

DDR STATEMENT

Design driven research is research that combines theoretical and interdisciplinary methodology with design reflection and personal experience. In this research the phenomenon of working from home has been observed from three perspectives: social, architectural and economical. The first part of research analyzes the context in which work from home occurs, statistical indicators, user groups and the needs and problems identified so far. The second part analyzes the spatial aspects of working from home, through a theoretical framework and a comparison of case-study examples. The scenario verification method was used to consider the level of adaptability of the space to achieve the dual function of housing and work. Three basic models are established and graphically described with space-function disposition model. In further research those models will be tested and reflected on through design proposals.

ABSTRACT

The topic of the proposed research is the impact of digital technologies and new forms of work on spatial and functional organization of housing. We create new patterns of living by overlapping family life, work and leisure. These changes have encouraged more people to work from home with an emphasis on flexibility and work mobility as the most desirable characteristics. The purpose of this research is to observe the relationship of functionality, spatial strategies and possibilities of use with particular reference to multi-storey housing. Although each space can be used in several ways, e.g., a bedroom can be used as a study room, this paper will focus on examples purpose-built for both living and working. Six case-study examples are analyzed and compared to determine basic principles of integration of home-based workspace in multi-storey buildings. The challenge is to create a proactive community in the immediate vicinity, encourage small business and create alternatives that include collaboration and multiple use of space.

MULTI-STOREY HOUSING AS A PLACE OF WORK

The dwelling is a mirror of the lifestyle of its users. Every progress brings new patterns of life that affect changes in the programming and design of living space. The digital revolution has changed the way we communicate, work and live. With the development of the Internet and smartphones, physical distance has been replaced by virtual networking. We create new patterns of living by overlapping family life, work and leisure. (1) These changes have encouraged more people to work from home with an emphasis on flexibility and work mobility as the most desirable characteristics.

So far, both the advantages and disadvantages of working from home in the existing spatial environment have been recognized, but no complete solution and characteristics of a space that would be suitable for working from home to meet all the needs and spatial criteria of a normal workplace have been offered. The purpose of this research is to observe the relationship of functionality, spatial strategies and possibilities of use with the aim to form architectural criteria that would meet the multiple needs of users.

Work from home is divided into three categories: home-based business, teleworking and occasional teleworking. The first refers to business entities that are registered or performed at the owner's residential address and make 6% of adult employees in Croatia, and average of 15% in EU (2) Teleworking refers to work for an employer permanently or occasionally away from a traditional workplace, and there is a total of 20% of such employees according to 2015 statistics (fig.02). Out of these, approximately 9% of employees work permanently or very often from home, while 11% of them work from home more than once a week. (3) The most represented sectors are knowledge-based: information and communication sector, buildings, business services and creative industries, and young people age 19-21 make 21%. (2) These are also sectors that show a tendency to increase the number of employees in the overall population. The proposed research will be based on work from home of the listed sectors. Such forms of work are associated with mobility, unbureaucratic jobs and temporary employment. (4) Although productivity at home has proven to be higher and overall worker satisfaction is high, (5) some of the frequently highlighted problems are social isolation and lack of space for formal and informal meetings and a generally weak social and business network. (6) Some of the most frequently mentioned benefits are lower labor costs, better scheduling of business and private responsibilities, flexibility in working hours and flexibility in childcare as well as savings time to go to work. (7)

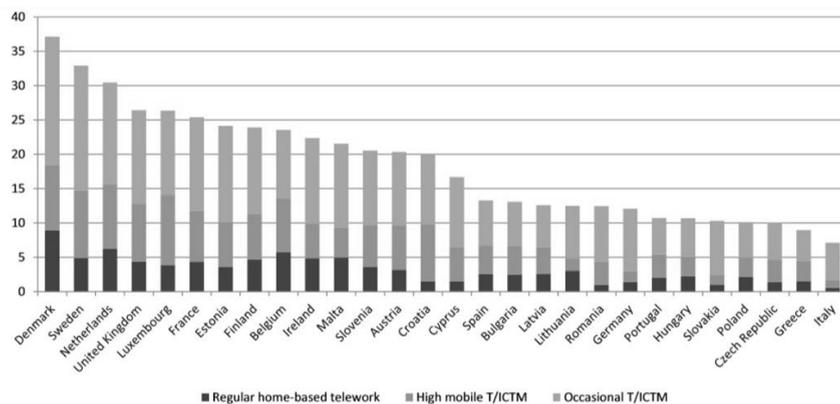


fig.01 Percentage of employees doing T/ICM in the EU28, by category and country (source: EWCS 2015.)

In 2017, European 14 offers "Productive city" as the theme of the competition, with the thesis that by accessing an apartment building as a place of active heterogeneous community, we can create a basis for better networking of the local and global economy. By mixing housing and work, we return production (in terms of creative industries and knowledge production) to the heart of the city and create new opportunities for social interaction, urbanity and sustainable use of space. (8) In 2019, the company JPG presented the architectural and design competition "Workspaces for tomorrow" with the aim of thinking about the future of the workspace in the age of digital technologies. (9) The given examples are indicators of the aspiration for positive integration of workspace at home. The challenge is to create a proactive community in the immediate vicinity, encourage small business and create alternatives that include collaboration and multiple use of space.

The dual function of the living space in which work from home takes place can be determinate or indeterminate. (10) Although each space can be used in a number of ways, e.g., a bedroom can be used as a study room, this paper will focus on examples purpose-built for both living and working. The relationship between function and use, and spatial strategies, was first observed through theories dealing with changeability within a living space, and then through projected examples.

„As explained in Frame and Generic Space (Leupen, 2006, p. 18), we are faced with a contradiction in terms: the more precisely we are able to decide what requirements a dwelling should meet at the start of its life, the greater the likelihood of a discrepancy arising between the dwelling and its future use. The more precisely architects were able to define the measurable aspects of living and convert them into a design, the more the design neglected the unquantifiable and non-measurable aspects and the less able it was to provide an answer to unpredictable changes in use.“ (11)

N.John Habraken presents in his book 'Supports: an Alternative to Mass Housing' (1972) the theory of *Support and Infill*. He argues that the architect should offer a permanent spatial framework in terms of the structure of the building, and in collaboration with the user, work on a spatial disposition that is changeable. (12) He is the originator of a design model that accepts the changeability of user's needs. A similar approach is taken by Stuart Brand, who describes 6 layers of a building and the associated durability in his book *How building learn*. Brand also emphasizes the need for the architect to anticipate future use. (13) Steane and Steemers (2013) describe such a design method as Scenario-Buffered Design. When designing, the architect reviews several different possible future scenarios that can be realized when using the space. (14) The importance of these theories lies in the role of an active participant of the user versus traditional design models that treat living space monofunctionally.

During the research of work from home F. Holliss establishes the relationship between dominant function, spatial project strategies and ways of use. Continuing the work of Dolen T. who establishes three types of housing and work units based on numerous examples from practice: the type dominated by home, the type of equal status and the type dominated by work. The research was performed in 86 houses where it has been lived and worked. Topics good to consider when designing a residential space with a dual function have been identified: 1. flexibility, 2. determinacy, 3. public / private 4. visibility 5. noise pollution, 6. clean / dirty, 7. warm / cold, 8. inside / outside, 9. storage. (10) Since the research is about individual housing, these topics are part of the design process between the architect and the investor / user and does not affect the determination of the type.

Methodology

The focus of this research is placed on apartment buildings that are more complex systems, with multiple types of users, where the investor and the user are not the same person. When we add the dual function of space to this, we come to more groups of users who have different spatial needs. Examples in which the intention of the double (or multiple) role of space is emphasized and the dominant function is residential are analyzed. A review of examples involving workspace identified three types of integration of workspace at home in an apartment building - integration of work at the apartment level, integration of work at the building level and integration of work at the immediate neighborhood level. In some examples, the integration of workspace on several levels is visible, e.g. in both the apartment and the building. Selected case-study examples represent each one form of integration of workspace into an apartment building. During the analysis of the example (fig.02), the analyzed space for work and its characteristics were singled out, and then the apartment and the building with an emphasis on spatial-functional relations. The scenario verification method was used to consider the level of adaptability of the space to achieve the dual function of housing and work.

Case-study examples

The *110 Rooms* building (2016) of the Barcelona MAIO office is an example of integration of workspace at home on the unit level. The seemingly ordinary building is designed through a series of equal rooms, interconnected in many ways, which can adapt to any use, including work from home. Like most other examples with workspace at home integrated into the space of the apartment unit, the building does not have any additional common facilities to support working from home. In this way, a scenario is enabled in which the user performs permanent or occasional telework, or home-based business that does not involve face to face contact with clients or associates.

The example of the *Baugruppe LiSA* (2015) by the architectural office Wimmer und partner was built as part of the Aspern Seestadt urban development project near Vienna. In accordance with the *Open-building values*, the project is based on a clearly defined structure with indicated privacy zones and free filling of space according to user's needs. The project is defined by an extended external gallery, half of which is provided for communication and the other half for free interpretations by users. Each apartment can be entered along the entire length of the gallery, which allows additional flexibility in use. The positioning of the workspace is planned in the more exposed area of the apartment with a direct entrance from the gallery. The workspace can be connected to the space of the apartment or completely separated. The movement of external users through the galleries would to some extent endanger the privacy of other tenants, so it can be concluded that the marginal units are more suitable for dual-use due to the proximity of common, public communication. According to the position of the workspace, it can be considered integrated into the building, as well as into the housing unit.

Another example in Vienna, *Kallco Wienerberg City Lofts*, by Delugan Meissl AA office in 2004 is a typical example of the integration of workspace at the building level. The architect uses the north side of the access gallery to accommodate additional rooms for flexible use. This way, the workspace is located in the immediate vicinity of the living space, but allows the necessary privacy. The separated space has more options of use, and external users do not disturb the tenants by coming to the building. The size of the space allows more than just the owner to work there.

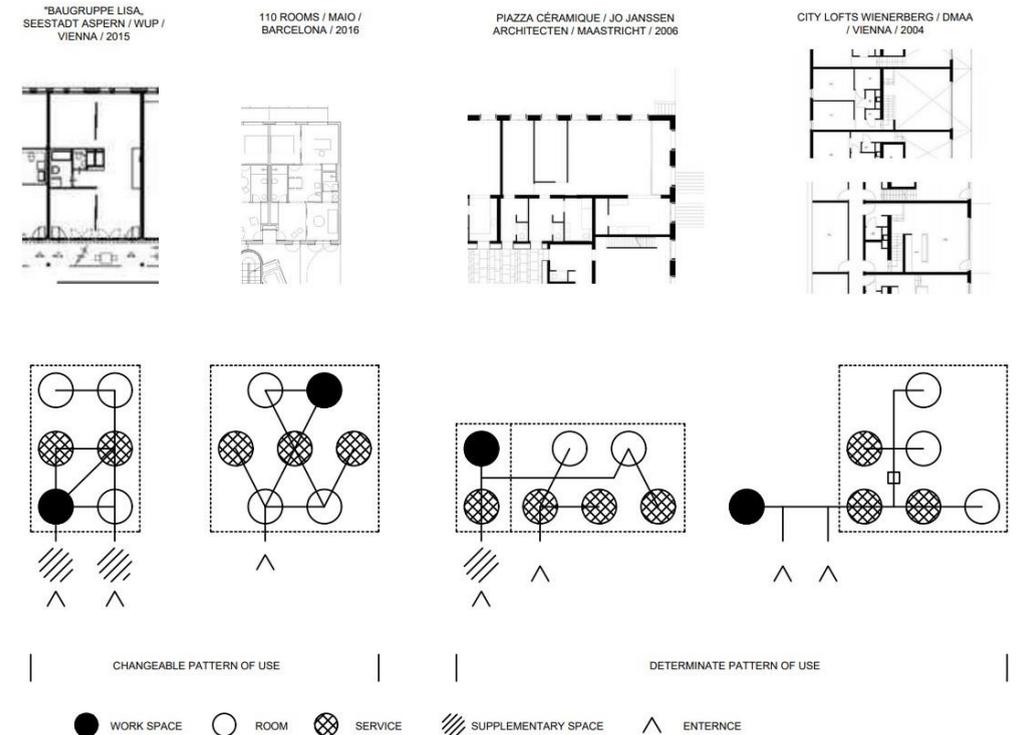


fig.02 Patterns of use analyzed in case-study examples

The integration of workspace at home on the building level and the immediate neighborhood was achieved in the project *Piazza Céramique* (2008) by Jo Janssen architects. The complex of three buildings forms a square that continues into the central atrium, which by its appearance belongs more to business than residential architecture. On the ground floor there are two-storey apartments, each with two entrances, one of which leads to the work area (room and associated toilet and wardrobe), and the other to the living space. Residential and commercial space are interconnected by internal communication, so the user can determine the boundary between private and workspace. The entrance atrium provides space for formal or informal meetings and stimulates a sense of belonging and community.

The example of *Veld van klancken* (2010) in Rotterdam, by architects Maartje Lammers and Boris Zeisser have a strong relationship with the environment in which it is created. The whole is formed of four groups of row-houses that surround a common workspace - music studios. The spatial layout of the complex, and the common positioning of the workspace have created the preconditions for the development of a networked community that is a quality example of the integration of workspace at home in the immediate neighborhood.

And the last analyzed example is the *Residential Revamp in Kleiburg* (2016), NL Architects and XVW architectuur with two-storey apartments on the ground floor. The apartments have direct access from the outside public space and have all the features of a traditional shophouse - they are easily visible to external users. The entrance to the private space of the apartment is through the workspace and it is possible to provide conditions for all types of work from home. They are a typical example of the simultaneous integration of workspace at home into the immediate neighborhood and housing unit.

Conclusion

It is possible to integrate a working space at home into each apartment, whether such a space is purpose-built or not. But the housing unit cannot be viewed isolated from the building in which it is located. The phenomenon of working from home in previous research has been observed at the level of the housing unit (mostly individual housing), which is not enough for integrating the space for working from home into an apartment building. By comparing the above examples, we can conclude that an apartment building with spaces with a dual function is a complex system in which the needs of several different groups of users are confronted. From the six examples given, three different basic principles stand out. (fig.03) The first model is the most common, workspace from home is integrated into the space of the apartment without recognizing the importance of the common space of the building. Workspace can be realized in any apartment, but uninterrupted use for external users is not provided. The second model is the building integration model, where a more complex relationship of multiple user categories is recognized. Examples from this group most often offer two entrances to a residential unit, one to a private part of an apartment, one to a workspace, and extended shared communication of a building. The third group of examples is the model of integrating workspace from home in the immediate neighborhood. The most common type are buildings with monofunctional housing units on higher floors and ground floor housing units that combine live and work and are easily accessible and visible in the neighborhood.

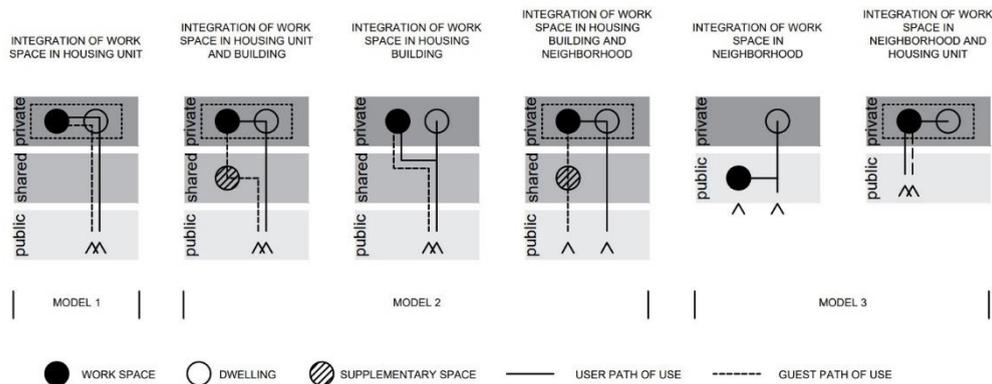


fig.03 Basic principles of integration analyzed in case-study examples

By recognizing the three basic principles of integration of workspace from home, the preconditions were created for further research of architectural criteria that affect the dual use of space. Exploring more examples involving working from home will provide a better understanding of the phenomenon of working from home and dual use of space, and creating new models of integrating work space that do not necessarily rely on solving the need of working from home in each housing unit. The integration of workspace from home into an apartment building needs to be fully considered so as to create a stable business, spatial and social network that spatially and functionally complements the living space without interfering with the primary function of housing.

- (1) Junstrand S., Tollmar K. (1998): "The Dwelling as a Place for work" in: *Cooperative Buildings: Integrating Information, Organization, and Architecture* [ur: Streit N. A., Konomi S., Burkhardt H.-J.] 1370: 230-247. Springer, Heidelberg
- (2) Reuschke, D., Domecka M. (2018): *Policy Brief on Home-Based Businesses*, OECD SME and Entrepreneurship Papers, no. 11, OECD Publishing, Paris
- (3) Eurofound and the International Labour Office (2017): *Working anytime, anywhere: The effects on the world of work*, Publications Office of the European Union, Luxembourg, and the International Labour Office, Geneva
- (4) Relja R., Šuljug Z. (2010): „Novi oblici rada u umreženom društvu“ in *Informatologia*, 43(2): 143-149, Zagreb
- (5) Blooma, N., Liangb, J., Robertsc, J., Yingd, Z., J. (2015): „Does working from home work? Evidence from a Chinese experiment“ in: *The Quarterly Journal of Economics*, 130/1: 165–218 <https://doi.org/10.1093/qje/qju032>
- (6) Holliss, F. (2012): „Space, Buildings and the Life Worlds of Home-Based Workers: Towards Better Design“ in *Sociological Research Online*, 17 (2): 24, <http://www.socresonline.org.uk/17/2/24.html>
- (7) Holliss, F. (2007): *The workhome... a new building type?*, (doc.dis.) London Metropolitan University, London
- (8) <https://www.europan.hr/sessions/europan-14/#> [25.01.2020.]
- (9) <https://www.archdaily.com/930037/workspaces-for-tomorrow> [25.01.2020.]
- (10) Hollis, F. (2015): *Beyond live/work: The architecture of home-based work*, New York, Routledge
- (11) Leupen, B. (2006): „Polyvalence, a concept for sustainable dwelling“, in *Nordic Journal of Architectural Research*, V19, No 3, pp. 23-31
- (12) Habraken, N.J. (1972): *Supports: an Alternative to Mass Housing*, Urban International Press, UK, Edited by Jonathan Teicher
- (13) Brand, S. (1995): *How buildings learn: what happens after they're built*, Viking Press
- (14) Moshaver, S., Altan, H. (2016): „A knowledge model to implement home working in multi-tenant housing“ at 15th International Union of Architects (UIA) World Congress, Durban, South Africa, Abstracts Proceedings, pp. 63