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Architectural Programs as Corporate Communications Platforms

Preliminary Communication
UDC 721.17:061.5 "20"

Arhitektonski programi kao komunikacijske platforme korporacija

Prethodno priopćenje
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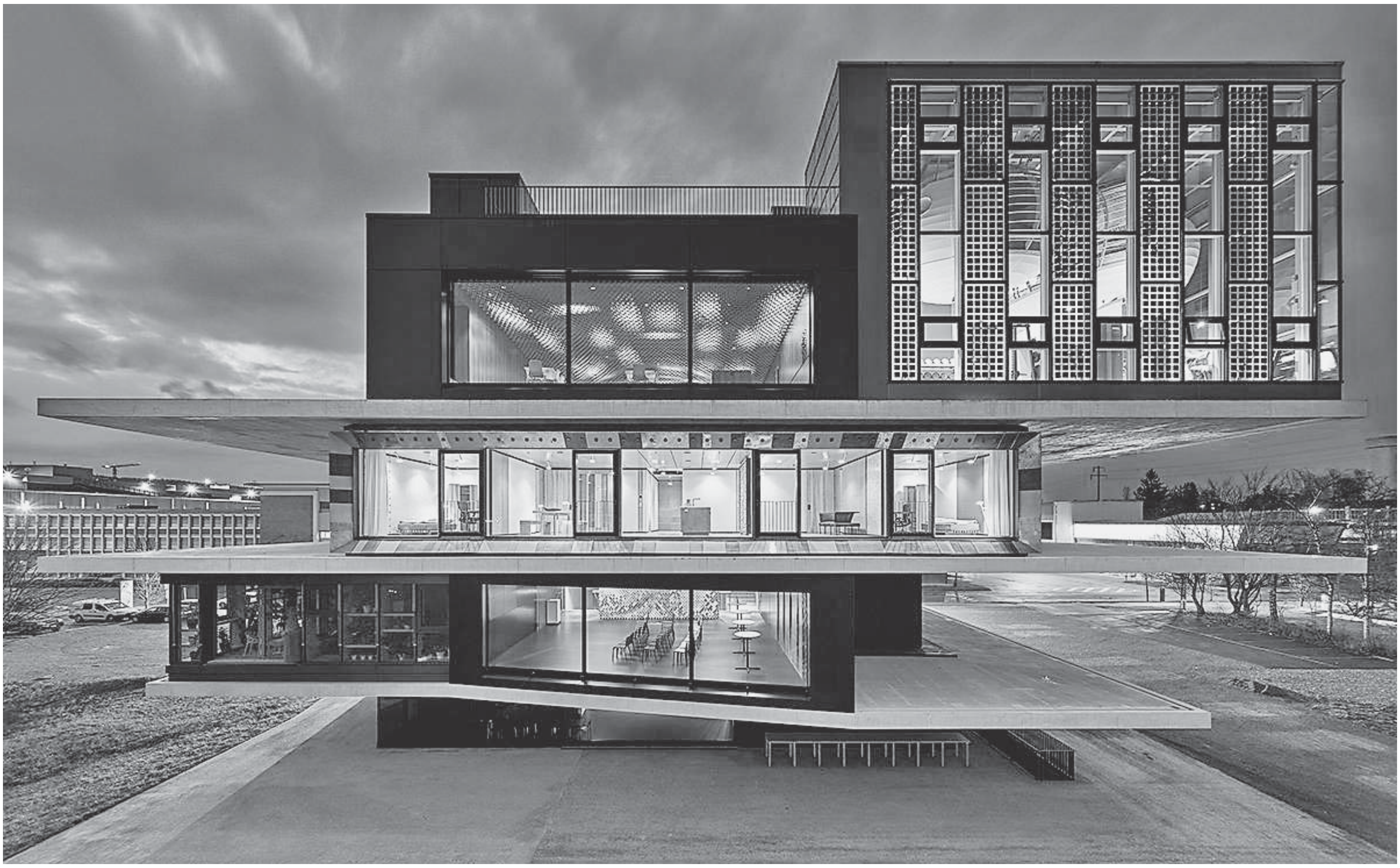

Fig. 1 W. Sobek, D.E. Hebel, F. Heisel, Exterior View of the Urban Mining and Recycling Unit at Empa Nest, Dübendorf, Switzerland, 2017
Sl. 1. W. Sobek, D.E. Hebel, F. Heisel, Vanjski pogled na jedinicu urbanog rudarstva i reciklaže, pri Empa Nest, Dübendorf, Švicarska, 2017.

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Architectural Programs as Corporate Communications Platforms

Arhitektonski programi kao komunikacijske platforme korporacija

architectural program
communications platform
industry 4.0
Internet of Things
thematic park

arhitektonski program
komunikacijska platforma
industrija 4.0
internet stvari
tematski park

Corporate communications platforms in an environment of the Internet of Things [IoT] are illustrated with a review of a case study pertaining to new phenomena that affect the design of architectural programs. Based on the architectonics of the Information Age and the Industry 4.0, the possibilities of active design systems are being recognized, additive construction techniques are being reasserted, natural and technical sciences parks are being examined as programs of designed place identities; also, transformations of housing, working, trading and transport places are being valorised as places with embedded values of full sustainability.

Komunikacijske platforme korporacija u okruženju interneta stvari [IoT] predstavljene su istraživanjem studije slučaja za nove fenomene koji utječu na oblikovanje arhitektonskih programa. Radi se o projektnoj diseminaciji kao skupu postupaka kojima se postiže bolja vidljivost namjera i rezultata projekta. Na temeljima arhitektonike informacijskog doba i industrije 4.0 spoznaju se mogućnosti aktivnih sustava dizajna, reafirmiraju aditivne tehnike građenja, istražuju se prirodoslovno-tehnički znanstveni parkovi kao programi projektiranih identiteta mjesta te valoriziraju transformacije mjesta stanovanja, rada, trgovine i transporta s ugrađenim vrijednostima potpune održivosti.

INTRODUCTION

UVOD

The development of new architectural programs recognized as corporate communications platforms[1] in an environment of Internet of Things [IoT] and the Industry 4.0[2] are a result of globalization flows in heterogeneous industries partly supported by models of public-private partnership and locally designed place identities of various scales, as phenomena of the architectonics of the Information Age.[3] Universities with virtual programs are forerunners in the dynamics of that development; remote learning models are asserted, digital libraries in the field of pedagogy of architecture are being formed[4], whereas the possibilities for art design and visual culture are being refined. In the domain of design software application, components of multi-parameter design[5] and of virtually and dynamically generated environment[6] are being developed, as well as particularly advanced active systems of architectural design with simulated homeostatic functions.[7] Inciting commitment to acquisition of knowledge in the natural and technical sciences and to developing studies for the new work generations, for the needs of research and development in the environment of Industry 4.0, indirectly leads to transformation of architectural programs, competitively designed identities of places and locations of different scales: from architectonic details, natural and technical sciences parks, centres, and museums, corporate communications platforms as architectonic pilot projects, to transregionally shaped communities.[8] Architectural design[9] in an Industry 4.0 environment, in its programmatic foundations depends on the infrastructural connections of the Internet of Things[10] – collected, interpreted and operationalized data from substantial information databases – generated from the stated connections (data mining), which can service the shaping of new series of architectural ambients in vast variety of scales, products, services, and maintenance servicing. Corporate communications platforms in their architectural-programmatic complexity and manifestation announce new trends in selection of locations of activities, and transform architectonic parameters of housing, work, trading, and transport. At the

1 In his previous works, the author has researched the influence of technological revolutions on the development of architectural programs and plan composition. Recent changes in the industrial paradigm (pertaining to Industry 4.0), which approximately date back from the transition to the second decade of the 21st century, opened a new research field for phenomena affecting the development of certain architectural programs as corporate communications platforms. In this way, a preliminary research was conducted as basis for applying with a scientific-research project financed by the University of Zagreb, while at the same time there is an on-going research within HIS's [Croatian Engineering Association] program "Development of professional competencies for green construction", the author being a fellow on the project, financed by EU-SF/ESF.

2 The term "Industry 4.0" originates from the strategic program for development of the next generation of industrial plants, manufacturing, research, maintenance servicing, and services based on: ICT foundations, unification of robotics, the Internet of Things, operationalization of data from process conditions recorded in big digital databases (data mining) etc., which in the period 2011-2013 was instigated by the German state as a project dedicated to new ways of high technologies implementation. Akatech – German Academy of Technical Sciences – presented the recommendations for the implementation in 2013, prepared at the instigation of the Federal Ministry of Education and Research [BMBF]. KAGERMANN *et al.*, 2013: 79

3 HOMADOVSKI, 1997

4 MILLER, 2016; S.P.I.R.O. Digital Library, Berkeley, Director of the Visual Resources Centre. The digital database was founded in 1992 and locked in 2016, providing computerized access to analogue photographic collections management via an on-line catalogue of 35 mm slide library. The 2016 system migrated to new platforms; ARTstore and Omeka with restrictive access rights. [https: //archives.ced.berkeley.edu/blog/the-spiro-image-database-1992-2016 (11/8/2016)]

5 Gehry Technologies [GT] was founded in 2002, and created by the Gehry Partners development team. In 2005, GT entered into partnership with the company Dassault Systems in order to introduce innovations from the aeronautical and manufacturing sector into AEC (Architecture Engineering Construction). The partnership resulted in the development of the Digital Project and created the framework of GT's process of technological reinventions. *DP Designer* is a software profile developed on basis of Dassault *Catia*'s product portfolio: the product includes 3D and BIM modelling of high performances for architectonic design, engineering and construction with components: *multi-parameter modelling of surface*, advanced modelling of solid state, automation based on know-how, project organization etc.

6 In the 1990s, the association CIRAD-AMIS developed AMAP [Plant Modelling Programme]. The technology be-same time and not in opposition to the capacities of Industry 4.0, new relations are being examined in the research of energy resources usage efficiency; constructions and projecting methods are being conjectured and embedded design-wise, and it is with these methods' additive-linear approaches that new solutions are found for high degrees of material exploitability and recycling procedures. Corporate communications platforms in an environment of Internet of Things are illustrated by examined architectural programs put in the function of dissemination of strategies, values, and achieved results in selected corporate projects and they are also dimensioned by case studies for the respective fields.

Fig. 2 J.P. Dürig AG (& P. Rämi), Ned Kahn, Swiss Science Centre Technorama, Winterthur, Switzerland, 2002

Sl. 2. J.P. Dürig AG (& P. Rämi), Ned Kahn, Švicarski znanstveni centar Technorama, Winterthur, Švicarska, 2002.

Dissemination of Knowledge Related to Programs of Thematic Parks

Diseminacija znanja na programima tematskih parkova

Modern dissemination of knowledge in the natural and technical sciences, functioning as instrument for forming place identities, is realized through new architectural programs, being typologically realized as museum destinations and/or locations of thematic parks of special purpose. The following are analysed for the purpose of case studies: Swiss Science Centre Technorama, Winterthur; Universeum, Public Science Centre, Korsvägen, Gothenburg; Glasgow Science Centre; Phaeno Science Centre, Wolfsburg; Exploratorium, San Francisco; The Exploratory, Bristol; Cité des Sciences et de l'Industrie, Pariz. The selected examples confirm the developmental tendency of those institutions, as well as the changes in architectural programs i.e. the changes in design composition and museological concepts due to their establishment or additional development by means of public-private partnership (faculties, research centres, industries, and state/regional administration) and not as private or state museums of classical format; also by dissemination of knowledge from natural and technical sciences aimed at training new generations so as to achieve the work-oriented quotas of their industrial partners. Museological presentation with high-degree interactivity, conditioned by the change of the project holder, normally unfolds in settings of distinctly opened plans, observable in terms of perspective. The architectural program and the plan composition are entirely subordinated to the mission of knowledge dissemination; hence, the architectural format, in its manifestation, takes over the role of communications platform. At the same time, the stated destinations are extremely successful in terms of their potential as tourist attrac-

Fig. 3 Wingårdh Arkitektkontor, Gert Wingårdh, Universeum, Public science centre, Korsvägen, Gothenburg, Sweden, 2001

Sl. 3. Wingårdh Arkitektkontor, Gert Wingårdh, Universeum, Javni znanstveni centar, Korsvägen, Gothenburg, Švedska, 2001.

hind the dynamically generated environment was transferred to the company Bionatics; its software editor provides 3D solutions for decision-making in the process of territory management. The software enables 3D modelling and visualization of sizeable urban or rural landscapes as well as *simulation of their evolution through time*.

7 The active systems represent a concept of bionic-cybernetic technology of multistat and its ability to establish possible conditions of balance depends on the functioning of the network of semi-stable homeostats. The development of active systems as concepts of mechanical and civil engineering constructions is a result of the technological transfer from series of scientific domains into fields like aviation, robotic factories engineering, artificial intelligence development, engineering of machines and measuring instruments in astronomy etc. Sobek *et al.*, 2006; http://www.uni-stuttgart.de/ilek/forschung/adaptivitaet/ [14/12/2017]

8 Branding for the region Øresund. "We find examples of implemented arbitrary markers with the design company Wolff Olins in order to develop a branding strategy for Øresund, a cross-border region of eastern Denmark and southern Sweden, 1999." [Homadovski, 2010: 197]. "The Øresund Region that connects Copenhagen metropolitan area in Denmark and Southern Sweden is an interesting example of European cross-border collaboration." [Falkheimer, 2016]

9 Berkel, 2017. Ben van Berkel and UNStudio have launched UNSense, a new "arch tech" start-up that "explores and develops new integrated tech solutions specifically designed for cities, buildings and indoor environments." ...It aims to enable the built environment to catch up with the "digital revolution [that] is driving change in every part of our lives." CitySense: "Health, safety, liveability and mobility are complex challenges that require innovative, social and adaptive solutions. The goal of urban planning should not be to meet efficiency targets, but moreover to positively impact the life of people in the city. *To do this we collect data through a sensory digital infrastructure. Based on this data, we design and implement positive, personal experiences for people and continuously improve on them, profoundly changing the way people live and work in our cities."* [http://unsense.com (1/12/2017)]

10 International Telecommunication Union, 2013: 3. The Internet of Things [IoT] has been defined as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies. Recommendation ITU-T Y.2060 provides an overview of the Internet of Things. It clarifies the concept and scope of the IoT, identifies the fundamental characteristics and high-level requirements of the IoT and describes the IoT reference model. The ecosystem and business models are also provided in an informative appendix.

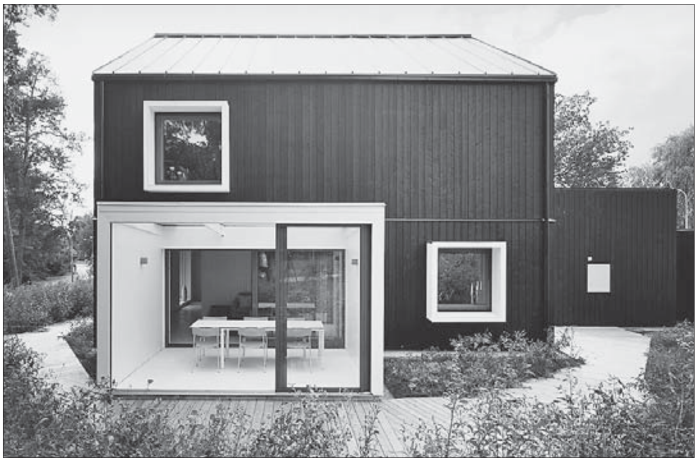

Fig. 4 Wingårdh Arkitektkontor AB, A-Hus, Vattenfall, Volvo Cars, Siemens et al., One Tonne Life project, Hässelby Villastad, Stockholm & Gothenburg, Sweden, 2010-2011

Sl. 4. Wingårdh Arkitektkontor AB, A-Hus, Vattenfall, Volvo Cars, Siemens i sur., Projekt – Život od jedne tone, Hässelby Villastad, Stockholm & Gothenburg, Švedska, 2010./2011.

Fig. 5 SFP Architects, Schwarz Architekten, AIG architectural office, Bosch Research campus, Renningen, Germany, 2014

Sl. 5. SFP arhitekti, Schwarz arhitekti, AIG arhitekti, Bosch istraživački kampus, Renningen, Njemačka, 2014.

Fig. 6 Sekisue, Honda, Toshiba, Sekisui House, Green First Zero, Saitama, Japan, 2012

Sl. 6. Sekisui, Honda, Toshiba, Sekisui House, Zelena Prva Nula, Saitama, Japan, 2012.

tors. So far, two destinations have been researched, with confirmed hypothesis on designed place identity, as follows:

– Swiss Science Centre Technorama, Winterthur, 2002 [App. 1][11], architects: J.P. Dürig AG (& P. Rämi), Ned Kahn, 8,050 m^2, The Technorama park area 15,000 m^2, 2016: +270,000 visitors (Fig. 2)

– Universeum, Public Science Centre, Korsvägen, Gothenburg, 2001 [App. 2][12], architects: Wingårdh Arkitektkontor, Gert Wingårdh, 11,000 m^2, 2012: 615,000 visitors (Fig. 3)

Architectural Shaping in an Industry 4.0 Environment

Arhitektonsko oblikovanje u okruženju Industrije 4.0

In the last five years (2013-2017), Internet of Things and Industry 4.0 have taken the central position in the understanding of the transformational paradigm of industrial development; hence, the methodological as well as the terminological research of these phenomena are dominant in both scientific and professional publicist writing.[13] Within the strategies of corporate management, communication of higher values and agency on local levels have been directed towards forms of dissemination of messages and activities as well as towards development of new programs of special interest for those communities. Within architectural typology we recognize corporate communications platforms as spatial frameworks of those strategies, collaborations of interest partners and their respective programs, which today, in following industrial development trends, employ structures of Industry 4.0 as backbones of values and action modalities. The operation of corporations in the selection of locations for their activities has been recognized (for example: Google data centre, Hamina, Finland[14]) transform the architectonic parameters of housing locations, as well as working, trading and transport locations. For the needs of the case study, three thematic fields have been selected: housing, work, and trading and industrial programs, whereas each of them was illustrated with examples. For the housing field, the case study included: One Tonne Life project, Stockholm & Gothenburg; Sekisui House, Green First Zero,

11 Lessing, 2006; http://www.technorama.ch/en/about-us/technorama/history-and-corporate-form/ [15/6/2016]

12 Universeum, our mission [https://www.universeum.se/hallbar-varld/vart-uppdrag (1/12/2017)]; Universeum [https://www.architonic.com/en/project/wingardhs-universeum-science-center-and-aquarium/5101211 (15/6/2016)]

13 Kagermann *et al.*, 2013; Drath, Horch, 2014; „The increasing integration of the Internet of Everything into the industrial value chain has built the foundation for the next industrial revolution called Industrie 4.0. Based on a quantitative text analysis and a qualitative literature review, the paper identifies design principles of Industrie 4.0. A case study illustrates how the identified design principles support practitioners in identifying Industrie 4.0 scenarios." [Hermann *et al.*, 2016]; Gausemeier, Klocke, 2016; http://www.plattformi40.de/I40/Navigation/DE/Industrie40/WasIndustrie40/was-ist-industrie-40.html [1/12/2017]

14 Basalisco *et al.*, 2017: 5

15 The stated acronyms stand for English abbreviations of various types of infrastructural connections (for example: h2g – house to grid) in systems which, until the technological boom of the Internet of Things [IoT] had not had a possibility to communicate and therefore no possibility to balance or mutually share energy resources ("demand response"). Such connections are particularly important for the development of intelligent cities, cities exposed to extreme environmental conditions as well as during critical periods for urban environments, which had emerged due to natural disasters.

16 Woodward, 1997: 335-344. Cost Effective Design through a Life Cycle Costing – LCC. Originally: "Especially in the last two decades of an increasingly-competitive business environment, dwindling resources and an ever-increasing need to obtain value for money in all areas of corporate activity, it has become essential that all available resources be used optimally [Griffith, J.W. and Keely, B.J., Cost Engineering, 1978: 165-168]. Physical assets form the basic infrastructure of all businesses and their effective management is essential to overall success. It has thus become essential to plan and monitor assets throughout their entire life cycle, from the development/procurement stage through to eventual disposal. Life cycle costing (The concept is not new, and was actively pro-

Fig. 7 Google data centre, Hamina, Finland, 2012, Aalvar Aalto, originally a paper mill, mechanical engineering facility, 1953

Sl. 7. Google podatkovni centar, Hamina, Finska, 2012., Aalvar Aalto, izvorno tvornica papira, strojarnica, 1953.

Saitama; Aktivhaus praxis 41-14, Weiswnhofsiedlung, Stuttgart; NEST Unit UMAR, Dübendorf. With regard to the work field, the case study included: Bosch Research Campus, Renningen; Science Park Getheborg; BMW alpenhotel, Ammerwald; Audi Akademie, Ingolstadt; Office building, Lustenau; House of Logistics and Mobility, HOLM, Frankfurt am Main. For the field of industrial programs and trading, the case study involved: Google data centre, Hamina; Amazon fulfilmentcentres Carteret 2 & Dunfermline; Amazon Go retail chain, Seattle. Fundamental values being disseminated through cooperative activities of the partners on the majority of the stated projects are: balanced transfer and cohesion of various energy sources (creating shared value strategy: h2h, h2g, h2c, c2h, c2g, g2g etc.)[15], general resource optimization in construction programs with low greenhouse gas footprints, impact on changes in life cycles and habits in (experimental) housing programs, recent reassertion of the Life Cycle Costing [LCC] model[16] with the intention to bring about complete recycling in construction and manufacturing procedures, intelligent manufacturing and construction processes management as well as maintenance of plants based on cohesion of sensory data from the Internet of Things, opening new (logistic) models of work settings and business operations of high flexibility and efficiency, by integrating robotics and humans at the same work posts etc. For the field of housing, so far three locations with confirmed values have been researched, as follows:

– Sekisui House, Green First Zero, Saitama, 2012 [App. 3][17], Sekisui, Honda, Toshiba (Fig. 6)

– One Tonne Life project, Hässelby Villastad, Stockholm & Gothenburg, 2010-2011 [App. 4][18], Wingårdh Arkitektkontor AB, A-Hus, Vattenfall, Volvo Cars, Siemens et all (Fig. 4)

– NEST Unit UMAR, Dübendorf, 2017 [App. 5][19], Swiss Federal Laboratories for Materials Science and Technology, W. Sobek, D.E. Hebel, F. Heisel (Fig. 1)

For the field pertaining to work, so far two locations with confirmed values have been researched, as follows:

– Bosch Research Campus, Renningen, 2014 [App. 6][20], SFP Architects, Schwarz Architekten, AIG architectural office, 92,000 m^2 (Fig. 5)

– Office building „2226", Lustenau, 2013 [App. 7][21],Headquarters of Baumschlager

Fig. 8 Baumschlager Eberle Architekten, office building "2226", Lustenau, Austria, 2013

Sl. 8. Baumschlager Eberle arhitekti, uredska zgrada „2226", Lustenau, Austrija, 2013.

Fig. 9 Amazon Fulfillment Centar, Carteret 2, New Jersey, USA, 2016 Employee picking packages with Amazon robotics

Sl. 9. Amazon logistički centar, Carteret 2, New Jersey, SAD, 2016. Djelatnik sortira pakete uz Amazon robotiku.

moted in the UK by the Department of Industry through its Committee for Terotechnology in the mid- to late-1970s. See Sherif, Y.S. and Kolarik, W.J., Omega, 1981, 9, 287-296 for a brief history of the concept.) is concerned with optimising value for money in the ownership of physical assets by taking into consideration all the cost factors relating to the asset during its operational life. Optimising the trade-off between those cost factors will give the minimum life cycle cost of the asset. This process involves estimation of costs on a whole life basis before making a choice to purchase an asset from the various alternatives available. Life cycle cost of an asset can, very often, be many times the initial purchase or investment cost (Hart, J.M.S., Tetrotechnology Handbook, p. 22, HMSO, London, 1978; Hysom, J.L., Journal of PropertyManagement, 1979, 44, 332-337). It is important that management should realise the source and magnitude of lifetime costs so that effective action can subsequently be taken to control them. This approach to decision making encourages a long-term outlook to the investment decision-making process rather than attempting to save money in the short term by buying assets simply with lower initial acquisition cost. It is suggested project managers should familiarise themselves with what the approach involves, to better appreciate how they might then contribute to the enhanced quality decision making which it makes possible."

17 Sekisui House [http://world.honda.com/news/2014/c140521eng.html (21/5/2014)]

18 One Tone Life [http://onetonnelife.se/ (15/6/2016)]

19 Habel *et al.*, 2015; Turning waste into building blocks of the future city [http://www.bbc.com/future/story/20130524-creating-our-cities-from-waste (6/2/2014)]; NEST Unit UMAR [https://www.wernersobek.de/en/projects/material/specials/nest (14/12/2017)]

20 Bosch Center [http://www.sfp-architekten.de/bosch-zentrum-fuer-forschung-und-vorausentwicklung (15/6/2014)]; Bosch Research Campus [http://www.bosch-presse.de/pressportal/de/en/bosch-officially-opens-new-research-campus-in-renningen-42977.html (14/10/2015)]

21 Baumschlager Eberle Architekten, project 2226, Lustenau [https://www.baumschlager-eberle.com/werk/projekte/projekt/2226/ (15/12/2013)]; Schoof, J. [https://www.detail-online.com/article/house-without-heating-office-building-in-austria-16667 (1/4/2014)]

Short Glossary

Kratki pojmovnik

The active systems – Represent a concept of bionic-cybernetic technology of multistat and its ability to establish possible conditions of balance depends on the functioning of the network of semi-stable homeostats. The development of active systems as concepts of mechanical and civil engineering constructions is a result of the technological transfer from series of scientific domains into fields like aviation, robotic factories engineering, artificial intelligence development, engineering of machines and measuring instruments in astronomy.

Adaptation or adaptivity – Refers to the ability to change the properties as a consequence of changed influencing variables.

Corporate Communication Platform – Is a project-based dissemination, representing a collection of procedures which achieve better visibility of the project intentions and results. The partners assembled state their reasons for contribution in an expert field of knowledge, which in the community, along with other approaches, makes the uniqueness of the solution of architectural programs created as communications platform of all associated partners.

Industry 4.0. – The term originates from the strategic program for development of the next generation of industrial plants, manufacturing, research, maintenance servicing, and services based on: ICT foundations, unification of robotics, the Internet of Things, operationalization of data from process conditions recorded in big, digital databases, which in the period 2011-2013 was instigated by the German state as a project dedicated to new ways of high technologies implementation.

Internet of Things [IoT] – Is defined as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

Life Cycle Costing [LCC] – The concept is concerned with optimising value for money in the ownership of physical assets by taking into consideration all the cost factors relating to the asset during its operational life. Optimising the tradeoff between those cost factors will give the minimum life cycle cost of the asset. This process involves estimation of costs on a whole life basis before making a choice to purchase an asset from the various alternatives available.

Place branding – A balanced development of space rely on methods of place branding in the construction and on transfer of images of renewed and sustainable development by creating conditions and infrastructure for investments in economy, culture, industry of tourism and leisure time, labor market that is attractive to professional profiles as well as on differentiation of own market of products, services and utilities. Strategic formation of the image of spatial, designed identity by means of branding contributes to the programs of regional and inter-regional connection. Locally, place branding supports coherent centering of developmental policies for a range of investment cycles: creation of location portfolios, destination branding, development of the infrastructure of educational systems, formation of corporate communications platforms, etc.

Eberle Architekten, Baumschlager Eberle Architekten, 13,138 m² (Fig. 8)

For the field of study pertaining to industrial programs and trade, so far two locations with confirmed values have been researched, as follows:

– Google data centre, Hamina, 2012 [App. 8][24], originally a paper mill, mechanical engineering facility Aalvar Aalto, 1953 (Fig. 7)

– Amazon fulfilmentcentres: Carteret 2, 2016, 74,300 m², USA & Dunfermline, UK, 93,000 m² (Fig. 9)

Ever since 2014, Amazon's logistics-distribution centres in Europe and USA have been transforming places of work and goods distribution by fusioning robotic automation with human work environment in single work stations. The total potential of Amazon Robotics (former Kiva Systems technology) currently comprises 100,000 robotic units on global level. Robotics in logistic centres changes the dimensioning of (mechanical) warehouses by omitting communication corridors for human serving, while hybrid work posts are dimensioned in a way that enables safe coexistence of humans and machines for specific (shared) forms of work processes as well as procedures of human supervision.

Hybridization of work posts in Industry 4.0 increased production efficiency in so-called "real time" (i.e. it decreased costs of operation)[22], disburdened the workers in terms of heavier and repetitive operations and significantly reduced communication work flows, both in factories and in distribution centres. Goods and services delivery terms were cut while at the same time specialization of new work posts is being enabled (at least for now). In the existing system development so far there hasn't been reduction in the number of work posts in Amazon's logistic centres, while at the same time the company's consolidation in trading and goods distribution logistics reduced the number of work posts in the trade department in general.

The development of factories in Industry 4.0 is in its inception phase and as with all branches with new infrastructural ICT integration, exponential growth is expected.

Conclusion

Zaključak

The beginning of the functional flow of the third industrial revolution dates back to the early sixties of the previous century[23]; it unfolded until it reached maturity in the transition of millennia when automation processes in manufacturing started developing vigorously.

Simultaneously, social and scientific engagement in issues pertaining to ecologic and environmental conditions of the civilization were at work (starting with the Club of Rome and so forth...).

Within the framework of the paradigmatic context of informatization, pedagogy in architecture has been following that development in technical terms since the nineties of the previous century (remote learning, digitalization of study corpus, development of software tools for designing more complex forms, multi-parameter design, dynamically generated environment etc.). With the inauguration of Industry 4.0 and the Internet of Things, architectural programs and design fell partly under the influence of cybernetization of physical systems (Cyber Physical Systems) and phenomena of the environment falling within the scope of construction procedures are observed in a more complex manner under modalities of sustainability. All of the above is a new framework within which forms of dissemination of knowledge and operational strategies are being transformed. Corporate communications platforms are being inaugurated.

The new programmatic context in architecture (for example, presenting knowledge in the natural and technical sciences) changes architectural plans of cultural institutions in terms of content; experiments are rendered with various solutions for housing spaces while places of work and manufacturing change the logistic infrastructure as well as the spatial shapes of work units.

Corporate communications platforms in the environment of the Internet of Things is an initial research of transformation of architectural programs and place compositions, dimensioned with a case study for the stated phenomena, within which so far nine out of thirty anticipated examples from thematic fields have been elaborated (institutions in culture, housing, work, and industrial manufacturing). The representative quality of the show-case examples is explained in an introductory text, and they are presented with graphical, study corpus as well as with an appendix of source texts in expanded format.

[Written in English by author; proof-read by prof. Slavica Košća-Vrlazić]

22 Cline, 2017
23 Mindell, 2011

Appendix

Dodatak

The need to present the broadly quoted texts in the appendix mainly emanates from the particularities in which corporate statements (with examined programs) include bigger number of stakeholders in the realization of architectural solutions as equal partners. The author positively evaluates the methods and circumstances of their emergence, the aspect of leadership in promoting the responsibility of architectural design towards the social values of sustainability. At the same time, these pilot projects represent the maximum quality of newly implemented architectural programs available in the market today. In the realisation, it is a project-based dissemination, representing a collection of procedures which achieve better visibility of the project intentions and results. The partners state their reasons for contribution in an expert field of knowledge, which in the community, along with other approaches, makes the uniqueness of the solution of architectural programs created as communications platform of all associated partners. It was assessed that bigger number of fragmentally quoted sources of study corpus would dissolve the focus and emphasize the integrative nature of the methods of agency employed by partners actively involved in the examined projects. At the same time, some of the highlighted show-cases are experimental programs or pilot projects realized in the last five years, and there are no more significant or independent sources related to them, apart from the existing corporate information. In that context, presentation followed with broadly quoted texts is deemed valuable. The author italicized particularly important parts of the corpus from the study corpus.

App. 1[11]

Swiss Science Centre Technorama – As early as 1947, an organisation was established for the foundation of a technical museum for Switzerland, and potential exhibits were collected, principally redundant pieces from industrial firms in the region, and from what was described at the time as the ”golden triangle” of Swiss mechanical engineering – Winterthur, Zurich and Baden. VTW Vereinigung Technorama und Wirtschaft (Association Technorama and Economy), which is the economic patron association for the Swiss Science Centre Technorama. *Currently, there are over 30 known industrial and service companies in the association.* In 1969 a foundation was set up called ”Technorama of Switzerland” with a supplementary purpose document, ”Science and Technology in a living Exhibition”. The intention was obviously to set up an exhibition which would permit a wide public to have direct experimental contact with particular topic areas. 1982 saw the opening of an exhibition which was very conventional and technical museum-like, with a large amount of verbal material, mainly in the form of an audio-visual ”superstructure”. *In 1990, however, an entirely different model was adopted which was inspired by the leading science centres in the USA and England* (the Exploratorium in San Francisco and the Exploratory in Bristol). The theoretical basis of an interactive science centre had been substantially worked out by Frank Oppenheimer (USA) and Richard Gregory (UK), together with publications by Steve Pizzey (UK) and a comprehensive collection of reports and evaluations by the American ASTC (Association of Science and Technology Centres). *In addition, the work of the German educationist, Hugo Kuekelhaus (1900-1984) was a great influence on the way in which stimulating exhibits were to be designed and built.* In the following decade (up to 2000), the dusty museum was systematically transformed into the current science centre – a diverse, atmospheric experimental area dedicated to informal learning, with a strong element of play. *Technorama was establishing itself as an increasingly indispensible ”Oasis” in the field of extra-curricular science education.* In 1999 *VTW promotes the understanding and enthusiasm of young people for science and technology, thus supporting the preservation and expansion of modern science and economy.* For this purpose, it provides the Foundation Technorama financial Funds available for the extension and renewal of the Swiss Science Centre Exhibition, for the execution of workshops and laboratory courses, as well as for the intro-and continuing education services for teachers. VTW does not pursue commercial purposes and does not seek profit. Architecture*: The core of the project is a new access axis running through the Technorama. This elongated space functions simultaneously as the foyer, entrance, rest space, communication place, orientation aid and acts as a distinguishing feature. The space is architecturally formed as a rectangular tube, both ends of which symbolically jut out of the building and mark the entrance from the forecourt and the park.* The entrance façade is designed by the Californian artist Ned Kahn.

App. 2[12]

Universeum, Public Science Centre – Founders: Universeum AB is owned by the Korsvägen Foundation. The foundation consists of Chalmers University of Technology members (Gothenburg University), the Göteborg regional councils, West Swedish Chamber of Commerce (Vastsvenska handelskammaren). Partners: AkzoNobel, APS, AstraZeneca, BASF, Cybercom Group, Ericson, Folk-Tand-Varoen, Hans Anderson Recycling, Hogia, Jordbruks verket, Milk, SAAB, SERNEKE, SKF, Swedbank, Tripnet, Volvo, Vastra Gotalandsregionen. Universeum is a public science centre and museum. Universeum is a non-profit organisation. *As a science centre, we have an important role to play in strengthening Sweden's skills and ability to transform into a sustainable society. Knowledge is doubtless the key to solving that challenge. Knowledge is also what our mission is about: Universeum is a public arena for lifelong learning where children and adults explore the world through science and technology.* We create experiences that enhance creativity and innovation, increase knowledge and activate critical thinking. With science as a foundation and an education that engages, we challenge people to enrich their lives and act for a sustainable world. *Having been an inspirator who interests children and young people in science and technology, we are now advancing to becoming an actor who transforms people and challenges them to engage in global work for a sustainable world. Universeum has over half a million visitors each year.* It not only makes us the most visited science centre in the Nordic region, but also an important force in society. *Together with our founders and partners, we strengthen the supply of skills and contribute to sustainable development.* Architectural concept: Wingårdh decided early on that the building would need to be a general, flexible volume. At the bottom of the hill, adjoining the street would be the ”wooden nave,” the great general volume inspired by Wanås. Above this, the sprawling ”glass stair,” a glass-roofed rainforest, would cover most of the hillside. In the middle of the complex lies a massive ”stone chest” that holds the aquariums. At the top is a transparent volume that will house an exhibition on Swedish landscapes. A vast roof hovers over the complex, dominating together with the wooden nave the appearance from Korsvägen. Circulation through the 10,000 square meter science centre is from the top down. *The complex produces its own energy nearly to the point of self-sufficiency and has advanced systems for recycling water and waste products. These systems serve a highly pedagogic purpose: the building itself is an integral part of the educational project.*

App. 3[17]

Sekisui House – Toshiba and Honda Embody 2020 Lifestyle of the Future with Real-World Smart House. Three Companies Conduct Joint Demonstration Testing Toward Practical Applications of Their Smart Community Technologies; Sekisui House, Ltd., Toshiba Corporation and Honda Motor Co., Ltd. have jointly built a new demonstration test house in Saitama City, Japan, and have begun verification of the advanced lifestyle with their information technologies, personal mobility and energy management technologies designed to realize comprehensive control over supply and demand of energy for houses, mobility products and community. The new demonstration test house is a fully liveable two-family house designed to further advance technologies in real world that will support future life by testing new technological challenges such as the mutual supply of electricity and hot water generated in the two households, non-contact recharging of an electric vehicle, electric supply from the vehicles to the home and community, and the creation of the residential space that enhances the usability of personal mobility products. For example, surplus electricity by photovoltaic generation in one of the two households can be used in another household. Striving to realize a future where people can enjoy a safer, more comfortable, more convenient and more fun lifestyle, the three companies have been proactive players in the area of promoting the realization of a smart community. *Under a brand vision of ”SLOW & SMART”, Sekisui House has been promoting various initiatives to utilize advanced technologies for a comfortable and enjoyable lifestyle. While envisioning popularization of ”net zero-energy” houses in 2020, Sekisui House has been offering a smart house, under the brand name of ”Green First Zero,” which is equipped with various energy creations and saving technologies optimally controlled by HEMS (home energy management system). In order to accomplish a stable energy supply and creation of comfortable and efficient living space, Toshiba has* *been offering solutions that combine energy devices, smart home appliances and cloud services. Such solutions have been provided in a broad range of forms from household appliances for a household to the demand-response demonstration for a community which connect houses and the community.* Striving to realize "the joy and freedom of mobility" and "a sustainable society where people can enjoy life", *Honda built two demonstration test houses in Saitama City in April 2012 and Honda Smart Home US in California, and has been verifying the effectiveness of its energy management technologies which enable in-house energy production and consumption*. Honda also has been studying the ideal future of personal mobility. *Moreover, in November 2013, the three companies jointly exhibited at the SMART MOBILITY CITY 2013, an organizer-themed project held within the venue of the 43rd Tokyo Motor Show. Through this exhibit, the three companies collaborated beyond the boundaries of industries and proposed a future lifestyle where houses, electric appliances and automobiles are linked to one another. This time, the three companies envisioned an enjoyable lifestyle that is sustainable throughout the course of a person's lifetime, as well as a 2020 lifestyle of the future where houses and mobility products emit zero CO_2, and such lifestyles were embodied in the newly-built fully liveable two-family demonstration test house.* Utilizing this new test house, the three companies will conduct various verification tests with the aim to establish technologies that realize a futuristic lifestyle and to put such technologies into practical use.

App. 4[18]

"One Tonne Life" is a project where A-hus, Vattenfall, Volvo Cars and cooperative companies create a climate-friendly household. A chosen family of children will try to get to the emission level a ton of CO_2 per person per year and still live a normal life. To help them, they get a climate-smart house with solar cells on the roof that supplies the house with electricity and "tanks" the electric car on the garage uphill. A Hous ooden house manufacturer A-house wants to lead the development of climate and energy-efficient housing solutions. The goal is to make climate-smart wooden houses widely available on the market. Vattenfall is currently working in several projects to develop *smart power grids* and energy solutions for households in terms of energy efficiency. An important part is to visualize energy use in the home. In "One Tonne Life", Vattenfall contributes, among other things, to new technology for measuring family electricity consumption in real time. "One Tonne Life" gives Volvo Cars an opportunity to study how the Volvo C30 Electric car fits into a modern family's living environment. The family's use of the car will show what is required for a battery-driven car to be attractive and cost-effective to drive and own. Industry partners: Siemens: Approximately 50% of household energy consumption at home goes to the appliances. Thus, there is a very high energy saving potential for a family in using climate-friendly energy-efficient appliances. Siemens contributes with innovations and new technology in the One Tonne Life household, so the family, taking into account the environment, does not need to compromise on its convenience. Over the past 15 years, Siemens has reduced the energy consumption of appliances on average by between 40 and 80 percent – and the figures for energy and water consumption in the most efficient devices are world-class. *One Tonne Life gives ICA the opportunity to find new ways of communicating so that customers are committed to making significant choices both in the store and at home.* Other partners: Chalmers is a technical university that studies and educates on a wide front in technology, science and architecture. *Chalmers has contributed to One Tonne Life by developing a method for calculating the family's greenhouse gas emissions. In addition, the university's researchers perform emissions calculations and factual parts of the material within the project.* Stockholm's city has a long tradition of ambitious climate work that led to reduced greenhouse gas emissions. The goal is to reduce emissions per inhabitant in Stockholm by almost 44 percent from 1990 levels to three tonnes of greenhouse gases in 2015. By 2050, the goal is that Stockholm will be a fossil fuel-free city.

App. 5[19]

NEST Unit UMAR – The Urban Mining & Recycling [UMAR] Experimental Unit is part of the NEST research building on the campus of the Swiss Federal Laboratories for Materials Science and Technology (Empa) in Dübendorf, Switzerland. The building design created by Werner Sobek in collaboration with Dirk E. Hebel and Felix Heisel demonstrates how a responsible approach to dealing with our natural resources can go hand in hand with appealing architectural form. *The project is underpinned by the proposition that all the resources required to construct a building must be fully reusable, recyclable or compostable. This places life-cycle thinking at the forefront of the design: Instead of merely using and subsequently disposing of resources, they are borrowed from their technical and biological cycles for a certain amount of time before being put back into circulation once again.* Such an approach makes reusing and repurposing materials just as important as recycling and upcycling them (both at a systemic and a molecular/biological level, e.g. via melting or composting). *This conceptual emphasis means that UMAR functions simultaneously as a materials laboratory and a temporary material storage. The following approaches lie at the heart of the design: – Temporary removal and borrowing instead of permanent acquisition and disposal; – Maximal modularisation and prefabrication; – The potential for all materials and products to be extracted cleanly, separated out and sorted. The building, which is created on the basis of a modular construction concept, is fully prefabricated and tested in the factory. The supporting structure and large parts of the façade consist of untreated wood, a material that can be reused or composted after the building is dismantled. The façade also includes aluminium and copper, two types of metal that can be separated out cleanly, melted down and recycled. The interior of the unit contains an extremely diverse range of serially manufactured building products whose various constituent materials can be separated out and sorted before being introduced back into their respective materials cycles without leaving behind any residue or waste.* Among the technologies used here are cultivated mycelium boards, innovative recycled bricks, repurposed insulation materials, leased floor coverings and a multifunctional solar thermal installation. *Visitors can learn about all of the materials and products used in the project at the entrance to the unit and in the dedicated materials library. The UMAR unit is not just a material storage, but also a public repository of information that is intended to serve as a model example and a source of inspiration for other building projects. UMAR wants to make a contribution to the paradigm shift that is required in the construction industry. The module functions both as a laboratory and a test run for sustainable building projects and the processes associated with them. In collaboration with partners from the worlds of planning, administration and production, the unit's goal is to examine resource consumption and the key issues in the construction industry and use its insights to develop a range of innovative tools and approaches.*

App. 6[20]

A completely new work environment for creative minds: with its Renningen research campus, Bosch wants to encourage interdisciplinary collaboration, and in this way further enhance its innovative strength. At the new centre for research and advance engineering on the outskirts of Stuttgart, some 1,700 creative minds are doing applied industrial research. The campus brings together many disciplines from science and technology. Whether electrical engineering, mechanical engineering, computer science, analytics, chemistry, physics, biology, or microsystems technology – in Renningen, a total of 1,200 associates in corporate research and advance engineering, plus 500 PhD students and interns, are now working on the technical challenges of the future. *Up to now, these researchers were spread over three locations in the greater Stuttgart area. In the special campus atmosphere, Bosch's pioneering minds will work on both new products and innovative manufacturing methods.* Their work will focus on areas such as software engineering, sensor technology, automation, driver assistance systems, and battery technology, as well as on improved automotive powertrain systems. *One area that is becoming increasingly significant is software expertise – particularly for IoT connectivity.* Apart from the main building, eleven laboratory and workshop buildings, and two buildings for site maintenance, there is also a modern proving ground for testing driver assistance systems. *A networking matrix was used to determine who should occupy the individual buildings. It was based on analyses of how intensively individual disciplines exchange information with each other: The closer units work together, the shorter the physical distance between them on the new campus.* Bosch paid particular attention to working conditions in Renningen. Whether inside or out, the researchers will encounter a modern work environment. *Essentially, the entire campus is a workplace.* "Brainwaves in the fresh air, technology at the water's edge – all this is possible here in Renningen" Denner said (Volkmar Denner, chairman of the Bosch board of management). Wi-Fi connections are available in every building and everywhere on the grounds. Laptops, tablet computers, and voice over internet mean that work can be done in every corner of the campus. *Office layouts have been designed on the basis of a comprehensive analysis of the innovation process.* When they are exploring ideas, researchers need to have peace and quiet. Later on, exchange and collaboration with others take on more importance. These phases, as well as associates wishes, were considered when planning the complex. *The result of the joint consultation with everyone involved was a completely new office concept.* Apart from individual workplaces, 270 meeting rooms of various sizes are the salient characteristic – meaning that there is sufficient room for both focused activity and teamwork. On average, each associate is just ten meters away from the nearest meeting room, and thus possibly also from the next innovative breakthrough.

App. 7[21]

Headquarters of Baumschlager Eberle Architekten – Although modern buildings require less and less energy, the effort required for maintenance and servicing is becoming ever greater... What can humans regulate if they do without any heating, ventilation and cooling systems in an office building? The answer is 2226 and is in the Millennium Park Lustenau. More than just architecture. And a not arbitrarily chosen name: in the 2226 rule constantly between 22 and 26 degrees. *The heat sources in the house are those that are present anyway: the users themselves – each person has an average heat output of 80 watts – as well as the lighting, computers, copiers and even coffee machines. Living with the elements: In the perfect room climate, noticeable well-being is fulfilled by the calculated angles of incidence of the sun and the intelligently controlled flow of the wind. In high rooms and clearly structured architecture unfolds a generous, light-filled atmosphere.* Behind it the technical vision: based on the findings of more than 35 years Baumschlager Eberle Architekten. Through reduction, lower construction costs, low energy costs, more natural climate and thus more well-being. *In winter, the waste heat of all heat sources ensures a pleasant room temperature. Interior-hinged, sensor-controlled ventilation windows of the windows open automatically as soon as the CO_2 content or the temperature in the room rises. In summer heat, the wings open at night to cool the 2226 with natural drafts. The climate system sensors can be bypassed and the air vents operated individually by hand. The necessary thermal stability of the building is provided by the thermal mass: as an elementary means of architecture, the outer walls (76 cm) are divided into 38 cm static and 38 cm insulating brickwork.* The walls were given a smooth lime plaster on both sides, which on the outside becomes increasingly harder and dirt-repellent under the sun during the course of time. A first glimpse into the future of the 2226 concept, which will last a long time as a building built with quality materials, with a life span of 200 years. *First, however, 2226 will be a model for new thinking for a long time to come...*

Naturally "2226" is not really a passive house, even if the outer walls with their U value of approx. 0.14 W/m^2K could well meet this standard. Yet although the triple-glazed windows with their completely insulated frames (assuming that 78 centimetres of brickwork can be regarded as insulation) are also approved element in the passive house construction kit, the office building in Lustenau has no heat recovery ventilation system. Instead the architects opted for window-based or rather shuttered aeration in the form of vent shutters in the façade. These are operated by either mechanical or software-controlled means to ensure a sufficient supply of fresh air both independently of the users on the one hand, and to prevent the building from cooling out in winter or overheating in summer on the other. Sensors automatically open the vents whenever the carbon dioxide content of the indoor air exceeds a certain level, and on summer nights the building is also "bathed" in fresh air for a cooling effect, whereby the large high-ceilinged rooms (4.21 metres on the ground floor and 3.36 metres in the upper storeys) support the circulation of air throughout the building. The users can override the automatic control system whenever desired to open the vents themselves, but closing takes place automatically. As Willem Bruijn, Managing Partner at be baumschlager eberle, explains, the house without heating indeed reacts sensitively to oversights. What with high-ceilinged rooms and brick walls 76 centimetres thick, "2226" uses the attributes that many people value in housing typical of the late 19th century. Yet as proved by the window control system alone, the building naturally does not simply return to 120 years ago on a structural design level. Nor does the edifice manage without the 20th-century achievements of construction chemicals in building materials. The flat roof has a classical superstructure made up of sealing foil, 30 to 40 centimetres of Styrofoam tapered insulation and a gravel layer, and the shutter vents in the facade have vacuum insulation panels on the inside and thus the most efficient system that the insulation branch currently has to offer. *"2226" is a simple building – and like so many other simple buildings is the result of a thought and planning process that was all the more complex and multifaceted. The architects soon realised that the calculation standards that form the base of performance certificates would not be of much help since they do not adequately model either the building's enormous thermal storage mass or the true heat loss caused by the automatic aeration system. Rather, the architects relied on their experience first and foremost in their design – and on dynamic simulation calculations done for them by experts from the U.S.A. Shortly after its completion, the new building by Baumschlager Eberle had become a much-visited object of identification for architects and many other construction professionals.* In a day and age caged in by regulations and constraints, a day and age with a longing for the luxury of simplicity and a growing appreciation of immaterial values, it seems to touch a nerve. The luxury of "2226" can be seen in its generous interior spaces, its use of high-quality materials and the awareness of working in a building designed for a lifespan of 200 years. Luxury can also be seen in the 76-centimetre-thick outer walls, which would undoubtedly be out of the question for downtown investment projects in which every rentable square centimetre counts. Yet "2226" wasn't expensive to build: Willem Bruijn puts the construction costs according ÖNORM 1801, not including fixtures and furnishings and the costs of the property, at Euro 950/m^2 net. In other words, the architects offset the costs of the enormous room heights, the additional thermal mass and the longevity compared to an average building by dispensing with technical equipment.

App. 8[14]

Google data centre, Hamina – From paper mill to data centre. In March 2009, we purchased the Summa Mill from Finnish paper company Stora Enso and outlined our plans to convert the 60 year old paper mill into a data centre. After investing an initial €200 million, we completed the first phase of the project in September 2011. More than 2,000 individuals working for 50 companies (mostly Finnish and from the local area) contributed to the project. In August 2012, we announced an additional €150 million investment in Phase II of the data centre, which will involve the restoration and conversion of an Alvar Aalto-designed machine hall. We expect the conversion to last approximately 18 months and to provide work for approximately 500 engineers and construction workers. The facility is one of the most advanced and efficient data centres in the Google fleet. Our high-tech cooling system, which uses sea water from the Bay of Finland, reduces energy use and is the first of its kind anywhere in the world. Why did Google choose Hamina? Hamina has the right combination of energy infrastructure, developable land and available workforce for the data centre. We had the unique opportunity to salvage an old paper mill in Hamina and use the pre-existing infrastructure to build a data centre there. First, data centres create jobs in remote areas that include IT technicians, electrical and mechanical engineers, catering, facilities and security staff. Second, the signalling of a large and well known company (such as Google) investing in a region can influence others to invest there too, by confirming the presence of skills, suppliers and resources that other investors are also looking for. Google's presence is used actively by regional development entities to promote further investments in the regions. Third, research has found that large multinational companies' hold technical, operational and managerial knowledge that can improve the productivity of local suppliers through knowledge spill-overs and market-size effects. Google's data centres demonstrate this research finding; their presence, training and their business increases the local suppliers' productivity and competitiveness. Last, Google supports the local data centre community, for instance, through grants. Almost EUR 3 million in grants has been donated across Europe over the past few years. Google also supports communities via teaching collaborations in local colleges, which builds the local skills base. Google's data centres are leaders in energy efficiency in Europe. Over the years, Google has been able to reduce its energy dispersion indicator (power usage effectiveness, PUE) to an average 1.12.6 The European data centre sector average is much less efficient at 1.70. If data centres in Europe were as efficient as Google, electricity consumption would drop every year by around 26 TWh (the equivalent of the electricity consumption of all Polish households).

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Fig. 7 Google, Connie Zhou
Fig. 8 Jakob Schoof: https://www.detail-online.com/article/house-without-heating-office-building-in-austria-16667/
Fig. 9 Amazon, Eric Slomanson

Summary

Sažetak

Arhitektonski programi kao komunikacijske platforme korporacija

Razvoj novih arhitektonskih programa koji se prepoznaju kao komunikacijske platforme korporacija u okruženju interneta stvari i industrije 4.0 proizlaze iz strateškog projekta razvoja sljedeće generacije industrijskih pogona, proizvodnje, istraživanja, servisa i usluga (npr. diseminacije znanja i integracije mjesta za istraživanje i razvoj) temeljenih na ICT osnovama, na objedinjavanju robotike, interneta stvari, asimilaciji i operacionalizaciji podataka iz digitalnih baza. Internet stvari razumijeva se kao globalna infrastruktura za informatičko društvo s potencijalima razvoja naprednih programa, proizvoda, servisa i usluga nastalih na interakciji međusobno povezanih stvari. Operacionalizacija tih aktivnosti zahtijeva poticanje opredjeljenja za stjecanje prirodoslovno-tehničkih znanja i studija u generacijama novih radnih naraštaja, a za potrebe razvoja i istraživanja u okruženju industrija 4.0. Posredno dolazi do transformacije arhitektonskih programa, kompetitivno projektiranih identiteta mjesta kao dijelom nositelja tih aktivnosti.

U sklopu paradigmatskog konteksta informatizacije, pedagogija u arhitekturi pratila je postupno taj razvoj u tehničkom smislu od devedesetih godina prošloga stoljeća, i to konstituiranjem učenja na daljinu, digitalizacijom studijske građe, razvojem softverskih alata za projektiranje složenih oblika, parametarskim dizajnom i dr. Komunikacijske platforme korporacija u svojoj arhitektonsko-programskoj složenosti i pojavnosti najavljuju trendove u izboru lokacija za svoje aktivnosti, transformiraju se arhitektonski parametri mjesta stanovanja, rada, trgovine i transporta. Suvremena diseminacija prirodoslovno-tehničkih znanja u funkciji formiranja identiteta mjesta ostvaruje se putem novih arhitektonskih programa i tipološki realiziranih kao mjesta (muzejskih) destinacija i/ili tematskih parkova, istraživačkih centara i kampusa posebnih namjena. Na temelju odabranih primjera studije slučaja potvrđuje se tendencija razvoja institucija prema većem broju nositelja integracije, promjena arhitektonskih programa, tj. kompozicije projektiranja i muzeoloških koncepata na način da su osnovane ili razvijene putem javno-privatnog partnerstva fakulteta, istraživačkih centara, industrije i državne/regionalne uprave, te da diseminaciju znanja iz prirodnih i tehničkih znanosti provode s vizijom osposobljavanja novih naraštaja u funkciji postizanja radno usmjerenih kvota partnerskih im industrija.

Uvjetovana promjenom nositelja programa, muzeološka prezentacija visokog stupnja interaktivnosti odvija se u pravilu u ambijentima izrazito otvorenih i perspektivno sagledivih planova. Arhitektonski program i kompozicija plana u cijelosti su podređeni misiji diseminacije znanja, stoga arhitektonski format u svojoj pojavnosti preuzima ulogu komunikacijske platforme. U sklopu strategija korporativnog upravljanja, komunikacija viših vrijednosti i djelovanja na lokalnim razinama usmjerena je na oblike diseminacije poruka i aktivnosti te razvoj novih programa od posebnog interesa za te zajednice. Radi se o projektnoj diseminaciji strategija i vrijednosti kao skupu postupaka kojima se postiže bolja vidljivost namjera i rezultata postignutih u (eksperimentalnim ili pilot) projektima. Partneri na projektu ugrađuju svoj doprinos iz ekspertnog područja znanja koji u zajednici s ostalim pristupima čini jedinstvenost arhitektonskih rješenja nastalih kao komunikacijska platforma svih pridruženih partnera.

U tipologiji arhitekture prepoznajemo komunikacijske platforme korporacija kao prostorne okvire tih strategija, kooperacije interesnih partnera i pripadnih programa, a koji danas, slijedeći trendove industrijskog razvoja, barataju sa strukturama industrije 4.0 kao jednom od okosnica vrijednosti i modaliteta djelovanja. U studiji slučaja prepoznata su djelovanja korporacija u izboru lokacija aktivnosti, u kojima se višestruko povezuju društveni, kulturološki, radni i okolinsko-klimatski potencijali zajednice (npr. Google spektar aktivnosti u Finskoj/Hamina i suradnja s Fondacijom Aalvar Aalto).

Za potrebe studije slučaja izdvojena su tri tematska područja – stanovanja, rada te trgovine i industrijskih programa, od kojih je svako prezentirano primjerima. Dosad je obrađeno devet slučajeva po odgovarajućim segmentima od ukupno predviđenih tridesetak. Temeljne vrijednosti koje se diseminiraju kooperativnim djelovanjem partnera na većini navedenih projekata jesu: balansirani prijenos i kohezija različitih energetskih izvora, opća optimizacija resursa u programima izgradnje s niskim otiscima emisije štetnih stakleničkih plinova (koncepti zgrada gotovo nulte energije), utjecaj na promjene u životnim ciklusima i navikama pri platformama stanovanja, recentna reafirmacija modela cjenovno efektivnog dizajna kroz procjene cjeloživotnog vijeka građevina, inteligentno vođenje procesa u proizvodnji i održavanju pogona temeljem kohezije senzorskih podataka interneta stvari, otvaranje novih (logističkih) modela radnih ambijenata (kampusa) i poslovanja visoke fleksibilnosti i efikasnosti integriranjem robotike i čovjeka na istim radnim mjestima i dr. Robotika u logističkim centrima mijenja dimenzioniranje skladišta roba, a hibridna radna mjesta dimenzioniraju se tako da omogućavaju sigurnu koegzistenciju ljudi i strojeva (robota) za specifične (dijeljene) oblike radnih procesa, kao i postupke ljudskog nadzora. Hibroidizacija radnih mjesta u industrijama 4.0 povećala je efikasnost proizvodnje u realnom vremenu i bitno smanjila komunikacijske tijekove rada. Razvoj tvornica industrije 4.0 na samim je početcima pa se, kao i u svakoj od grana s novom infrastrukturnom ICT integracijom, očekuje njihov eksponencijalni rast. Novi programski kontekst u arhitekturi sadržajno mijenja arhitektonske planove institucija, eksperimentira se s rješenjima u prostorima stanovanja, energetskom interakcijom stambenih jedinica, zajednica i susjedstva, dok mjesta rada i proizvodnje mijenjaju logističku infrastrukturu, kao i prostorne oblike radnih jedinica.

[Autor]

Biography

Biografija

Aleksandar Homadovski, Ph.D., full professor. He obtained his Ph.D. degree in 1994 from the Faculty of Architecture in Zagreb. In 1997 he completed his postdoctoral studies in Ljubljana with the thesis "Virtual University Case Study – with the application on vernacular architecture". He published more than thirty scientific and professional papers. He has authored or co-authored some forty architectural designs and competitions.

Dr.sc. **Aleksandar Homadovski**, redoviti profesor. Diplomirao je 1983., a doktorirao 1994. godine na Arhitektonskom fakultetu Sveučilišta u Zagrebu. Završio je 1997. poslijedoktorski studij s tezom „Virtual University Case Study – with the application on vernacular architecture" u Ljubljani. Objavio je više od trideset znanstvenih i stručnih radova. Autor je i koautor četrdesetak arhitektonskih natječaja i projekata.