NUMBERS AND NEEDS IN LOCAL GOVERNMENT – UPDATE 2015

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ABSTRACT

Research carried out in 2005 for the publication Numbers and Needs (Lawless, 2005) highlighted the fact that municipalities were short of civil engineers, technologists and technicians, with 28% of municipalities having no in-house civil engineering capacity at all. The key recommendations were to rebuild structures rather than embark on further restructuring, and to professionalise rather than politicise the appointment of technical staff.

Ten years later, the latest census of civil engineering capacity has shown that the number of civil engineering staff has increased. However, the number of experienced staff has reduced, the average age having dropped to 38, and the number of engineers has reduced, having been replaced by technicians, and in some instances technologists. In municipalities that previously had no civil engineering staff, systems and processes were not in place in terms of planning, budgeting for, developing, operating and maintaining infrastructure, and there are no experienced supervisors to manage and assist young recruits, who have subsequently been appointed. to design and implement the necessary systems and processes.

There is an urgent need to implement a policy and system to develop existing municipal engineering staff, which includes training courses and workshops associated with activities in the municipal calendar, combined with assignments associated with the actual work to be done. It is suggested that a programme of action learning should be rolled out to develop existing staff and empower them to develop the systems and procedures that need to be implemented.

A massive campaign needs to be mounted to find experienced engineers who are willing to return to, or be seconded to, local government as strategists, supervisors and coaches for a period, to assist with rebuilding such systems and supporting candidates in their growth as professionals. Furthermore, it is once again time to campaign for the introduction of qualification and experience requirements to be linked to each technical post to ensure that structures are populated with suitably skilled staff. Systems, processes and organograms that support career paths and professional development should be redeveloped, linked with technical competency profiles to ensure that assets are adequately developed, improved, operated and maintained.

INTRODUCTION & BACKGROUND

Research carried out in 2005 for the publication Numbers and Needs (Lawless, 2005) highlighted the fact that municipalities were short of civil engineers, technologists and technicians, with some 28% of municipalities having no in-house civil engineering capacity at all. A sequel to the publication was researched and written, entitled Numbers and Needs in Local Government (Lawless, 2007). Research carried out both locally and internationally showed that the civil engineering capacity in South African municipalities was too low to deliver, operate and maintain local government infrastructure in a sustainable manner. Even when comparing with neighbouring states, the number of civil engineering staff per 100 000 population was less than half. The key recommendations at the time were to rebuild structures rather than embark on further restructuring, and to professionalise rather than politicise the appointment of technical staff.

Capacity building since 2005

In response to the low numbers identified, various initiatives have been put in place since 2005 to develop civil engineering practitioners. The ENERGYS programme was one such programme, in which 100 interns and 43 graduates were paired with mentors/supervisors placed in local government over an 18-month period to gain municipal engineering experience. Many were appointed by municipalities, carried on to complete BTech qualifications and today have become technical directors of local rural municipalities or have reached middle management in larger municipalities and some even in metros. Sadly, this programme terminated prematurely, as the source of funding was withdrawn.

The Siyenza Manje Young Professionals (YP) programme was another such programme, in which 102 graduates were taken through a structured programme from 2008 to 2011 to work towards professional registration with the Engineering Council of South Africa (ECSA). One of the criticisms of this programme was that candidates were simply hosted, and were not guaranteed employment at the end of the period by the municipalities in which they worked. In some cases, candidates were used as 'free' labour to perform non-engineering functions, and in other instances they were placed in weak and/or under-resourced municipalities where there were limited budgets, projects, inadequate supervision or skills transfer. The period of three years was generally found to be too short to develop candidates to the competence required for registration by ECSA. On the positive side, YPs who had had experience before joining the programme were able to submit their applications, and were registered the year after the programme ended.

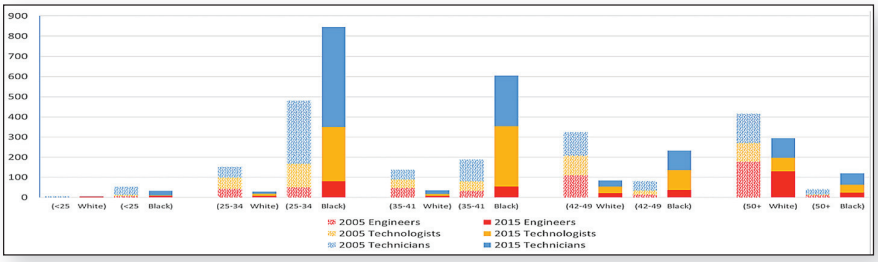
More recently, National Treasury has made funding available to municipalities to employ graduates and mentors/supervisors to develop the next cadre of engineering professionals through the Infrastructure Skills Development Grant (ISDG). The structured training is proceeding well where adequate supervision and projects are in place and candidates started to reach the registration stage in 2015. The Municipal Infrastructure Support Agent (MISA) has also embarked on an intern and graduate programme aimed at growing capacity. The CETA and LGSETA have also funded candidate programmes but these are to develop in-house staff rather than develop additional capacity.

To determine what progress has been made in building capacity in local government, SAICE Professional Development and Projects (SAICE-PDP) decided to repeat the research carried out in 2004/2005.

Research methodology

Every municipality was contacted and asked to furnish the details of each civil engineering staff member, including age, race, gender, engineering category (engineer, technologist or technician) and professional registration status. Of the 278 municipalities, only 18 did not respond. In such cases, neighbouring municipalities were contacted to establish whether

FIGURE 1 Civil engineering staff in local government – 2005 compared with 2015



their neighbours had civil engineering staff or not. Where they did have staff, data was imputed using staff profiles of similarly sized municipalities. The bulk of responses were received in the second half of 2015 and early 2016. As staff turnover is inevitable, the following numbers will not be exact, but will be very close to the current reality.

CIVIL ENGINEERS, TECHNOLOGISTS AND TECHNICIANS IN 2015

Findings – the positives

Many of the findings have been gratifying. Of significance is the fact that there are now over 500 more civil engineering staff and the number of women has increased, as has the number of black civil engineering staff. The number of municipalities without any civil engineering staff has reduced from 82 in 2005 to 28, the number with only one from 60 to 41 and the overall ratio of civil engineering staff per 100 000 population has increased from 3.9 in 2005 to 4.4. For more metrics see Table 1.

**The number shown for metros in 2005 is higher than published in 2007, as several metros realised once Numbers and Needs in Local Government had been published that they had not submitted information for all departments, and then supplied corrected information.*

TABLE 1 Civil engineering metrics – 2005 compared with 2015

Totals	2005	2015	Number of Municipalities with	2005	2015
Civil engineering staff	1 875	2 387	No civil engineering staff	82	28
Civil in metros	1 059*	1 201	No civil engineers	126	202
Civil in districts	240	260	One civil engineering staff member	60	41
Civil in locals	576	926	Only civil engineering technicians	95	81
Population	47,640m	54,432m	Female civil engineering staff	56	153
Households	11,754m	16,122m	Registered civil engineering staff	85	56

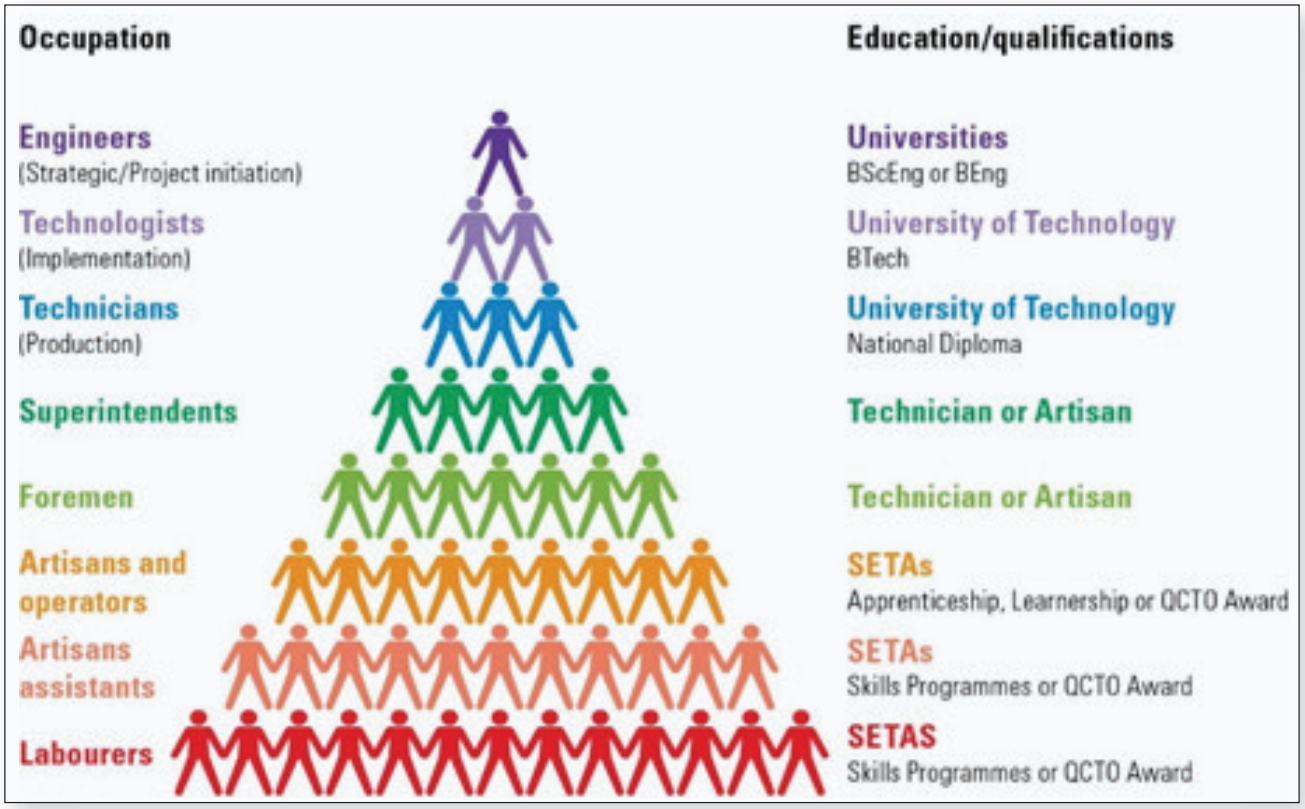
Findings – the concerns

Although there has been an increase in the number of civil engineering staff, there has also been a massive increase in the number of households to be serviced (37% increase in households versus 14% increase in population). Referring to the formulae developed in Numbers and Needs in Local Government (Lawless, 2007) for the number of civil engineering staff required to adequately plan, deliver, operate and maintain services, the ratio of civil engineering staff per 100 000 households has dropped from 15.9 to 14.8 (StatsSA 2014, 2015).

In Table 1 it can be seen that the number of municipalities with no civil engineers on their staff has increased from 126 to 202. Twenty-eight have no civil engineering staff at all and in the remaining 174, 81 have only technicians, 17 technologists and 76 have a mixture of technicians and technologists. Broadly speaking, it is considered that engineers should be 'innovators' responsible for complex tasks, and may use engineering principles where necessary to develop unique solutions. Engineering technologists solve engineering problems by using proven techniques and are thus the 'doers' who implement broadly defined tasks or projects. Engineering technicians are the backbone of infrastructure support, and carry out well-defined tasks such as managing operations, maintenance, production, etc. Certificated engineers are required in large installations which require machinery or power considerations such as in power stations, large treatment works and the like. A complete hierarchy of technical staff should therefore be in place to plan, develop, operate and maintain services as shown in Figure 2.

Considering the metrics further, the number of professionally registered staff has

FIGURE 2 (Below) The technical team and related qualifications



decreased from 455 to 294, while the number of non-registered staff has increased from 1 420 to 2 094, and the average age of civil engineering staff has dropped from 46 to 38. This means that it falls to a reducing number of experienced, registered professionals to manage, supervise and train a growing group of inexperienced staff. Given the inadequacy of the numbers overall, those with experience are totally overloaded and have little time to train. As a result, those entering local government with limited engineering experience can rarely develop the competence required to ultimately register professionally.

Findings per category of municipality

Studying the split of staff per category of municipality shows more trends.

Transformation has been significant, as can be seen in Figure 3. Studying the numbers for each municipality individually, however, shows that while the larger metros have increased their staffing, the smaller ones have experienced a concerning reduction in staff. Given the increase in urbanisation over the period, the ratio of civil engineering staff per 100 000 population has decreased from 6.2 to 5.9.

The widely held view is that district municipalities should be well-resourced structures able to support local municipalities. Figure 4 shows that there are just 260 civil engineering staff in districts and explains why this model has, in many instances, not been effective to support the many struggling local municipalities. Indeed, many district municipalities are also classified as struggling municipalities.

Figure 5 shows the dramatic drop in staff over the age of 50 in local municipalities, who would typically be the strategic planners and leaders, and would also act as mentors and coaches. The number under 35 has increased from 208 in 2005 to just over 500 – a significant load for the remaining seniors to direct and develop.

The formula developed in Numbers and Needs in Local Government (Lawless, 2007) was based on the number of households and a range of parameters, including powers and functions, land use, area, urbanisation and other specialist services where applicable, such as coastal engineering. Applying the formula to all municipalities at the time suggested that at least 2 500 to 3 000 civil engineering staff were required to service a total of 11 754 households. This had increased to 16 122 households in 2015, suggesting that an increase to some 3 400 to 4 100 is required to cope with the increased load. Thus the gap is growing, rather than being closed. The clarion call of the 2007 publication was to rebuild and professionalise, and the message has not changed. In the interests of developing approaches to rebuilding capacity, professionalisation will be discussed first.

PROFESSIONALISATION

FIGURE 3 A comparison of civil engineers, technologists and technicians in metros from 2005 to 2015

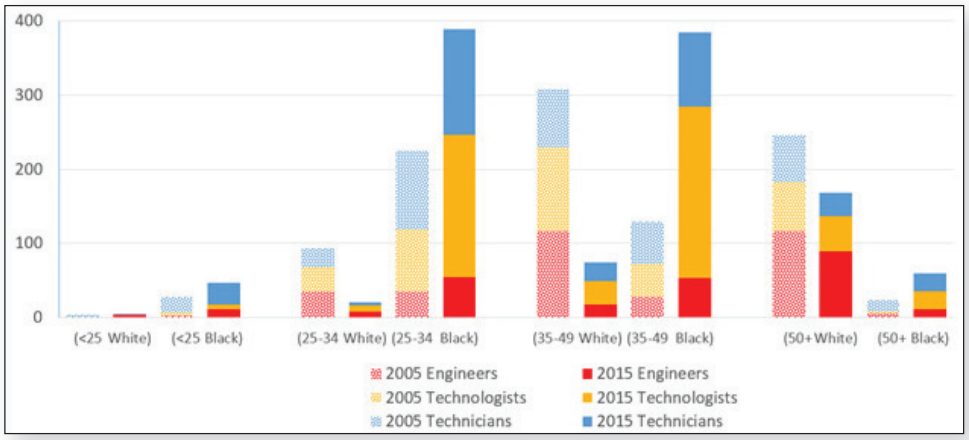


FIGURE 4 A comparison of civil engineers, technologists and technicians in districts from 2005 to 2015

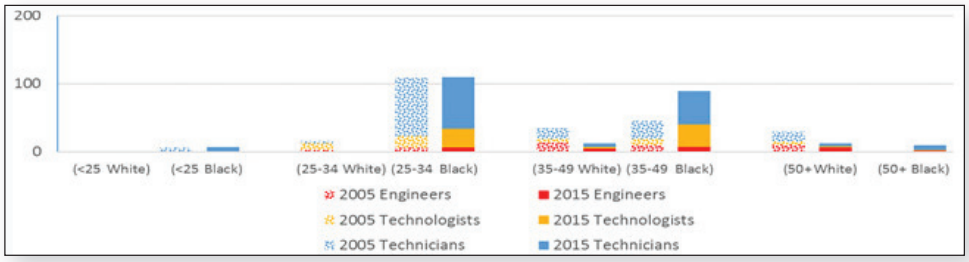
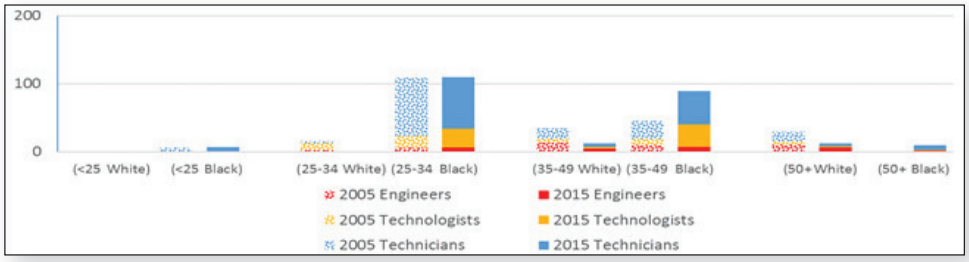


FIGURE 5 A comparison of civil engineers, technologists and technicians in locals from 2005 to 2015



Competency frameworks

The 'any manager can manage anything' philosophy, which has become prevalent since the late 1980s, has had devastating effects in many fields. "Without knowing the essential technology, a manager's ability to make decisions is impaired" (Adizes, 2004: 50). There has been much publicity over many years about inappropriately qualified managers in local government. It has not been unusual to find the CFO post being filled by an ex-policeman with no financial education, training or experience, or the Technical Director post being filled by a social worker or someone from an unrelated occupation. The results have been poor financial control and management in the case of the former, and the breakdown of service delivery and operations and maintenance in the latter. To address these challenges, the Department of Cooperative Governance (DCoG) has been developing Local Government Frameworks for Occupational Streams, which will become part of the Local Government Municipal Staff Regulations in time (DCoG, 2016). The important technical competencies highlighted under the Functional/Professional Competencies in the frameworks for engineering are – planning, design, construction, operations and maintenance, and project management. This is a welcome recognition These frameworks have been in the process of development

Phase		Level	Process followed	Planning	Design	Construction	Operation & maintenance
Preliminary	Increasing experience	Senior management	Intuitive	Forward and master planning	Collect brief and select options	Land and negotiate contract	Initiate O&M activities
Pre-implementation		Mid-management to senior-management	What-if ability – must be able to make decisions	Feasibilities	Design considerations and detailed design	Resource allocation and project planning	Monitor O&M activities
Implementation		Junior staff to middle-management	Process can be largely rule-based	Programming, collecting data	Detail and production drawings	Site supervision and monitoring	Manage O&M teams

FIGURE 6 Changing roles with experience

for a long period, and were finally workshopped with statutory councils, professional bodies, voluntary associations (VAs) and experienced municipal officials in May 2016 in preparation for gazetting the frameworks for public comment. Most councils and VAs were concerned that the roles which different categories of professionals play, e.g. engineer, technologist or technician, had been confused with the development of an individual, who may articulate from technician to professional by gaining further, relevant qualifications and experience. A team of municipal engineers and technologists gave input on behalf of ECSA with respect to engineering professionals. It was decided that a single framework was not appropriate, but three streams were necessary to represent the work of engineers, technologists and technicians. Certificated engineers were included with the technologist framework. As discussed above, the roles that these groups are expected to play are different, but complementary.

A five-level scale was selected to demonstrate the increase in competence with experience and development of expertise. Figure 6 broadly captures the type of work that young engineering staff would be involved in versus the strategic role that a Technical Director would play.

A difficulty arose in trying to determine where engineers, technologists or technicians would be appropriate as Technical Directors or departmental managers. If a municipality predominantly supplies dry sanitation and yard tanks, and the district is responsible for the roads, the work would be sufficiently routine for a technician to manage the engineering department. In a metro, however, where all services must be supplied, urbanisation, densification, aging infrastructure and a myriad of challenges arise; much strategising, planning and innovation is required for long-term service delivery, requiring the expertise of experienced professional engineers.

Given the limited time made available for councils and VAs to fine-tune these first drafts, it was decided that the typology of municipalities should be used to determine the qualification required for the most senior technical posts, where incumbents are fully responsible for service delivery. Given enough time to debate widely, budgets, types of infrastructure and other variables should perhaps also be factored in. The initial suggestions for the occupation of the Technical Director were:

- **A:** Metros – engineer
- **B1:** Secondary cities: the local municipalities with the largest budgets – engineer
- **B2:** Local municipalities with a large town as core – engineer
- **B3:** Local municipalities with small towns, with a relatively small population – technologist minimum
- **B4:** Local municipalities that are mainly rural with communal tenure – technician minimum
- **C1:** District municipalities that are not water services authorities – technician minimum
- **C2:** District municipalities that are water services authorities – technologist minimum

The category of the most senior person per department would be determined in relation to the most complex service offered by that department.

The question of registration must also be considered. Clause 18(4) of the Engineering Profession Act (46 of 2000) states that "a person who is registered in the category of candidate must perform within the engineering profession only under the supervision and control of a professional". This implies that there must at least be one registered professional in every organisation that performs engineering work. The registration process is a peer-review process and is a measure of competence. Applications for registration are assessed by four assessors and, in the case of engineers, they are also subject to a professional review/interview at which candidates present their work to a further two professional reviewers. Thus employers, funders and the public can take comfort that their engineering work is in the hands of competent professionals.

As shown in Table 1, only 56 municipalities have any registered engineering professionals. It has been suggested that a timeframe should be set in which all senior engineering personnel must become professionally registered, failing which their contracts would not be renewed, or they may not be promoted (depending on their conditions of contract). This, too, must be debated and finalised when the Competency Frameworks are out for public comment. We call on all those interested in contributing to this important work to register your interest on http://www.civils-masakheni.co.za/page/Questionnaire

Streamlining systems

When research was carried out for the 2007 publication, the overriding conclusion was that local government was not a satisfying environment for any professional to operate in. The ECSA requirements of a professional are to be able to investigate requirements or problems, design or develop solutions, implement them and take responsibility for decision-making, using professional judgement. These requirements are no different from those of other professions, including the medical, financial or legal professions. In local government, all too often supply chain, HR and budgeting requirements or decisions are overruled by those in the support departments, to the detriment of service delivery. Support departments, although meant to support line departments, have usurped the authority and undermine the processes that are the domain of technical departments. This view was still held by civil engineering staff interviewed in 2016, whether they were professional engineers soon to retire, or young candidates working towards professional registration.

Many recommendations were made in 2007. Thankfully, some changes are now on the horizon:

- **Supply chain** – As part of the Infrastructure Delivery Management System (IDMS), the Standard for Infrastructure Procurement and Delivery Management has been issued as National Treasury Instruction No. 4 of 2015/2016 (National Treasury, 2015a). This came into effect on 1 July 2016 and requires that evaluation reports and recommendations must be prepared by registered professionals. Thus the views of engineers will be heard when engineering tenders are being awarded.
- **Reporting and financial control** – The number of different reports required and control of budgets by the financial department will be addressed when the new Municipal Standard Chart of Accounts (mSCOA) is implemented nationally from 1 July 2017. This will cover not only budgets, but also asset management and projects, among other things. Engineering departments will need to develop capital and O&M budgets, and develop the more detailed asset registers, including all components as required for GRAP compliance. It is essential that technical departments work with the mSCOA team to ensure that all data in stand-alone systems are integrated into the corporate IT solution.
- **HR** – There has always been the complaint that new employees are

Level		Nature of work: The Candidate	Responsibility of Candidate	Level of Supervisor/ Mentor Support
A. Being Exposed	Increasing responsibility	Undergoes induction, observes work of competent practitioners	No responsibility	Mentor explains challenges and forms of solution
B. Assisting		Performs specific processes under close supervision	Limited responsibility for work output	Supervisor / Mentor coaches, offers feed back
C. Participating		Performs specific processes as directed with limited supervision	Full responsibility for supervised work	Supervisor progressively reduces support
D. Contributing		Performs specific work with detailed approval of work outputs	Full responsibility to supervisor for immediate quality of work	Candidates articulates own reasoning and compare it with those of supervisor
E. Performing		Works in team without supervision, recommends work outputs	Responsibility to supervisor is appropriate to a registered person	Candidates takes on problem solving without support, at most limited guidance

FIGURE 7 Increasing levels of responsibility towards professional registration

generally not selected by those who will be employing or managing them, resulting in inappropriately qualified or inexperienced staff being appointed in many cases. Once complete, the Competency Frameworks should be used as a basis for adverts and selection, but it is still essential that experienced engineering professionals be part of the interview and selection process. HR should simply offer the support of advertising, setting up interviews and finalising the contracts.

REBUILDING

In 2007 it was recommended that major training and professionalisation programmes should be put in place to grow capacity. As outlined at the outset, many such programmes have been put in place, but many lessons have been learnt from these which now need to be factored into developing tomorrow's civil engineering capacity. Those graduates who are trained for local government but are not employees of a municipality often find themselves unemployed at the end of the programme. On the other hand, recent graduates employed by local government are placed into fixed posts and do not get the range of experience required to develop as engineering professionals. Senior posts are filled by junior staff, or remain vacant as suitably experienced staff do not apply for these posts. Changes in approach to employing and developing at all levels need to be considered.

Training posts for junior recruits

When staff are appointed in the public sector, they are appointed to fixed posts. This does not allow engineering graduates to work towards professional registration. Graduates being trained as candidates for registration are required to develop 11 outcomes relating to the investigation of needs or problems, designing or developing solutions, management of the implementation and taking increasing responsibility over time, until they are ready for registration. The ECSA competence standards, R-02-PE (2011), R-02-PT (2015a) and R-02-PN (2016), suggest that the range of activities should "include but are not limited to: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; implementation, manufacture or construction; engineering operations; maintenance; closure or disposal; project management research, development and commercialisation". Planning, design, construction, operations and maintenance, and project management, identified in the Competency Frameworks, is a subset of this list, and is an ideal range for training candidates. However, since no single post will cover all these activities, it will be necessary to rotate candidates from one post to another, reporting to competent supervisors and working under the watchful eye of a registered professional acting as a mentor. If such a system is not in place, candidates will either not develop adequately, or will job hop several times during the early years of their career to gain this range of experience.

Where candidates are placed in local government on such programmes, the main challenges are to get buy-in from in-house supervisors, and to ensure that candidates are not assigned routine processes or projects.

Figure 7 is extracted from Table 4 of the ECSA document R-04-P (2012), Training and Mentoring Guide for Professional Categories. It is clear that the development process is more than just being involved in a range of activities. Rather, candidates need to take increasing responsibility, develop solutions themselves, and make recommendations on the final approach to be taken. This approach is well recognised. Prof. Stephen Billet, an international expert on vocational and workplace learning, suggests that experiences should not be routine and repetitive, but must be structured to offer increasing complexity, and increasing accountability on the part of the learner (Billet, 1996). All too often, on structured training, candidates remain at level B, simply assisting on many projects, but do not become engineering problem solvers, which is what is required of tomorrow's infrastructure leaders.

The appropriate approach would be to appoint recent graduates to training posts under a training cost centre that is not allocated to any department, but from where they can be rotated across the organisation to get the range of experience needed to obtain professional registration. This approach has been adopted by eThekwini, and even some private sector companies such the Engineering, Construction, Project Management (EPCM) consultants which require their personnel to be well versed in design, costing, developing specifications and managing consultants and contractors, although they do not actually design or perform contracting functions in-house. A national policy should be considered in this regard. It will not be possible in all municipalities, as there will be insufficient resources to develop such skills. It is therefore incumbent on the larger, and/or better-resourced municipalities to 'over-train' for those who cannot train their own, but agreements need to be in place initially to ensure that once trained, young professionals will have a post to enter.

The development of candidates has been recognised as an important training phase for many professionals. The definition of candidacy was included in the Department of Higher Education and Training's draft Learning Programme Regulations for the first time in 2012 (Government Gazette 35489, 3 July 2012). Quoting this document, "candidacy means the practical and work experience training that is an occupational qualification as determined by the relevant professional body and follows the completion of an academic qualification required for access to the assessment for the issue of a professional designation".

The recognition of candidacy has also been adopted as Category C in the Skills Matrix defined in the Department of Trade and Industry's Amended B-BBEE Codes of Good Practice. Companies are awarded points if they train candidates towards professional registration. The CIDB Standard for Developing Skills through Infrastructure Projects (Government Gazette 36760, 23 August 2013) also recognises candidate training. Using Clause 3.1.3, municipalities may call for their own candidates to be placed with service providers to receive the required design, contracting or any other experience required. Municipalities that commit to training should sign the ECSA Commitment and Undertaking agreement (ECSA, 2015b), which gives guidelines on what is expected of employers and mentors when training candidates towards registration.

The need for this approach is not limited to engineering – town planners, urban designers, finance, audit and even HR professions need to invest in such a model. Developmental career paths should be reintroduced, allowing junior staff to proceed towards seniority with the attainment of specific competencies. This will offer a clear career path to the employee, allowing him or her to move upward in one municipality

without the need to job hop, and allowing the municipality to benefit from the ever-improving skills.

Developing in-house staff

The experiences in mentoring 133 municipal engineering staff aged 47 and below (average age 33) on the LGSETA Candidacy Programme have demonstrated what a devastating effect the demise of graduate training and career-pathing has had in local government. This is a generation that has come into specific posts and has been doing much the same work for many years. Although they may be working independently, they are making routine decisions, and without adequate training are often making the wrong decisions. Many simply follow processes and do not have a feel for the overall needs of their departments or municipalities – few know the population of their municipalities, or the number of households they are serving, or the significance of land-use planning and requirements for the services they are providing.

While there is a view that training should be structured to suit the municipality's needs and not those of ECSA, this is extremely short-sighted. The method of training suggested by ECSA is designed to ensure that a professional has sufficient experience to be able to develop solutions to problems that may not be frequently encountered but can be deduced from the range of prior experiences. This is typically what experienced personnel are able to do. As can be seen from the demographics, there is a diminishing number of senior civil engineering staff, and the younger group must be able to take over. At present they continue to rely on seniors to tell them what to do, and have not yet grasped the need to solve problems independently.

There have been suggestions about developing qualifications for municipal engineering staff to bridge skills gaps due to inadequate theoretical knowledge. From the civil engineering profiles determined through this research, it appears that theoretical knowledge is not the main problem, but rather application and development in the workplace. Vygotsky, the founder of cognitive development theory, was of the firm belief that scientific concepts cannot be generalised from everyday experiences but must be developed through interaction with knowledgeable others (Vygotsky, 1934/1987: 167–172). Senker, a prolific researcher and writer on vocational education and training states that "... most of an engineer's learning occurs … as an integral part of work activities" (Senker, 2000). The challenge with this group is that they have had limited guidance or have seldom been challenged to apply higher-order problem-solving skills. They are thus reactive, rather than proactive, and need support by integrating training into work experiences in order to transition to the leadership roles required. It is suggested that a programme of action learning, including training courses and workshops associated with activities in the municipal calendar, combined with assignments based on the actual work to be done, should be rolled out. This will allow engineering staff who have not had sufficient support to develop as professionals, at the same time as developing the key plans, documents, policies, systems, checklists and procedures that need to be put in place, reinstated or enhanced.

An 18-month to two-year programme should be developed composed of formal lectures, workshops and workplace experience. Typically, a series of two- or three-day modules would cover guidelines on various aspects of municipal engineering, including planning, budgeting, designing, procurement, contract management, managing consultants, construction, monitoring contractors, operations, maintenance, running a depot, asset management, fleet management, legislation and bylaws, HR and performance management, etc.

Modules should be offered in workshop style with lectures, site visits, group discussions, developing documents, forms, processes, etc. The purpose of the site visits is to measure candidates' knowledge and competency, and to offer an opportunity to show them the basic causes of service delivery failure, and discuss and debate how to effect lasting repairs/upgrades. This is the vital element missing in the lives of municipal technical staff. After each session, delegates will be asked to describe what they will do differently when they return to the workplace and will be set an assignment to implement what was covered. Assignments will be assessed by a team of municipal engineering advisors, and feedback at subsequent workshops will allow participants to learn from each other's experience. Where necessary, input will be offered remotely between sessions. It is suggested that workshops take place every four to six weeks, using experienced ex-municipal engineers as lecturers and advisors.

Given the numbers needing support, a large team of experienced municipal engineers needs to be assembled and all institutions working in this field need to form an alliance to ensure adequate coverage.

Harnessing experienced staff

Figures 8 and 9 show the dramatic change in demographics in local government. While the transformation is impressive, the loss of knowledge has impacted on the progress of the young engineering staff who would have benefited from the supervision, coaching and mentorship of experienced staff. This problem was identified in the UK in the mid-1990s when Kevin Thomson cautioned that "… by getting rid of older people an organisation's KNOWLEDGE is being lost, not just its people …" (1998: 153). A similar sentiment was voiced in the USA, where it was suggested that the unintended consequence

FIGURE 8 Population pyramid of civil engineering staff by race in 2005

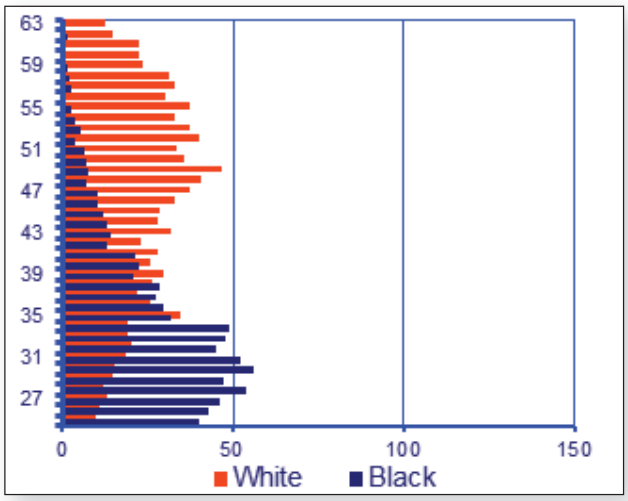
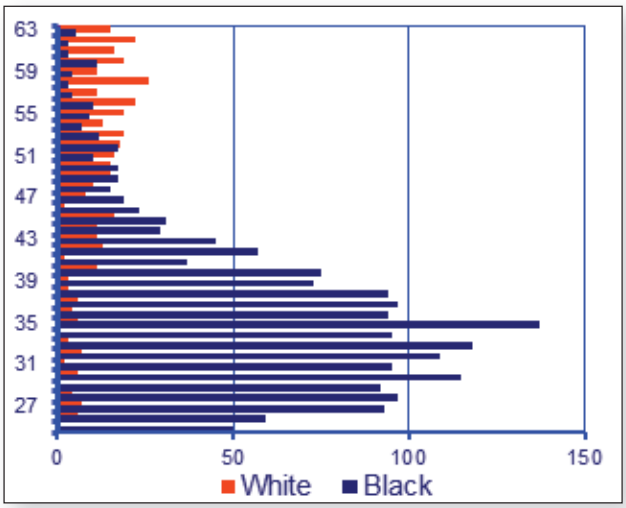


FIGURE 9 Population pyramid of civil engineering staff by race in 2015



of forced retirement was the loss of "hard-earned knowledge", often with dire consequences (Leonard & Swap, 2005: 21–22).

The bulk of those over 50 are employed in the metros. In half of the municipalities, the oldest civil engineering staff member is 44 or younger, in 45, 34 or younger, and in one municipality there is only a 23-year-old. This means that many local and district municipalities only have junior staff, few of whom have been adequately developed. The result is that many do not carry out any long-term planning, but wait for demands from their Councillors, do not schedule work, but wait for call-outs, complaints or invitations to meetings, do not carry out any meaningful budgeting, but accept and make do with whatever budget is allocated to them. Although the training outlined above is aimed at reversing this situation, it is not going to happen overnight. In the meantime, senior personnel able to drive the re-establishment of short- and long-term planning, budgeting, managing development and building control; handle emergencies as well as planned maintenance; manage designs and contracts; and redevelop systems and processes must be appointed to these municipalities.

In 2015, SAICE conducted a snap poll to determine whether there were engineers prepared to work in the public sector and received many positive responses. Over the past 10 years, SAICE-PDP has been able to source and place over 300 retired engineers into the public sector to troubleshoot, advise and/or mentor. At present spending in the construction sector is low. Many companies are considering retrenchments, but are loathe to let experienced staff go. An opportunity therefore exists to harness experienced staff who have had municipal experience in the past, through secondments.

From past experience, placements should be for at least two to three years, to allow time to assess the challenges, develop and implement solutions, and develop younger staff. Such placements may be for three or four days a week, but should not be only for a day or two a month, as this simply does not afford enough time become familiar with the environment and effect meaningful changes. Those placed should be given full authority to make decisions and drive service delivery. It is also critical that such a team of secondees or deployees is managed by engineering professionals who can support them technically, rather than being managed through targets and tick boxes. A systematic approach to transforming engineering departments is urgently required, covering planning, capital projects, operations and maintenance and skills development. Once again, an alliance of professional bodies should be set up to handle this important task.

Attraction and retention

When municipal engineering staff have been interviewed, their views on attraction and retention have included the need to pay premiums for tertiary qualifications, professional registration, years of experience in local government and years of service within the municipality. Furthermore, municipalities should pay professional registration fees and technical staff should be afforded the opportunity of attending meaningful workshops and courses each year to retain their registration through continuing professional development.

The most important factors for attracting those with experience back into the system are, however, the need for more autonomy and authority for delivery departments, and uncoupling the business of local government from the politics of local government. With regard to identifying and employing those who have been developed through graduate programmes, it is suggested that all municipalities also advertise junior posts on a central website, such as MISA or DCoG, to allow graduates to find opportunities to harness their development to date.

CONCLUSIONS

There is a need to re-engineer local government capacitation and professional development. The training processes of the past have been lost, and the gap between the demand for service delivery and available capacity is growing. Assuming that an applicant with a tertiary engineering qualification can grow into any post without working in a community of expert practice is a fallacy.

Instead of restructuring, structures should be rebuilt. Instead of politicising appointments, they should be professionalised. Professional judgement should be highly valued. In the medium to long term, selection based on professional registration and experience is essential. Where suitably qualified people cannot currently be found, staff should be sought through secondment and by tapping into the pool of retirees to offer their expertise until such time as in-house staff have been adequately trained.

RECOMMENDATIONS

The Competency Frameworks under development must be finalised and implemented to ensure an adequate supply of skills. Hierarchies of young, mid-career and experienced professionals must work together to address all levels of service delivery. Training posts and integrated workplace training methodologies should form the basis of training policies to ensure that junior and mid-career civil engineers, technologists or technicians are attracted into and developed in the municipal sector. Professional bodies should form an alliance to mentor, support action learning, and source and manage senior professionals placed in municipalities to rebuild engineering departments.

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