

**Engineering Profession in collaboration
with the Engineering Industry
submission to
the Ministry of Economic Development**

“ Developing an Essential Partnership”

28 June 2012

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EXECUTIVE SUMMARY

The Engineering Council of South Africa (ECSA) is a statutory body created in terms of the Engineering Profession Act, Act 46 of 2000, whose mandate is protection of the health, safety, environmental and all other interests of the public in relation to the activities of the Engineering Profession. ECSA relies on various forms of quality assurance in carrying out its mandate and is cognizant of the fact that optimum long term benefit from implementation of the Government's Infrastructure Plan will be conditional on the effective mobilization, in all respects, of the best quality engineering that can be made available.

It is therefore appropriate that the Council of ECSA secured the participation of a wide range of organizations in the engineering environment to formulate this submission to Government on creating an ***Essential Partnership between the Engineering Profession and Government*** for implementation of the Infrastructure Plan. The Engineering Profession proposes that a cohesive partnership, initially based on core recommendations, be established between government, industry and the professional bodies to address this challenge as a collective. By drawing on lessons learned in previous major infrastructure development programmes it is expected that the level of success in implementing the **National Infrastructure Development Plan** will be significantly increased and that:

- Urgent action will be taken in the Short Term to create professional engineering capacity in public sector organizations that are responsible for implementing components of the National Infrastructure Development Plan. Various options are suggested for the Short Term initiative;
- Focussed plans will be implemented to ensure stability in the Engineering components of public sector organizations in the Medium Term;
- In the Long Term the public sector would be professionalized with competent and responsible persons in every post where this is called for. It is envisaged that the State becomes the employer of preference among engineering professionals, leading to a capable State being rebuilt as expected by the NPC;

- A Supply Chain Management system, more appropriate for the procurement of professional engineering services and construction contracts will be introduced which incorporates consideration for :
 - including a revised threshold for single source procurements;
 - the Framework Agreement Model for providing professional services on a call-down basis;
 - Utilising the CIDB Method IV basis for adjudicating bids.
- The role and function of the CIDB be revised and broadened to support the envisaged procurement system for engineering services;
- Serious steps be taken to avoid corruption in the procurement and supply of engineering services by introducing an Integrity Pact between representatives of contracting parties and by much stricter implementation of existing laws without impunity for transgressors;

In view of the scope and gravity of these recommendations, urgent and intensive dialogue on these matters between Government, the Engineering Profession and Industry would have to take place to not only enhance the pace of this process but also to ensure that sustainability is integrated into all of the desired outcomes of this process.

1. INTRODUCTION

“For the year 2012 and beyond, we invite the nation to join government in a massive infrastructure development drive. We are going to launch a huge campaign of building infrastructure nationwide. This will boost the level of economy and create job opportunities”, so said President Jacob Zuma in his State of the Nation Address on 9 February 2012. The budget speeches in Parliament of various Ministers reinforced the expectations and the challenges contained in the President’s statement.

It is clear that the intention is to use this infrastructure expenditure programme to achieve the socio-economic development vision of Government by transforming the economic landscape of the country. This implies, *inter alia*:

- Improving South Africa’s global competitiveness and level of socio-economic activity through improving existing infrastructure and by providing new infrastructure, and
- Providing a platform for employment in a significant number of new jobs created directly through the investment in infrastructure and permanent jobs in the industrial development and downstream economic activities that can be expected to follow.

Furthermore there is a strong focus on infrastructure for the delivery of basic services to the people of South Africa and for supporting the integration of African economies by using the North-South corridor development as a catalytic channel for regional integration.

Herein lays a direct mechanism for poverty alleviation, reduction of inequity in society and a boost for progress towards achieving The Millennium Development Goals.

Reference to “massive infrastructure” conjures up images of very large physical structures such as dams, highways, bridges and soccer stadiums, built from concrete and steel using powerful machinery. This is only part of the whole truth and cannot be realized or sustained without the co-existence of other, perceived softer but perhaps more important, social infrastructure components such as:

- Universal access to the socio-economy in a robust democratic dispensation,

- Basic education that prepares all our human resources for maximum participation in the socio-economic opportunities that are presented,
- Skills training and higher education to develop the human resource capacity necessary to create, operate and maintain the nation's socio-economy,
- A strong and productive skills base,
- Efficient institutions such as a banking system, effective policing of law and order, health services and a regulatory environment conducive to doing business and encouraging foreign direct investment.

The presentation by Minister Ebrahim Patel, Minister of Economic Development, to the **Economic Development Conference on Infrastructure**, which took place in Ekurhuleni in April 2012, demonstrated Government's high level of understanding of the infrastructure challenge facing the country. The Strategic Infrastructure Projects (SIPs) which have been defined by the Presidential Infrastructure Coordinating Commission (PICC) to make a positive impact on every corner of the country comprise a welcome and well thought-out grand plan. The expectations are high, however success will be determined by its effective and timely implementation.

There is no single action or arrangement which, on its own, will be a panacea for successful implementation of the Infrastructure Plan adopted by Government. However, the Engineering Profession in South Africa, comprising the skills of its members employed in many sectors of the economy, both public and private, and the engineering industries such as manufacturing, construction and consulting, can make a significant contribution to successful implementation.

2. A CONTRIBUTION FROM ENGINEERING

The Engineering Council of South Africa (ECSA) is a statutory body created in terms of The Engineering Profession Act, Act 46 of 2000, whose mandate is protection of the health, safety, environmental and all other interests of the public in relation to the activities of the Engineering Profession. ECSA relies on various forms of quality assurance in carrying out its mandate and is cognizant of the fact that optimum long term benefit from implementation of the Government's Infrastructure Plan will be conditional on the effective mobilization, in all respects, of the best quality engineering that can be made available.

As a statutory body ECSA maintains a register of professionals and does have members whose interests are to be promoted. This is the role of the many Voluntary Associations which serve their member's interests. It is therefore appropriate that the Council of ECSA secured the participation of a wide range of organizations in the engineering environment to formulate this submission to Government on creating an ***Essential Partnership between the Engineering Profession and Government*** for implementation of the Infrastructure Plan.

It is against this backdrop that the Engineering Profession proposes that a cohesive partnership, initially based on core recommendations, be established between government, industry and the professional bodies to address this challenge as a collective. By drawing on lessons learned in previous major infrastructure development programmes it is expected that the level of success in implementing the **National Infrastructure Development Plan** will be significantly increased.

It is recognized that many factors will affect the success with which the Infrastructure Plan is implemented over the envisaged 20-year project pipeline and that many of these factors are not within the purview of the Engineering Profession. It is desirable that Government be made aware of the influence that these success factors may have on the ability of the Engineering Profession to make its maximum contribution. This statement is made respectfully and is based on a critical review of the lessons learned, over many years, in developing, operating and maintaining the existing physical economic infrastructure in the country. Many iconic physical infrastructure projects, as well as many equally important but less imposing projects, have been completed in recent years and have taught many lessons.

South Africa should and can be proud of an Engineering Profession that enjoys the highest respect world-wide. Not only are our professionals sought-after for their knowledge, skill,

expertise, competence and willingness to work hard, but our engineering industries have proved their ability to compete effectively in the world's markets. There is always room for improvement in technology and for broadening the skills base. The payoff line comes from the way that these are utilized for the benefit of socio-economic development, the challenge then is to mobilize these resources to best advantage for implementation of the Infrastructure Plan.

The Engineering Profession co-ordinated by ECSA, have undertaken to go the extra mile to contribute maximally to the Government's initiative to invest in infrastructure of all kinds, over a long term, to achieve the vision and objectives of socio-economic development referred to above. The recommendations documented below are a synopsis of many views and opinions expressed in a series of round table discussions between well-informed and mandated representatives of many constituencies in Engineering. These constituencies were invited to participate voluntarily and did so with the best intentions. The process was managed to avoid the dominance of personal, commercial or sectorial interests.

It is recognized that whilst it may be easy to table such recommendations, it may be much more of a challenge to give effect to these recommendations. In this regard the various constituencies in the Engineering Profession have expressed their commitment to make any contribution so success that is within their capacity and which will be embraced in the spirit with which it is offered. Though there is a long list of points which were tabled during the discussions the key institutional aspects which could be addressed in **collaboration between the Engineering Profession and Government** to make an immediate difference in the interest of South Africa are expanded on in this submission.

3. DEVELOPING ENGINEERING CAPACITY IN ALL SPHERES OF GOVERNMENT

A perennial topic for debate in South Africa, and in many other countries world-wide, is whether or not there is a shortage of capacity in the Engineering Profession. In her works entitled *Numbers and Needs* Allyson Lawless (2005, 2007) addresses the imbalances between the supply and demand of resources in the engineering profession and in the civil engineering discipline in particular. It is a fact that while many young people with academic qualifications at different levels in engineering, and even a number experienced, professionally registered engineering practitioners, are unable to obtain employment in Engineering, employers will report shortages of suitable candidates to fill their vacancies. This situation has been evident for decades and the general wisdom has it that among the root causes are inadequate opportunities for young, educated persons to gain the necessary experiential training necessary for recognition and registration as a professional, and the exceptionally volatile pattern of capital investment in engineering infrastructure.

Whatever imbalances there were in the Engineering Profession, and whatever the actual causes thereof, it is a fact that major infrastructure programmes have been successfully engineered and constructed in South Africa. These include the iconic sport stadiums, supported by extensive other projects, built for the 2010 Soccer World Cup, the Gauteng Freeway Improvement Programme (GFIP) and the Gautrain as examples. One important consideration is that professional people are mobile and are attracted to major, exciting projects wherever they are in the world. The above-mentioned projects benefitted from internationally experienced engineering staff that has since moved on. Engineering resources for these projects were also drawn from the ranks of retired persons with professional expertise and from other economic sectors, like banking and business where their competence is highly valued.

In order to inform this submission a Working Paper on an update of the “Estimate of the Number of Engineering Practitioners in South Africa” was commissioned from Allyson Lawless. While this is still work in progress the current version of the document is appended as **Annexure A**. This estimate is based on the data base of Registrations by ECSA of Professionals in the Engineer, Technologist, Technician and Certificated Engineer categories, across all nine engineering disciplines recognized in the Engineering Profession Act, Act 46 of 2000, and on

the available information on the graduation of engineers from our Universities. Cognisance is taken of (a) the fact that at present not all practitioners in Engineering are required by law to be registered as Professionals, (b) there is attrition from the Engineering Profession for various reasons and (c) emigration and immigration of professionals plays a significant role.

The preliminary finding is that there are at present between 32 000 and 35 000 Professional Engineers active in South Africa. A similar estimate of the number of Engineering Technologists and Engineering Technicians, both important members of the engineering team on any project, indicates a combined total of between 40 000 and 55 000 in the South African system. These professionals are located in the private and the public sector, including academia.

Estimating the real demand for the services of Engineering Professionals, now and in future, in South Africa is more difficult. Demand is seen to comprise the positions already filled, vacancies not filled as well as the resources necessary to do the **work that should be done but has not been scheduled or resourced**. Important in the last-mentioned category is the operation and regular maintenance and refurbishment of existing and new infrastructure. This does not of course factor in the demand from growth in private sector capacity required for expansion into markets outside of the immediate South African environment which will render South African based companies competitive in growth markets internationally.

The following anecdotal evidence points to a conclusion that there is no overall shortage of engineering resources in South Africa:

- The consulting engineering sector has resorted to cost-competition strategies as a survival strategy to retain capacity in an extremely volatile work flow situation;
- Companies in both the consulting and contracting sectors are actively developing market share in markets abroad using South African engineering capacity;
- Retrenchments of engineering professionals as a consequence of lack of work load in consulting and contracting companies occur periodically;
- Engineering professionals migrate to other economic sectors where their skills are appreciated.

The loss of skills and competence by the Engineering Profession has possible serious implications for the appropriateness and long term viability of projects implemented in the

National Infrastructure Development Plan, particularly in relation to project sustainability and public health and safety. This knock-on effect cannot be countered by simply producing more engineering resources by increasing the graduation rate at Universities. The lead time to educate and train a competent engineer to a professional level can be up to ten years if one factors in the fact that most graduations take place after five years and that it takes a minimum of three years through a well-structured mentorship programme “with a willing giver and willing receiver” to render the individual eligible for professional registration. This process is evidently inadequate to meet the time constraints for the for the start of implementation of the important National Infrastructure Development Plan, however it must be reiterated that acceleration of this process will serve only to provide insufficiently competent persons and that further development will be required to ensure that a sustainable cadre of confidently competent professionals are developed to mentor and develop future generations of professionals. Unfortunately, the applied science nature of this profession, based on practice and not only qualification, not too unlike the medical profession with similar inherent risks to public health and safety, though at much larger scales, makes it impossible to short circuit the process required for professional competence.

The most likely response from the private sector will be to build capacity as the need arises in the same way as it has done many times before as mentioned above.

In its Vision Statement and the National Development Plan the National Planning Commission (NPC) identified the lack of capacity in Government Departments as a major constraint in Government’s ability to deliver on this vision. Of particular concern is the lack of suitably qualified and appropriately experienced Engineering Professionals and Project Managers in Government, without whose input and guidance the proposed Infrastructure rollout will be impossible to achieve in an efficient, cost effective and corruption free manner.

In this respect the concept of Project Governance plays a vital role in the successful delivery of all infrastructure projects, particularly in the Public Sector. Project Governance refers to those aspects of corporate governance which are related to ensuring that (a) the appropriate projects are undertaken and (b) that they are executed well in all respects. Governance of infrastructure projects, in the public and private sectors, relies heavily on the effective functioning of a multi-disciplinary team. Where the infrastructure comprises engineering works intended to enable and support economic activity, e.g. highways and roads, railways, bridges, electric power generating

stations, dams, water supply systems, waste management facilities, industrial and commercial buildings and structures, mines and municipal infrastructure among others, the project team

requires various engineering disciplines together with other disciplines. It is the lack of capacity of this kind in all spheres of the public sector, which requires urgent attention.

It should be noted that the loss of technical capacity in government organizations, at professional and at artisan levels, brings with it an inability to create, operate and maintain economic infrastructure. This results in the organization being exposed to unacceptably high risks. Such risks include not only the consequences of failure in Project Governance referred to above but also exposure to the liability for the consequences of inadequate duty of care being given to public structures and facilities. The lamentable deterioration of the South African road infrastructure resulting in serious road accidents with loss of life, serious damage to public and private vehicles and huge losses to the economy as a result of increased road user costs and increased travel times, is but one example.

Another example is that Government is responsible for the operation of water management infrastructure during times of floods where the lack of expertise and competence can result in damages amounting to billions of Rands per event. Such damages were recently experienced in the Northern Cape. This is a very specialized field where availability to Government of the necessary expertise is not negotiable. In the water sector the State also has a responsibility to oversee dam safety. Should a dam fail and it is found that it did not comply with all the regulated dam safety requirements, the relevant Government Department can be held responsible for loss of life and damage to property.

Of great concern is that these risks to the State are not clearly understood since there is limited technical capacity available to sensitise decision makers to these risks. This then begs the question as to how we would be able to go about successfully rolling out the massive, long term National Infrastructure Development Programme if the issues of capacity are not adequately addressed.

The Engineering Profession would support all well-conceived interventions to urgently improve the engineering capacity in Government at National, Provincial and Municipal levels and grow

and sustain this capacity for the long term. These interventions have to commence as soon as possible with **Short Term** arrangements, followed by arrangements that will ensure stability in the **Medium Term** and sustainable arrangements for the **Long Term**.

In the **Short Term** the focus should be on creating capacity as quickly as possible in order to develop Business Plans and Governance Structures for priority projects. This can be achieved by:

- Deploying experienced engineering professionals from the private sector and from retired practitioners to designated National and Provincial Departments to form Project Management Units (PMU) in each of those Departments;
- Deploying experienced engineering professionals from the private sector and from retirement to a National Project Management Unit to oversee and support the work of the departmental PMUs.
- Deploy less experienced practitioners in the above Units so that their own skills may be developed through a process of defined and measured mentorship for the longer term to capacitate Municipal and Provincial structures.
- Make the award of contracts to Consultants and Contractors subject to the submission of a defined and measurable mentorship plan for young practitioners to enable registration with ECSA within the timeframes normally prescribed;

Short term deployments as described above can be no more than stop-gap measures designed to kick-start implementation of the Government's National Infrastructure Development Plan which has a 20-year outlook. Success with the implementation plan will to a large extent hinge on **Medium Term** stability in the project management and governance structures of the responsible functional organizations. This resonates with the vision of the National Planning Commission. It is suggested that such essential stability can only be achieved by creating an environment in these Departments where suitably qualified and appropriately experienced

Engineering Professionals are again attracted to the public sector. At the same time it is strongly recommended that leadership and management of Engineering Departments is again placed in the hands of appropriately qualified and experienced Engineering Professionals. This will consolidate stability and enable training and development of new recruits to have a real chance of succeeding.

For the **Long Term** successful implementation of the National Infrastructure Development Plan and beyond, it is essential that the public service be professionalized with professionally responsible and competent people in every post where this is required in the interest of public health and safety. In this way a capable State will be rebuilt as envisaged by the NPC, but building a dedicated and stable professional human resource capacity will take time. It will be necessary to redesign many departments, recruit, appoint, train, and retain staff, and reintroduce systems and procedures for supporting infrastructure development and ownership throughout its lifecycle. Institutional redesign and an enabling environment will be a prerequisite for real professionalization of the public service. The Engineering Profession considers it essential that the State becomes the employer of preference among engineering professionals, offering the most satisfying and challenging careers, competitive remuneration and other benefits, recognition and a working environment which is conducive to dedication, hard work, productivity and job satisfaction.

In the long term it is essential that a flow of engineers, technologists and technicians that graduate from tertiary institutions be developed by and for the public sector. It is necessary to implement comprehensive career guidance, selection, education and training as soon as possible to develop a new cadre of Engineering Professionals in the public sector for the long term.

4. PROCUREMENT FOR GOVERNMENT CONTRACTS

It was most significant that during the **Economic Development Conference on Infrastructure** in April 2012 the issue of tendering for Government business and the present system of procurement in Supply Chain Management was heavily criticised by representatives of many constituencies. The criticism centred on the effectiveness of the system in delivering value for money to the State, the costly and ineffective bureaucratic procedures that are in place and the susceptibility of the system to fraud and corruption. Last-mentioned issue is discussed in Section 5 below.

In order to deliver the Government's large planned infrastructure initiative it is essential for the private and public sectors to engage with one another to clearly identify and agree on ways to manage the major bottle necks in procurement. This could have a major impact on the efficiency and cost effectiveness of infrastructure delivery. It is fully understood that new innovative methodologies for the various components of the delivery model need to be explored and, where applicable implemented. Anti-competitive behaviours such as collusion in the market place are deplored. However, it is important for sustainability of the engineering industries that the private sector is able to deliver fair and reasonable returns to its shareholders while the Government receives good value for its investment. For this reason it is strongly recommended that a Supply Chain Management system, more appropriate than the presently prescribed tendering procedure in which cost considerations far outweigh functionality and competence criteria, be adopted. Existing Government structures and systems should be used more effectively than at present to implement such an alternative procurement system so as to improve the value for money returns and dramatically reduce opportunities for corruption and other abuses.

Numerous effective delivery models already exist both internationally and locally, some of which could be adopted for implementation of various components of the National Infrastructure Development Plan. As an example, overarching **Framework Agreements** appear to be the most effective delivery model in many circumstances. This model allows for a "partnering" type of relationship between all stakeholders which in turn engenders trust and transparency.

Framework Agreements are not new and are used with success in many situations in South Africa and world-wide. Consulting Engineering South Africa (CESA) proposed that its document, **“Framework Agreements: Tool to Increase Jobs and Infrastructure Spend”** is attached as **Annexure B** to this submission. This document has previously been submitted as a CESA submission titled **“Construction Procurement”** to Business Unity SA (BUSA), dated August 2011, for discussion at NEDLAC. Representatives of the Engineering Profession and Engineering Industry in South Africa recommend that Government give serious consideration to including this model in the procurement rules for professional services, particularly in engineering. Experience has shown that this model engenders a “partnership” type relationship between the Client body and the Professional Service Provider (PSP) resulting in greatly improved transparency and, most importantly, mutual trust.

Associated with the above are recommendations that:

- the role of the Construction Industry Development Board (CIDB) be expanded to assist Treasury in regard to procurement for infrastructure development projects by providing an auditing and developmental function;
- the CIDB Method IV, which includes merit and quality together with cost as criteria for adjudicating bids, be adopted for procuring professional services;
- the estimated cost of services for which competitive bidding procedures are made applicable be revised in relation to professional services so as to allow single source procurement procedures for assignments where the cost is likely to be less than R500 000;
- the CIDB Method IV method of procurement be augmented with special provisions to enable SMME’s to develop skills and capacity in a structured manner (by introducing special registers) to become fully capacitated and competitive to render professional engineering services.

The recommendations made above are far-reaching and detailed in their conceptualization. This is fertile ground for urgent in-depth consultations with the parties concerned so as to be fully prepared for the commencement of implementation of the National Infrastructure Development Plan. The Engineering Profession looks forward to further discussions of this nature.

5. CORRUPTION

The thorny issue of corruption must be dealt with as a matter of extreme urgency in order to set aside the current mistrust that exists between Government and the Private Sector.

The urgent adoption of an “**Integrity Pact**” between stakeholders responsible for infrastructure delivery in South Africa and alignment with the international multi-stakeholder “**Construction Sector Transparency Initiative**” (CoST) programme is advocated. This should assist in establishing a contracting environment which is dominated by integrity rather than opportunities for corruption. Only when the incentives for conducting business with integrity far outweigh the risks associated with corrupt practices, and impunity gives way to sanctions that fit the crime, can the business of delivering massive infrastructure for stimulating socio-economic development be conducted in a way that meets Government’s objectives.

The urgent finalization of the Competition Commission’s “Fast Track” process for dealing with historical cases of collusive behaviour in the construction sector is anxiously awaited. This should have a positive impact on future relationships between public and private sector stakeholders in infrastructure development.

In a recent report of the Construction Industry Development Board (CIDB) entitled “**Construction Quality in South Africa; A Client Perspective**”, fraud and corruption was identified as being among the major barriers to construction quality. In another study the CIDB found that corruption was not restricted to the paying of financial bribes, but also often took the form of “political interference in the tender process, or cronyism, nepotism, etc”. Government officials at both provincial and national levels are aware of this trend and have cited the need to eradicate corruption in the construction industry. The Engineering Profession is of the view that opportunities for corruption can best be avoided by adopting a procurement system which is founded on:

- transparency,
- participation of all stakeholders,
- competition,
- reduced discretionary powers,
- removal of unnecessary regulation,

- improved financial management and
- extended auditing.

The Engineering Profession envisages the adoption of at least a **Construction Industry Integrity Pact** in terms of which bidders for engineering-related professional services and construction contracts undertake in writing to prevent any form of tender-rigging, collusion, and corruption during the tender process and during execution of the work. Such practices are in any case against the law but perpetrators are known to get away with malpractices with impunity. Although not a panacea, such an Integrity Pact will enjoy wide support from within the Engineering Profession, focus attention of all concerned on the intentions and be a deterrent. If such a Pact was in place back-to-back with similar personal undertakings from individuals responsible for implementing the procurement procedures corruption in the engineering and construction industry would be dealt a significant blow.

6. RECOMMENDATIONS

A forum of well informed, mandated representatives of a diversity of constituencies in the Engineering Profession and the Engineering Industry, convened and facilitated by ECSA recommends that the following aspects be addressed by an ***Essential Partnership between the Engineering Profession and Government namely that :***

- Urgent action be taken in the Short Term to create professional engineering capacity in public sector organizations that are responsible for implementing components of the National Infrastructure Development Plan. Various options for suggested for the Short Term initiative.
- Focussed plans be implemented to ensure stability in the Engineering components of public sector organizations in the Medium Term.
- For the Long Term the public sector should be professionalized with competent and responsible persons in every post where this is called for. It is envisaged that the State becomes the employer of preference among engineering professionals, leading to a capable State being rebuilt as expected by the NPC.
- A Supply Chain Management system, more appropriate for the procurement of professional engineering services and construction contracts, be introduced including a revised threshold for single source procurements, the Framework Agreement Model for providing professional services on a call-down basis and the CIDB Method IV basis for adjudicating bids.
- The role and function of the CIDB be revised and broadened to support the envisaged procurement system for engineering services.
- Serious steps be taken to avoid corruption in the procurement and supply of engineering services by introducing an Integrity Pact between representatives of contracting parties and by much stricter implementation of existing laws without impunity for transgressors.

In view of the scope and gravity of these recommendations it is proposed that urgent and intensive dialogue on these matters between Government, the Engineering Profession and

Industry take place to not only enhance the pace of this process but also to ensure that sustainability is integrated into all of the desired outcomes of this process.