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projective habitat

Contextual Background

PROJECTIVE HABITAT

Innovative urban dwelling concepts for the city of the future – Neue urbane Wohnformen (New Forms of Urban Dwelling) Trinational BDA Concept Competition – Supplement

If one enters "Neue urbane Wohnformen" in an Internet search machine then interestingly, and invariably, the first search result to be returned is the 50-year-old, but "still" - or perhaps better "enduringly" - very topical book of the same title by Ot Hoffmann and Christoph Repenthin.

Under the heading *The fundamental issue that is urban development*, this book begins as follows:

> *"The material presented in this book challenges much of urban development as it has existed to date. Most of the buildings published here violate conventional building conceptions. On the other hand, we hear ever more catchphrases: "Entire cities are becoming suburbs!" "Greater density!" etc., words which not merely impinge upon our remit but affect it directly.*
> *These are the catchphrases that herald the peak that follows the trough that was "building in the countryside at any price" and "separation of functions".*

If one looks back on the entire sweep of these 50 years, one wonders whether the then heralded peak (as a reaction to the "Functional City" enshrined by CIAM in the Athens Charter of 1933) did actually become established, or whether this peak was overtaken by the wave that was the "car-friendly city" (that had been prefigured somewhat earlier by Hans Bernhard Reichow's book of 1959)?

Today, a few energy and financial crises later, the catch phrases are still: "Entire cities are becoming suburbs!" and "Greater density!" but these have been joined by new catchphrases such as "the sustainable, flexible, climate-friendly and green city", but all of these can be traced back to the first two.

However are these relatively one-dimensional catchphrases what it is all about? Are these superficial symptoms of urban habitation, which in turn typically lead to a one-dimensional treatment of the symptoms, or is the core of urban habitation significantly more diverse?

In the very illuminating study by Eberhard Tröger "Dichte Atmosphäre. Über die bauliche Dichte und ihre Bedingungen in der mitteleuropäischen Stadt" (Dense atmosphere, on structural density and its conditions in the central European city) the author asks himself:

> *"Our cultural landscape is threatened with disappearance in the face of the onward march of building development and increasing traffic flows.*
> *The urgent question as to what building density our cities can withstand is therefore triggering ever more heated discussions. Can specific criteria be adduced for this density? Is it possible to find a sensible level for it? And how can it create pleasant living spaces for a harmonious communal life?"*

Tröger concludes that urban habitation and forms of urban dwelling cannot be tied to a specific density.
In his opinion it is the relationships between the objective and subjective factors of structural density, the resulting ambiences and the regard in which they are held, which constitute urban habitation (and its quality).

This illustrates that the quest for "new forms of urban dwelling" is not about looking at urban habitation from one limited perspective only, but is about the need to think about and develop "new forms of urban dwelling" from a cross-disciplinary perspective and at the same time on a number of spatial scales - from the dwelling unit to the residential quarter.

What is it that constitutes the urban? Is it always linked to the city as a physical place, or does urban habitation also exist outside the city?

In the present-day age in which our day-to-day lives are profoundly permeated by digitisation processes, where in principle each item of information is available everywhere and at any time, the question as to the urban is presumably different to what it was in the past. There is a tendency for urban lifestyles to have become ubiquitous and no longer tied to the milieu of the real-life city. At the same time, the urban ambience is indeed tied to it.

CITY OF THE FUTURE

By 2050 approximately 75% of the world's population will be city dwellers, according to a UN estimate. People dream of a better life in the city. Cities as places promising better living conditions exercise a strong attraction.

Unlike in the developing countries with their rapidly growing megapolises, the urbanisation process in Western countries has been largely concluded. The challenge here is in optimisation, in the "updating" of existing structures.

The future is urban! writes trend researcher Opaschowski. He notes: There is a new appetite for the city. The era of urban pessimism is a thing of the past. The urban is once again attractive: cultural offerings, short travel distances, good medical services, attractive jobs and a lively public life. Urbanity is becoming a lifestyle. Someone moving to the city today is first and foremost in search of identity, of creative possibilities and freedom. Cities are creative experimental spaces for forward-looking and liberal urban living spaces. Opaschowski

For Rem Koolhaas the city is the most important place of residence.

People are migrating to prosperity: This is confirmed not only by recent migration movements.
Commuters are returning to the city. The population's objectives are expressed in a desired quality of life which indicates a rejection of commuter society with terms such as "central"/"near"/"short".
Often those moving in are returnees to the city.

Migration determines population growth in conurbations, thus transforming housing demand. **Sustainability** and **digitisation** will bring about a massive qualitative change to cities.

CITIES OF TOMORROW - challenges, visions, ways forward - EU study

By virtue of their density, cities offer a huge potential for energy savings and for developing a carbon neutral economy. But cities are also places in which problems such as unemployment, segregation and poverty are concentrated.

There is a consensus on the core principles of development, which should be characterised, among other factors, by a compact settlement structure with limited over-development of the landscape. It should be distinguished by a high degree of environmental protection and environmental quality. Over-development of the landscape is one of the biggest risks to sustainable territorial development.

Making cities "green and healthy" requires far more than reducing carbon emissions. What is required is a holistic environmental and energy policy concept as the numerous components that make up the natural ecosystem are uniquely interwoven with the component parts of the social, economic, cultural and political urban system.

A sustainable city must possess attractive public spaces and promote a sustainable, inclusive and healthy mobility.

The potential of socio-economic, cultural and ethnic diversity and of the various generations must continue to be tapped as a source of innovation. The cities of tomorrow must cater for the needs of the elderly and families and be places of tolerance and respect.

"Cities of tomorrow" must conform to a holistic concept of sustainable urban development.

Power of Places: Key factor quality of life.

With the transformation from an industrial into a service and knowledge society, cities are experiencing a renaissance. In the competition for the "creative class", cities are scoring with the highest quality of life. This includes cosmopolitanism, good transport connections and a comprehensive cultural, leisure and local recreational offering.

Post growth problems

Gentrification processes and the associated rise in the cost of living in central locations mean that only a high earner can afford to live in the city centre. Whereas in the cities environmentally-friendly mobility is possible without one's own car, it is especially the financially underprivileged who are affected by high mobility costs.

Social polarisation is growing: Urban underclasses are causing conflict. Social polarisation in the cities is increasing because this is where the poor, the old, the unemployed, foreigners and singles are concentrated. Danger of the creation of parallel worlds.

It will become necessary to promote the building of social housing and to reduce costs through intelligent economies.

City update: European cities are learning from megacities' highly concentrated structures

The future of Western cities lies in their renewal from the inside out, in a gradual optimisation of existing structures - the permanent updating of the city. Post-compaction - building on the existing stock, the repurchasing of buildings and infill development - is becoming the strategy for efficient old town use. With high building plot prices and limited availability of building land, even small "city plots" are becoming more attractive. Tapping unused potential, especially in German cities, is enabling "continued building" without sacrificing land in the surrounding area and is an important component in updating the cities of tomorrow. The Federal Government wants to reduce the daily land consumption from 120 ha today to 30 ha in 2030. As a result, urban development will necessarily become denser, with the negative effects of greater density having to be avoided or offset.

Digital smart cities: data-based knowledge is making cities predictable

The Internet of Things will soon be interconnecting terminal devices. "Ubiquitous Computing" enables the vision of smart living, smart homes and smart cities with a smart infrastructure. Buildings and cities, can be operated efficiently aided by optimal control technology. "Augmented reality" makes the city a digital space capable of being experienced. Virtuality and reality will merge into a new total continuum. "Ambient Assisted Living" (AAL) systems will help elderly people lead an independent life.
"The *Smart Cities* concept is mobilising a considerable amount of positive energy among the elite, its discourse truly has a 21st-century ring to it, but it lacks the connection with a broader reform agenda" laments Maarten Hajer of the University of Utrecht in the polemic paper "*Smart about Cities*". At the most - if at all - it can only be about smart urbanism. "It needs a language that articulates more than just efficiency and technology".

Landscape Urbanism - Intelligent open concepts and smart designs are unifying the potential of nature and technology.

Landscape is not just "undistilled" natural space outside the city's gates, but is becoming an important element within the very city centre, contributing to a high quality of life and better urban ambience. Consistent environmental policy is causing landscape and city to merge. The outcome is an optimal quality of life and thus attractiveness as a company location and for the "creative class".

Silver City - City dwellers worldwide are becoming older

An ageing urban population requires new provision structures and mobility concepts. A "universal design" that remains easy to operate and use irrespective of physical and mental well-being will be the key to participation in urban life. New forms of residential living will emerge. Inclusive residential accommodation for young and old offer (older) people as well interaction and contact. The "new" elderly are fitter than any previous generation, technically literate and dynamic. They still have sufficient time to actively plan their life. This will have a positive influence on urban life. There is increasing demand for communal residential care in old age. The demand for outpatient or community care is increasing.

Growing old with family and friends as social participation is becoming an alternative to the old people's home. Generations under one roof - living with families of one's choosing. People without grandchildren, children and family are accepted into housing communities through adoption. Social convoys (friends/neighbours (are becoming ever more important as lifelong companions. More modest habitation with a quality social life is becoming more important than more comfortable habitation in social isolation.

Collaborative city - With increasingly scarce municipal financial resources, the citizen is becoming an active force in shaping the city

Crowdfunding models are being transferred to development in the urban environment. Urban development is occurring through active participation - "bottom-up" instead of "top-down".

The increasingly networked digital world is also influencing development processes in the city. Urban gardening and farming are becoming a firm feature of city culture. They are an expression of the inhabitants' personal growth. Building groups, sharing models, urban gardening communities and co-working spaces are bolstering the urban community.

Good neighbours are making a comeback - neighbourhood help is becoming more important. The assistance rendering society is supplementing the service provision society.

Living a worthwhile life - staying busy throughout one's life. People are getting back into greater mutual assistance by supporting their family and neighbours. Local neighbourhood shops that are everything in one: baker, grocery shop, newspaper kiosk and post office are winning through.

The adaptive city of the Sharing Economy

Sharing rather than owning is becoming ever more popular. House builders as well are starting to offer sharing models.

Use instead of ownership is becoming far and away the more flexible options for the flexible citizen's mobile lifestyle. New mobility concepts are being integrated into everyday life as a result of increasing digitisation, app-based mobility, GPS and "ubiquitous computing". Vertical mobility is becoming key to urban efficiency.

If in the past car ownership resulted in a greater experience of freedom, the pendulum has now swung the other way. Not owning a car can considerably enhance individual degrees of freedom. The Sharing Economy is not being driven by altruistic do-gooders but by the broad mass of those who are consciously striving for greater freedom, more time and lower costs. What is new about the Sharing Economy is the ability that data analysis confers to customise situationally appropriate offerings to each individual citizen.

The term for the sum of the individual and the situational is adaptivity. In the adaptive city, "peer-to-peer" business models à la Ueber and AirBnB will extend to every conceivable area of life in the next few years. It will be possible to construe the adaptive city as a platform taking over from or complementing the familiar public service provision institutions. It will create "peer-to-peer" systems based on intelligent data analysis, enabling sharing in all spheres of public service provision. The adaptive city offers "Service by Design" - not standard products at standard prices for standard citizens.

The city of those without a "home base": project workers, job nomads, patch workers, cloud workers

Company structures will change. Instead of permanent employees there will be cloud workers who will come together on a project basis and work from their Home Office.
The Adaptive City's task will be as a home base for those without a "home base", who will make up 40% of the population. The understanding of home base is changing. The Adaptive City needs to offer a home base not to "those who have always been here" but to the active job nomads. Being a home base will also mean offering a "home" to those highly qualified people capable of living anywhere in the world.

Urban energy landscapes

The energy transition. There is a political consensus for switching away from nuclear power, and increasingly from fossil fuels as well. The most appropriate way of achieving this objective initially is to reduce energy requirements. Only then does the question arise of how to make the most effective possible use of , and recover, the energy employed without any harmful environmental impact.

The currently rather centrally organised infrastructure will be broken down into smaller structures through the use of renewable energy sources, alternative energy concepts, energy recycling and intelligent energy saving and energy management models. Urban communities cannot merely finance their own energy infrastructure, but operate it as well.

The CO_2 free city - zero emissions

Global warming, and the climate change it causes, with its drastic, catastrophic consequences, requires a fundamental realignment of the urban system with the objective of preventing greenhouse gas emissions. Technical developments enable new opportunities to be tapped. Zero emission powertrains, intelligent systems for reducing traffic density and driverless vehicles reduce traffic emissions and the amount of space needed for roads. In the Adaptive City, traffic will be customised and optimised. Factories and industry can be reintegrated into the decarbonised city because harmful and unpleasant emissions can be largely eliminated, once again enabling the residential and working worlds to coexist.

Professor Dr. Wilhelm Bauer - Director of the Fraunhofer IAO - summarises the critical issues facing urban transformation in a blog in the IAO blog series on "Science Year 2015 – The City of the Future." The city of the future is to be climate neutral, energy and resource efficient, liveable and social. The city as we know it was a space of stability and safety. The city we need in future is a space of change and that is probably the biggest challenge for the present. He identifies the following attributes:

- **Adaptable city:** Climate change, demographic developments and digitisation require cities to be extremely flexible and resilient. What are the success factors en route to the "resilient city"?
- **Liveable city:** Ever more people are living in increasingly complex urban systems. How can we successfully comprehend the city as a communal social space and how can we create new forms of participation?
- **Productive city:** In the city of the future, production plants will be so quiet and clean that they can fit harmoniously into a residential area. What work practices, processes and technologies are necessary to turn this vision into reality?
- **Communal city:** Sharing is the new having. The "sharecononomy" affords people and companies new and sustainable paths and business models in their dealings with goods and resources. What do the smart services of the future look like, and which new models are coming to the fore in the city as a living space?
- **Mobile city:** Ever more people and goods are on the move in the city. The result is congestion, air pollution and noise. New technologies and networking possibilities afford convenient urban transport. What do pioneering traffic concepts look like?
- **Digital city:** It isn't just people who are networked within the "Internet of Things" but increasingly machines and things as well. What are the opportunities and risks inherent in this development, especially in the urban environment?

HABITATION OF THE FUTURE

HORIZONS 2020 – A scenario as an impetus to thinking about the future

The study that TNS Infratest produced for Siemens in 2004 is based on two different scenarios of possible developments. The picture painted by the two equally ranked scenarios is intended to highlight the spectrum of probable trends and stimulate discourse about society. Although the study is more than 10 years old and the time horizon concludes in only 4 years, the assumptions have not been refuted by reality and continue to be eminently relevant.

Scenario 1: Equality, freedom, modesty

Life is characterised by a strong state ensuring safety, equality of opportunity and freedom. The biggest change is the (re)discovery of leisureliness. The constant striving for "more" was curbed, and halted in a number of spheres of life. Notwithstanding dual-employment and doing multiple jobs, citizens have struck a balance between work and leisure, achieving a better quality of life in the process. Movements such as the "slow food" movement, for example, are highly regarded. The reason for this lies in a return to the essential values in life and in organising leisure as "quality time" to strengthen one's own mental resilience. Senses, the development of which requires time and attention, such as smell, taste and touch have experienced a renaissance.
The desire to have everything at once has yielded to the willingness to exercise restraint. Society had to learn that economic growth is limited. One of the major reasons is the dismantling of social benefits. Numerous things previously provided by the state free of charge now have to be self-funded. This is true of health, education, and above all mobility. As all citizens are equally affected, people have perforce reconciled themselves to the restrictions. The high proportion of old, mentally and physically productive people has qualitatively changed society.

The transformation from a society differentiated by age to a society that embraces age has been completed. People of all three age groups want to work, educate themselves and enjoy their leisure.

Consequences

Habitation as a core part of living

The intensity with which one's personal living space is used has increased markedly. The new trend is called "homing".

The home is the personal refuge from the world of work of the multi-jobbing and dual-employment couple. Many sporting and recreational activities previously carried on outside the home are now being transferred inside in order to maximise time spent at home.

The number of "Me Incorporateds" whose registered office is the domestic desk has increased. Domestic working hours as an employee have become increasingly prevalent as a more flexible world of work requires less face time in the office.

Smart Home: An increasingly technological living space

See also the study by the Gottlieb Duttweiler Institut GDI

Digitisation and the Internet of Things are the enablers of "domotics". The networked, automated and remotely controlled household is one of the biggest areas of innovation. The key drivers in accelerating the development of the networked home as one unified system were the instruction manuals for individual devices of yesteryear, pages long and incomprehensible, as well as the proliferation of remote controls on the living room table, and the "technostress" that went with it. A balance has been struck between sophisticated technology and "convenience".

The living room has increasingly become a media zone. Here is to be found the central computer delivering the television experience in cinema quality and sound experiences in immersive quality, and which one can use to consume television programmes according to one's individual preferences.

The limited time which all family members spent together as a result of occupational pressures requires so-called digital "home markets", e.g. in the form of a fridge door-mounted touchscreen. In addition, the emergence of areas affording a break from technology, and thus a sensation of self-selected seclusion, is becoming increasingly common.

Urban habitation

The city as a location featuring high infrastructure density and numerous recreational offerings is mainly inhabited by two age groups:

1. Young people whose consumerism means that proximity to shops and urban leisure offerings is a critical criterion. Singles or young couples are offered either smart one and two room flats or affordable large flats in less attractive residential buildings. The average number of square metres per capita has increased markedly.
2. Older people attracted back into the city. They appreciate assisted living with shopping, cleaning, leisure and other concierge services. For many older people rent subsidies have enabled service-oriented, assisted living.

In-between city – the new city

The trend to seeking refuge in the outlying districts on the periphery of large cities - the in-between cities - has continued, especially among families, but also among a section of middle aged people living alone. They represent a better compromise between the infrastructure offering, affordable living space and closeness to nature.

Higher spending on health and provision for old age, a more flexible working world, which frequently makes for an irregular income, together with subsidy cuts, have increased the demand for affordable home ownership and the lowest possible running costs, combined with a high technology content. The building industry has responded to this "cheap-and-smart" trends with an increased degree of prefabrication, with starter and low-energy houses with networked digital information and communication technology as standard.

Small households - big area: Housing aspirations are changing. Single-family households are becoming single-person households as a result of demographic change. *Opaschowski*

The new life in the country

Large conurbations drive stronger demand even in more remote rural regions. Only in a few instances is the longing to live in the country the determining reason, and if so, then only in attractive regions for people with very high income and for creative self-employed people who can get by in their profession without regular "face-to-face" contacts. Otherwise the country is a place of refuge for people who are overwhelmed by working life and who depend on the lower cost of housing and cost of living, notwithstanding poorer accessibility as a result of the withdrawal of public transport providers. Living in the country is then quickly the consequence of unfulfilled career aspirations. Or else it is a home base to those who were born there, who are rooted in traditional social structures and who accept the disadvantages of the daily commute.

Public space

Public and individual transport have converged. Intermodal nodes such as railway stations, airports, or park-and-ride lots have become large, attractive malls, which enable quick and uncomplicated changes on the one hand while on the other hand inviting people to linger because of their shopping opportunities and gastronomic offering.

City parks are being repurposed as meditative natural spaces for relaxing reflection, using mazes, wind chimes and Zen gardens to help walkers find inner peace.

Scenario 2: Dynamism, network, risk

Life is becoming ever faster and structures have become increasingly amorphous. Social institutions such as partnerships, networks, mutual interest groups, but companies and groups of colleagues as well, are increasingly scarce long-term constants in the individual's life as relationships and employment contracts are only entered into for an indefinite period. In companies, the boundaries between the core and peripheral workforce are fluid. Employees frequently do not know whether their team colleague is a "permanent", a "permanent-freelance" or a "freelance" employee, nor for how long the individual will remain a member of the team. The commitment to relationships with friends, acquaintances and people with the same interests is often significantly weaker than before.

This has far-reaching consequences for the state of society, which is predominantly characterised by individuality and personal responsibility. Each individual has to create and cultivate his own personal network, failing which he is threatened with isolation and solitude.
The shifting of responsibility onto the individual has resulted in a society dominated by marked contrasts. It is disintegrating into poor and rich, into those who are more achievement-oriented and those who are more leisure-oriented. Never had the distinction "money poor, time rich – money rich, time poor" been so important.

Different experiences of life and life chances result to a large extent from the fact whether and to what extent the individual is a member of the "digital world". This "divide" society, this society split between "participation" and "non-participation" is not however static. Today's winners in society can be tomorrow's losers, and vice versa. Social position is no longer a constant but depends on the opportunities that the individual takes in his life.

In this society of contrasts, people who think on a local scale are confronted by a global elite comprising 3-5% of the world's population, namely 300 million people, who are at home anywhere in the world and who represent a common global culture. It is they who shape the "global village", communicate and discuss with one another, make contacts wherever they go and work on common issues and solutions.

Consequences:

Living Environment Divide

The divide between poor and rich also manifests itself in living accommodation. One group of people on low incomes lives in the remnants of dilapidated standard housing stock dating from the 1950s through to the 1980s. Another lower income group prefers so-called "low level living", which is cheap and easy to convert after around 50 years of use, and which was built in unattractive locations close to transport links and industry, for example.

The affluent part of the population predominantly inhabits "high level living" which is defined in terms of the networking, digitisation and telematics linking all living spaces. "High level living" is to be found in districts or complexes with their own security or concierge service, which is responsible for the entire (energy and) technical area and organisers services. These premium residential complexes increasingly feature a collective "online community platform". It confers an identity of its own, and by joining inhabitants together within a network, it helps a real neighbourhood to develop out of the virtual one.

Born to Move

In a society of rapidly changing life contexts, residential mobility has increased immensely. Depending on changes in working conditions, financial resources and the family context, one is also confronted with a change in living space. That is why the ability to resell property easily has become an important criterion when purchasing it. Real estate agencies offer a buyback facility and an electronic property sales platform and exchange mart has grown up. The "house or apartment for life" is a thing of the past.

The most frequent trigger for a change in place of residence is a change in professional circumstances. Where there are children of school age and where one's partner has limited flexibility because of his or her own professional situation, ever more families are opting for dual households, i.e. one household for one's place of work and the other where the rest of the family lives. A number of new forms of residential living have developed out of this "living apart together" situation for couples. For economic reasons there is an increasing incidence of flat-sharing by professionals who return to their family residence in their leisure time. However, because "convenience" at one's work location is the priority, the job-related part-time singles phenomenon has caused the emergence of so-called "concierge living", offering a laundry and shopping service, in the vicinity of employers or places with a high density of companies. The number of "hometels", an amalgam of hotel and small office for nomadic workers, has also mushroomed.

Serviced, assisted living housing is on trend - housing companies are becoming social service providers. Most users of such services live in single households, and are, if they remain childless and grandchildless, dependent on a social assistance infrastructure. Serviced, assisted living housing is the future. *Opaschowski*

The ownership mentality is changing: City dwellers are renting lifestyles. Living as if in one's own house, but not having to take care of everything like an owner. The residential living experience plays an important role in the rental decision. *Opaschowski*

Functionality of the living space

There is now demand for the optical tailoring of the living space to the life phase in question, and the associated number of occupants. This development has boosted the demand for variable short and long-term partition wall systems, which can be installed or removed again depending on the set of circumstances and needs. Houses are increasingly being built as modules, with the box-shaped base module containing the kitchen, media area and sleeping area capable of having additional smaller modules, such as for sports/hobbies or children, added on. When the children move out either they can take their living module with them or else sell it on to young families.

The mobile property

The frequent confrontation with a job-related change has prompted a counter trend of longing for local ties and one's own four walls. The building industry has responded to this by developing a mobile living box as its smallest ready-made housing product. Because of its small dimensions (on average 4x12 m) it can be erected and dismantled in just a few hours and is ready to move location at any time. This concept is being widely accepted, because approximately one third of all new construction space created through attractive urban restoration is being given over to building not new houses but frameworks into which the living boxes can be inserted.*
The idea of the "plug-in city" was first hatched in the 1960s, developed by "archigram" but has not yet gained any traction. But it seems questionable whether it really makes sense to take one's house with one like a snail shell.

An alternative is the more expensive variant, which is to build foundations for these living boxes in attractive surroundings. With their own distinct site, these give residents a sense of amenity similar to the former single-family house, whereas greater site density enables temporary settlements and neighbourhoods to be created. Real estate is increasingly being resolved into the components residential property and plot.

A further contemporary phenomenon is the virtual address, resulting from the longing to meet individuals, with whom one communicates exclusively via the Internet, in a physical location to conduct a variety of activities. There are now numerous buying and selling platforms for virtual addresses featuring images and 3D guided tours and many a person who has not succeeded in purchasing an attractive property in real life can at least find some compensation for this in the virtual world.

Shifting the focus of one's life outdoors

Especially in city apartments, ever less time is being spent at home. Kitchens in living modules or boxes are therefore of negligible dimensions and transition seamlessly into the media area. The reason for this outdoor trend is the constant and almost compulsive openness to contacts, be it looking for a partner in the case of singles, or networking for professional purposes. Restaurants and cafes have recognised this development and offer an alternative to the workplace and home environment in the form of the so-called "third place", offering professional logistics on the one hand and a quasi homely feel on the other. Moreover, there is an expanding offering of business lounges as an additional office to the desk at home, as a substitute office while at the same time enabling contact with other self-employed professionals.

From the building trade to the building industry

The extent of prefabrication in the form of a transition from craft construction to industrial construction will increase. The benefits lie in lower costs, high-quality details, time savings, and predictable costs. Assisted by mass customisation, private house construction has seen a trend to "house on demand" systems. The client can configure his house to his own wishes on his computer. The boundary between the individual architect designed house and a prefabricated house is being blurred. Concentration processes are in train between the building trade and furniture manufacturers, as evidenced by individual furniture manufacturers' first prefabricated house ranges.

In multi-storey construction, the trend towards a high degree of prefabrication is resulting in building systems. Industrial prefabrication will drive structural changes in the construction sector. Numerous building contractors are putting themselves forward as one-stop providers and as a single point of contact for the client. The disadvantage of job losses is offset by the advantage in terms of shorter construction time and a high degree of quality assurance.

A cost consciousness extending beyond manufacturing is combining with government environmental and energy policy requirements to make energy efficiency a new standard. The energy-independent and energy-surplus

house are becoming increasingly common. Component production is, however, energy intensive and the longer transport distances frequently to be found as a result of globalisation reduce resource efficiency.

Public space

As personal egos and positive self-promotion predominate in society, the public space has developed into a permanent stage for self-presentation. This is testified to by the ubiquity of live cam big screens in towns and cities which, on the one hand give the individual the feeling of constantly being seen. On the other hand, it creates live connections with people in other locations such that the world temporarily shrinks to a community defined by similar activities and moods.

The high tempo, the density of simultaneous lifestyles and the concomitant raising of the stimulus threshold require shopping malls, restaurants, museums or sports venues to be made far more of an event then in the past, failing which the users' interest will quickly wane. On the one hand, architecture has to deliver a far more intense sense of experience and atmosphere than before and, on the other hand, offer the widest possible range of options for rapid alterations.

HOUSING TRENDS 2030

In 2013 the Bundesverband deutscher Wohnungs- und Immobilienunternehmen e.V. (GdW) (Federal Association of German Housing and Real Estate Companies) presented the study prepared by InWIS und ANALYSE & KONZEPTE.

Against the backdrop of demographic and economic development, migration and integration, ecology and energy, seven important housing trends will emerge by 2030.

Technology – between feasibility and desired outcome

Numerous integrated technology systems fulfilling various tasks are already to be found in German households: programmable and networked heating, ventilation, or lighting control systems are no longer just technical gimmicks but boost energy efficiency as well.

People will use these technical developments more effectively and intensely than in the past. In future, it will be possible to operate powerful microelectronic products at any time and from anywhere, relieving people of many day-to-day activities. Information from various sources will be automatically generated and networked, piggybacking on a dynamic and powerful data transmission infrastructure. Smart terminal devices are able to process this information in real time and on a bespoke basis, thus assisting people in their day-to-day routine. People will use these technical developments more effectively and intensely than in the past. Infrastructure barriers will be further dismantled.

In those areas in which technology and technologically integrated services are available there will be significantly greater use of such technologies:

- Household (day-to-day support/workload reduction)
- Services (trades, shopping, transport, post, etc.)
- Health and care
- Family and social networks
- Entertainment and communication
- Cost-reduction/resource husbandry

The 25-hour society

In future, life will be characterised by increasing intensity of work and ever more variable working hours, including increased night and weekend working. These hours will be at the expense of shared leisure and relaxation time. Time for sleeping is also reducing because not only work but also permanently available leisure offerings, whether locally or online, are making increasing calls on people. "Multioptionality" is the name for the dilemma afflicting modern man, who doesn't want to forego any of these attractive offerings. On the one hand there is the desire for an ever improved and faster expanding offering; on the other hand, ever more people are looking for a balance.

The 25-hour society significantly influences the lives of tenants and owners in very different ways, and thus has repercussions on their housing preferences and on neighbourhood community life. Among many customer groups, the requirements on residential location are characterised by the desire to be able to avail themselves of comprehensive professional and leisure opportunities. These include combining career and family, taking advantage of sport and leisure opportunities, and meeting friends. Given a limited time budget, short travel distances are becoming more important, making it possible to find numerous offerings in the immediate vicinity.

But housing also provides an important refuge when the demands and possibilities of the world outside become too much. Clear floor plans together with natural and simple materials enable the senses to draw new strength.

In future it will be increasingly important to promote contact between tenants and – with the involvement of the tenants – arrive at agreements on communal life in the building that take adequate account of the interests of the building owners, while also reflecting the residents' changing values.

My, yours, his,… our

Collaborative and sustainable management will become more important in future. The terms "sharing economy" and "collaborative consumption" in the English-language media refer to the new trend in collaborative production and communication. In this context, sharing encompasses far more than the collaborative use of objects. Not only objects such as cars, bicycles or second-hand items are shared, exchanged and sold. Sharing also concerns the collaborative organisation of leisure activities. A generation is growing up that is very familiar with an Internet-based organisation of communal life. Other generations use at least those parts of the Internet that are already professionally organised and therefore simple and reliable to use.

The housing industry not only has the opportunity to increase customer loyalty but to some extent also the potential to generate additional business areas. An Internet-based, professional organisation is the prerequisite for success. Collaborative ventures will help to boost efficiency or create networks, thus extending user potential.

It is advisable to link all network and other services directly with the company's website. This will create a close association between the service and the company's services, constantly creating reasons to visit the company's homepage and taking the opportunity to obtain other information from the company as well.

Fit into the future

Interest is focusing on maintaining one's health. Physical fitness and a healthy diet are vital components of this trend. Beyond the strictly regulated health market with benefits financed by the health insurance companies, the so-called second health market, financed by voluntary customer contributions, has achieved a significant size

The conventional healthcare system as well is undergoing numerous changes; standalone medical applications based on new technologies and mobile devices such as the smart phone and tablet PC are making the healthcare market increasingly mobile. New services are being developed here, such as the monitoring of patients' vital data, video conferences with doctors, online consultations, the mobile issuing of prescriptions. Climate-related risk management will thus also evolve into active health management for the residents when they need to be protected from dangers and the repercussions of such events minimised.

The fitness training of the future will ideally take place in a dedicated community fitness studio or mini sports centre in which residents can "work out" according to the time they have available. Change is afoot not just at community level; the home as well is adapting to the change in health and wellness needs. At the same time the home is shaping up for the E-health systems of the future.

The city of communities 2030

See also Kent Larson: City of Microcities

In the context of changing family structures in developed societies, communities and thus neighbourhood relationships, are assuming increasing importance. Communities are becoming the level at which the building industry operates. In the case of existing housing stock, the focus is no longer on the individual dwelling or building; instead, investment decisions are taken against the backdrop of community level development. Notwithstanding all the importance of virtual worlds, the specific conditions in the community have a significant effect on the residents' living conditions. They thus also determine the letting attractiveness of the building stock and ultimately also its price development.

But communities will also be the platform for the massive integration that will be necessary in the society of the future. This will require multifaceted social activities. Functioning neighbourhoods are also the outcome of an occupancy strategy oriented towards communities and of good occupancy management in the housing companies. Recognising neighbourhood structures and being able to read the processes going on there will become an important housing company capability.

Housing companies are "born" partners for supporting and promoting social networks. They themselves have a keen interest in vibrant neighbourhoods as the stabilisation and development of neighbourly relationships is advantageous to housing companies. This does not mean that housing companies bear sole responsibility for a community; this responsibility remains with the communities themselves but they should nevertheless actively partner with the relevant agencies and responsible bodies.

To create vibrant living environments with an intact neighbourhood, the housing industry creates community-related concepts, which also involve grassroots partners. These are created through cooperation and participation: cooperation so as to coordinate the activities of various partners in the community and participation in order to take account of residents' wishes and needs in decisions on the development of the community.

Golden old age or poor senior citizens

The income situation of the future generation of pensioners is characterised by a high risk of poverty. Structural changes in employment, for example disrupted career patterns, part-time jobs and a high proportion of long-term unemployed, especially in East Germany, will in future result in a difficult income situation for many senior citizen households. In addition, there are more migrants of retirement age, who will tend to exhibit a significantly greater than average risk of poverty.

To provide for senior citizens on very low incomes, who in many regions will account for a fifth and more of the elderly, it is becoming increasingly necessary to develop care provision concepts for this group tailored to local circumstances. This cannot be achieved by housing providers alone but only by interaction between all the appropriate players. What this means for the housing providers, given their own existing housing stock and resident structure, is to develop long-term, market-oriented care provision strategies for low income senior citizens; this ranges from forgoing modernisation measures that drive up rental rates to the construction of new, low-cost, small dwelling units.

By a large majority, most elderly people would like to grow old in their own familiar home. However, in the context of increasingly diverse residential concepts - among senior citizens as well - there is a growing group of senior citizens who would once again like to change their place of residence or type of accommodation to achieve greater social integration and more assured care provision. When it comes to moving, approximately one third of older households can imagine moving into a flat or house in which their accommodation situation is significantly different from what it was before.

But new forms of residential living, such as multigenerational houses or senior citizen residential communities, will not become the trend in the foreseeable future, but will be more of a niche phenomenon. It is starting to become clear however that communal residential living in old age will grow, initially not so much as a result of older households' preferences but because of the need to contain the growth in residential care as far as possible.

An increasingly important offering will be forms of residential living offering care for senior citizens with a migrant background. Very close consideration needs to be given here to the various cultural identities and concomitant expectations about care. Currently there are only isolated instances of special care facilities dedicated to migrants.

Companies as housing partners

By 2030 the tenant will be involved far more closely in designing residential accommodation. This creates the opportunity of aligning dwellings very much more with the wishes of subsequent users and their different life situations. At the same time, however, experience of the preferred variants is being gathered, which can then be used for new construction and renovation. Solutions are being created that make it easier for households to access appropriate accommodation if their life situation changes, and which at the same time enable the resource that is "housing" to be husbanded.

By 2030 there will be a marked change in many housing companies' remit and the way in which they operate. Web presence and apps as an entry portal will acquire critical importance. New operational processes are being defined that can only be controlled efficiently using IT. Housing companies are becoming the core provider of all housing related services. Collaboration with other housing companies and service providers will assume great importance. New types of contract and invoicing methods will come into being. Housing companies will be faced with additional management tasks.

There will be an increasing trend towards dwelling units capable of being organised flexibly thanks to load bearing external walls and flexibly positionable bathroom shells on the inside. This will enable the floor plan to adapt to a new letting. Given the use of a modular construction system with ready-made modules, it is possible to create a floor plan layout of 80 m² with 2-4 rooms, as the tenant wishes.

As a housing partner, the company can also offer the tenant with a single tenant contract a lifelong living supply contract. Such a contract would give the tenant the assurance of being able to rent accommodation catering for his life circumstances until the end of his days. The tenant would pay a basic monthly fixed amount which would then be uplifted depending on the specific accommodation required. This fixed amount could also include models for the provision of residential accommodation in old age.

Within this development as outlined we can identify the following are some of the important specific trends:

- Ecology and sustainability as a way of life are becoming more important. LOHAS - Lifestyle of Health and Sustainability.
  Energy-saving continues to be an important prerequisite for reducing housing costs.
- The demand for inexpensive family accommodation in towns and cities continues to increase.
  Expectations of the fitting out and design of the accommodation by the landlord are rising.
- The home is making a comeback as a haven of peace and security.
  The bathroom as a functional space is becoming increasingly important and, depending on the residential concept, can be used as a wellness oasis or health room.
- The creation and provision of virtual and real networks by housing companies is becoming more important.
  With a better knowledge of the target groups, housing companies will specifically design and sponsor neighbourhoods.
  New CRM systems enable round-the-clock communication with the landlord.
- The old house regulations have had their day. Life in the residential community is agreed individually and takes account of different values.
- Smartphone and tablet as the building's custodian and administrator are becoming standard. "Smart Home". Internet and smartphone are replacing the doctor's home visit of the future. "Smart Living"

STUDY ZUKUNFTSINSTITUT 2025 / 2050 (FUTUROLOGY INSTITUTE)

In 2013, the Zukunftsinstitut presented a study on urban living with a time horizon out to 2025 / 2050.
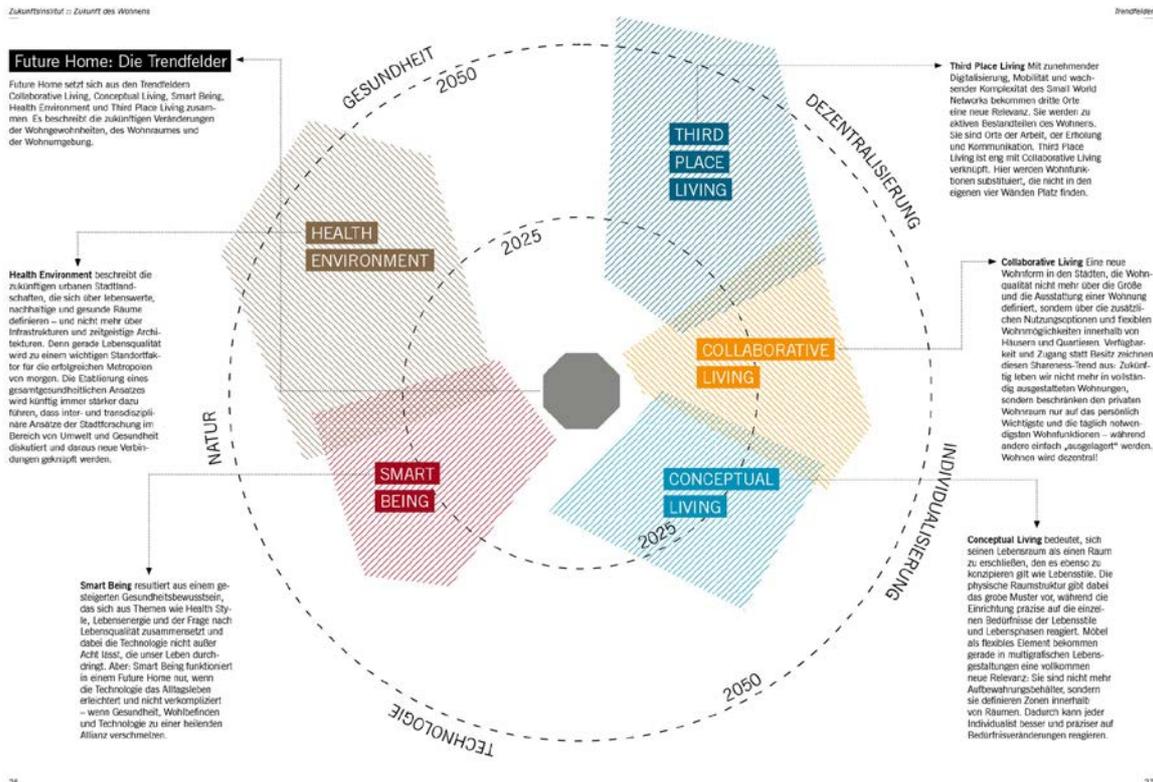
It identifies 5 trend topics

Collaborative Living – living is becoming decentralised and creating a need for "third places" and new concepts for living. The quality of city life is no longer defined in terms of a home's size and specification but by the additional amenities that buildings and communities offer. The home remains as the core, supplemented by new external locations. The trend to the "shareconomy", meaning the sharing of resources, as is also the case with car sharing, is being carried across to living. The procurement of private rooms, which will in future be provided "on demand".

Third Place Living – living is becoming more spontaneous.
Similar principles as for cloud computing are being carried over to the physical "existing and living": evermore everyday functions are being "outsourced". Be they offerings such as an external kitchen for occasional cooking meetings, quasi living room salons or co-working spaces, specialised third places are becoming active hubs within one's individual network.

Conceptual living – living is becoming fluid.
Spatial areas are replacing rigid spatial structures. The living room naturally doubles up as a home office. Open floor plans and modular living elements enables the user to subdivide the rooms themselves into zones by means of furniture. Carpets and wallpaper define rooms. This is why we can expect a veritable renaissance of interior design. Intelligent room concepts are becoming ever more important (space optimisation).

Smart Being – living is becoming "medicine".
In future, living will be characterised by ever higher expectations of health. The focus here is on nature as the starting point - Urban Gardening, for example, meaning one's own small vegetable patch, e.g. on the roof garden.

Health Environment – urban air makes you healthy.
In future, the urban living space will become an environment that energises rather than saps its citizens. An integrative city imbues its inhabitants with a sense of belonging and the security of a functioning social network.

Edinburgh international culture summit 2014

Kent Larson, Director of MIT Media Lab's Changing Places group on technologies being developed for urban data analysis

I will start with my brief history of cities. Cities often started as a settlement around a scarce resource, such as a well. They were limited in size by the distance that a person could walk while carrying a pot of water on their head, for instance. That pattern can be seen when flying over Germany, India or any rural area—we can see a series of villages that are a mile apart or a mile and a half apart, because that was the distance that could be walked conveniently to the fields.

I love maps and collect lots of them. Maps of medieval cities often show that they are about a mile in diameter, which can be walked in 20 minutes. There is something fundamental about that dimension. Hundreds and hundreds of examples of it can be found not only in Europe, but in Latin America and Asia. It can be seen here in Edinburgh, which has the Royal Mile.

We have been exploring the notion of the neighbourhood—the urban cell that is a compact community where people live, work, play and engage generally in most activities that are necessary for of daily living. Paris consists of 20 arrondissements, which basically follow the pattern that I have described. What is great about Paris—and most other cities in Europe that evolved before the car—is that it has an even infrastructure of amenities. Every dot in the image that I am showing is a cafe, shop, physician or pharmacy; that is the opposite of what is done in China, where the hospital district is put in one quadrant. The Paris approach creates a walkable and liveable city.

We then had technology—streetcars and trains—that allowed dispersed functions to be connected, and everything changed when cars hit. We started to design for the needs of machines rather than people. In the city where I live, which is Boston, we took a really ugly cut through the centre of that historic city, although we have—fortunately—now taken it down.

The slide that you can see is an image of the model of urbanisation that is being followed all over the world. It is of Los Angeles, where there is low-density sprawl that depends on the private automobile. The same idea is used in China, although the density is a little higher. We are building single-purpose ghettos. They might have very expensive condominiums, but they are still ghettos, in that they are communities that are not connected to other communities without the car. That is found all over the world.

On screen is a video that I took last year out of the window of my taxi in Beijing. People were being told that it was a really good day because green and yellow lights were up; there were no red lights, so the traffic was, comparatively, flowing nicely. The same thing is found in São Paulo. Recently, I have spent a lot of time in Beijing, where the pollution is extraordinary; it is a combination of coal and cars stalled in traffic.

It is critical to get the design of cities right, but we are not doing that. Ninety per cent of population growth will take place in cities. Most innovation takes place in cities, but the world is not flat in that respect. On the slide that I am showing now, patents are filed where there are green circles: on the coasts of the United States, in northern Europe, in Korea and in Japan—in cities that have the qualities that support innovation.

From the data, we think that there is a really interesting relationship to density, which involves good things and bad things. The lower scale shows that, as the population in millions of people increases, rates of AIDS and crime go up non-linearly, along with the number of patents, the amount of gross domestic product and research and development investment, and the rates of energy efficiency, water efficiency and arts activity. Good things and bad things all go up together.

The next chart shows the result of a study by a group in Singapore. It is not surprising. Liveability goes along the bottom and density goes up the left. By that analysis, Singapore is the most liveable high-density city, but density can be done well or poorly.

The next slide shows density related to transportation energy. Houston is about as bad as it gets, because it is a low-density city. In relation to the automobile, Hong Kong is about as good as it gets, because it is not dependent on the private automobile and it is high density.

It is interesting to look at new developments. I was in the downtown area in Dubai recently, which is about 1km in diameter. It is very high density, but it has low social diversity because it comprises mostly high-end condos for rich people. In Rio, la Rocinha is about 1km in diameter, is high density and has low social diversity, just as Dubai has, but at the other end of the spectrum. In other places,

there is high density and high social diversity but low enterprise diversity. Where I work—Kendall Square—there is high job diversity but low residential density. So, the issue is very complicated.

We have been asking what enables innovative, entrepreneurial and high-performance cities. We are exploring a formula, although we have not yet solved it, which says that density plus diversity plus proximity, if you get it right, equals innovation, quality of life and sustainability, as well as a lot of other things such as equity. We are working on the notion that we need to increase the density generally in cities—social-tie, residential, employment and third-place density—and add that not just to demographic diversity, but to enterprise diversity involving big companies, little companies, start-ups and research centres; to diversity of housing for young people, old people and families; and to activity diversity in eating, socialising and so on. We then need to add urban interventions to manage the problems that come with density. If we proactively increase diversity in that way,that will equal a high innovation potential, and all the eco things will just come as by-products. So, our theory is this: Start with people.

I will go through what we are doing in some areas, because we like to build things. The slide on screen shows our notion of what a city should be. It is really just a city of microcities that are connected by trams, which are the red lines in the image. There might be 25,000 to 30,000 people in each $1km^2$. There might be cars round the perimeter, but people would not need cars to go inside it. We decided to model the approach with Lego—of course—so we use Lego units as data units. The smallest bricks on the slide could equal 300 customers per day for a Starbucks.

We can then rapidly go through a design process. If you know the code—yellow is for retail, black is for housing and white is for offices—you can easily see how things go together. We did that for Nansha, which is a horribly designed new city in China. The next slide shows $1km^2$ neighbourhoods. You can see that the partis for the two are very different. They use the same number of bricks and the functions are the same, but the experience and, probably, the economic and cultural performance would be very different.

However, it is hard to know what that performance would be, so we are trying to understand it and are looking at mapping experiences to pre-architecture designs. We just formed a partnership with the Mori Building Co Ltd, which did Roppongi Hills, so I am interested in that. There are three layers to the building. There is the mobility layer at the street—that is where the Guccis and the Pradas are, and the cars. There is a second level that has beautiful gardens, footpaths and terraces, and then there are the functional layers, which are offices and residential buildings. Those can be extruded up, because nobody really cares about them and you do not really see them. That can parametrically tune the density.

We are interested in mapping great public spaces. The next slide is of one of my favourite projects, from Seoul in Korea. A highway was taken down and replaced with a beautiful stream, which is very poetic and gets more and more natural as it goes down towards the river. In Manhattan, we did essentially the same thing, only we went up to the elevated train tracks for the high line. Those are sort of superhighways for pedestrians through the city, and they give great experiences for people. We can map all those kinds of things.

We decided that we needed a better decision support tool. I very much like the next slide, which is from the movie "Avatar" and which shows a platform that is used to visualise complex three-dimensional data in new ways to make decisions about how to kill people better. We thought that we could perhaps do the same thing with urban planning. Lego bricks were used. We are studying Kendall Square, which is cited as one of the models for innovation districts, but is actually kind of dysfunctional. Everything in green is what we are adding, because 3,000 people live there and 40,000 people work there every day. Therefore, there are inflows and outflows of people, and the area is very dead at night.

The slide shows a platform that we built with projectors; we can do what is called 3D projection mapping. Delegates can see the satellite view. We can then run all kinds of models. That was the easy stuff—solar radiation and wind flows—but we are looking at more interesting views into the city. The area at which I am pointing on the slide is where all the venture funding is by industry segments, and it reveals some interesting things. You can see on the slide all the mobility modes, including our new shared bike systems.

Ira Winder, who is sitting over there, is tweeting #cityscope. He works in the media lab building, so that lights up and his tweet is there. We can use the tool as a real-time data visualiser. It is very interesting that the model is a proxy for the activities of young people. The media lab building, which is on the top, and the artificial intelligence lab are brightly lit. The Sloan business school is usually pretty

dim-I do not know why. The Cambridge innovation centre, which has more start-ups than anywhere else on the planet, is always lit up. It is a nice proxy.

We are working on new tools. You can see a hack that a student did one weekend to paint the model using just his hand. We are looking at new interfaces. I show that slide just for fun.

We can look at land use. Yellow is housing; you can see how little housing there is. The light blue is MIT buildings, and the darker blue is the research labs.

We have built a number of different tools. A group from outside Brisbane that was building a new city came to us and said that it had a walkable city, so we decided to model it. On the current slide, red is the businesses and blue is the houses. You can also see the population and the number of jobs on there. From that, we can get a walkability number. The green area is more walkable, and the red area is less walkable. We can dynamically tune the density and how far someone can walk. In the next slide, we have moved jobs closer to houses, and you can see that the walkability score goes up.

We are interested in real-time tools that can give feedback to non-experts. We would like to embody those tools with expert knowledge, but allow them to be used by non-experts.

You can see here the planning commission whose zoning ordinance I think we caused it to re-evaluate because it did not meet its stated expectations. We tested it in a new district in Riyadh in a workshop, which was interesting.

You can see in this slide a tool that we built for use in our workshop. In that case, Ira Winder adjusts for one building the mix of uses and the density, and maps that to a building. Forget about the form, which is not important; this is all about function. He can rapidly build a city, but he does so with data. As we add the building elements, we know precisely what the number of residential and retail units are, and so on. Ira Winder and Caleb Harper videotaped that last night, after they had set it up. We will see that a little bit later.

We are now working separately on modelling interactions. In this case, there are two office buildings, which you can think of as force fields. People move about them. They are attracted to residential units, cafes and shops, and you can begin to see people's interactions. Triggering interactions is critical for innovation, because a percentage of those interactions will be creative, which leads to innovation.

If you dial up the density, you must then find alternatives to cars, otherwise there will be traffic problems. We are working on mobility on demand—alternatives to the private automobile. You can see our vision of a mobility-on-demand system; there are all those shared-use modes. People would use the right mode for the right trip at the right time. The most important one—walkability—is shown on the upper left of the screen. There are also shared bikes and trams that connect each of the microcities, as well as electric bikes, et cetera, all of which would be available using a single card or a mobile phone. On the screen, you can see a little three-wheel shared-use vehicle that we are working on, which will be able to be integrated into a bike-sharing programme. Ultimately, we think that all those vehicles will be autonomous vehicles that will come to you. They may deliver packages—for Amazon, FedEx and the like—autonomously at night.

On the screen now is the little CityCar that we designed a few years ago. The essence of it is that you get rid of the engine of transmission and put all the mechanicals into the wheels, which are robot wheels. The drive motor, steering, braking and suspension are all in each wheel and plug into something like a USB port. It is all driven by wire. You can go into the kerb nose in. The length of the vehicle is the width of a conventional car. The front door opens and you step directly out. In a parallel parking situation, it is possible to fit three and half of these vehicles in the space that one conventional car occupies. People thought that it was just a crazy MIT media lab idea, but we worked with Ford and GM and then a start-up in Spain to commercialise it. The picture that I am showing was taken on the streets of Vitoria in the Basque region. By the way, the yoke can pivot left or right so that you can use the vehicle in Paris and London on the same day.

We presented the vehicle at the European Union headquarters in Brussels. You can see a picture of our happy sponsor, Barroso, who presented it as an example of US-European urban innovation. That is an old project, in that we finished it last year.

We are now considering what we think is the future, which delegates can see on the screen. It is a combination of autonomy, vehicle sharing and electrification, all of which are tied together through new sensor networks. If a car can park itself and charge itself in an out-of-the-way place, it is possible to serve about 10 times as many people with a single car. With parking, you get a 5:1 ratio, which results

in a fiftyfold efficiency in land use, and the vehicles are kept in use more, so the value proposition is quite strong.

We are looking at new ways to collect data. The marks on the current slide show people—or, more accurately, mobile phones—moving through San Francisco. We are classifying those people as members of a night-life tribe, mapping that back on to the city and finding out what else they have in common. They tend to buy the same shoes and the same cell phones and to have the same diseases. We are using that kind of information to build a model of autonomous shared-use vehicles in the city.

In the picture on the screen, you can see the vehicles communicating with one another. The purple areas are fixed infrastructure in the city that communicates with the vehicles. That creates what we think is a very low-cost and scalable shared autonomous-vehicle system. If we were to adopt such a system, we could get rid of all traffic lights. There would be no parking lots and no turn lanes. The vehicles would be integrated with other modes. In other words, everything would change. Any city that is being designed without taking that into account is not facing reality. On the screen, I am showing that study projected on to a three-dimensional model of Kendall Square.

One of the most innovative mayors, the mayor of Hamburg, has announced that his city plans to be car free by 2034. I think that he means that it will be private-car free, but we are working with him.

Eventually, we will get to the situation that is shown on the screen, because it is simply too dangerous for people to be behind a vehicle that weighs 4,000 pounds. Computers are probably 10 times safer. We will not have humans driving cars within 20 years—I guarantee it.

We are also thinking about food for cities. In China, about 20 per cent of the land is contaminated by heavy metals. We are depleting the aquifer; in the middle east, there will be huge problems related to water. Food security is also a big issue; the model of industrial food production that is shown on the slide does not scale. We decided that no school on the planet was thinking about food technology that was good. Agricultural schools have good plant scientists, but we felt that MIT should be a good place to think about food tech, so Caleb Harper, who is with me, is working on a project on how to grow food in new ways, in cities, near where it is consumed, using hydroponics and aeroponics.

We are now building a new laboratory to examine how we can integrate aeroponic and hydroponic food production through new sensor networks with which we can skin the facades of buildings and, by doing so, serve markets and create jobs directly in the city. Indeed, we can do that with great efficiencies; we think that a one-storey array might provide something like 100 times the food production of growing in the ground, while using 90 per cent less water and 60 per cent less fertiliser. However, we still have to prove that.

We are also working a new housing model. The fact is that young people who want to live and work in the innovation cities are getting priced out of the market. My next slide shows former mayor Michael Bloomberg of Manhattan standing in a conventional micro-apartment of 300ft^2 that he was advocating, and which had a pull-out sofa bed and about 3ft of closet space. It was not a very liveable model, so I challenged our students to design a space with a big living room, a handicap-accessible bathroom, a queen-size bed, a full work desk, dining space for six and a full-size kitchen that would fit into the smallest possible package. The model that we came up with was 19m^2 or 200ft^2. We experimented with transformation and, as a result, used three types of interface: gesture; voice; and touch. To take a shower, for example, you would have to move a whole wall out of the way.

As you can see, we are having a lot of fun with this, but we also think that we can make it work and make it cost effective. On the order of magnitude, the cost of space is greater than the cost of the technology. By the way, it can also be really fun for young people, although I should say that it is not the home that I would want.

The next clip shows work that we did for a developer. The space is 300ft^2, which is the same size as the Bloomberg apartment, and there is a big living room that converts into a big bedroom, a big dining room for 10 people or space for your start-up. We decided to test it; the graduate student who did the CityCar is now working on transformable, essentially architectural, robotics for apartments. As you can see, the table comes down from the ceiling—we have pretty much figured that out. The next clip shows the student and his wife in the apartment, where the living room converts to a bedroom, and we have also worked out a linen management system to ensure that the bed does not have to be made; everything just gets flipped out of the way. We have started a small start-up to commercialise the technology involved.

The fifth element that I want to discuss relates to cultural events. This is a really critical urban intervention for enhancing identity, expression and social ties, particularly in the many anonymous

cities that are being built all over the world. With regard to social ties, the next clip shows the work of Sandy Pentland, who works with me at MIT's media lab, looking at how broad and how deep people's networks are. In the clip, we can see people in the workplace; the bigger circles with more connections are those who have stronger social ties. Those people are the most creative and productive, and the outliers with no connections are non-productive, disconnected people. The same is true in cities, and you can use technology to evaluate all of that.

Just for the many Australian people in the room, I want to highlight the example of Melbourne. It is one of my favourite cities, partly because it did not design for change. We now need to design for change, but the people in Melbourne decided to take advantage of an opportunity to initiate change. They flipped the main streets for cars and people so that the people spaces are now the old service alleys that used to have dumpsters, and the laneways that were too narrow for cars. The message, therefore, is that we need to design for people, not machines, and to design for change.

Thank you.

Kent Larson directs the MIT Media Lab's Changing Places group. Since 1998, he has also directed the MIT House_n research consortium in the School of Architecture and Planning. His current research is focused on four related areas: responsive urban housing, new urban vehicles, ubiquitous technologies, and living lab experiments.

Recommendations + additional reading:

European Union – Regional policy I Cities of tomorrow, Challenges, visions, ways forward October 2011
ec.europa.eu/regional_policy/sources/docgener/studies/pdf/citiesoftomorrow/citiesoftomorrow_final.pdf

APuZ Aus Politik und Zeitgeschichte 17/2010 (Politics and contemporary history) I Urban development
APuZ Aus Politik und Zeitgeschichte - 20-21/2014 Living
www.bpb.de/shop/zeitschriften/**apuz**/

Stiftung für Zukunftsfragen Forschungsstudie 2005 (The foundation for future issues Research study
2005) I Das Leben in der Stadt der Zukunft (Life in the city of the future) *Opaschowski*
www.stiftungfuerzukunftsfragen.de/

2b-AHEAD Trendanalyse 2014 (Trend analysis 2014) I Die adaptive Stadt der Zukunft (The adaptive
city of the future)
www.**2bahead**.com/analyse/trendanalyse/detail/trendanalyse-die-adaptive-stadt-der-zukunft

Deutsche Bank Research I Die Stadt der Zukunft (The city of the future)
www.dbresearch.de
Deutsche Bank I Fraunhofer IAO Trendreport Stadt (Trend report city) I Aussichten für Deutschlands
urbane Zukunft (Prospects for Germany's urban future)
Deutsche Bank I Stadteinsichten 100 Ideen für Deutschlands Städte. (City insights 100 ideas for
Germany's cities)

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