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Living buildings

The future of office buildings until 2050

Short version

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Introduction

We may not always realise this, but everything that is happening today actually influences what our future is going to look like. For example, the advances in work automation, which have been talked about particularly often recently, influence the future look of office buildings and, consequently, our cities. After all, today, we usually build office blocks which are tall and have a lot of panes. This is because people need access to daylight for their work comfort. This generates enormous costs for construction companies and has an impact on the quality of life in cities. Tall buildings cast a shadow, take up space, eliminate greenery from cities, prevent one from seeing the sky – to say nothing of other problems (related to energy, for example) generated by them. But if in the future, work is performed by robots instead of people, we may imagine that we will be able to construct buildings underground, for robots do not need daylight to work.

Of course, there are many more such factors of change, including, among others: depletion of resources, energy crisis, lack of contact with nature, knowledge -based economy, innovation culture, nomadic lifestyle, and the threat of terrorism and declining sense of security. We have analysed them in the report which you are holding right now. As a result, we present herein five scenarios in which buildings are changeable over time, invisible, self-sufficient, built in harmony with nature and inclusive. Each scenario requires a different amount of time to be carried out. The most distant in time is the Invisible Architecture scenario – due to the not yet fully developed technological capabilities; the one in our most immediate future is For the People and by the People – which falls into the trend of inclusiveness and diversity that is extremely strong at present.

Another great value of the report is the fact that one of the research methods used in it has been the so-called speculative design. Office blocks of the future have been designed for each of the respective scenarios in cooperation with the Faculty of Architecture of the Gdańsk University of Technology. Those designs not only allow to imagine the coming future better, but also ask the question of whether that future is truly one we desire. I shall leave you with that question as well. I hope that you will find this report interesting not only in its research aspect, but actually provoking deeper reflections on where we are today and where we are heading.

I wish you a good read,
Natalia Hatalska

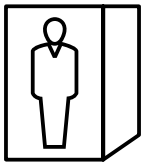
Gdańsk, November 2017

Methodology

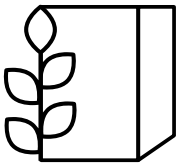
The report published by infuture hatalska foresight institute and Skanska is an attempt to answer the question about the future of office buildings. It presents five different scenarios for a medium- and short-term perspective.
The scenarios included in this report have been prepared using several study methods, including: environmental scanning, signals based forecasting and qualitative analyses (in-depth interviews with experts). The drivers of change have been analysed according to the STEEP (sociological–technological–economic–environmental–political) model.
Additionally, the scenarios are also based on works in the scope of speculative design prepared by students of the Faculty of Architecture at Gdańsk University of Technology. While designing solutions for problems which have not actually occurred yet, the students helped us get a broader outlook on changes in progress and a diagnosis of long-term trends (such as living buildings). On the one hand, speculative design showed us directions for development (including indicating new technologies on the building and architectural market, such as metamaterials), while on the other hand, it encouraged us to ask certain questions: is this the future we want, fear or for which we are waiting?

1. Speculative design uses conventional design tools and methodology, which yields results which are sometimes indistinguishable from a prototype ready for implementation, which forces the recipient to reflect on occurring changes in various areas.

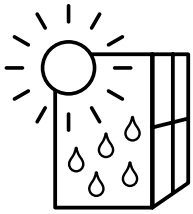
Scenarios of the future



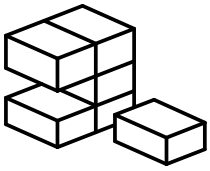
For the People & By the People (Inclusion & Diversity) — office building will have to become more open and useful for numerous purposes, taking more and more into account the age, gender, experiences and needs of different groups of people. This very diverse and heterogeneous society of tenants and local people that belong to a given space will become even more important. The local society will participate more and in the life of facilities and office buildings, making spaces useful even after standard working hours.



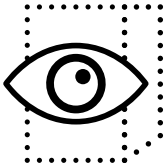
In Symbiosis with Nature – this scenario predicts that all future buildings will be „green" and that they are going to make use of multiple solutions based on so-called "green infrastructure" (green terraces, roofs, plant-covered façades, indoor or outdoor gardens, plant-covered walls). All of this will make "green areas" more than just decorations. This scenario includes a total change in the ways of thinking and the need to come back to nature.



Independent & Self-Sufficient – it's based on the assumption that in the future every building will be an autonomous unit, meaning that it will be able to function independent of outside infrastructure. The buildings will be delivering 100% of the energy demand, according to the needs of their inhabitants. In such office buildings, the sense of security of their users will be very high, as it will not be possible to hinder its functioning in case of any unexpected events: cataclysms, sudden weather changes, terrorist attacks or even ordinary malfunctions.

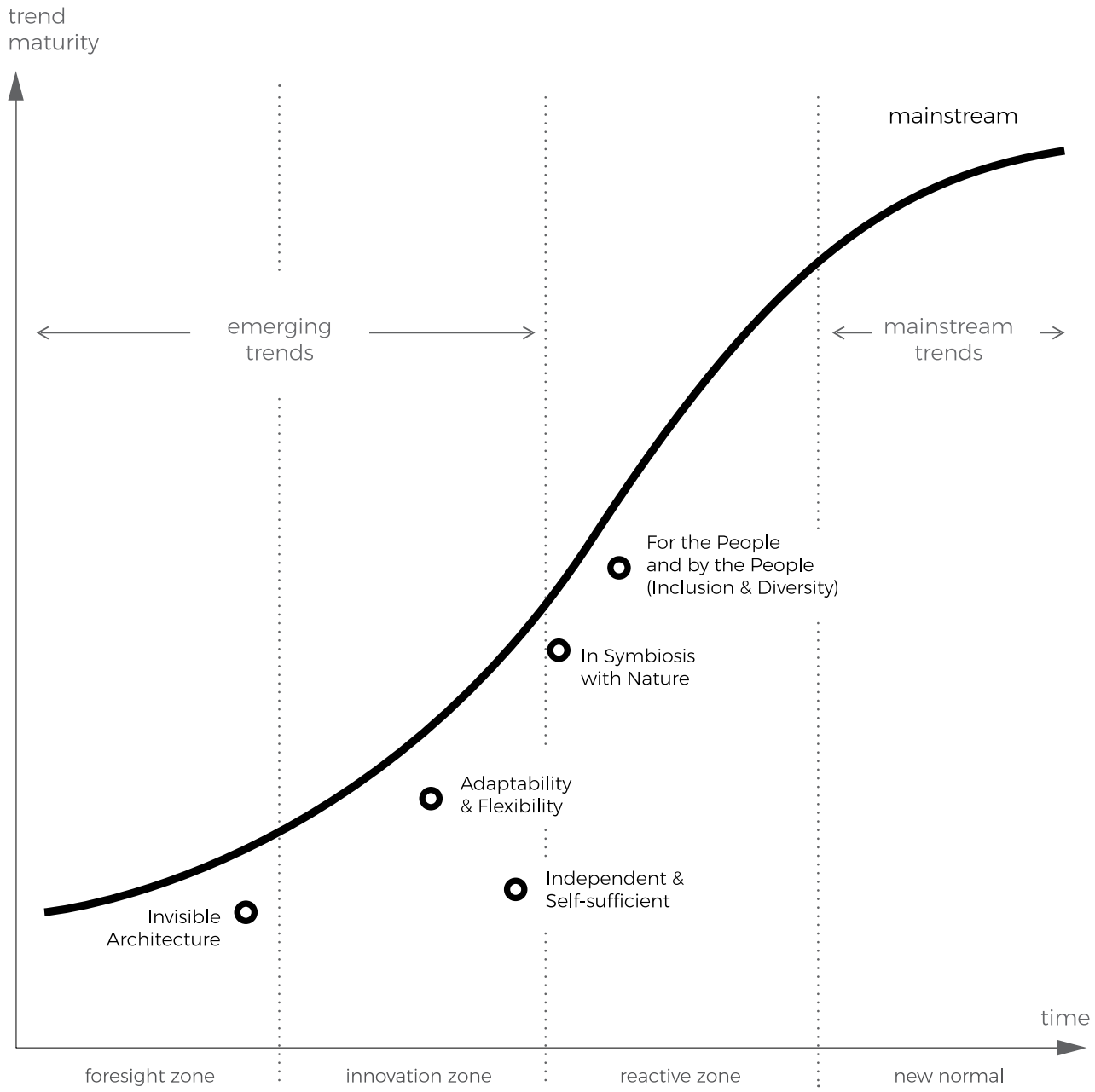


Adaptability & Flexibility – it predicts that all future buildings will be changing in time, flexible, never completely defined, and adjustable to their users (when it comes to their shape and functionality). This scenario is currently driven by trends such as: modularity, multifunctionality, dynamics and adaptation. Advanced technologies make it possible for buildings to transform freely depending on current needs of their tenants or the number of teams working there.



Invisible Architecture – it assumes that buildings are becoming "invisible" to people in cities. They don't only blend in with the environment without disturbing the space around them – thanks to applying innovative solutions and technologies they almost disappear from cities. This scenario is also an answer to ever decreasing spaces in cities and architectural mess, and it corresponds strongly to the ever-stronger notion of respect towards cultural heritage and urban landscape. .

Trends on the timeline



Prepared by: infuture hatalska foresight institute 2017.

Facebook office in Menlo Park, San Francisco (USA)

Source: newsroom.fb.com

Office space today – a summary of a qualitative study

In August 2017, infuture hatalska foresight institute conducted in-depth interviews with representatives of companies and their employees who use office space every day, and with representatives of administrators managing office space. Respondents included: an international corporation providing financial services, a nationwide internet medium which has several offices across Poland, a company occupying with tax advisory services and audits, a consulting company, organisers of a nationwide conference, an entity occupying with service design, a company providing PR and social media services and an entity offering services in the scope of personal development and events. All of them have used office space with various areas—from an entire building, through a storey in an office building up to leasing a desk in a co-working space.

The respondents included people of various profiles, both with regard to their age, sex or industry. The study was focused on issues connected with employees' and tenants' needs as well as various aspects for which work in an office space is valued. We have also been looking for challenges which people designing office space and managing them will need to face, to ensure that these challenges comply with the reality of tomorrow. The results presented below are focused on common points and aspects which bind respondents' answers together.

Offices have been undergoing a silent revolution over the last several years—the transformation started with identical cramped rooms, then went through open space halls up to individually designed space which favours both work in silence as well as cooperation and creativity. Interview respondents' answers were used as a basis for preparation of a list of features which should be or which should not be present at an office.

Relationships

Modern office space is mainly a place based on relationships, which enables establishing them, reinforcing them and using them for business operations—both within one's own team and those leasing office space.

Flexibility[2]

The key feature expected by companies is flexible office space. This concerns diverse issues—from a lease contract which can be quickly signed, terminated or decreased in terms of scope, up to providing space for suddenly growing teams.

Multi-functionality and modularity

The categories concern creating various office zones, a possibility to arrange space on one's own using e.g. moving walls/screens and modular furniture (e.g. several chairs which change into a table when put together). Office space should be divided into several zones, such as: quiet places for individual work, a relax zone, an entertainment zone as well as a zone for meals or meetings.

Comfort[3]

A modern office should be a comfortable place with access to daylight, ensuring fresh air and proper ventilation as well as a view or a perspective going beyond the back of another employee or adjacent building's wall. Despite the fact that these are fundamental components of well-being, there are still shortcomings in that area.

Nature[4]

According to respondents of the study, nature and green areas—both at offices and around them—are an element which allows them to balance out moments of intense work during the day and they give them a moment to breathe.

Design

A tendency to use more cosy, warm and house-related materials instead of metal, glass or plastic is becoming more noticeable . The thick demarcating line between the appearance of houses and offices is fading away.

Ergonomics[6]

The best designs are those, which we do not notice, because they allow us to focus on work instead of issues such as a struggle with a badly regulated chair. Agility, ergonomics and usefulness of operation of various devices and availability of space to people with special needs constitute a pronounced need.

Co-working

A strong accent among small companies is a need to share space in the form of co-working and sharing devices such as a printer, a scanner, and a possibility to use modern technologies. An important component is a large desk standing in the common area, which enables team work at any time, favouring sharing ideas with others, not necessarily only with members of one's own team.

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According to respondents' opinion, the key challenges faced by office centres include:

- their location in places ensuring access to a broad offer of various services—from nursery schools to beauty salons;
- a lack of car parks and traffic jams caused by crowds of employees driving at similar hours;
- ensuring a possibility to work in silence;
- efficient use of office space in terms of flexibility of work and changes within teams as well as vacation of buildings in the afternoon.

2. See: the Adaptability & Flexibility scenario.
3. See: the In Symbiosis with Nature scenario.
4. Ibid.
5. See: the Adaptability & Flexibility scenario.
6. See: the Invisible Architecture scenario.

for the people and by the people

(inclusion & diversity)

KEYWORDS:

Inclusion, sense of inclusion, diversity, place making

DRIVERS OF CHANGE:

economic (knowledge-driven economy, human economy, innovativeness, womenomics), social (needs and values of generations Y and Z, multi-generationality)

TIME PERSPECTIVE:

short- and medium-term (1-5 years, 5-20 years)

Signals of change

- Aiming to decrease inequality and increase inclusiveness (sense of being included)

- Diversity in knowledge-driven economy

  Studies confirm that companies using an inclusiveness policy are more profitable than their competitors who are less diversified in terms of employment. Analysts from Bloomberg in London and Singapore showed that the results of most diversified companies in terms of sex were 141% better over the last 10 years.

- Ageing society

- The growing role of women

  The number of women in the USA who have established their economic activity between 2007 and 2016 has exceeded the national average five times. Poland recorded the highest growth during that time in the "Women in Work" index (advancing from the twelfth place to the ninth place).

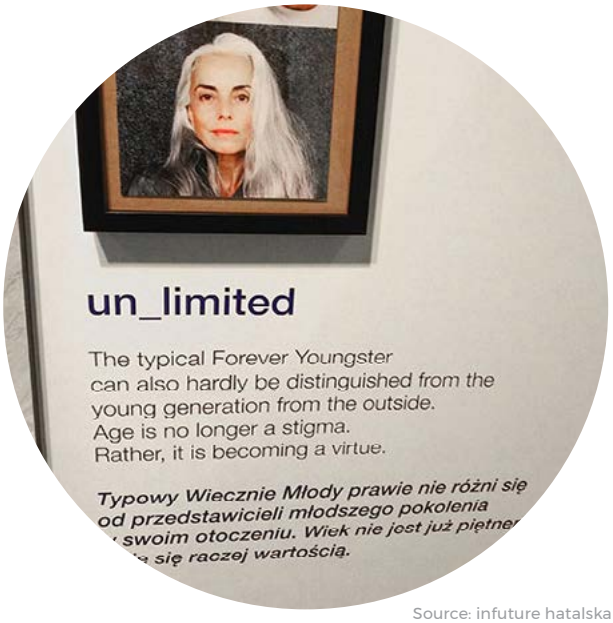
- The growing significance of human economy

  It is more and more frequently mentioned that the companies which are going to be successful in the future are not only going to be green (i.e. aiming to ensure sustainable development and provide a friendly environment) but also blue, which means that they are going to be giving more (e.g. to the local community, excluded groups) than they take.

Scenario

Office buildings in the For the People & by the People scenario are going to be characterised by openness and usefulness considering age, sex, experience and needs of various social groups to an even greater extent (e.g. special stairways, amenities for the elderly, family rooms). The trend connected with inclusiveness is going to be growing significantly in the future, which is going to directly affect workstations and offices as well. Office complexes are already frequently designed in a way ensuring that they become open places available for all people. They are a place for meetings, also during working hours—they are surrounded with gardens with benches, fountains or space designated for physical activity. The zones can be used not only by office building tenants, but also by inhabitants of nearby housing estates. Contemporary developers have been more frequently engaging in a noticeable manner in the life of local communities and they are no strangers to principles based on placemaking[9].

9. Placemaking is a concept for shaping public space, which assumes a multi-aspect approach to planning, design and management, which is supposed to activate local communities and engage neighbours in creation of common areas.



Source: infuture hatalska foresight institute

SPECULATIVE DESIGN PROJECT

Turning Office

Magdalena Dolot, Magdalena Bernardyn,
Faculty of Architecture, Gdańsk University of Technology

Currently, one in ten people, i.e. approx. 810 million people, are at least 60-years-old. However, UN's report indicates that in 2050 it is going to be as much as one person in five, i.e. over 2 billion people. This is a problem not only in affluent countries. Currently, approx. 65% of all people aged 60+ are living in developing countries, but in 2050 it is going to be 80%.

Solution

The Turning Office has a medical centre in the bottom part of the building. This ensures that medical assistance is always available in unexpected circumstances. Due to the large height of the building, stairs were omitted, because they may pose a problem for the elderly.

The labour market is changing. There are more and more people working as freelancers, who do not have a permanent job or fixed working hours. It is expected that we are going to be working much less in the future.

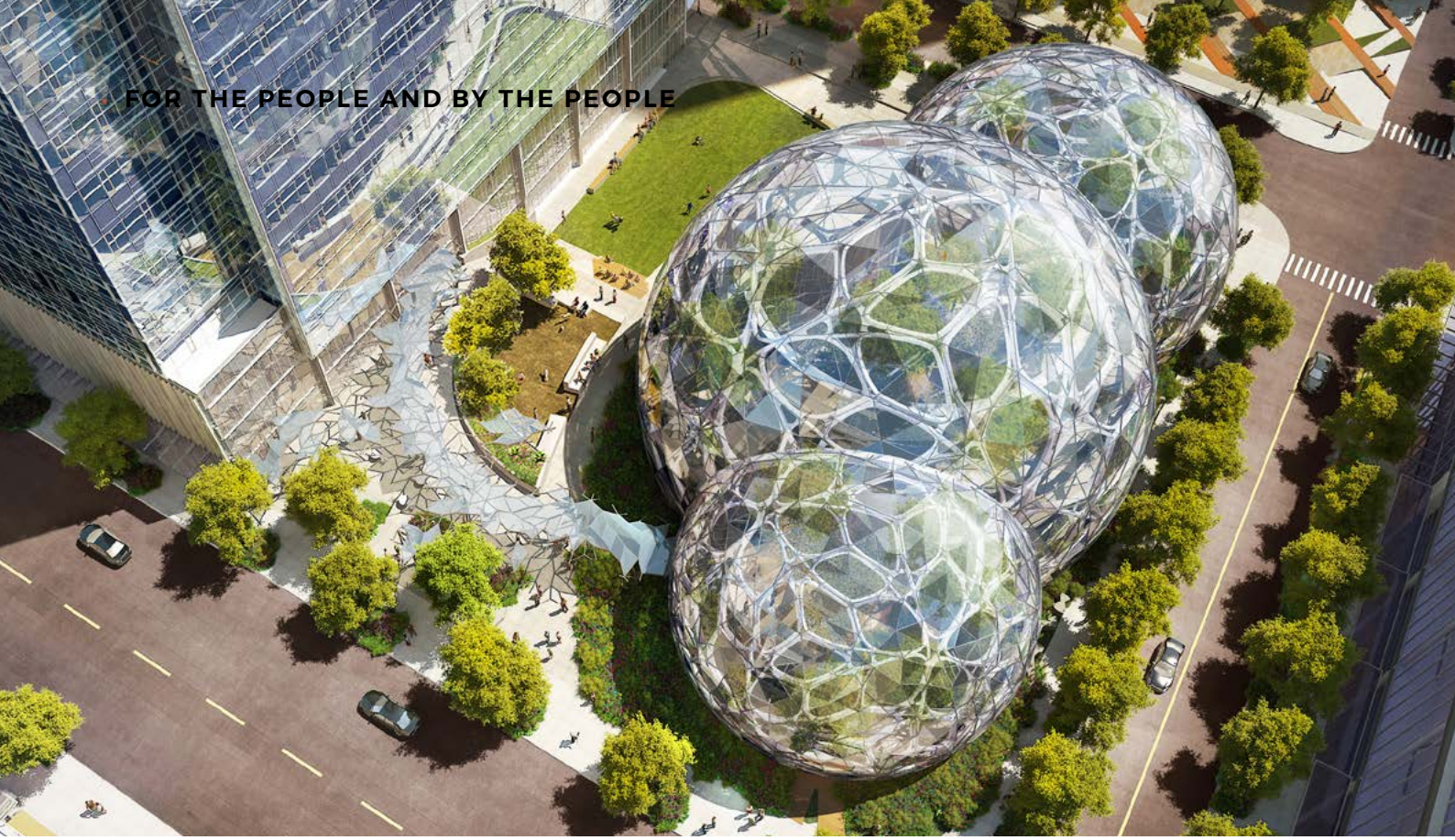
Solution

Work is flexible at the Turning Office. Offices in the building are not separate rooms. Instead, it is an open space separated into smaller areas surrounded with greenery. Owing to that, all users do not feel as if they were at work, and the atmosphere is very casual and unrestricted.

One of numerous problems of our times is global warming. Its result is the melting of glaciers and the increasing water level.

Solution

The Turning Office is located on the water, due to the high risk of excessive water levels. To fully utilise all benefits offered by the location and to adjust to surrounding conditions, individual storeys are turning around the structure's shaft. It allows provision of the greatest amount of sunlight inside the building and to photovoltaic cells placed on the façade, which are the main source of energy. The wind farm placed on the top of the building is an alternative means energy production.



Proj.NBBJ

Source: www.nbbj.com

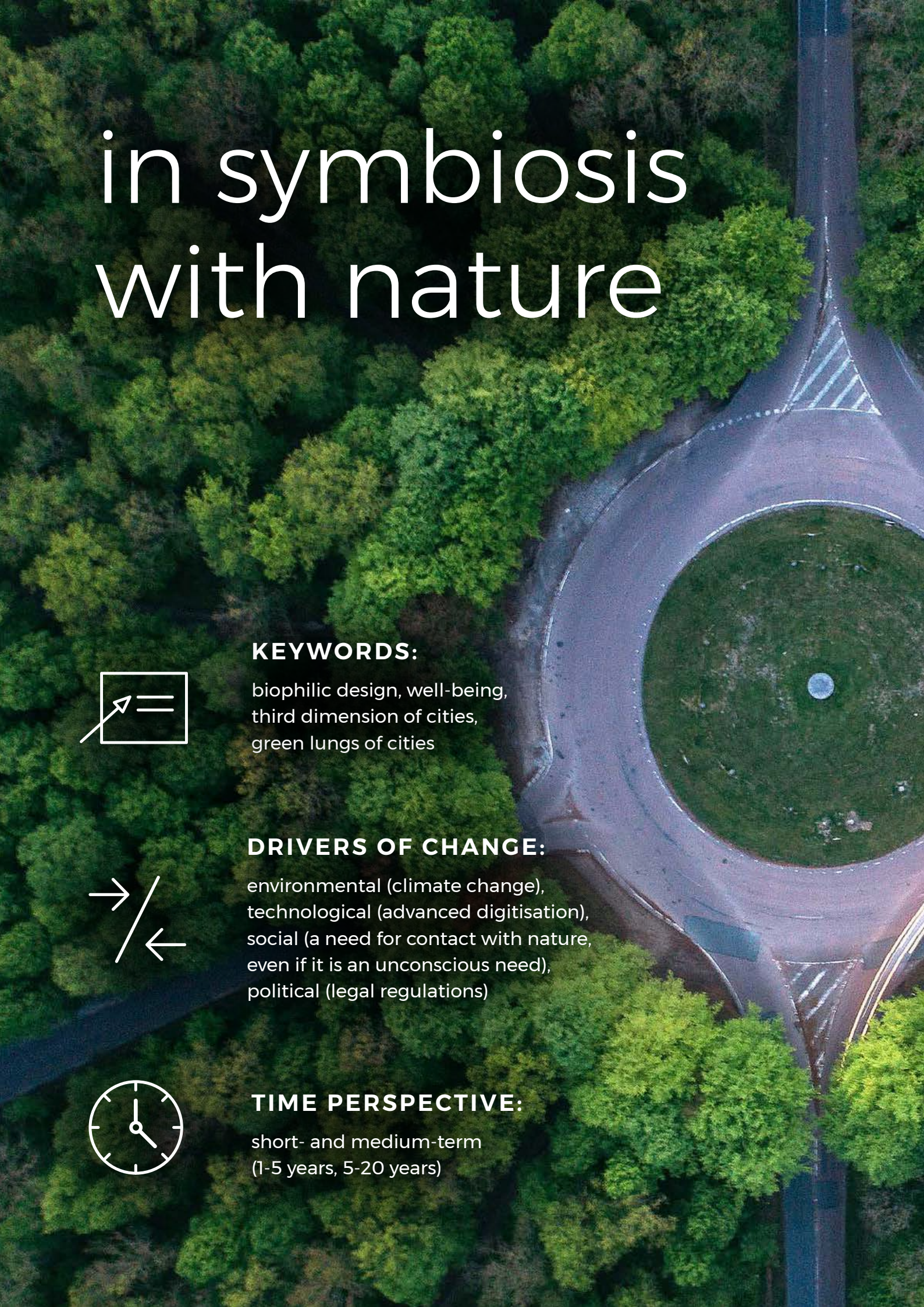
Buildings that answer this scenario today

At Google or Intel there are special teams responsible for "managing diversity and the inclusiveness strategy to assist managers". This is because currently, one can find representatives of as many as four generations at a single company. In modern complexes, office buildings have been changing their character for some time now. Former business centres (e.g. Canary Wharf in London) are quite significantly different from contemporary ones (e.g. Silicon Roundabout). The former are vacated right after working hours, so these areas become dead after 5 p.m. In case of the latter, the entire infrastructure—cafés, places for meetings, medical centres, hairdresser's, laundries, etc. are adjusted both to tenants and nearby residents and their needs. Changes are visible in buildings themselves. In December 2016 Etsy changed all bathrooms at its office to gender-neutral ones.

Amazon campus
Rufus 2.0, Seattle (USA)

Three large "spheres" compared to biosphere are to be constructed in Seattle to serve both company's employees and evoke tourists' admiration, and be used by city inhabitants.
In Seattle it is raining throughout more than a half of each year—the glazed domes are meant to prevent cutting people inside them from their surroundings, and to be compatible with the city and natural environment. The emphasis was mostly put on integration with the surrounding city centre. The objective was to connect commercial areas with the city park and workplaces. Plant zones feature plants from around the world, which are able to grow at an office maintaining a temperature between 18°C and 22°C. During the night the temperature within the building is decreased, whereas the humidity is increased, which makes the plants easy to maintain.

in symbiosis with nature



KEYWORDS:

biophilic design, well-being, third dimension of cities, green lungs of cities

DRIVERS OF CHANGE:

environmental (climate change), technological (advanced digitisation), social (a need for contact with nature, even if it is an unconscious need), political (legal regulations)

TIME PERSPECTIVE:

short- and medium-term (1-5 years, 5-20 years)

Signals of change

- A growing number of regulations, standards, certificates (e.g. BREEAM, LEED, WELL Building Standard).
- An increasing significance of the notion of well-being, including at offices.
- Green cities and buildings.

As a result of climate change, the concept of green buildings and cities is being discussed more and more frequently. The current term—smart city—is used interchangeably with terms such as green, eco or sustainable city more frequently than digital city.

Bosco Verticale Mediolan
proj. Boeri Studio

Scenario

The In Symbiosis with Nature scenarios assumes that in the future all buildings and cities will be obligated to use solutions based on so-called green infrastructure[9]. It is going to be connected with a complete change of the way people think and their intense need to return to nature rather than a fleeting trend. We have been an urbanised society for only 150 years. According to the UN, in 2050 as much as approx. 70% of people around the world are going to be living in cities. A loss of direct contact with nature takes a toll on our health and well-being (diseases related to contemporary civilisation, including depression) and productivity.
The scenario assumes that people are going to be increasingly aware that green infrastructure, environmental policy and ecological standards in cities are not only important—they are necessary, including for their health and well-being. A good example is set by places and buildings which maximise benefits for people while minimising their impact on environment and the planet. Sustainable green development will allow the world to significantly limit CO_2 emissions and use of non-renewable energy sources, contribute to improved air quality or counteract negative effects of advancing urbanisation in general.
Moreover, the essence of caring for well-being is going to become one of the paramount values of development of work environment. It will be dominated by the so-called biophilic design which has already introduced elements of nature into the work environment, which is going to start constituting an integral component of space outside and inside buildings. Green terraces, green roofs, façades covered with vegetation, internal or external gardens, walls covered with plants—all of that will make the presence of vegetation more than just a decorative element. Its soothing effect on human psyche or the quality of air at the office is going to be appreciated. Plants located on a façade—apart from their aesthetic value—will help reduce air and water pollution, noise and contain dust. This, in turn, will translate directly into the quality and comfort of use of space and it is going to become a sort of a live thermal insulation.

9. Green infrastructure entails elements combining natural environment with developed areas.

SPECULATIVE DESIGN PROJECT

Back to nature

Anna Radziemska, Joanna Pasymowska
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The "construction site" in the design is a forest, while the plot for the "building" is a tree. The workplace is an organic cocoon, the structure of which is made of bioplast, while its "façade" is made of fibres which can perform gas exchange processes. Inside the cocoon there is a nutrient which stimulates human body and supplies it with necessary substances.

After the employees perform their work, the substance degrades and acts as a fertiliser for the soil. It is drawn from the tree which produces a nutritious nectar as a result of it being constantly nourished and enjoying favourable natural conditions. The employee is connected to probes which monitor his or her progress and needs; in case employee's vitals drop, the employee is "nourished". This is a way to gain a workforce which operates at its most efficient as a result of being deprived of the need to satisfy their physical needs.

The energy to work is supplied through Wi-Fi. Each tree holds several cocoons selected according to the type of work performed by the employees. For instance, one tree can hold a cocoon with an architect, a builder, a constructor and an installer, all of whom are involved in the creation of a visionary design of an office building of the future.

Proj. Kraaijvanger Architects photo: Ronald Tilleman

Source: www.kraaijvanger.nl

Buildings that answer this scenario today

Corporations such as e.g. Amazon or Google use biophilic design elements to attract and retain the best employees. Outside Apple's new headquarters there are green areas with paths for jogging and walks, whereas the courtyard features a park, an orchard, ponds, etc. The structure of the building forces employees to get in touch with nature every day.

The so-called green roofs are becoming more and more common in cities, in which they become a common area for employees and a place for meetings. Since 2010, every newly built and modernised building with a flat roof (i.e. with a slope of up to 30°) in Copenhagen must have vegetation planted on it.

An anti-smog residential building which is supposed to help clean the air is to be put into commission in Taiwan by the end of 2017. All sides of the building feature terraces which will have 23,000 trees and shrubs planted on them. Apart from the terraces, the trees will also be on the roof and balconies (the same number of plantings is present e.g. in Central Park in New York). The building will be able to absorb approx. 130 t CO_2 a year.

City Hall, Venlo (The Netherlands)

Venlo fully complies with the Cradle-to-Cradle (C2C) concept. All products and materials at all stages of use must be 100% reusable and environment friendly. The most striking feature of the building is its green façade (200 m^2) composed of 100 various types of plants, which contributes to biodiversity and cleaner environment. The adjacent road is a source of pollution, but the façade filters as much as 30% of it. Greenhouses on top storeys provide heating for the building. When combined with the green façade, a solar chimney and storage of heat in the ground they serve as natural air conditioning. An ecological water cycle with minimal losses has been ensured. Rain and water from sinks are treated using a wet roof and they are used to hydrate the green façade and to flush toilets. The lining on the floors is made of processed plastic bottles and each piece of furniture in the building is made of C2C materials.

independent & self-sufficient

KEYWORDS:

self-sufficiency, survivalism, preparedness, intelligent buildings

DRIVERS OF CHANGE:

social (decreased sense of security),
political (increased risk of terrorist attacks),
environmental (climate change, sudden weather phenomena, energy crises, depletion of resources),
technological (sensors, IoT, energy efficiency)

TIME PERSPECTIVE:

medium- and long-term
(5-20 years, 20-50 years)

Signals of change

- Decreased sense of security (as a result of the risk of terrorist attacks or climate change and sudden weather changes).
- Concepts of independent, self-sufficient buildings which are fully autonomous.
- Concepts of independent, self-sufficient cities, districts, villages.

Self-sufficient eco-village in the Dutch Almere
Source: www.regenvillages.com

Scenario

The Independent & Self-Sufficient scenario is based on an assumption that every building in the future is going to become an autonomous unit, i.e. it is going to be able to operate regardless of external infrastructure. Any outside threats or even weather changes will not have any impact on the comfort of building users. The entire building is going to be managed by an intelligent supervision system constantly balancing building's operation and it will be able to automatically respond to external conditions by using sensors and provide security, energy efficiency and maximal comfort by intelligently managing resources (e.g. water).

Additionally, the buildings are going to become places in which one will be able to cultivate or produce food; the number of proponents of vertical farm concepts (for cultivating vegetables and herbs, for instance), frequently combined with aquaponic farms (an internal system for raising fish and seafood) is significantly increasing.

In such office buildings the sense of security of their users is going to be very high, since it is going to be impossible to disrupt one's operations in case of unexpected events: cataclysms, sudden weather changes, terrorist attacks or even mere breakdowns.

SPECULATIVE DESIGN PROJECT

Seedizen

Iga Jagodzińska, Adam Grudzień
Faculty of Architecture,
Gdańsk University of Technology

The idea behind the facility is providing inhabitants with all elements necessary to live by using defence and survival mechanisms previously used by plants—they are the ones with the longest experience in adaptation to unfavourable conditions on the planet.
Whenever there is a need, the building is tightly sealed and partly hidden in the ground for the duration of a dangerous event, while also expanding and strengthening its root system. Due to it being autonomous, as a result of using organic materials which have their own cell systems enabling their division, the place enables survival inside it for an unlimited time assuming its growth by 1% per annum (in compliance with average natural growth).
The facility is fully autonomous, which means that it can operate freely without a need to engage the outside: it breathes, digests and defends on its own, it filters the air using its external façade coat, recycles waste and water, collects heat, solar and wind energy and processes it into energy necessary for the building, produces food and ensures safety using an external coat which is incredibly flexible and resistant to any weather conditions.

Source: flickr.com/Norman Foster

Buildings that answer this scenario today

Reid Hoffman, the co-founder of LinkedIn believes that over 50% billionaires from the Silicon Valley have their shelters or places which are fully self-sufficient and able to provide them with comfortable conditions in case of cataclysms, terrorist attacks or other unexpected events[7]. A two-storey residential building near Zurich satisfies the following, among others: 100% of demand for energy of all inhabitants, including renewable energy. Energy is provided through solar panels covering the roof and panels installed on the south façade, which resembles an ordinary façade. ReGen Villages is a real estate development company which currently occupies with the development of a self-sufficient eco-village in Almere in the Netherlands. The first 25 buildings are supposed to be finished by the end of 2017. In Dubai there is an entire district, Bastakiya, which is self-sufficient in terms of energy and it provides its inhabitants with food produced locally in special greenhouses.

Apple Park
Cupertino (Kalifornia, USA)

The "natural ventilation" system enables the main building of the headquarters to get by without heating or air conditioning for three quarters of the year. The campus is going to be supplied with energy entirely derived from renewable resources. Energy is going to be supplied, for instance, using photovoltaic cells installed on the roof. The building is equipped with solar panels which are supposed to cover all energy demand within the complex (over 16 MW).
Green areas are supposed to constitute 80% of plots used to build the campus (there are going to be 9,000 trees growing there). The courtyard in the middle of the main building is not only going to be covered with greenery, but also fruit trees and herbs, which may be used at the nearby cafe. Plants selected for the campus are draught resistant. Used water is going to be reused.

7. http://www.businessinsider.com/silicon-valley-billionaires-apocalypse-preppers-2017-1?IR=T

adaptability & flexibility

KEYWORDS:

living organism, adaptation, dynamic, modularity, multi-functionality

DRIVERS OF CHANGE:

mainly social (changing needs of Y and Z generations, entrepreneurship, mobile work style, digital life style, nomadism

TIME PERSPECTIVE:

medium- and long-term (5-20 years, 20-50 years)

Signals of change

- Digital nomadism

  The growing phenomenon of digital nomadism (i.e. people combining work with travel, who do not need a permanent office) is connected with changes within organisations. They frequently perceive offices not as a place, but rather as a service. They expect space to be easily adaptable and flexible.

- A growing number of co-working spaces.

- Multi-functionality of office space.

- Workspace personalisation.

  Advanced technologies (including artificial intelligence, using big data analyses or internet of things (IoT) solutions) enable employees to personalise their workspaces. Special applications allow, for instance, caring for individual's comfort by adjusting temperature, lighting or even ordering lunch or catering.

Skanska works according to the concept of Activity Based Working. The offices offer various types of space that correspond to diverse needs of employees.
Source: SKANSKA

Scenario

Nature which surrounds us constitutes an inspiration for the Adaptability & Flexibility scenario. It is assumed that the buildings are going to be able to grow and develop (e.g. by using organic materials which have their own systems of cells enabling their division and growth) similarly to plants or trees, while also breathing or cleaning the air. Thus, the buildings will be functioning similarly to live tissue of a bigger organism such as a city. Their use is also going to change and expand, whereas the space will be able to serve diverse functions, depending both on employees' needs as well as the time of day or year.

Despite there being no solutions yet, which would make building alive or enable them to grow, the number of designs and phrases which appeared in works in the field of speculative design shows that this is one of the most popular and the hottest topics and issues. Currently, the Living Buildings scenario is carried out rather in the form of modular and multi-functional nature of buildings which become flexible, malleable and they adjust to companies and employees as well as their individual needs.

A modern office building according to the Living Buildings scenario is thus a fluid and dynamic space which is constantly adapting both to the needs of a particular employee and companies. Tenants are the ones who co-create and transform it. They are able to interact with the space and adjust it to themselves (through the layout of furniture, movable walls, individual settings of intensity of lighting or air conditioning). An office building becomes a living place which is constantly changing.

SPECULATIVE DESIGN PROJECT

Neutro Micro Plastic

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NeutroMicroPlastic is a facility which is 90% under water and acts as a sea and ocean water treatment station capturing microplastic particles, whereas the remaining 10% is located above the water level. That part is intended for office workers. The idea and form of the office building were inspired by sea oak (fucus vesiculosus), in particular the way it expands (a dichotomous system).

The building has been designed in compliance with biomimicry principles. The oval window openings have been inspired by a microscopic image of organic tissue. The building regenerates itself, i.e. it rebuilds itself on an ongoing basis using 3D printers which have been built-in the structure and it even expands using neutralised microplastic and graphene particles. Moreover, it is energetically self-sufficient as a result of used technologies which draw energy from forces of nature. The surplus of produced energy is supplied to the municipal network.

Source: newsroom.fb.com

Buildings that answer this scenario today

There are no permanently assigned desks at Microsoft's headquarters in Milan or LEGO's offices. Employees come to work in the morning and they choose where they want to sit, depending on whether they want to work independently or in a team and whether they need silence or dynamic space. They can use various stations: standard desks, standing desks, sofas, large tables for group work, closed off rooms of various sizes (for formal and informal meetings), open space, relax zone, etc.

For instance, employees in a Dutch building, The Edge, can check on their smartphone screen where they are working on a particular day, because they do not have permanent workstations. The system shows them available stations matching preferences selected by the user: close to the coffee machine, a silent corner, next to a window or a group of colleagues. User's profile also contains information about features such as their preferred temperature or lighting. When the phone owner is seated at the desk, the system automatically regulates air conditioning.

Menlo Park Facebook
San Francisco (USA)

Facebook's headquarters building in Menlo Park (near San Francisco), which was built in 2015, is the largest open office in the world. It accommodates 2,800 employees. The enormous space is divided according to functions so that temporary teams working on joint projects can be created in the easiest and the quickest way. The large and empty space has been diversified with a large number of partitions, resting areas and comfortable sofas, to ensure employees' comfort. The building features omnipresent employee canteens (serving dishes from various parts of the world) and a single, large hangar with separate, individual rooms, such as toilets, canteens and family rooms.

invisible architecture

KEYWORDS:

invisibility, biomimetics, metamaterials, adjustment, masking, adaptive architecture

DRIVERS OF CHANGE:

social (progressing urbanisation, wellbeing), technological (metamaterials)

TIME PERSPECTIVE:

medium- and long-term (5–20 years, 20–50 years)

Signals of change

- Invisibility became a trend in architectural and design exhibitions
- Contemporary construction

  Modern construction uses materials, technologies and glazings to allow building façades to blend in with urban tissue, instead of making them stand out at all costs. More and more advanced materials enable achieving the impression of "invisible" construction.

- Advanced research on using meta -materials.

Milano Design Award 2017. An exhibition fully dedicated to the concept of invisibility.
Design: Tokujin Yoshioka S.F. Senses of the Future
Source: www.tokujin.com

Scenario

The Invisible Architecture scenario assumes that buildings become invisible for city inhabitants. They not only blend with their surroundings and do not disturb the space in any way—they also disappear, in a way, from the cities using latest solutions and technologies. The scenario is also an answer to the decreasing amount of space in cities and architectural disorder, and it is connected with the increasingly strong appreciation of cultural heritage and urban landscape. According to the scenario, metamaterials used to build façades are already so technologically advanced, that the buildings become almost invisible for passers-by. There are no problems with the shadow cast by buildings or any noticeable interference with city landscape. Also, people working inside such buildings have an impression of being a part of the city. The architecture is intertwined with surrounding landscape and the city, it becomes inseparable from it, it does not disturb the space and it creates a harmonious whole with it.
The scenario is also compliant with a greater invisibility trend which is generally connected with the contemporary world—in particular with regard to new technologies, in which the greatest advances and innovations are practically invisible for people (the development of artificial intelligence, 5G networks, big data, etc.).

SPECULATIVE DESIGN PROJECT

Archetypical non-block

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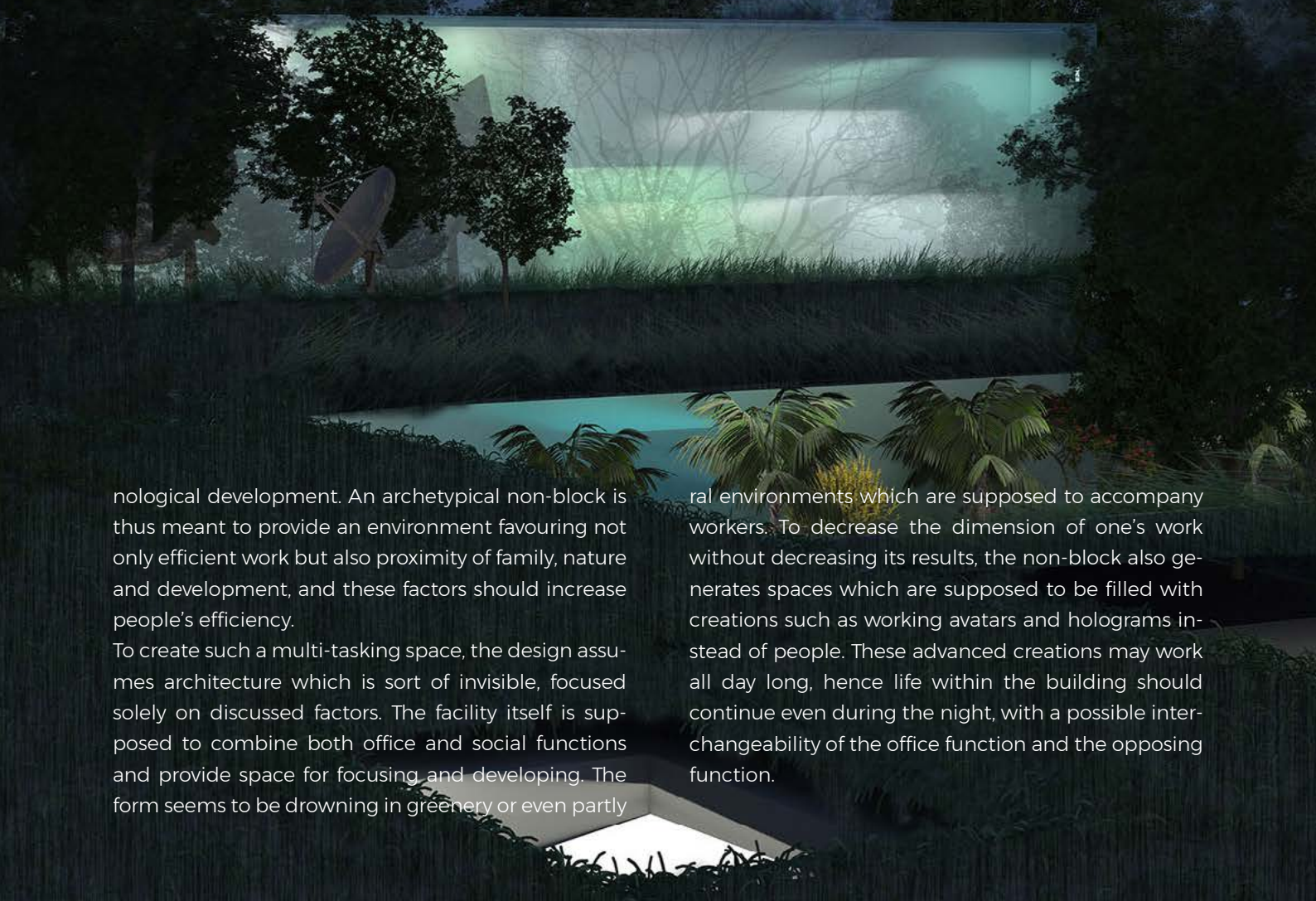
Despite the term archetype being a reference to the prototype, which in this case is the innate, primal need rooted in human consciousness—buildings which have continued to exist for ages do not necessarily consider such values. Apparently, it will be no earlier than in 2040 that an office building will be able to combine all those needs, considering technological development. An archetypical non-block is thus meant to provide an environment favouring not only efficient work but also proximity of family, nature and development, and these factors should increase people's efficiency.

To create such a multi-tasking space, the design assumes architecture which is sort of invisible, focused solely on discussed factors. The facility itself is supposed to combine both office and social functions and provide space for focusing and developing. The form seems to be drowning in greenery or even partly hidden under a layer of vegetation, to bring out areas focused on aforementioned factors. People working in designed facilities should have an impression of being not in a building, but rather as if they were surrounded by nature.

The design not only assumes using solutions protecting natural products, but also newly created natural environments which are supposed to accompany workers. To decrease the dimension of one's work without decreasing its results, the non-block also generates spaces which are supposed to be filled with creations such as working avatars and holograms instead of people. These advanced creations may work all day long, hence life within the building should continue even during the night, with a possible interchangeability of the office function and the opposing function.



The headquarters of BNL-BNP Paribas Group in Rome. Photo: Ezio Gosti

Source: www.realestate.bnpparibas.pl

Buildings that answer this scenario today

BNP Paribas, Rome

BNL-BNP Paribas's seat in Rome is a 12-storey building designed by an Italian architectural office 5+1AA (currently Atelier Femia), which was created to ensure that it fits in with the surrounding urban landscape without distorting it. The intelligent design of glazing enables it to reflect its surroundings on all sides, just like a mirror. The appearance of the building thus changes depending on the time of day and the weather, and it reflects the city and light, while at the same time not disturbing the landscape. The structure of glazings required that the building use five different products from the line of sun reflecting glass, four of which ensure a silvery reflection, whereas the fifth provides a more neutral appearance.

Another example of aiming to create invisible architecture is the new Elbphilharmonie in Hamburg from 2017. Its top part is built on the top of an old warehouse and it is composed of 1,100 glass elements. During the day, the façade takes the colour of the sky, whereas in the evening it reflects the setting sun, and during the night it sparkles with lights from its interior and blends in with the city. Each of modern glass panels is 4–5 metres wide and 3 metres high.

The Invisible Barn is a design located in California. The application of reflective polyester film with a high reflection factor (90%) on the entire surface makes the building virtually invisible for human eye within the wave length of 200 up to 400 nm, but it can be noticed by birds, which prevents them from hitting the invisible structure. The building reflects its natural surroundings: various types of trees and plants or the sky. The optical illusion which diffuses borders of the building allows it to hide and stay invisible, thus reconstructing the landscape around it.

The increasingly popular concept of virtual offices, in which a conventional building will be redundant for everyday work or it will be serving solely the purpose of ensuring firm's prestige, is compatible with the scenario to some extent.

This is just an extract from the report „Living buildings".

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examples of buildings that answer the scenarios today

fully described factors influencing the future of office buildings.

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