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## Underground space needs an interdisciplinary approach

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### ABSTRACT

During a very long period of time, civil engineers have been the only ones to be designated as the experts for underground space, while the planners and architects were the ones of the development at the surface. This silo approach to work is now a thing for the past in most major cities, but solving this fragmentation of the disciplines does not happen overnight. It first took a few thinkers to promote and publish on the subject, such as Edouard Utudjian, founder of GECUS in 1937, and also that planners abandon their ambiguous position on this invisible space, become part of multi-disciplinary teams and participate in the dissemination of new knowledge, particularly through some international associations such as ACUUS. With biennial scientific conferences dating back to 1983, the organization actively promotes since partnerships amongst all actors in the field of planning, management, research and uses of urban underground space in all its forms. The originality of ACUUS comes from its success in attracting public, private and university levels into a cohesive network of mutual cooperation, which is not so common in international organizations.

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### 1. Introduction

Urban underground space, a place where all disciplines currently converge, is therefore better planned? Planning underground space hasn't the same meaning even today for an engineer as compared an urban planner. In fact, a lot of planning terms are used by many disciplines and they are not always consistent. During a very long period of time, civil engineers have been the sole experts of the underground space, while the planners and architects were the ones for the development at the surface. More recently, some visionary reformers and urban planners came and tried to change the situation, leading gradually all the experts of the underground toward real interdisciplinary work. Some international organizations, like ACUUS, also have helped to achieve this change of mentality and knowledge sharing.

### 2. Plans, planning, planners

There are civil engineers, geologists, geotechnical engineers, specialists in rock mechanics, urban planners, architects and many other experts that work on the underground space. Are these experts still working in silos or in an interdisciplinary manner? The silo approach to work is now a thing of the past in most countries, but solving this fragmentation of disciplines does not happen overnight, neither interdisciplinarity. In the 1960s and 1970s, the

multidisciplinary approach was successfully employed in the UK by architects, engineers, and surveyors working together on major public-sector construction projects,<sup>1</sup> as well in overseas regional and urban planning projects, together with planners, sociologists, geographers, and economists.

In theory,<sup>2</sup> interdisciplinarity involves the combining of various disciplines into one activity with the aims of creating something better by crossing traditional boundaries between professions. A multidisciplinary approach allows reaching solutions based on a new understanding of complex situations. There are, however, two schools of thought on the subject. A first sees interdisciplinarity as a need because traditional disciplines are unable or unwilling to address an important problem, and the other sees it as a remedy to an excessive specialization of those disciplines. In reality, when interdisciplinary collaboration is performed, much information is given back to the various disciplines involved.

Everyone agrees on what interdisciplinarity is, but few on the definition of planning because each profession defines this in its own way. Many professionals are claiming to be planners because they are doing planning. As such, planning is necessary for multiple professions and in each there are different types of plans that help

<sup>1</sup> One of the earliest construction project using a multi-disciplinary team of architects and engineers in the 1980s is a residential computer education centre for Unisys in Milton Keynes, a new town located north-west of London – Source: Management Accounting magazine, February 1985, pp. 36–38.

<sup>2</sup> Source: <http://en.wikipedia.org/wiki/Interdisciplinarity>.

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achieve efficiency and effectiveness. By example, project planning is part of project management, used to organize different areas of a project, whether in engineering, architecture or urban planning. This is all the more acute when they are planning a project in the underground space. The processes of planning are also under constant mutation (Frébaud and Pouyet, 2006) as new issues, problems, techniques and ideas emerge, and the vocabularies change. So, a question arises – which is to know what underground space urbanism is and who should be in charge of it. It is not an easy one to answer because today highlighting urbanism is fashionable for many professions.

According to the official definition, urbanism is the work on the physical needs and interaction of inhabitants of urban areas with the built environment or, in simple words, city planning, also known as urban planning in many parts of the world. According to American architect and planner Jonathan Barnett the approach of defining all the different ‘urbanisms’ in the world is an endless one (Barnett, 2011). Alex Krieger,<sup>3</sup> teacher of urban design and New Urbanism, studies urbanism theory in order to provide insight into how urban practitioners work. He identifies spheres in which urbanism takes place in practice. They are a bridge connecting planning and architecture, a category of public policy, the architecture of the city, the urban design in all its variants, the infrastructure study of the city, the landscape urbanism, the new urbanism and so on. Krieger concludes that urbanism is less a technical discipline than a mind-set based on a commitment to cities. Consequently, another question arises, that is if all the technical disciplines working on the city and its underground have that mind-set? To answer this question, let’s examine some of the professions working in the underground space.

### 3. Professionals involved in the urban underground space

Municipal engineering is traditionally concerned with infrastructure and involves specifying, designing, constructing, and maintaining streets, sidewalks, water supply networks, sewers, and so on. In the case of underground utility networks, it includes the civil portion of the local distribution networks of services. Some of the engineering disciplines overlap with civil engineering, however municipal engineering focuses on the coordination of these infrastructure networks and services as they are often built simultaneously and managed by the same municipal authority.<sup>4</sup> Even today, in many cities, municipal engineers are in charge not only of the detailed design and specifications for the roads, sidewalks and infrastructure, but also of the general layout of streets and public places instead of municipal urban planners. In many cases those responsibilities are given to private firms. The engineering profession is governed in all cases by a certification body.

In the field of architecture, an act generally entrusted to private firms, an architectural plan is the design and planning for a building or any other buried structure dedicated to welcome people. The architect is responsible for the architectural drawings, specifications of the design, calculations, and time planning of the construction process. It is clearly different of what are the responsibilities of the engineers, compared to the structural engineers with whom they must work. As in the engineering profession, architects are governed by a certification body.

Urban planning is a technical and political process concerned with the use of land and the design of the urban environment, including the location of some infrastructure such as transportation and distribution networks. Urban planners guide and ensure

the orderly development of settlements, and plan at different levels, such as regional, city and rural, and at different angles, such as urban renewal or housing programs. They may be involved in research and analysis, strategic planning, urban design, public consultation, policy recommendations, master plan preparation and implementation, zoning, environmental planning, transportation planning as well as in management. They are generalists unlike the engineer or the architect, and consequently they must have a minimum knowledge of related professions and public administration. Urban planning demands also a good understanding of a wide range of subjects from physical geography to social science, real estate development, urban economics, political economy and social theory. Today, urban planning is a separate, independent professional discipline, governed in many countries like USA, UK and Canada by a certification body. The architect and the urban planner responsibilities are however more subtle in some countries. Indeed, without a professional training in urban planning, or without a certification body for the urban planning profession, many call themselves planners.

Pursuing any development plan or project involves working with a myriad of actors beyond the above professional collaborators during planning and design phases. These include owners, surrounding neighbors, elected officials, public agencies, opponents, investors, financial institutions, all described as “stakeholders”. Navigating in such a context is perhaps the greatest challenge, beyond the simple technical ones. Consensus around goals that are not very ambitious is, unfortunately, common (Krieger, 2009). The multiplicity of actors, their lack of coordination, their different logics further complicate things. This is often due to the current limited knowledge of the underground space which reduces fruitful collaboration between professionals and other stakeholders. This situation is worrying because it has led and leads to the waste of this resource because there some irreversibility to the use of the underground. That lack of knowledge often reduces project analysis to an opposition between the “for” and “against”, the first claiming multiple benefits of going into the ground, the latter strictly inverse arguments (Barles and Jardel, 2005). The quality and interest of future achievements in urban underground space depend on a better partnership between the various actors of urban development and, in particular, urban planners and engineers.

### 4. First awareness from architects

Yet it is thanks to some visionary architects, at the beginning of the twentieth century, that we can now speak of interdisciplinarity in the field of underground spaces. It must be remembered that at that time the unhealthy living conditions in the industrial city slums of Europe, and later North America, horrified social reformers, like Ebenezer Howard, the father of the Garden City concept. Howard basically believed that big cities were condemned. Later in the 1900s, the French architect Eugene Henard denounces for the first time the anarchic congestion of the urban underground beneath streets and suggests burying the urban traffic, the fluids, waste and goods in a gallery with multiple floors (Besner, 2002).

Inspired by Hénard, another French-Armenian architect Edouard Utudjian will be the man of a new idea: the underground urbanism. To this idea he has devoted all his life.<sup>5</sup> Underground construction did exist, but isolated, without any continuity. Noting the underground chaos, congestion of the surface, the need to preserve the urban heritage, the growing risk of foreign aggression,<sup>6</sup>

<sup>3</sup> Alex Krieger is Chairman of the Department of Urban Planning and Design at the Harvard Graduate School of Design, and Principal of Chan Krieger & Associates in Cambridge, Massachusetts.

<sup>4</sup> Source: [http://en.wikipedia.org/wiki/Municipal\\_or\\_urban\\_engineering](http://en.wikipedia.org/wiki/Municipal_or_urban_engineering).

<sup>5</sup> Preface of Michel Ragon in the book *L'Architecture et l'urbanisme souterrain* (Edouard Utudjian, Paris, Robert Laffont, 1966).

<sup>6</sup> The imminence of Second World War militated for the creation of shelters intended to welcome the populations.

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