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Ashraf M. Salama

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FACILITY MANAGEMENT: A PARADIGM FOR EXPANDING THE SCOPE OF ARCHITECTURAL PRACTICE

Mirjana Devetakovic and Milan Radojevic

Abstract

In this paper the authors discuss challenging interrelations between the contemporary architectural practice and the expanding facility management (FM) sector. After defining FM and determining the part of it that is directly dependent on an architectural expertise, the authors identify possible interests in combining knowledge between the two fields, both dealing with the built environment.

The empirical part of the research is a study of the current development of FM concepts and strategies in Serbia, and examination of the position and a possible impact of the local architectural practice. A systematization of local real-estate from the point of FM includes three different groups of objects: the ones with integrated FM strategy in the early design stage; the ones with imported FM strategy from international firms; and the last incomparably largest group of objects that desperately need an appropriate FM concept. The methodology of tracking the FM related knowledge has been applied with the aim to recognize key actors in the FM knowledge exchange on the national level, as well as to understand current position and propose possible activities for the local architectural community.

Keywords

Facility management, architectural practice, Serbia

Introduction

For many architects and a majority of architectural students, understanding architectural design concludes at the point of completion of an architectural object, and its initial occupation. At that point, when the architectural object corresponds to its design documentation, photographers and TV crews take perfect snapshots, and the architect goes through the rare moments of glory that should generate new clients. For an architectural object, however, at the point of inauguration, the long and complex lifecycle has just started. The way an architectural object will be used, maintained, altered, renovated, and finally destroyed and recycled, often exceeds interest and consciousness of architectural designers. As a result, after a couple of years of exploitation, the architectural object may function and look surprisingly different than initially designed. A lack of appropriate maintenance concepts, ignorance of local user behavior, application of improper materials, are just some of problems that arise in a couple of years of exploitation period.

Such scenario is quite common for all developing

countries in which Facility Management (FM) has been either in early developing stages, or completely unknown.

Analyzing the case of Serbia, the authors are trying to contribute to understanding the phenomenon in countries, where the lack of FM strategies causes a significant devastation of built environment. Discussing the state of the art of Facility Management in Serbia, a systematization of Serbian real estate regarding the FM implementation is given. The main sources of knowledge on Facility Management have been identified and the actual academic initiatives at the Faculty of Architecture, University of Belgrade are presented. A particular role of architectural practice has been analyzed. The analyses are based on the knowledge flows within the Serbian FM scene.

Facility Management

Facility Management is relatively young professional field, developed and spread during the recent decades. It is related to the exploitation period of buildings and built environment in general. FM sector is the increasing one in developed economies. According to recently published reports, the UK FM market reached £110.9 billion in 2006 (FM Link, 2007). Figure 2 illustrates diffusion of the FM technology worldwide.

According to the International Association of Facility Managers (IFMA), Facility Management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology (Figure 3). It is evident that the connection of architectural practice with the field of FM is represented by the "place" component, i.e. physical, built environment that facilitates processes performed by people.

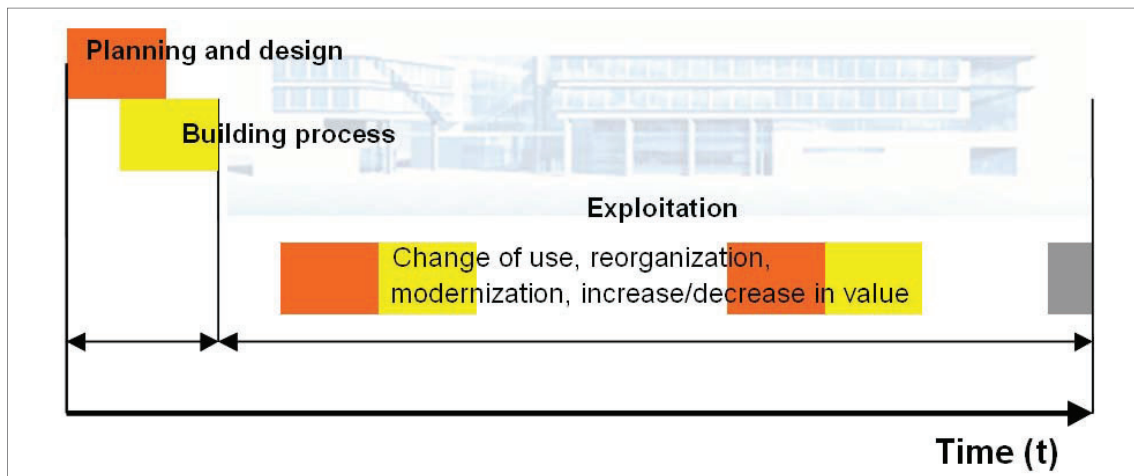


Figure 1: The Lifecycle of an Architectural Project

Professionals in the FM field come with various backgrounds, ranging from interior design, through mechanical and electrical engineering, to economics and management. Since FM deals with real, physical built environment, the role of architects in the field tends to be extremely important.

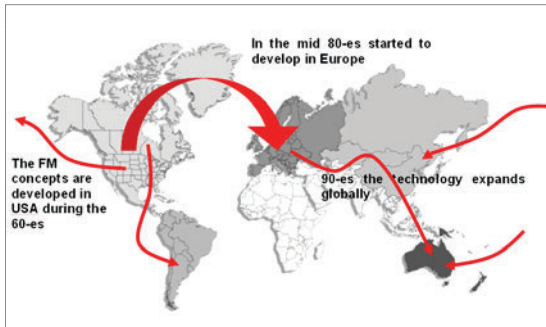


Figure 2: The Development of Facility Management Concept Worldwide

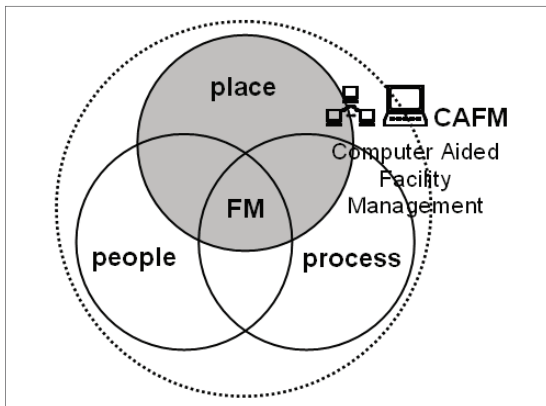


Figure 3: Schematic Representation of Facility Management

Position of Architectural Practice in the Multidisciplinary FM Sector

Multidisciplinarity of FM as a discipline requires a significant understanding of various issues related to buildings. Architectural practice should be the one that follows architectural objects from their conceptual stages, through the exploitation period, until the building destroying and recycling, which might be a short period of a couple of years (even months), to several decades. In the case of historical objects the duration of buildings is much longer.

There exists a two way interrelation between the architectural practice and the FM area. In the building conceptual stage and during the design and construction period, the FM aspects need to be considered, and FM consultants should be involved in the design process. This requires architects to understand and acquire the basic FM knowledge.

During the period of building exploitation, at first the technical documentation related to the building should be completed, updated, and kept available. Integration of such documentation with information systems related to building functionality is controlled by CAFM (Computer Aided Facility Management Systems, Figure 4). The range of architects' activities therefore increases from a relatively short design period, to an incomparably longer period of building utilization.

Secondly, architectural practice should be involved in any process of space remodeling, either functional or aesthetical. This is possible through:

- establishing so called “corporate architect” positions,
- outsourcing architectural consulting services, or
- adding some architectural knowledge in the education of facility managers

Finally, the feed-back information that architectural practice could acquire from the FM sector, related to behavior of users and building performance in various exploitation scenarios, might be of the greatest importance in the process of future designing.

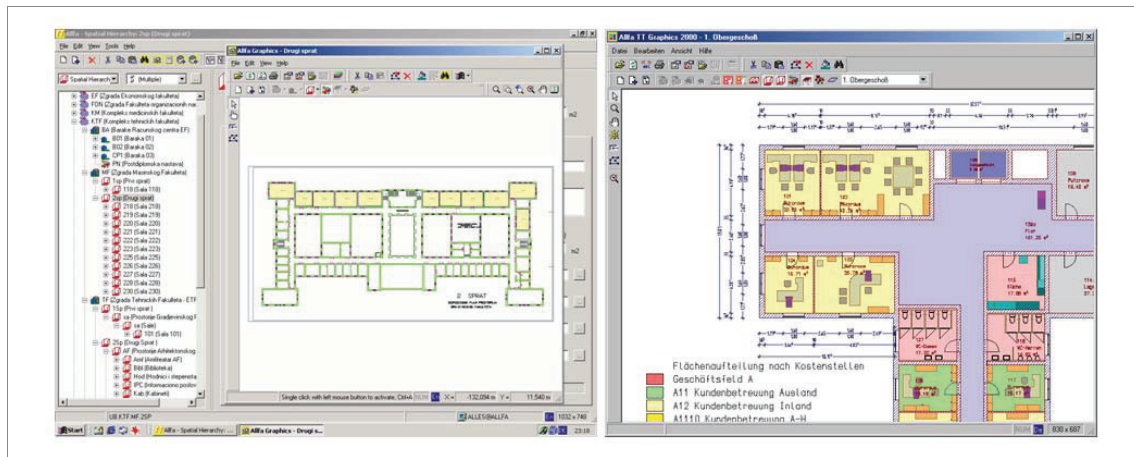


Figure 4: CAFM: An Integration of CAD and Information Systems.

Modeling FM Knowledge Environment

Creating a model of FM knowledge environment, aiming to simplify representation of its complex structure, we are focusing not on knowledge itself, but on the main actors and a range of activities within which the knowledge appears. A particular interest of this research is in the role of architectural designers and architects included in various multidisciplinary teams.

In the initial stage of the model that we call the extreme model (Figure 5), it is supposed

that every actor communicates with every other actor, producing different knowledge externalities and forming a network of activities resembling a neural network (Coveney and Higfield, 1996). Another extreme of the same model would be the one in which there is a single point that mediates in knowledge transfer between all actors.

Activities in such a model seem to form a plane in which the flow of knowledge happens, shaping a general communication channel for the field of FM on a national level. In reality this is not the case. In fact, the FM knowledge scene is stratified, and depending on participating actors and analyzed activities, it is possible to distinguish communication channels such as practice, legislation, education, research, etc.

The lines connecting the main actors in the model of an abstract national FM knowledge

scene represent activities that theoretically might occur between actors. Examining FM related activities that generate knowledge on a national level, it becomes evident that there are activities that invoke numerous other activities, intensifying knowledge creation, which are not constant and general. Such activities we defined as "knowledge events" and represented with dots in analysis of the Serbian FM scene (Figure 10, Figure 11).

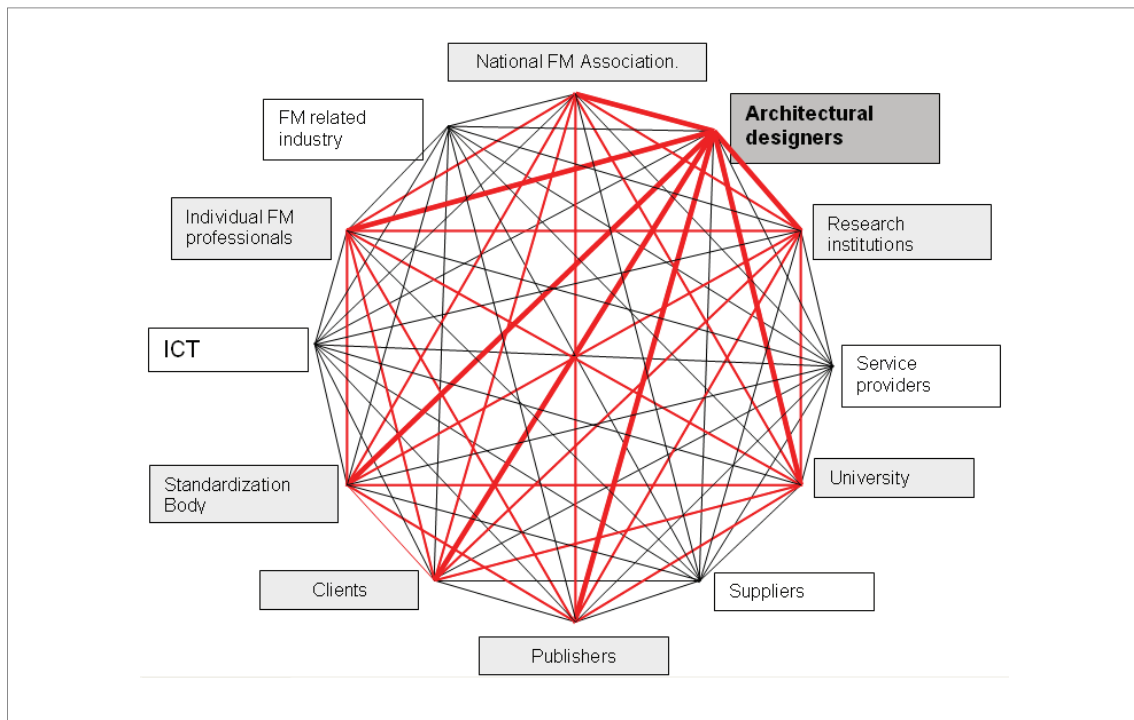


Figure 5: An "extreme" model of FM knowledge environment; highlighted potential positions of architects and their participation in knowledge flows

A National Study Facility Management in Serbia

Trying to estimate perspectives of FM development in Serbia the authors considered recent experiences from the countries in the CEE (Central and Eastern Europe) region such as Hungary, Croatia and other European countries in transition. In a milieu of a recovering economy, privatization in progress, a dynamic real estate market and an expansion of foreign investments, development of FM is regarded as a field with a significant perspective. The presence of developed FM concepts in European countries is regarded as a chance for Serbia to start developing its own FM strategy based on the best regional experiences.

At the first glance, Facility Management seems to be completely new technology in Serbia. Although a certain percent of public objects has been managed by special departments or experienced individuals, the majority of related activities have been dispersed within organizations and Facility Management as a professional field has still not been established. In this research authors are looking for rare cases and initiations of Facility Management in practice, as well as for the clues of facility management in the existing academic and continued education programs.

Searching for examples best describing the state of the art of Facility Management technology in Serbia, the capital city has been focused, estimating that being an administrative, business and industrial center, it will include a full variety of FM application levels. A sampling process is illustrated in the Figure 6.

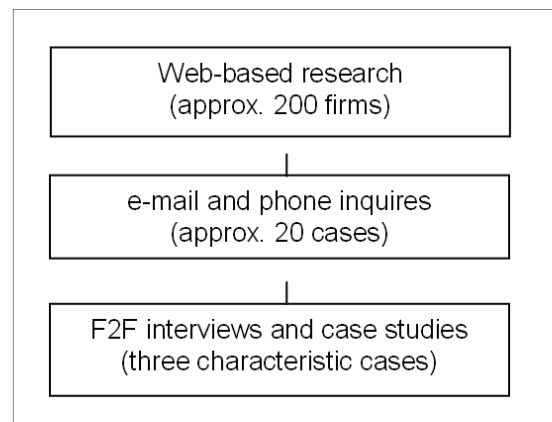


Figure 6: The Scheme of the Sampling Process.

1. Systematization of Serbian Real Estate

The systematization of Serbian Real Estate regarding the FM implementation includes three different groups of buildings:

- The first group consists of buildings owned and built by international companies, hotel chains (Hyatt Regency, Intercontinental, etc.), big retail firms (Metro, Mercator, etc.), banks (Société Générale, Raiffeisen Bank, etc.), fast food such as Mc Donald's (Figure 7) and many others. These companies come with already established facility management standards and requirements, and apply them within institutions. The cases from this group seem to be isolated with low or no connections on the local/national level.

The only institution mentioning publicly the Facility Management department until now has been Austrian Raiffeisen Bank, that a couple months ago established the Facility

Management department recruiting people from its ICT sector (Raiffeisen Bank Contacts, 2004).



Figure 7: McDonald's chain of restaurants (Source: McDonald's Serbia and Montenegro, 2002).

- The second group is the one with the FM technology included in the stages of designing and construction. This group is represented by the case of the Usce Business Center (Figure 8), the state building seriously damaged during the NATO bombardment of Belgrade in 1999, that has been privatized, and after a public architectural competition, is under reconstruction.

The FM technology in this case helps in negotiations with future owners and tenants of offices, as well as in simulating the constantly changing functionality of the designed space.

- The third and incomparably largest group includes the majority of existing buildings in use, be it administrative, educational, government, retail, tourist or any others. In this group we expect dynamic needs for implementation of FM technology, caused by wide variety of factors such as:

- Huge operational costs
- Needs for renovation / reconstruction
- Privatization
- Change of building owner
- Functional alterations

Figure 8: The Usce Business Center – Rebuilding of Office Spaces with Integrated Facility Management, (Source Usce Business Center, 2004)

This group is represented by the case of the Building of Technical Faculties in Belgrade currently accommodating faculties of Electronics, Civil Engineering and Architecture, of the University of Belgrade (Figure 9).

The authors of this paper had the chance to participate in and observe the activity of updating the technical documentation on the building for the purpose of reconstruction and renovation of the existing heating system. It was surprising to discover that, despite of the existence of the building directorate and generally high technical culture of the accommodated institutions, the accurate documentation did not exist, nor centralized for the whole building, neither for the spaces used by any of departments.

The production of up-to-date CAD documentation (the so called "as is" study) took a couple of months and a significant body of work. The benefit of centrally elaborated documentation was immediately recognized by different members of the institution ranging from the management to the cleaning division members. The authors of this paper identified

this study with one of the initial steps in Facility Management application. Based on the documentation mentioned above, a Pilot project of Facility Management implementation is proposed within the institutional R&D activities for the period 2005 – 2007.

The case of the Building of Technical Faculties is more or less typical and represents a huge group of buildings where even the basic technical documentation needs to be updated, followed by establishing information systems supporting processes of the building's quotidian function.



Figure 9: The Building of Technical Faculties Belgrade, (Source: Faculty of Electronics Web Site, 2004)

2. ICT Issues

Related to perspectives of Serbian market for adopting the FM technology, it is important to stress that domestic engineering practices relatively easily implemented CAD technologies in early 1990s, supported by integration of these technologies in appropriate academic programs. The orientation of Serbian architectural practices for example, towards remote Eastern markets (the Russian in particular) during the last decade, enforced local professionals to consider the electronic communication as a substitute for traditional means of communication. Based on this it could be estimated that the digital divide in local engineering and academia significantly differs from the national average, so that adoption of a new technology based on ICT-s could be realized efficiently and smoothly.

3. Sources of FM Knowledge

In this research the four main sources of knowledge related to Facility Management have been identified:

- Software producers and distributors, mainly in the field of CAD, such as Nemetschek with its Allfa FM solution, Graphisoft with the ArchiFM, etc
- Equipment producers such as Siemens with its Facility Management solutions.
- Professionals in the field of FM identified in the rare cases of FM technology implementation
- Academic circles to which the authors of this paper belong

Discussing sources of FM knowledge it is important to consider the experiences from the region. Looking at the neighbor countries, the best results and the higher development level

as well as an established national network of FM professionals is identified in Hungary (Kuczogy, 2003). The influences coming from Croatia, however, seem to be more influential, despite the fact that the Croatian FM scene has not been that articulated as yet.

In this research the leading Croatian firms in the field of FM have been identified and contacted. The feedback received indicates that there are strong similarities between the two markets, and some stages that the Serbian FM is to go through. It also highlights certain characteristics of FM implementation in transitional economies such as dealing with dispersion of FM related activities within diverse departments of institutions, obstacles of syndicates and challenges of outsourcing processes.

The papers presented at the Conference of Facility Management in CEE countries in Vilnius 1998 and later published in the special issue of Facilities (Melnikas, 1998) did not include cases from Serbia, but still seem to be applicable to the Serbian situation about six years later.

4. Architectural Initiative

Considering the fact that being involved in the Facility Management activity, architects extend their influence in the building lifecycle beyond the stages of designing and completion (Career options..., AIA, 2003), a group of researchers from the Faculty of Architecture, University of Belgrade, initiated a range of FM related activities.

The initial interest of this group for Facility Management was influenced in 2004 by a presentation of a range of engineering CAD software of the German firm Nemetschek

that includes the Alfa FM system. Last summer the group attended an introductory workshop related to Alfa system, organized by the Nemetschek CREM Solutions experts in Munich. This collaboration was supported by Nemetschek's regional representative Nemetschek D.O.O. Pula, Croatia.

Under the title: *Facility Management – Information Technologies Supporting Architectural Objects in Use*, a part of a wider R&D project has been proposed by the authors of this paper to the Ministry of Science and Technology of Serbia. The issues of initial application of the Facility Management technology in Serbia are in the focus of the proposed research theme. Apart from these general interests, the group is examining the positions of architects in FM multidisciplinary teams (AIA, 2003) and relation of FM with architectural design (Akin, 1994 and Mills, 1996).

After completing the pilot project and after critically examining a couple of implementations, the activity of this group is aimed at providing consulting services in the field of Facility Management in Serbia.

Position of Architectural Practice within a National FM Scene

In terms of estimating the influence of architectural practice on the local FM scene, we focus on particular events invoking actions that generate the production of FM-related knowledge. In the following text these events are called the "knowledge events". Figure 10 illustrates the Serbian FM knowledge environment responding to a particular event – the call for tenders for integrated FM solutions

by one of the largest international banks in Serbia.

The knowledge flow in this case is connected with activities that appear stratified in two layers:

- The activities of the first layer are preparatory; the client made a range of consultations with other actors both on the local and international markets, gathering information and expertise necessary for launching the call for tenders.
- The activities of the second layer are caused by the launching of the call for tenders (represented with a small circle).

The following examined knowledge events were: **02** - publishing a series of articles on FM, **03** - Initiating the FM related research project, **04** - Purchasing equipment with an ready-to-use FM solution, **05** - Presenting a CAFM solution to the clients, **06** - Initiating constitution of national FM Association; **07** – Initiating activities towards standardization in the field of FM. A superimposition of examined knowledge events (01-07) and relevant activities generated a complex representation of the observed market (Figure 11).

It is clear from the illustrations above that Serbian architectural practice actively participates in the emerging local FM market. Serbian architects also take part in it as individual professionals or as corporate architects, independent consultants or academics and researchers.

In such constellation, the influence of architectural practice does not seem to be developed enough. It slowly adopts the FM concepts as an important part of the design

process. Consequently, it is often excluded from the process of building exploitation, and takes just marginal responsibilities of completing the so-called "as is" studies of the existing built environment.

Conclusion

Facility management is a paradigm that challenges contemporary architectural practice. It enforces the architect to predict not only the building's initial form and functionality, but the dynamics of possible changes and the building's response to them.

There's a two-way interrelation between architectural practice and the FM sector. While the consideration of the FM concepts becomes inevitable during the period of building design, the architectural expertise is needed during the exploitation of the designed buildings. Information that comes as feedback from facility managers in the post-occupancy period can not be ignored by architects. They increase a possibility of improving future designs by better understanding problems that arise during the life-cycles of buildings.

A lack of basic understanding of the FM concepts is particularly characteristic for the developing world and transitional markets. In such a situation local architectural practice, as an interested part, has a chance to play a leading role in establishing standards for maintenance and protection of architectural objects, extending its scope of activities to the FM area.

The study of a Serbian national FM scene shows that an intensive development of FM concepts worldwide happened during the last decade when the country experienced the toughest political and economic time in its recent history. In the context of broken domestic economy, the Serbian Facility Management as a professional field has not been established

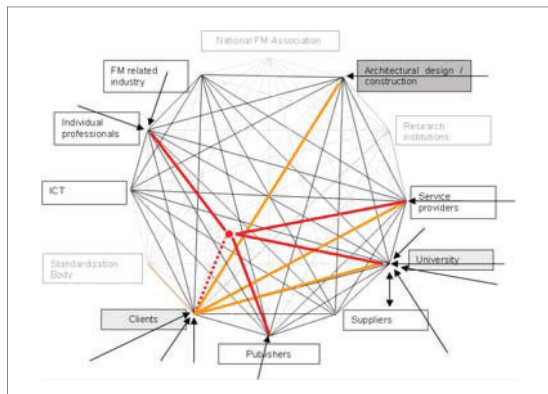


Figure 10: The model of Serbian FM knowledge scene (2005) - The activities determining knowledge flows based on a call for tenders for FM services by an international bank.

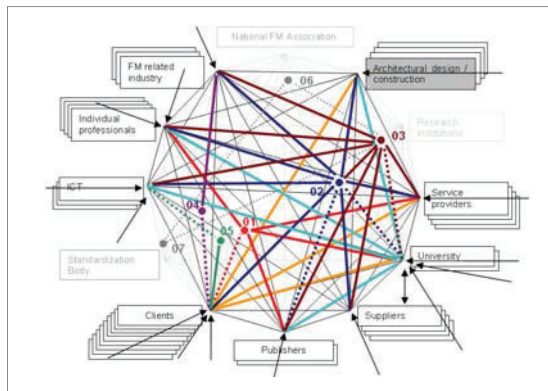


Figure 11: The representation of knowledge flows in Serbian FM market generated by various events in 2005.

as yet and its clues in practice are rare and isolated. National organizations are entering the conception stage in FM development, establishing FM departments, identifying initial needs, and gaining experience in outsourcing. The technological disadvantage caused by a delay of ten years behind the leading European FM companies, theoretically opens the Serbian market an opportunity to chose and adopt the best technical solutions and to learn from advanced European experiences. The main forces for adoption of FM are identified, as well as the sources of possible obstacles. The local specifics are estimated as a subject of further research, as a necessary activity before discussing strategies for FM development.

In such context, architecture as a discipline might take an important role, considering the interests of the profession in preserving the huge part of the built environment from an increasing devastation. While the Serbian architectural practice still keeps a peripheral position in the local FM scene (mainly in completing the so called "as is" studies supporting future FM implementations), the academic initiatives are oriented to strategic positioning of FM on the local market.

The authors of this paper, members of the Facility Management Group at the Faculty of Architecture, Belgrade University, proposed the Facility Management as a theme within the wider Research Project on Urban Management that is funded by the Serbian Ministry of Science and Technology in the period 2005-2007. This research project is a start point (incubator) for establishing academic connections with related European academic

institutions and research programs. It is also a base for enriching existing architectural education and introducing new academic curricula, with FM related issues.

References

- Alexander, K. (2003). 'A Strategy for Facilities Management,' *Facilities*, Vol. 21 (11/12), PP. 269-274.
- Akin, Ö. (1994). *Computer Aided Facilities Management (CAFM), State of the Art in Computer Applications for Architecture, Engineering and Construction in the USA*, Carnegie Mellon University, Department of Architecture, Pittsburgh, PA, USA.
- AIA (American Institute of Architects) (2003). *Career Options for Architets*. AIA, Washington DC, USA.
- CEN (2004). CEN/TC 348 "Facility Management", Draft Standard, European Commission for Standardization.
- Chotipanich, S. (2004). 'Positioning Facility Management,' *Facilities*, Vol. 22 (13/14), PP. 364-372.
- Coveney, P. and Higfield, R. (1996). *Frontiers of Complexity: The Search for Order in Chaotic World*, Faber and Faber, London, United Kingdom.
- Devetakovic, M., Radojevic, M., and Kosic, T. (2005). *Facility Management in Serbia – State of the Art and Perspectives*. In *Proceedings of EFMC2005*, Frankfurt, Germany, PP. 583-592.
- Duffy, F. and Hutton, L. (1998). *Architectural Knowledge: The Idea of a Profession*, E & FN SPON., London, United Kingdom.
- Foray, D. (2004). *The Economics of Knowledge*, MIT Press, Boston, Mass., USA.
- Goldberg, E. (2003). *Lifecycle FM Solutions*, CADalyst.
- May, A., Breitenstein, O. and Lennerts, K. (1996). *The Latest Developments in Facility Management*

Research, LACER No1, Leipzig Annual Civil Engineering Report, Institut für Massivbau und Baustofftechnologie, Leipzig.

Melnikas, B. (1998). 'Management and Modernization of Housing Facilities,' *Facilities*, Vol. 16 (11), PP. 326-333.

Mills, E. (1996). *Building Maintenance & Preservation*, Architectural Press, United Kingdom.

OECD (2000). *Knowledge Management in the Learning Society*, OECD Publication, Paris, France.

Sloan, B. (1998). 'Editorial: Facilities Management in C & E Europe and CIS,' *Facilities*, Vol. 16 (11).

Teicholz, E. (2002). 'Infrastructure Management,' *Architecture Week*, October Issue.

Teicholz, E. (2001). *Facility Design and Management Handbook*, McGraw Hill, New York, USA.

Internet Sources

<http://www.eurofm.org>

http://www.aia.org/fm_default

<http://www.ifma.org> <http://devdata.worldbank.org/external/CPPProfile.asp?PTYPE=CP&CCODE=YUG>

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