelligent bots have been making the Net more and more sentient.

The Fled Institute reports that about 3 percent of bot agents combine on a regular basis to exchange human-like information. Scientists conclude that this is irrefutable proof that part of the Net is now self-aware. **There are more electronic communicating sensors than people in**

**the world** Professor Sklavovit laments the increasing number of spy sensors and downfall of pure human interaction in his inaugural speech at Leiden

University... **Consumer communication devices are instantaneous network programmed chame-**

**leons, depending on the actual and realtime need of its users** PurpleCroc's latest release of SnockWare 9.99 now

incorporates realtime reprogramming functions for users wanting to use their SnockDevs for environmental hazards warning... **To be technologically**

**challenged is a valid handicap** Medical insurance companies have agreed to recognise technology handicap as a valid ailment for which patients

will be eligible for treatment in the form of training and coaching... **Newspapers are daily open source wikis** As of today, The Daily News

Feed is now entirely made up from news gathered and communicated by contributors to the open source news wiki...



## SOCIAL CHANGE

impact and social use of new communications and infrastructure (e.g. broadband), for example in health, education or businesses

## PERSONAL(ISED) CONTENT

filtered and tagged information, user generated content, time shifted consumption

## AMBIENT INTELLIGENCE

intelligent networks (generic devices), location based and context aware information services, M2M.

## (MOBILE) MEDIA CONVERGENCE

integration of internet, TV and voice services; multiple play strategy; IP-applications (VoIP, IPTV); digital-/mobile-/interactive TV

ben verwaayen, ad scheepbouwer, horst lennertz,  
patrick morley, gerard kleisterlee, koen handekyn.

## CUSTOMER DRIVE & HUMANISED TECHNOLOGY

customer focus, sense & simplicity, implicit use of devices, acceptance of new user friendly services

## E-COMMUNICATION

remote personal interaction, virtual (3D) appearances and collaboration; also counter movements e.g. loneliness & isolation

## (SELF)REGULATING MARKETS

role of government, liberalisation/deregulation, competition law, end-user protection

## SEAMLESS CONNECTIVITY

access anywhere, anytime, regardless of network and without worrying about e.g. network switching and bandwidth requisitioning

## NEW (APPLICATION) PROVISIONING MODELS

new entrants e.g., 'virtual operators', new business models, new branding

John Quist, Nikolaj Gammeltoft, Rob van Esch, Laurens-Jan Brinkhorst, Chris Fonteijn, Neelie Kroes, Rein Willems, Pieter van Westerloo, Wim van der Klauw, Kick van der Mark, Marlies Pernot, Lodewijk de Waal, Roel Pieper, Elena Branet

TNO Information and Communication Technology helps companies, government bodies and (semi-)public organisations to realise successful innovations in ICT. Value creation for clients is our priority. Our research involves more than the technologies themselves. Where necessary, we also focus on user-friendliness, financial aspects, and business processes. TNO's independent status, specialised knowledge and multi-disciplinary approach to all aspects of innovation enable us to enhance the competitive strength of organisations.

**telecom.beyond** was written by Marc de Jong, Hans Stavleu, Annemieke de Korte and Christiaan van den Berg. Many colleagues at TNO Information and Communication Technology have also contributed to this publication.

We would like to thank the contributors from the 18 organisations that were involved in this publication. We would also like to thank Ben Verwaayen for writing the foreword.

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telecom.beyond offers a glimpse into future communication worlds. TNO Information and Communication Technology presents nine realistic scenarios that show us how the world could look in ten years' time. In addition 18 organisations within and outside the sector present their vision for the year 2016. telecom.beyond aims to be a source of inspiration for the telecom sector, enabling organisations to visualise the future and translate it into strategies. It is designed to serve as a framework for visioning and strategy-forming, or as a basis for developing new product and service concepts.

