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ScienceDirect

Procedia Engineering 165 (2016) 343 – 354

Procedia Engineering

www.elsevier.com/locate/procedia

15th International scientific conference "Underground Urbanisation as a Prerequisite for Sustainable Development"

Underground space development key planning factors

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Abstract

Historically underground space has been developed on a first-come-first-served basis around the globe. Reviewing these global experiences, key factors to improve underground development practices are discussed. Issues such as effective identification of colocation opportunities, successful integration of underground with surface developments and requirements for data availability are highlighted and their impact on underground space planning is clarified. Where these are clearly understood and incorporated into the process, underground space planning can be improved and carried out efficiently in a sustainable manner.

Peer-review under responsibility of the scientific committee of the 15th International scientific conference "Underground Urbanisation as a Prerequisite for Sustainable Development

Keywords: Benchmarking, Planning, Policy, Data.

1. Introduction

Increasingly the value of underground space for development use is being recognized particularly in urban locations facing increasing demand for additional space creation. Historically underground space development has typically occurred on a first-come-first-served basis whereby underground space was consumed as and when a need arose with limited holistic planning. This has seen significant and very successful projects be implemented providing significant benefits to the population.

Major historic underground projects such as the London Underground which was initially developed in the 1850s and has been in operation and continues to expand until today, were developed to address a specific issue; in this case transportation needs. However there was limited consideration of the impact on future underground space uses.

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Peer-review under responsibility of the scientific committee of the 15th International scientific conference "Underground Urbanisation as a Prerequisite for Sustainable Development
doi:10.1016/j.proeng.2016.11.709

Many developments in the second half of the 20th century; such as Montréal's RÉSO, recognized the specific value of underground space development and detailed planning and policy changes were undertaken to capitalize on this. In Montréal the opportunity of developing underground pedestrian networks was recognized and taken during the development of major public and private developments along with rail transportation systems (El-Geneidy et al, 2011). Since the initial network planning RÉSO has evolved overtime with opportunistic expansion as new buildings are developed and connected at basement level to the network. However there has been criticism of this opportunistic approach and the potential unintentional, unplanned impacts of this development. For instance negative impacts on ground level street life have been reported due to over expansion of the underground network (Anderson, 1976, Sijpkes and Brown, 1997).

Currently many locations have realized the limitations of unplanned, first-come-first-served underground development and particularly the impact this can have on future development. Helsinki has undertaken extensive planning activities to attempt to holistically review potential for underground space development and both manage and control underground construction works (Vähäaho, 2011). Hong Kong has been actively developing its approach to underground utilization through projects such as the Study of the Potential Use of Underground Space (SPUN) (ARUP, 1990). The Chief Executive's policy address of 2009-2010 stated the intention clearly "…To launch strategic planning and technical studies…promoting the enhanced use of rock caverns as part of Hong Kong's pursuit of sustainable development." Since this message was conveyed Hong Kong has also undertaken the Study on the Enhanced Use of Underground Space in Hong Kong (ARUP, 2011). Through this work Hong Kong is proactively taking stock of its assets, identifying potential resource and planning for use of this underground space (Chan, 2011).

This process of moving from the use of first-come-first-served planning approach to a considered approach to optimal, strategic, underground space development is still ongoing. Some locations are advanced and have systems, structures and practices in place to aid holistic planning and strategic development of their underground space. These locations present learning opportunities that can benefit less advanced locations to improve the efficiency, effectiveness and sustainability of their underground space development.

There can be many approaches and a variety of factors impacting underground space planning. Some of these could include principles adopted towards underground space planning, policies in place, institutional support systems, laws and regulations shaping governing underground space development and guidelines in place to shape underground space development. Figure 1 below sets out some of these aspects are.

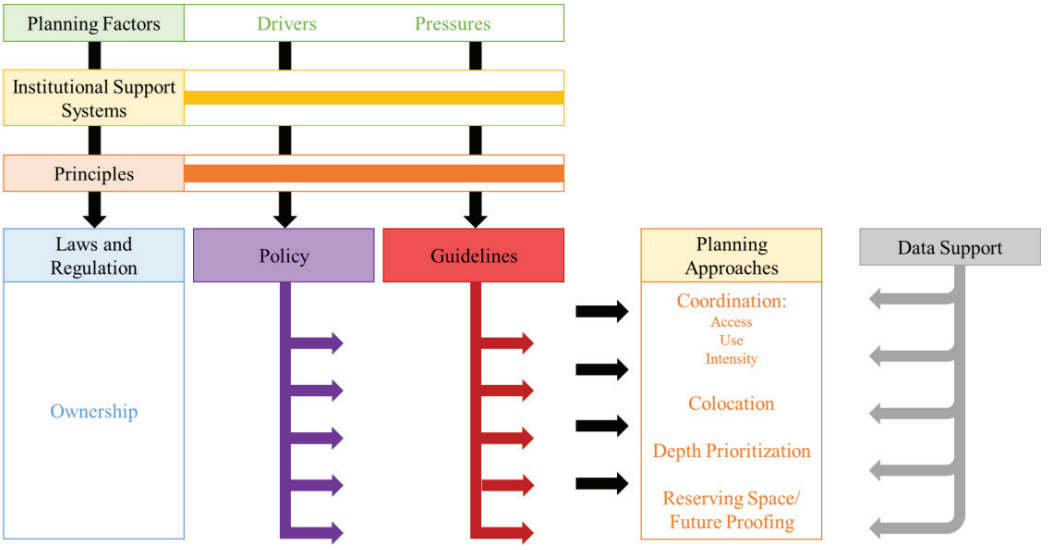

Fig. 1. Aspects impacting underground space planning.