Civil engineering – the critical profession for service delivery

This is the subtitle of Allyson Lawless' new book titled *Numbers and Needs in Local Government*. The book outlines the pressing problems faced by the country in the field of local government, but also makes recommendations to ameliorate the situation. The general conclusion is that unless rebuilding the skills base is tackled with resolve, long-term erosion of public confidence and consequent decline of the local government sector are likely as the older generation of public service professionals retire or move on and the inadequately prepared younger generation battle with their new-found responsibilities. Some salient points made by Allyson in the new publication appear below

ORIGINS OF TODAY'S PROBLEMS

After 1994 the TBVC states were re-incorporated into South Africa and the needs of the non-independent homelands were considered. Consequently the country came face to face with the challenge to provide services to some 12 million people for whom little had been done under the previous dispensation. Isolated rural communities and areas administered by national and provincial government also required incorporation into local government.

A number of new municipalities were formed while others were integrated as transitional bodies in an attempt to offer better services to the overall population.

In 2000 the new model of 'wall-to-wall' municipalities was launched, with many existing municipalities being merged into larger units. The net result was a total of 284 municipalities, composed of six metropolitan municipalities, 231 local municipalities and 47 district municipalities. Metros are large, stand-alone structures serving 200 000 to almost one million households, whilst local municipalities range from large, such as Buffalo City and Emfuleni (servicing just under 200 000 households), to small (serving as few as 1 500 households).

Several districts were already in existence, whilst others were set up along the lines of the Canadian model to strengthen local municipalities and take care of very small settlements consisting of only a few households.

These could not realistically be constituted as stand-alone municipal structures able to take care of their own water supply, sanitation disposal, police, parks, public transportation, capital borrowings or strategic planning.

Consequently the three-tier model of local government was born.

PROVISION OF SERVICES

Municipalities must be in a position to provide the basic services to address poverty and offer people the opportunity to live in dignity.

During the post-apartheid era, the public sector has been devoted to the development of basic infrastructure to address the inequalities of the past, thus addressing the human face of South Africa.

In many instances the new, shared services approach to support line functions has resulted in inadequate equipment, materials and staff being made available to handle operations efficiently.

Sadly, as a result of the neglect of the other aspects of development and maintenance, municipalities have exposed themselves to huge costs to rehabilitate completely run-down assets. However, they have taken little action to collect outstanding debt or increase their income base from industry and the paying residential sector. Thus many municipalities find themselves in a precarious financial position.

These challenges are witnessed not only in new rural structures but in municipalities nationwide. The wall-to-wall model has resulted in most expanded municipalities incorporating large areas of low-cost housing which were either

underprovided in respect of basic services or had basic services that had been inadequately maintained for many years, resulting in appalling conditions.

NUMBER OF CIVIL ENGINEERING STAFF

Although the need for engineering skills actually increased dramatically by virtue of the fact that the entire population and not the elite few required servicing, the restructuring process did not recognise this. The rationalisation of the existing engineering departments thus resulted in significant numbers of engineering staff being retrenched, retiring early or leaving the service, including many senior engineers. Restructuring and offering packages have continued unabated.

A study of local government carried out by the South African Institution of Civil Engineering (SAICE) in March and April 2005 revealed that:

- There had been a migration of staff to the private sector
- There was a shortage of civil engineering professionals in municipalities, with 83 municipalities having no civil engineering staff and 49 with only one or perhaps two very young and inexperienced civil engineering staff
- There were many student technicians who were unable to obtain experiential training or employment after graduation
- There were few experienced staff in production positions with sufficient time to act as supervisors or mentors for young staff members

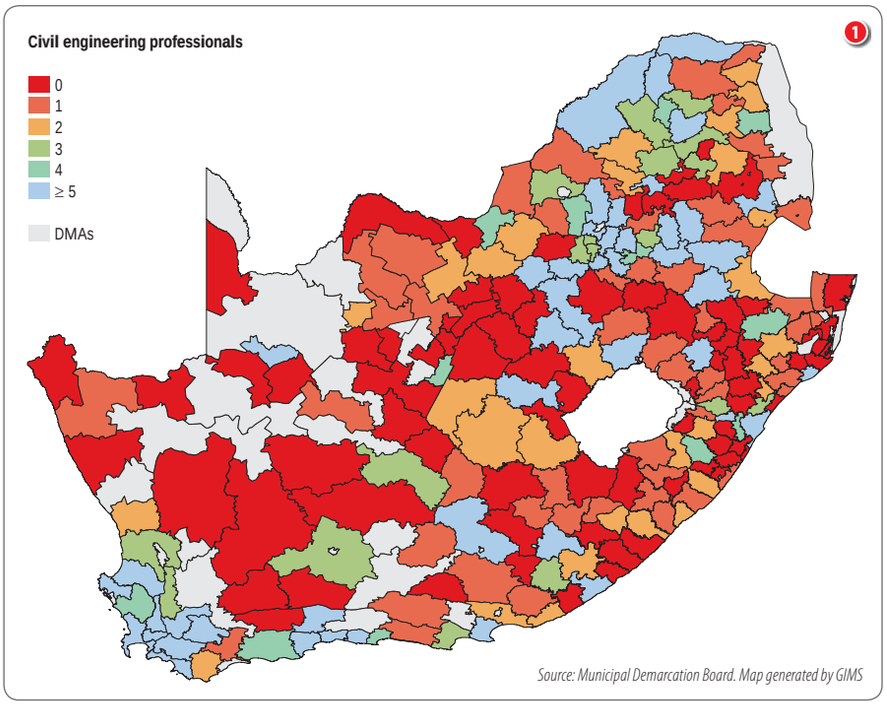
A summary of the numbers are given in tables 1 and 2.

Table 1 Civil professionals employed in all levels of local government, April 2005

	Municipalities	Engineers	Technologists	Technicians	Total
District municipalities	47	43	43	154	240
Local municipalities	231	98	100	377	575
Metros	6	240	226	253	719
Total	284	381	369	784	1 534

Table 2 Age distribution of civil professionals in local government, April 2005

	District	Local	Metro	Total
Total staff aged below 35	131	208	230	569
Staff aged 35 to 49	80	212	292	584
Staff aged 50+	29	155	197	361
Total	240	575	719	1 534



1 Civil engineering professionals employed in local municipalities and the metros, April 2005

PAST AND PRESENT – LESSONS LEARNT

These shortages manifest themselves as follows:

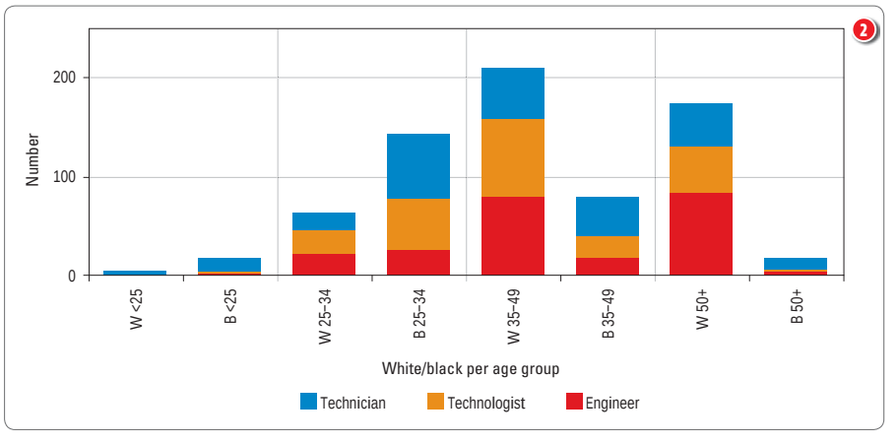
- Where there are no civil engineering professionals, non-technical staff carrying technical responsibilities are not confident to take decisions and therefore little or no spending and operations and maintenance (O&M) take place
- Where there is only one civil engineering technician there is generally inadequate capacity to deal with the myriads of problems and, consequently, limited spending or O&M takes place
- Where there are only young staff, they are not experienced enough to make decisions with confidence and, consequently, limited spending or O&M takes place
- The same picture emerges wherever there are no technical staff with authority

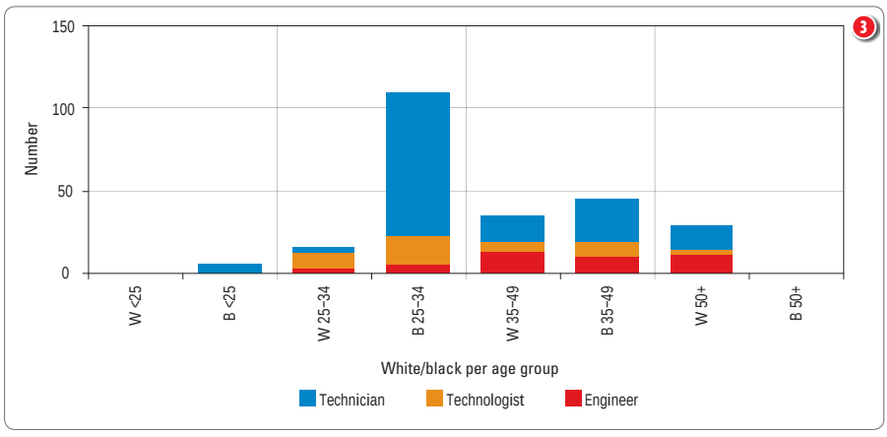
Figure 1 shows how wide-spread this problem is with the orange and red shading denoting municipalities that have only one or no technical staff member, respectively.

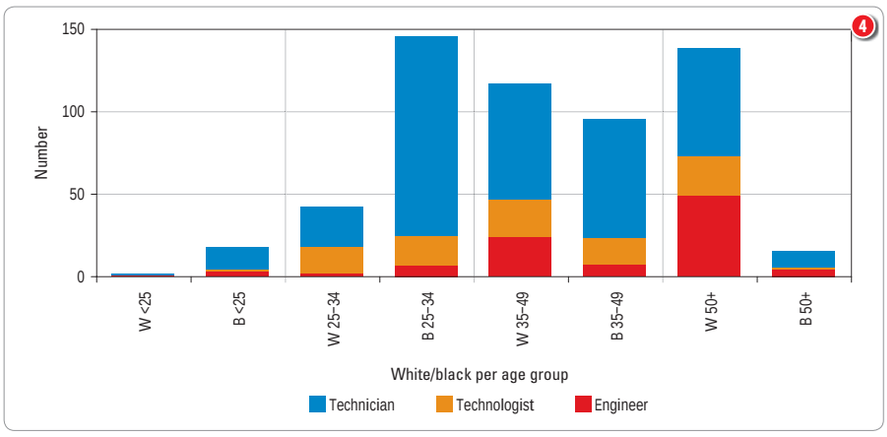
A recent SAICE report highlighted the fact that most municipalities that do have civil engineering staff are nevertheless suffering from vacancies of 35% to 50% against their current organograms. When considering appropriate organograms the percentage of vacancies could be considerably higher!

At the time of writing (mid-2007), possibly only about 1 300 to 1 400 civil engineering professionals were employed in local government. Considering that the population is now some 47 million, that means that there are two to three civil engineering professionals for every 100 000 members of the public – a dramatic drop from the 20 to 21+ of the previous dispensation, when 2 500 to 3 000 civil staff were servicing 14 million people.

Vast areas thus have no one to attend to their civil engineering needs, draw up project specifications or call for private







2 Civil engineering profile in metros – by age, race and qualification, April 2005

3 Civil engineering profile in district municipalities – by age, race and qualification, April 2005

4 Civil engineering profile in local municipalities – by age, race and qualification, April 2005

sector involvement in delivering much-needed infrastructure. Worse still, there is no one to ensure ongoing operation of critical plant or maintenance of existing infrastructure.

QUALIFICATIONS AND EXPERIENCE

The depth of knowledge, international qualifications, exposure and the number of years' experience seen in the earlier municipal engineering communities is a thing of the past.

Inexperienced technicians and unfortunately, in many instances, non-technical staff are found running technical departments and project management units.

The hierarchies, activities and responsibilities of technical staff have largely been dismantled resulting in the demise of technical skills in local and district municipalities. The executive role of councils means that many decisions previously taken by senior technical staff are no longer in the technical domain. Being some of the most highly educated and trained staff in local government, civil engineering professionals have left the sector as their skills were no longer being adequately utilised. This has more than halved the capacity that was in the system 20 years ago.

At this stage metros do still have the range of skills shown in figure 2, but as mentioned above, numbers are dropping and the frustration levels of those who are able to make a contribution but are not adequately utilised are ever increasing.

The selection of staff is often not based on skill or experience, but rather on equity and cost criteria, which compromises technical departments severely. In all but the largest municipalities there are few engineers or staff with significant experience. Where there are experienced staff they have generally been marginalised and are sitting waiting to retire. As such, few are involved in making strategic decisions.

Decisions are either deferred, are not made at all or, where they are made, are often inappropriate.

Figures 3 and 4 show the large group of young technicians who have been employed in local government. Whilst there is no problem with employing these young people, their qualifications and level of experience have not prepared them to deal with the complex challenges that they will face in local government today. Working in a vacuum, often on their own, they have no guidance and can therefore make little or no professional progress or offer direction to their municipalities.

THE GENERAL CLIMATE

Most technical staff, except a few isolated technical directors, regardless of race or gender, are frustrated to the point of giving up, as their skills are not being adequately used.

They are all too aware that many decisions being made, whether they relate to the level of service, choice of service provider, or allocation or re-allocation of the budget, will impact negatively on the solutions and long-term sustainability. Morale is at an all-time low and needs to be addressed as a matter of urgency.

OPERATIONS AND MAINTENANCE

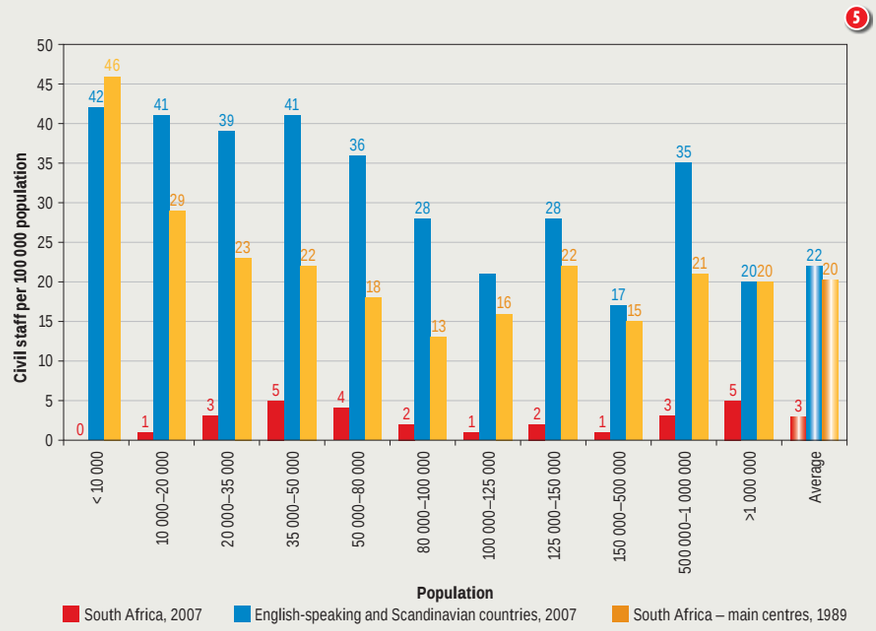
The need for efficient operations and maintenance (O&M) is not well understood.

Limited funds are budgeted and the number of staff attending to the well-

INTERNATIONAL BENCHMARKS

To arrive at an understanding of international norms, data was collected from many centres in English-speaking and Scandinavian countries. Small, medium and global cities that responded ranged in size from a small Swedish town with a population of 9 500 to San Francisco that is home to seven million.

From figure 5 it is clear that in 1989, South African numbers were considerably closer to international figures, which would explain how the level of infrastructure of that era was achieved. It is therefore quite unrealistic for us to expect the current two to three civil engineering staff per 100 000 to achieve all our targets.



5 English-speaking and Scandinavian versus South African municipalities: civil staff per 100 000 population

being of infrastructure has decreased dramatically. Examples are:

- **Planned upgrades** With little attention being given to O&M, few annual assessments take place. As a result, few (if any) recommendations are made on capacity increases, or replacing ailing equipment. The power crisis faced by the country is a good example of this, as is the increasing gridlock seen on the roads of many of South Africa's towns and cities
- **Routine or preventative maintenance** Without assessments, little budgeting or planning takes place. The number of technicians, superintendents, operators, artisans and general workers employed has also been reduced. As a result routine or preventative maintenance is limited
- **Emergencies – response to failures** Stores are depleted, vehicles broken and experienced staff no longer employed. Consequently response to failures in all but the major centres is poor. The most alarming incidences are long-term sewage spillages, long breaks in service provision, roads breaking up and municipal property becoming prematurely dilapidated
- **Operations** The reduction in staff also means that day-to-day operations are not adequately handled resulting in poor-quality water, unacceptable effluent quality, waste accumulating in the streets, etc. The neglect of infrastructure will now require huge investment to restore the status quo

The SAICE Infrastructure Report Card issued in November 2006 rated municipalroads and water in rural areas as a D– and sanitation as E (the rating ranged from A to F for failed). Urban infrastructure fared slightly better, ranging from C– for sanitation to C+ for water. The report card cited lack of investment and skills as the major bottlenecks.

TRAINING

The advent of the Sector Education and Training Authorities (SETAs) has placed much emphasis on formal training courses. Little or no distinction has been drawn between formal training and workplace training. Public sector staff spend inordinate hours in training courses, but commensurate improvement in efficiency, expertise or decision making is not evident.

Many young graduates are not career ready. Many of our young graduates have attended inadequate schools and are thus inadequately equipped to benefit fully from their tertiary studies. Because of language difficulties, they are unable to grasp several concepts. As a result of poor numeracy they battle with application in certain fields. Owing to inadequate tertiary institutions they may not have had any laboratory experience. As such they graduate with minimum marks and need much support in the workplace.

CONCLUSION

Engineering services cannot be effectively conceived, designed or delivered without experienced engineers. Effective engineering decisions cannot be made without experienced engineers. Engineering processes and systems cannot be developed or managed effectively without experienced engineers. Young engineering personnel cannot be trained effectively without experienced engineers.

It is recommended that a major campaign to recruit experienced civil engineering personnel be mounted nationwide. Control should be relaxed and authority returned to those able to make meaningful decisions.

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The price for SAICE members is R295 (students R195, non-members R395). Local postage per book is R50, or per courier R150

OUTLINE OF BOOK

Chapter 1 – Background and purpose
Chapter 2 – Structures ancapacity of the past
Chapter 3 – Structures and capacity today
Chapter 4 – The consequences of reduced engineering capacity
Chapter 5 – Structures and capacity for the future
Chapter 6 – Thinking out of the box
Chapter 7 – Numbers and needs
Chapter 8 – The way forward