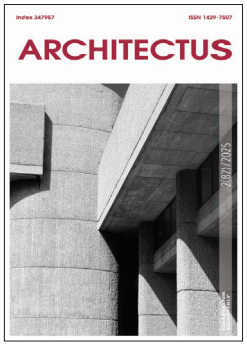

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Simplifying architectural space based on design experience

Abstract

The subject of the article is the process of simplifying buildings to introduce clear and intuitive operational layouts. The goal is to discuss the main features of the optimising processes, taking into account the numerous variables of the investment requirements. The article explores the simplification of architectural space in relation to initial design assumptions, which are often defined by complex functional programs. It examines the variables influencing the potential for simplification, particularly those which are related to the investment and design process. Drawing on the author's own experience in this area, the article presents opportunities for simplification through examples of completed buildings and design concepts. Simplification is linked to enhancing the legibility of a building and enabling intuitive navigation for its users. The conclusions are also illustrated through simple diagrams, which serve as universal design guidelines.

Key words: contemporary architecture, functional program, simple architecture

Introduction

The reason for taking up the topic of simplifying architectural space was the observation of numerous contemporary projects created both in architectural studios and by architecture students. In them, one can observe persistent functionalist and formalist tendencies, which make the space illegible, over-complicated or treated in a fragmentary way. Above all, one can find many common features such as dark, meandering corridors, small rooms scattered throughout the buildings and dispersed primary functions. All this is often laced with formal treatments (e.g., rounded corners, slants), which are used ad hoc, as solutions to problems that have arisen in the design process. This article is not a guide to design mistakes, but shows the most basic ways of dealing with the shaping of architectural space, which can be grouped under the concept of *simplification*. This is based on the authors' conviction that many of the spatial arrangements designed in our environment are too complex, and thus fail to support certain key values such as flexibility, social integration, economy of resources or sustainable development.

Simplification of architectural space means emphasising the essential elements of architecture in order to make buildings as clear and readable as possible. It often involves modifying the initial functional program in order to arrive at a space with an intuitive layout. This process applies to buildings with functions of great complexity, the program of which can primarily be changed during the pre-design and conceptual phases.

In general, the purpose of simplification may be to reduce volume, save building space, minimise the proliferation of spatial layouts and installations, and foster positive social relations.

Simplification can take place at least at two stages: during the formulation of a functional program and during the design process based on a preset or dynamically modified program. At the level of program formulation, simplification can involve, for example, combining selected functions, assigning additional functions to circulation areas, allowi1ng for the interchangeability of functions, and producing informal use opportunities. Spatially, such actions

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involve combining rooms in groups, enfilades and connecting selected functions in shafts.

A consequence of simplification is the need to properly organize the functioning of the building during its use, which can be seen as problematic. The article therefore describes simplification processes and their effects, but it should be emphasized that, like any design decision, such measures must precisely relate to the individual situation in which the building is being constructed and cannot be treated as universal. The potential space simplification process is fraught with many unknowns and variables both during the design and use of the building.

Here it is worth emphasizing that wrongly developed simplification may cause unfavourable solutions (monotony, lack of space identity, non-functional flexibility, etc.) therefore, as noted earlier, the effects of space simplification will depend on factors individualized for each situation, and the examples described above cannot be taken as universal.

Purpose and research method

The purpose of this article is to describe selected ways and effects of simplifying architectural space relative to the initial functional assumptions. The degree of simplification is impossible to measure unequivocally, as there are countless possible spatial solutions within a single design task. Therefore, a case study method was adopted. The projects presented in the paper are discussed on the basis of co-autorship and/or on-site research, which helped evaluate them and understand the intentions of the designers. In the analyzed examples one can see a clear desire to simplify the functional layout – with a different degree of implementation of the idea. The choice of projects was made so that, on the one hand, the issue in question was discussed as extensively as possible – with the advantages and disadvantages of certain solutions, and on the other hand, the designers' intentions and way of shaping the space were clearly shown. The processes described can also be applied to other projects. Conducting similar analyses of space can contribute to a better understanding of architecture with an emphasis on utilitarian aspects.

State of research

The simplification of architectural space in architecture is primarily associated with the rationalization of buildings based on industrial standards, a characteristic feature of Modernism. Subordination to the principles of modularity (prefabrication) applied not only to industrial architecture, but also to public, social and residential buildings, with the goal of simpler, faster and more economical construction. Throughout the diversity of Modernism, one can see the different ways of shaping space (from Functionalism, Constructivism to Structuralism) in order to rationalize the functional program and architectural solutions.

The search for the most essential and adequate spatial order can be seen in the work of many architects, such as Ludwig Mies van der Rohe, Cedric Price, Kazuyo Sejima or in the projects of Lacaton & Vassal. These architects try to create luxury through simplicity, adhering to the maxim "less is more" also in the economic edition – "cheaper is more" (Lacaton, Vassal 2015, 15).

Not only in projects and design trends, but also in the statements of individual architects, are there numerous records indicating the need to simplify spaces. Christopher Alexander, in *The Flow Through Rooms* chapter of *The Pattern Language* (Alexander 1977, 630), advocates for avoiding designing corridors in public buildings, replacing them with enfilade layouts – this pattern is particularly relevant in the context of space simplification, as it reduces the circulation area.

One of the contemporary designers paying special attention to program variability and the need to create freedom of use at both the city and building scale is Kees Christiaanse – author of such articles as *City as Loft* (Christiaanse 2002) and *Fuck the program?* (Christiaanse 2001), in which he cites examples of buildings without an initially defined functional program.

Bernard Tschumi in *Architecture and Disjunction* also wrote about the variability of functions, which can be crucial to simplifying buildings: *There are closed sequences of transformation as well as openness. Closed sequences have a predictable end because the chosen rules ultimately imply the exhaustion of the process, its circularity, or its repetition. The open ones are sequences without closures, where new elements of transformation can be added at will according to other criteria, such as concurrent or juxtaposed sequences of another order, such as a narrative or programmatic structure, juxtaposed with the formal transformational structure* (Tschumi 1996, 154, 155).

The topic of simplification was addressed in the work of Wrocław architect Tomasz Głowacki – especially in Academy of Fine Arts in Wrocław. In his report (Głowacki 2000), among the actions conducive to the so-called compression, as a result of which an empty space is exposed, he mentions: […] *multifunctionality, which allows us to concentrate in one area both interdependent functions, for example, kitchen, dining room and living room or cinema, theater and gallery, as well as commonly perceived contradictory, for example, garage and living room, church and sports hall, and optimization and minimization of the dimensions of the space and objects in it. The size of secondary spaces within the dominant space is reduced (for example, a bathroom and kitchen in a one-room apartment; toilets and locker rooms in a small office)* (Głowacki 2025). These activities are the same as those described in this article.

In summary, the desire to simplify space in architecture is not a new phenomenon, and it is driven by various reasons, such as simplifying and standardizing construction, aestheticizing space or ensuring its multifunctionality, future variability, as well as achieving clarity in functional-spatial arrangements. Despite the rich source material and references in countless architectural projects, the guidelines for the simplification in question are not obvious, and knowledge on the subject is fragmented. This article is based primarily on previously undescribed personal design experiences, drawn from work on concepts and realized objects.

Variables and uncertainties

Behind the simple slogan of simplifying space in architecture, there are many threats and unknowns involved in the process of designing and using buildings. The spatial layout of a building is influenced by such obvious variables as location, context, local plan considerations, budget, etc. – important elements in any development analyzed in pre-design work. Like the factors described below, these issues apply to every investment, but in the context of the goal of simplifying space, attention should be paid primarily to the functional program, since its modifications can significantly affect the building layout. It can be rigid in buildings defined by technology, such as industrial plants, specialty hospitals or nurseries; it can be in a limited way susceptible to modification as in schools (where specific teaching conditions are defined, but some functions remain flexible, such as the library or common rooms); and it can be strongly susceptible to change as in cultural centers, galleries, museums, cafes, stores, training and convention centers, etc. The above division is not rigid, of course, and at early design stages functional modifications are possible in each type of building and, on the contrary, can be rejected by commissioners.

Assuming that architects are usually (although it should be emphasized that not always) excluded from the development of the initial functional program (which involves specialists in the relevant fields, sales departments, commercialization companies, independent consultants, officials, etc.), the degree to which the program can be manipulated depends largely on the client and his openness to change, as well as the method of project selection adopted. Even an institutionalized public client, where the investment process is strictly defined by procurement regulations and legal strictures, can select a project through a competition (or other ways of qualification procedures like workshops or alternative design studies) that relates to the program in a creative way. Private clients – who can also use various methods of project selection – are potentially more flexible in working on functional layouts for buildings with a specific use, although this is by no means the rule. It happens that the client does not have a typical set of rooms defined when the architects join the design process, and the program is created during the emergence of the design concept (this may be related, for example, to the study of the absorptive capacity of the plot with different functional assumptions or the adaptive potential of an existing building, as well as – not insignificantly – the client's trust in the chosen architect). It should be emphasized that each situation is individual and depends on how the client and the architect approach the assigned topic.

The layout of rooms in buildings is significantly influenced by technical conditions and fire protection regulations with the division into fire zones of specific sizes, length and width of escape routes depending on the class of human risk. Fire protection regulations in some cases are interpreted differently by individual experts and the State Fire Service. Different solutions to individual cases are also possible, and hence during design work on certain projects it is necessary for architects to consult with experts.

A very important variable at the stage of operating a building and understanding its possibilities, limitations and unique features lies with the managers. The architect's role at this stage may be advisory or limited to preparing rules for interference with the building, such as for tenants in office buildings or shopping centers. The manager's role must not be marginalized in the design process, especially if we are dealing with a space that requires certain performance standards.

In summary, the variables of functional space design are very fluid, and it is impossible to identify all the challenges facing architects trying to simplify spatial layouts. In addition, one of the most important conditions determining functional character is the toolset[1] and creativity of individual architects, who have very different approaches to design, abstracting from the requirements of commissioners, context or purpose.

Functional and spatial actions for simplification of architectural space

Manipulation of the functional program

The functional program is mostly the basis of architectural design, and its modification can significantly affect the complexity of the space. In the context of its simplification, the following ways of manipulating the program can be distinguished: grouping and combining functions, designating zones of different functionalities in the open space, and additional functionality of circulation areas. At this point, it is worth mentioning the aspect of time – functions can change depending on the building program during its operation at different frequencies, for example the role of circulation space or exhibition halls can be variable in various intervals. All these assumptions can promote the overall ordering and reduction of rooms in a building, which in turn can lead to a significant simplification of its spatial layout. Although, as noted below, it is necessary to balance their application – if only to avoid creating spaces that are too universal, and consequently anonymous and indifferent – the manipulation of the functional program is a creative and highly individual activity.

Grouping of rooms

The analysis of the program, in addition to purely functional, technological or sunlight considerations, can allow us to combine rooms into groups according to their nature, purpose, size, proportions, etc. Based on our own practice and analysis of other projects, the most obvious is the division into rooms that require natural light and dark ones (e.g., toilets, storerooms, utility rooms). Such grouping allows, for example, the maximization of the facade's potential by placing dark rooms deeper within the plan. This frees up

[1] Design techniques can influence the final solutions, in which CAD tools that enable 3D modeling and other advanced software using artificial intelligence, such as Finch 3D, can be particularly helpful. The software itself may be the subject of other research on the technical aspects of the topic at hand.

exterior walls and corners, enabling the interior to open up to the streets and/or surrounding environment.

An example that can well illustrate the method of simplifying space as well as functional issues in the completed building is the Wrocław Congress Center (authors: Agnieszka Chrzanowska, Marta Mnich, Łukasz Wojciechowski, Wojciech Chrzanowski, Andrzej Chrzanowski, Jerzy Erdman, Grzegorz Kaczmarowski, Danuta Katarasińska, Agata Kurto, Natalia Rowińska, Sebastian Stanisławski) (Rutecka 2010). The conceptual design significantly reduced the volume in relation to the guidelines of the local plan to minimize interference with the historic surroundings. In order to maximize the use of the elevated 1st floor of the existing part connected with terraces descending to the water pond and pergola, all facilities (sanitary, kitchen, technical) were moved to the partially lighted basement. Here it was necessary to obtain a variance from the regulations justified by the unique value of the existing fabric.

On the 1st floor, where up to two thousand people can be accommodated, there were only four functional boxes which house: freight elevators, restaurant bars, waiter's switchboard, handy backrooms, director's room in the auditorium and installation ducts. The cores were located in the center of the plan in order to free the elevations from unnecessary walls and thus open the interior to the surroundings where this was possible within the original historic structure of the building designed by Max Berg – the author of the neighbouring Centennial Hall. The stairways leading to the basement and to the 1st floor are open, thanks to the proper division of the building into fire zones. The two restaurants, the auditorium and the multipurpose hall, and their foyers have been arranged in the simplest possible enfilade layout allowing to avoid designing corridors, moreover, the two foyers can be used not only for checkrooms and passage to the large halls, but by connecting them with the restaurants, they can also be used in various ways, for example for workshops or as an extension of the dining area.

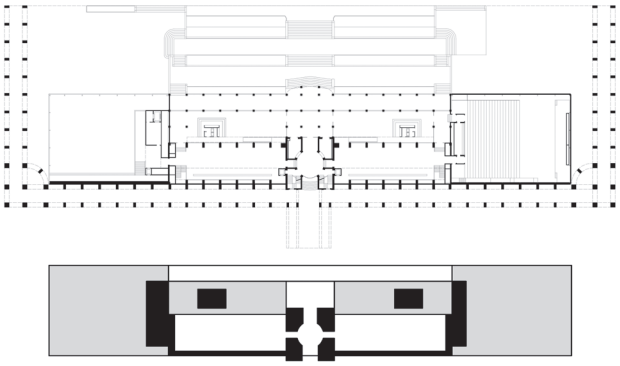

Fig. 1. Wrocław Congress Center – main floor plan. Below diagram with marked shafts (black) and groups of rooms (grey) (drawing by Ł. Wojciechowski)

Il. 1. Centrum Kongresowe we Wrocławiu – rzut przyziemia. Poniżej schemat ukazujący trzony (czarne) i zespoły pomieszczeń (szary) (rys. Ł. Wojciechowski)

Fig. 2. Wrocław Congress Center – view from the north showing the kitchen shaft in the terrace restaurant (photo by Ł. Wojciechowski)

Il. 2. Centrum Kongresowe we Wrocławiu – widok od północy okazujący boks zaplecza w restauracji tarasowej (fot. Ł. Wojciechowski)

The use of interchangeability of functions and the use of circulation areas for other events allowed the building's volume to be reduced. The entire functional potential is complemented by the opening of the façade by means of sliding and opening glass doors, allowing access to the outside – to the area bounded by the pergola designed by Hans Poelzig (Posener 1992, 89). It should be noted that the simplification of space here is directly related to the rigorous structural layout of the historic part, which is continued in the extension wings (Fig. 1). The divisions of the façades and interiors are consistently maintained in a tripartite order between the elements of the structure. All these elements are interconnected: exposing the rhythmic nature of the skeletal structure ensures the clarity of the space and its flexibility of use (Fig. 2). Preservation of the existing values and openness to the surroundings constitute the identity of the space.

The project of the Wrocław University of Technology Library (authors: Sebastian Stanisławski, Monika Stanisławska, Łukasz Wojciechowski, 2nd prize in the realization competition in 2007) proposes a very simple functional layout resulting from the context of social realist buildings D-1 and D-2 (designed by Tadeusz Brzoza, Zbigniew Kupiec, 1950–1955). Here, parts adjacent to the blind walls of the existing symmetrical building function as two shafts (structural with mainly circulation and service rooms). Below ground, they are connected by storage sections, and above, by a two-story bridge, which mainly houses reading rooms with open access to shelves – this is the main space of the library designed to be flexible. The subdivisions in two legs of the building are rigid but at most neutral – the small rooms (technical, service, office, etc.) are grouped in a simple grid what allows us to define a clear layout (Fig. 3). An important urban design element of the project is the gate, which leads to the University campus and provides the setting for the Monument to Murdered Professors of Lviv (Borys Michałowski, 1964) (Majczyk, Tomaszewicz 2015, 72–76) (Fig. 4).

In summary, grouping rooms can contribute significantly to organizing the functions and spaces in a building, thus simplifying them. Such an action is the result of an individual design process (conceptual phase), and each situation

requires separate analysis. However, the cited examples, despite their differences, present common features that can be applied to a variety of architectural projects such as rows of similar size rooms, shafts made of dark rooms and a structural grid merging with the layout.

Combining rooms

Combining rooms, as opposed to grouping them, involves creating multifunctional spaces of different scales. It is a process that can contribute to streamlining the operation of a building (e.g., it is common to combine smaller conference rooms into large rooms, divided by sliding walls) and significantly simplifying space (e.g., combining individual office rooms into so-called open space). Here, of course, it is important to recall the numerous variables that arise in specific cases, which do not always enable spatial values to be improved by means of these treatments. In manipulating the number of rooms, therefore, the specifics of the development, its users, location, etc. should be taken into account. However, it is worth noting that in many programs separate rooms are multiplied, which do not necessarily require rigid functional divisions, for example, enclosing of an employee's office in a small library may not be necessary and it can become a zone in the open space.

The project where selected rooms have been connected and functions have been interlocked in shafts to simplify the public space (Fig. 4) is the competition entry for the Museum of Contemporary Art in Wrocław (authors: Agnieszka Chrzanowska, Wojciech Chrzanowski, Grzegorz Kaczmarowski, Agata Kurto, Marta Mnich, Łukasz Wojciechowski). Here is an excerpt from the description of the concept:

The project is an attempt to give specificity to the museum by modifying the initial program. The exhibition space has been saturated with public-access functions, as depicted in Hubert Robert's 1798 painting Louvre*. Commercial, catering, teaching and conference functions have been integrated into the exhibitions. Each public room is an exhibition room – each exhibition room is assigned a public function. The number of public-access rooms has been reduced to 12 rooms with different lighting characteristics, which are arranged in enfilades. All of the museum's core rooms are therefore spaces with the proportions, height and quality of a neutral exhibition space (the so-called white cube). This action creates new circumstances for exhibiting art, which is a potentially positive challenge for curators, artists and, above all, audiences. All technical functions and communications have been hidden in the thickness of the walls and ceilings that define the building's structure*[2].

The 18th-century painting cited above, fully titled *Projet d'aménagement de la Grande Galerie du Louvre*, depicts a single-space, elongated interior where not only visitors can be seen, but also artists painting and drawing, suggesting the multifunctionality of the space, particularly striking in comparison to the current situation in the Grande Galerie, where there are only queues of visitors. Inspired

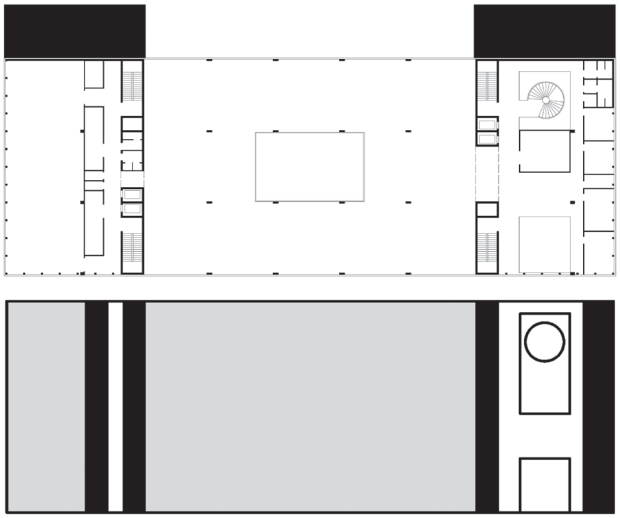

Fig. 3. Library of Wrocław University of Technology – the 4th floor. Below diagram with marked shafts (black) and groups of rooms (grey) (drawing by Ł. Wojciechowski)

Il. 3. Biblioteka Politechniki Wrocławskiej – czwarte piętro. Poniżej schemat ukazujący trzony (czarny) i zespoły pomieszczeń (szary) (rys. Ł. Wojciechowski)

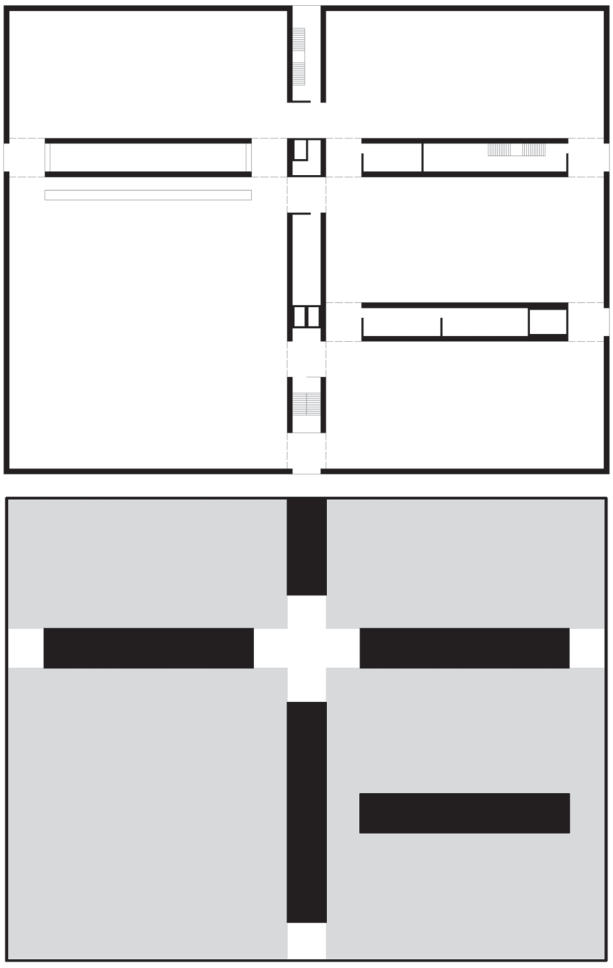

Fig. 4. Museum of Contemporary Art in Wrocław – ground floor plan. Below diagram with marked shafts (black) and groups of rooms (grey) (drawing by Ł. Wojciechowski)

Il. 4. Muzeum Współczesne Wrocław – rzut parteru. Poniżej schemat ukazujący trzony (czarny) i zespoły pomieszczeń (szary) (rys. Ł. Wojciechowski)

[2] Unpublished description of the competition entry.

Fig. 5. Deutsches Architekturmuseum in Frankfurt am Main – workshop in the vast exhibition areas organized between exhibitions (photo by Ł. Wojciechowski)

Il. 5. Deutsches Architekturmuseum we Frankfurcie nad Menem – warsztaty zorganizowane w salach wystawowych między wydarzeniami (fot. Ł. Wojciechowski)

by the presented situation, we attempted to connect all public rooms, listed in the competition functional program as separate, in a layout of exhibition galleries connected in enfilades. These are served by functions interlocked within the walls. The result is a significant simplification of the plan and an increase in the quality of the public rooms through their large size, proportions and lighting (depending on the level).

A similar model of how museums (but also buildings with other purposes) operate on the basis of interchangeability of functions can be seen in other situations – one striking example is the arrangement of workshops between exhibitions in the same exhibition rooms in the Deutsches Architektur Museum building in Frankfurt am Main (designed by O.M. Ungers) (Kieren 1994). This process takes advantage of the fact that the walls between exhibitions are painted, so scheduling a design workshop during the break allows participants to work in large, bright spaces and also to draw directly on the walls (Fig. 5). This requires proper organization of the building's operations during use but may be a more economical solution than a proliferation of mono-functional rooms and may also provide a higher quality of space for users.

In summary, combining functions requires close cooperation between the architect and the client, or detailed analysis at the competition stage. It is a process that will rely heavily on the proper organization of the building by the manager or tenant. Combining functions can significantly contribute to simplifying the space and building interaction between users. However, as we cannot measure it precisely and design process is often based on intuition, it is important to keep in mind the risk of combining too many functions or creating too big spaces that can lead to functional disturbances, anonymity or acoustic problems.

Additional functionality and simplification of the circulation space

On the one hand, design often seeks to minimize circulation space, on the other hand, expanding it by assigning additional functions can have a significant effect of making the space more legible and balanced. The corridor, despite being the archetype of architecture, is often a space used only for passage and is treated as such in the utility program (usually as 10–15% of the total area of the building with complex functional layouts). Circulation is customarily assigned the functions of a waiting room, checkroom, lobby, etc. but it is possible to combine it with other more or less formal functions, e.g., the cloister of the Museum of Architecture in Wrocław[3] hosts workshops, lectures, temporary exhibitions, banquets and houses a bookstore with a reading room. This formerly monastic space shows the potential of a suitably wide, well-lit circulation area (Fig. 6).

[3] The simple functional layouts of historical buildings are a very inspiring issue for the subject under consideration, especially in the context of their harmonious adaptation to modern functions. This issue is the subject of separate research.

Fig. 6. Museum of Architecture in Wrocław cloister (circulation) with the temporary exhibition (photo by J. Wypych)

Il. 6. Wystawa tymczasowa w krużganku Muzeum Architektury we Wrocławiu (fot. J. Wypych)

Of course, the atmosphere, the materials and architectural details, as well as the scale are crucial to the functionality of this kind of interiors. Leszek Zdek's monographic exhibition in the cloister of the Museum of Architecture is an example of such a solution (authors: Aleksandra Czupkiewicz, Łukasz Wojciechowski, Branda Studio). The elongated proportions of the interior resulted in a linear layout of the exhibition, but it does not interfere with the passage of visitors, while enriching it with the new content. Finally, it is worth noting that the plan of this museum follows a very simple medieval layout, which ensures spatial clarity.

Integrating functions into circulation spaces helps reduce mono-functional corridors, which are often narrow, long and dark. Because of this, they can cause a sense of confusion and stress – such a space is user-unfriendly. An additional program can involve enlarging the space, illuminating it and opening it up to the surroundings, making it less monotonous and making the transition between certain points in the building more interesting and pleasant for the user. Attaching certain functions customarily assigned to separate rooms to the circulation space can also significantly simplify the building layout. An example of such a solution is the combination of lobby and lecture hall at Kunsthal in Rotterdam (authors: OMA, 1996) (Wolf 1997). Two functions required a spacious room and separately they would probably have been distributed to smaller spaces. The slope of the auditorium floor is also part of the system of internal and external circulation. Some operational challenges may arise from the interchangeability of functions; however, as mentioned in the previous section, these can be addressed through proper organization of events within the building.

In the implemented project of the School and Kindergarten Complex in Karpnicka Street in Wrocław's Stabłowice (authors: Marta Mnich, Łukasz Wojciechowski, Agnieszka Chrzanowska, Wojciech Chrzanowski, Grzegorz Kaczmarowski, Mikołaj Smoleński, Agnieszka Hałas) (Głowacki 2018), the entrance hall was enlarged to the maximum, and thus can simultaneously function as a lobby with lockers, plaza for the canteen, library and common rooms, and is a meeting and exhibition place. This is not functionally different from most schools, but in this case values such as windows on three sides, lanterns (which are smoke chambers), opening to the atrium and mezzanine are important. Simplification of the space was achieved by connecting the circulation with the lockers area (although it should be noted that such a solution is sometimes challenged on fire safety grounds) and using the aforementioned smoke chambers, which replace fire partitions, thus creating a single-space interior. Another important issue of the design is the presence of open stairs, which were not enclosed in stair-wells – a design challenge in the building of this size due to fire safety considerations. However, this allowed users to move freely between zones and levels without having to overcome too many fire doors. An important element of the overall design is also the rhythm of the structure visible in the functional divisions and on the elevations – this allows the space to remain clear (Fig. 7), although with a building of this size it may also evoke a not-so-desirable effect of industrial architecture – this, however, is a matter of municipal planning.

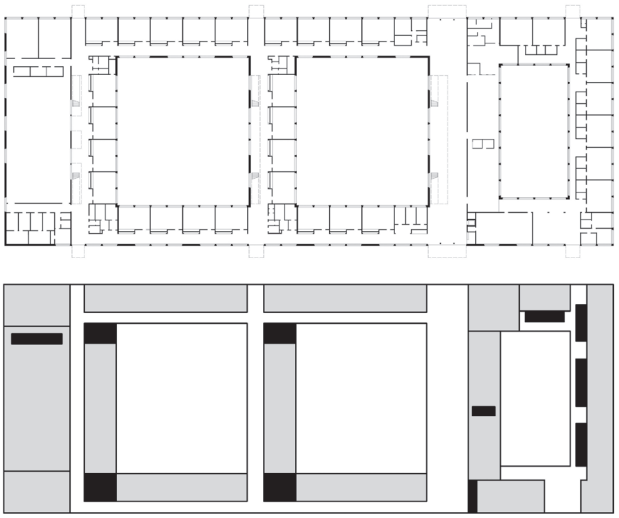

Fig. 7. School and kindergarten complex in Wrocław. 1st floor plan. Below the diagram with marked shafts (black) and groups of rooms (grey). Circulation is marked in white (drawing by Ł. Wojciechowski)

Il. 7. Zespół szkolno-przedszkolny we Wrocławiu – rzut piętra. Poniżej schemat ukazujący trzony (czarny) i zespoły pomieszczeń (szary). Komunikację oznaczono na biało (rys. Ł. Wojciechowski)

In conclusion, circulation, as an essential element of a building, requires special attention from architects due to its crucial importance for users. Enriching it with additional functions is an activity similar to combining rooms, but it is addressed separately in this paper due to the specificity of circulation spaces, which are often treated purely functionally, despite their significant potential (Fig. 8). Simplification here will involve minimizing the number of corridors and solving them in a clear way. An additional important issue are the stairs, the separation of which in staircases for fire safety reasons often complicates the space. So where regulations allow it, it is worth considering integrating them with the other elements of the circulation system[4].

Conclusion

Simplification of space in architecture is applicable to buildings of different scales and purposes. Numerous variables in the individualized design process make it difficult to formulate unambiguous and universal design methods. However, the activities observed in the examples above allow us to identify their common features. The diagrams created on the basis of design experience clearly demonstrate, first and foremost, the previously described combination and grouping of rooms of similar size and function, including the grouping of rooms in shafts (Fig. 9). This was closely linked to the manipulation of the functional program and the addition of functionality to the circulation spaces.

[4] The design of the so-called operational topography can contribute to this concept (Wojciechowski 2011).

Fig. 8. School and kindergarten complex in Wrocław. View of the rhythm of the internal structure and elevations (photo by Ł. Wojciechowski)

Il. 8. Zespół szkolno-przedszkolny we Wrocławiu. Rytmy wnętrza i elewacji (fot. Ł. Wojciechowski)

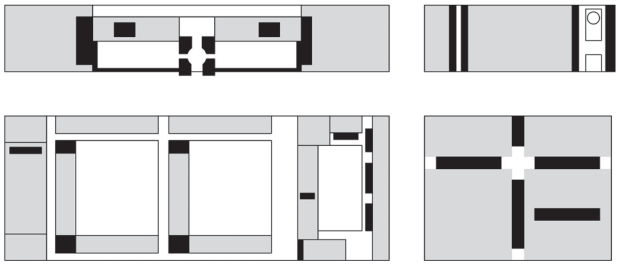

Fig. 9. Conclusion diagrams showing: groups and connections of rooms (grey); groups of rooms in shafts (black); circulation minimized or enhanced with an additional program (white) (elaborated by Ł. Wojciechowski)

Il. 9. Schematy podsumowujące: zestawienia pomieszczeń (szary); zestawienia pomieszczeń w trzonach (czarny); zmniejszenie lub rozbudowanie użytkowe komunikacji (biały) (oprac. Ł. Wojciechowski)

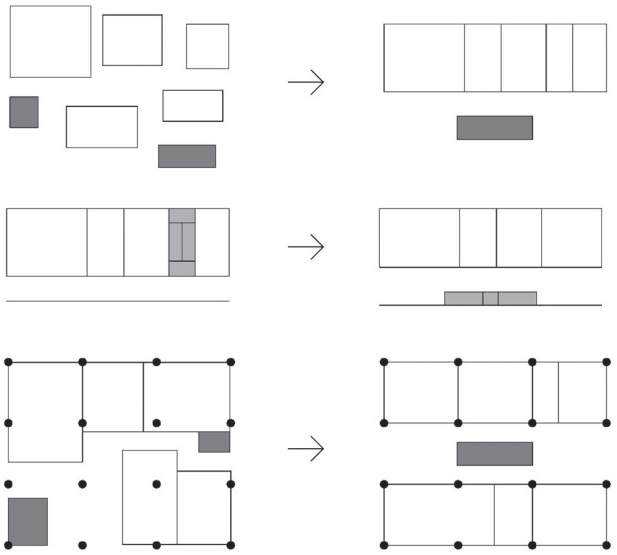

Fig. 10. Conclusion diagrams showing: grouping the rooms (white); simplification and enhancing the circulation space with stairs (light grey); adopting layout to the structure with dark rooms and shafts (dark grey) (elaborated by Ł. Wojciechowski)

Il. 10. Schematy końcowe ukazujące: grupowanie pomieszczeń (biały); uproszczenie i rozwinięcie funkcji przestrzeni komunikacji wraz ze schodami (jasny szary); dostosowanie układu przestrzennego do konstrukcji z pomieszczeniami ciemnymi i trzonami (ciemnoszary) (oprac. Ł. Wojciechowski)

In conclusion, it is worth stating that the role of designers in formulating the functional program is highly desirable, as they can influence numerous modifications to improve and simplify the operation of the building. Both in the real design process and in architectural education, a critical approach to customary room tables can result in positive architectural, social and environmental effects. Any action in this regard, however, is individualized and requires precise justification in each case, taking into account such factors as structure, installations, economics[5], sustainability, environmental psychology[6], etc. The following three diagrams show "patterns" of operations potentially enabling architectural space simplification (Fig. 10). Based on our own experience, they have the potential to be applied to diverse projects of different scales.

[5] Here it is worth noting that valuable results could be obtained from cost analysis, but they would require studying various design variants, which at the conceptual stage are often excluded and not subjected to further design development. It is possible in this aspect to compare different variants of finished designs (e.g., during architectural competitions), but it requires a different scope of study of finished designs possible in further research.

[6] I cover the topic of environmental psychology in architecture in the pamphlet *A Walk Through Architecture* (Wojciechowski 2023).

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Streszczenie

Upraszczanie przestrzeni w architekturze w oparciu o doświadczenia projektowe

Tematem artykułu jest proces udoskonalania przestrzeni w budynkach służący wprowadzaniu klarownych i intuicyjnych układów użytkowych. Celem przyświecającym autorom było omówienie głównych cech pracy nad optymalizowaniem budynków przy uwzględnieniu licznych zmiennych procesu inwestycyjnego. W artykule przedstawili oni sposoby upraszczania przestrzeni architektonicznej w odniesieniu do wstępnych założeń projektowych, które zwykle oparte są na złożonych programach funkcjonalnych. Przenalizowano zmienne wpływające na możliwości upraszczania w procesie inwestycyjnym i projektowym. Opierając się na własnych doświadczeniach, autorzy przedstawili możliwości uproszczeń na przykładach zrealizowanych budynków i koncepcji. Uproszczenie wiąże się ze zwiększeniem czytelności budynku i umożliwieniem intuicyjnej nawigacji jego użytkownikom. Wnioski zostały również zilustrowane diagramami, które mogą służyć jako uniwersalne wytyczne projektowe.

Słowa kluczowe: architektura współczesna, program funkcjonalny, prosta architektura