

# Urbanisation, Infrastructure transformation and skills

## The case for collaboration.

### Background

**About the mid 18th century the** historic military Engineer required to respond to commercial pressures to develop a national transport system that moved volumes of heavy commercial freight and passengers between cities faster. This privately financed work required a new Civil Engineer, to deliver major projects that transcended geographical and political boundaries for the benefit of society and investing clients.

Concurrently, related to this development, the massive growth of industrial cities placed pressures on Municipal Authorities to deliver housing and transport development as well as address a range of health concerns through infrastructure improvements. Consequently a less transient Municipal Engineer more suited to the urban development and responding to Local Authority ambitions was created.

This Municipal Engineer responded to public needs and became a broad discipline, managing the planning and delivery of roads and lighting, flood control, public health, waste management, water and sewers supply, crematoria, town planning, public housing, utility supply, parks, and construction of municipal buildings.

Over the 20<sup>th</sup> century these municipal disciplines evolved into dedicated Council departments and authorities which continued to deliver a cohesive public service.

However, recent trends towards privatisation and outsourcing of municipal services, political manifesto promises and alterations to political administrations at a local or regional level have broken down this cohesive system. This has had a detrimental effect on the ability of Municipal Authorities to provide a joined-up service and product. Critics of this approach included the [Commission for Architecture and the Built Environment](#) who complained that the management of the public realm failed the general interests of local communities.

### The current situation

The term Municipal Authority is generally replaced by Local Authority in the UK.

The global financial crisis of 2007 resulted in substantial and challenging Local Government budget reductions. However; the expectation was always to maintain the delivery of these public services. In an effort to manage these challenges, Local Authorities have evolved different management structures unique to their individual circumstances.

This restructuring normally consists of merging internal Council Departments together with staff reductions however an unintended effect has seen a worrying skills gap occur. A recent

survey of Scottish local authorities indicated 20% of their workforce is over 60 years of age, with only 8% under 30 years of age. Additional effects of this skills gap is difficulties with training new recruits and mentoring them to gaining traditional skills. There are other obvious issues associated with ethics, competence and understanding of those remaining staff who are not necessarily trained but expected to continue delivering the same work or projects within expected timescales. Overall, this places risks on society.

## **Contemporary pressures**

Ironically, once again there are pressures on Local Government to deliver on improved economies, house building and reducing community's carbon footprints. Financially, protected services such as "health and wellbeing" and "education" have resulted in 100% of any cuts being levied on the remaining 30% of service delivery. The unprotected areas consist of all the Municipal Engineering areas of service delivery and create a serious concern for just maintaining existing public infrastructure.

Quantifiable benefits to society such as reconnecting communities and increasing urban density have resulted in changes to government policies with regard to street and urban design. Greater emphasis is now placed on the quality of urban areas to address such issues as health, wellbeing, policing and efficient and effective movement of traffic as well as promotion of improved Public Transport Systems. This approach is placing increased pressure on housing developments to ensure that their quality and design is of a standard that does not burden society with ill-considered and difficult to maintain outcomes.

Technical advances based on rapid internet provision and the "Future Cities" expectation of joined up data are altering the traditional movement and work pattern of the population is affecting modern society substantially.

Despite all the recent pressures, Local Authority have responsibilities to deliver holistic services that are focused on the livability of the communities and are efficient in their delivery.

## **The need for change and coordination**

The recent Edge Commission Report entitled "The Collaboration for Change" although focusing on professional institutions highlights the need for a closer collaboration between these professional institutions in delivering a livable society plus addressing the development industry reform, climate change and building performance.

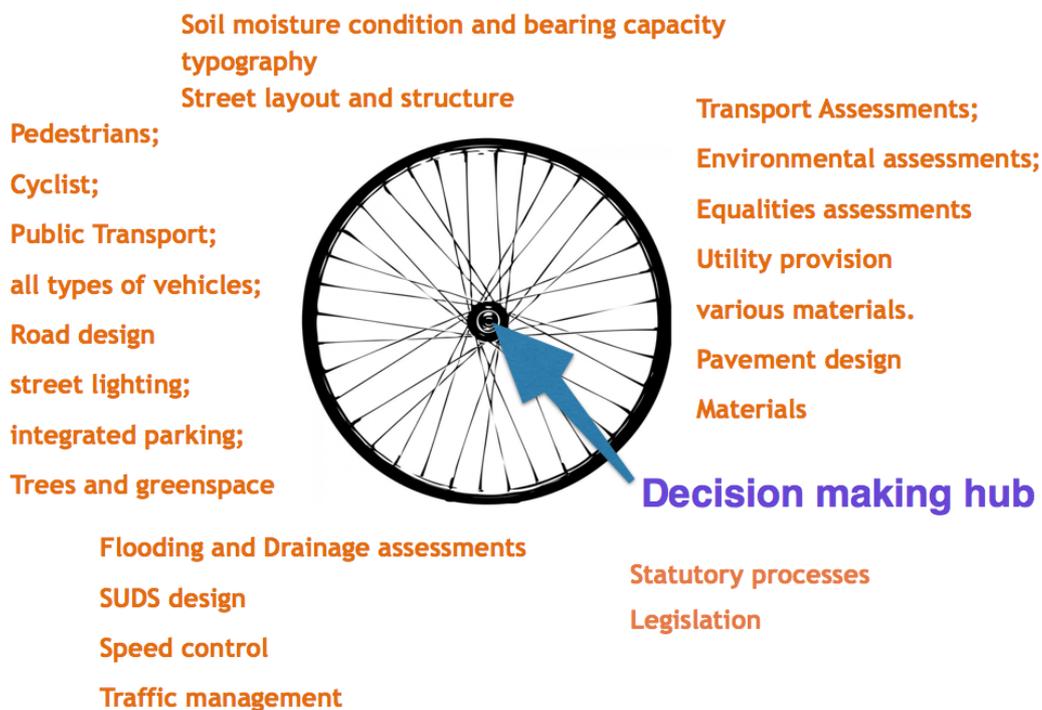
The need for such a report confirms that there has been damaging detrimental breaking up of skills and experience which needs to be arrested and corrective action taken.

The implications are to adopt a highly-skilled, multi-disciplinary collaborative approach, not dissimilar to the traditional Municipal Engineer's skills of the early 20<sup>th</sup> century, but in a more cohesive manner to meet our more complex societal requirements. Consequently, ensuring Local Authorities adopt exemplar professional standards to protect society is increasingly required.

## Case study

One such unique example of this practice is the introduction of the SCOTS National Roads Development Guide (NRDG) in Scotland [www.pkc.gov.uk/roadsdevguide](http://www.pkc.gov.uk/roadsdevguide). This on-line and dynamic guide identified just such a need to adopt a multi-disciplinary approach in developing extensions to the urban roads network in conjunction with urban development.

Not only does this guide commence with outlining the necessary street layout and structure required to fit into an expanding cities needs but it also needs to relate details of all the affected various specialist roles and agencies that need to integrate cohesively in a successfully developed area. Understandably it also has to identify and describe the statutory and legal procedures.



*Image of the cycle wheel with some considerations and point of decision*

x

Current best practice in developing or indeed redeveloping, urban areas involves integrating an increasingly wide range of specialist agencies and authorities who all consider their requirements are of the highest importance. The above bicycle wheel graphic highlights just this process with each spoke representing a specialist interest which also has no real regard to the other spoke's interests. However, ultimately a decision must be taken that balances all these demands into a workable urban development's solution. That decision is made by Development Control Engineers.

The NRDG is Engineering led, urban infrastructure outcome based approach that needs to include a range of other professionals in achieving a workable outcome. This includes coordinating with professional Planners, Landscape Architects, Transport Planners, Hydrologists and Arborists, to name just a few. The final project's street layout and technical details are expected to be adopted by the Local Authority and efficiently maintained in perpetuity. Clearly, addressing the range of subjects listed in the above graphic and ensuring durability are key requirements, primarily because the Local Authority take financial responsibility for any future maintenance or failures of design.

It is not practical to include technical detailed advice of all the individual affected issues, this is achieved by using hyperlinks directly from the guide to the webpages of the relevant expert organisations. As a direct result the guide contains the most accurate and up-to-date information. Prior to the guides launch in 2014, advanced consultation with these agencies was key to gaining support and confidence of the guides purpose and function. Without exception all these bodies understood the guides aim and supported its development.

Many issues need to integrate within a development, and importantly, without adversely compromising other issues, the major purpose is to "get it right first time" at the design and construction stages. The aim is to provide infrastructure that meets its needs whilst providing a whole life value that doesn't require excessive management and maintenance costs into the future.

A unique Quality Audit process was created and included in the guide to enable a developer to articulate their vision whilst meeting key criteria but not adopting a standard based outcome. This enables design innovation beyond that previously permitted in street design.

The final approved street design requires integrating with the existing street layout and structures such that an acceptable and well connected place is created. The successful and well planned street layout and design can assist in the efficient delivery of societal issues such as "health and wellbeing", "education" and the overall ability to provide a livable community.

## **Outcome Flexibility**

Future proofing the guides content so infrastructure transformation and future urban changes are addressed is critical to the guides function.

The benefits of a web-based guide lends the ability to update the content periodically and as required. To undertake this in a controlled and rigorous manner SCOTS have a dedicated Review Group that examine and approves periodic updates to the guide content. Examples of anticipated changes consist of utility companies improving on underground apparatus management and installing broadband communication systems. Estimating how vehicle developments can be accommodated leads to considering how adaptable infrastructure with minimum cost and intrusion impacts can be accommodated.

Current work on autonomous vehicles is likely to impact on street design, speed control and potentially, private owners. The current understanding of vehicle technology may be

changing substantially but private ownership is still an aspiration of society. Therefore, parking which has always been politically sensitive remains a major design consideration.

According to a recent customer care survey by the National House Builders Council (NHBC) parking of private vehicles within a development is the highest concern and source of complaints by householders following purchase of a new house.

The issue is the ability to balance the demand against making an appropriate provision for parking at a range of places. As a direct result, and to assist the placemaking agenda of homes, the NRDG provides guidance on integrating parking into the design. This guidance reflects international best practice which includes making provision for minimum size garaging, under and above ground parking that also accommodates cycle parking within new development parking allocations. This variation to parking design, over recent practice, impacts on the architecture and building control professionals in new developments. Many developers now accept this enlightened approach as garaging provides benefits such as vehicle security and a place to charge electrical vehicles overnight, in addition removing parked cars from the street view addresses enhanced place aspirations.

As a result of coordination and cooperation with the widest range of bodies during its development the guide is well networked into many professions and as a consequence it is well capable to address any changes rapidly.

## **Building on excellence to improve performance**

Clearly this is a lot of information to consider when designing a new, or re-developed, street layout and experience indicates that it is too much for designers to accommodate without further help. Consequently a related "Street Design Academy" is being developed to assist developers, their professional agents, local authority staff, and all others affected, to be trained together, to deliver a high quality, first time right outcome. The training is focused on enhancing efficiencies within the Development Industry, much as the Edge Report highlights.

At the request of the housing development industry this training will be accredited. Strathclyde University is to oversee rigor and consistency so that graduates are recognised for this learning.

The modular course content enables taking limited elements to assist educate very senior industry staff quickly so they understand the overall vision and gain strategic support. Similarly, specialist staffs such as traffic and maintenance engineers are assisted to understand how their contribution fits into the overall strategy and build confidence in accepting change. The full course elements are focused on staff that conceive, design, detail and regulate the applications, all this to ensure a wide and consistent industry understanding.

An additional benefit is that graduates of the course can be rapidly contacted to update them on changes or innovative practices as they happen, thereby delivering information to the relevant people rapidly rather than the current broad brush approach.

# Benefits of Collaboration

The guide redefines the application process with a specific aim to enable the simplification and alignment of both planning applications with the Statutory Road Construction Consent process (RCC). This is a government ambition designed to speed up, and provide confidence and surety to the development industry in delivering a project. That assumes the required legal process is updated.

The major point to note is that establishing the National Guide required the collaboration of:-

- All 32 Local Authority Road Engineers and the National Trunk Road Engineers, (SCOTS and Scottish Government - Transport Scotland)
- All 32 Local Authority Planners and the National Planning authorities, (HOPS and Scottish Government - Planning and Architecture Department)
- The Housing developers associations (Homes for Scotland)
- The Construction Association (Construction Scotland)
- All related and affected government and other agencies

All these bodies coordinate together in delivering this joined up, consistently understood and educated process. Bringing these apparently diverse bodies together was a complex process which was made easier by focusing on the benefits of a successful outcome as well as imparting ownership and active parts to each body in delivering the programme.

Following the collaboration process, an unforeseen and unique opportunity resulted. By having so many agencies and authorities taking part together in this project, the previous concerns of fragmented decisions has been largely addressed. Also, the resulting “learned body” associated with the training can undertake peer review of agency development proposals. This review has the opportunity to limit occasions where national advice contravenes other agency advice, as has happened, in a rapid and non-adversarial process. The greater benefit is enhancing development industry effectiveness and efficiency at all levels.

The close cooperation and improved visibility across the development industry overall can have meaningful benefits with a more focused Research and Development (R&D) process. This not only assists academia with relevant and supported R&D topics but is expected to speed the resulting knowledge back into the industry thereby enabling industry innovation. This can deliver a virtuous circle of understanding.

The Edge Report identifies key recommendations with Collaboration and a shared view on public interests and industry reform addressing industry gaps. The NRDG and related “Street Design Academy” training development is evidence that cooperation and collation of interests has occurred and continues into the future. In addition, it has proven beneficial as a basis for future adaptability to address industry reform, climate change and building

performance. Complex cooperation between authorities and related bodies has proven much easier in this case as there was always a clear outcome and benefit as the aim.

## Summary

On reflection, current urbanisation is not a lot different to the role the traditional Municipal Engineer held in the 19<sup>th</sup> century. However, current urban infrastructure delivery requires so much more effort and specialist knowledge so all the issues are coordinated.

Environmental concerns have resulted in such changes as flood management, air quality and noise, all of which feature in any development approval process today.

Autonomous vehicle driving is nearing a reality thereby questioning the need for much of the traffic management and control exercised through hard infrastructure today.

All of the above indicates just how rapid technological development occurs and influences society. As a result it is increasingly important to understand and predict future infrastructure change today. This places a demand on good design and adopting sustainable standards which in effect demands Infrastructure to be flexible.

However, this is not just a UK issue; pressure to rapidly expand cities is a global issue. The real problem may be time, or lack of it when we realise that we need to address these issues more rapidly than we think.

Currently, the demands of expanding smart and durable urban centers linked to population growth, climate change and resource depletion requires the rapid coordination of professional skills to achieve effective solutions for urban infrastructure.

An example of the UK collaborating internationally is through ICE's membership of The [International Federation of Municipal Engineering](#) (IFME). This is an organisation comprising professional municipal engineers from all round the world. IFME's aim is to connect municipal engineers, public works professionals, public agencies, institutions and businesses around the world in order that they can share a global pool of knowledge and experience. The aim is to foster continued improvement in the quality of public works and wider community services. Clearly collaboration is a global business today.

## Conclusion

Municipal Engineering has the competent skills, knowledge and ability to deliver a developing modern urban infrastructure. However, there are contemporary needs to integrate additional professional skills to enhance capability.

Collaboration was essential on developing The National Roads Development Guide so it could deliver and easily adapt to changed circumstances as required. To ensure the best quality, safest and fastest delivery of public urban infrastructure, maintaining, developing and enhancing these combined skills is critical.

The noticeable municipal skills gap is the result of ongoing and very serious Local Authorities budget restrictions. The first casualties of budget cuts are to older and experienced staff who have become more easy to “retire”. After a number of declining years the Local Authority intelligent client may not be considered so intelligent. (Certainly, current staff skills lack previous experience and capacity therefore they have limited ability to mentor junior staff).

This should be a warning that we are learning to collaborate professional skills just at a time we are developing a skills gap close to government decision making. Profound as this is, it is just at a time when we really need to be rapidly addressing changes to public infrastructure for the benefit of our society.

A recent meeting of key Scottish interest groups examined the way ahead for roads over the next 20 years. This recognised that infrastructure has to be maintained and therefore requires long term funding to remain functional. The anticipated outcome has to identify the long-term asset management link to fiscal systems and a reconfigured management structure that tackles, amongst other things, the skills loss.

Collaboration and sharing skills cannot be used as an excuse to reduce professional numbers and standards. To effectively future proof our society this is arguably the very time we will need all the knowledge and experience we have to address a rapidly changing world.

John Thomson C.Eng. C.Env. FICE FIAT

Vice President of the International Federation of Municipal Engineering.

ICE Municipal Expert Panel

April 2016