NACI Stakeholder Consultation Workshop

15 MAY 2015, SHERATON HOTEL

PROCEEDINGS REPORT

1. Opening and Welcome (Ms Claire Busetti)

Ms Claire Busetti welcomed the participants to the workshop noting that through the workshop, the National Advisory Council on Innovation (NACI) is working on getting government, universities and science councils to start working together. In introducing the workshop programme, she indicated that there would be two presentations; 1) results of the 2014 South African Science, Technology and Innovation (STI) Indicators booklet and 2) the proposed National Innovation Information Portal Framework being conceptualised by NACI.

She further highlighted the importance of the first presentation in measuring progress of the National System of Innovation (NSI) and its success; noting that South Africa is doing very well in terms of research and development (R&D) and academic excellence, and has had a great improvement in publication rates since the introduction of the incentives. However, success in terms of converting those R&D outputs into products and services is still lacking behind. World-wide there has been a tendency to measure innovation in terms of the number of PhDs, the number of patents and the number and quality of publications. Although these are very important inputs which are easier to measure, they often do not lead to commercialisation of technology. It is therefore important to not only measure outputs, but to also look at the impact. There is a need for targeted interventions to support the NSI in order to achieve the desired outputs and impact, which would in turn result in the creation of a thriving and inclusive economy that uses innovation and technology to improve people's lives, solve service delivery problems, increase GDP growth and create jobs. In conclusion, she stressed that all stakeholders in the NSI such as universities, science councils, government and the private sector need to start working together to achieve this.

2. Presentation: Results of the South African Science, Technology and Innovation Indicators Booklet, 2014 (Dr Azar Jammine)

The South African Science, Technology and Innovation Indicators booklet is an annual publication of NACI. NACI strives to continuously improve this publication each year by either addition or removal of some indicators, also taking into consideration inputs received from the stakeholders, including amongst others, the Academy of Science of South Africa (ASSAf). The purpose of the publication is to provide a wide range of critical STI indicators that can be used for assessing the NSI. The indicators used in the publication are sourced from a wide variety of publications, Statistics South Africa, Reverse Bank bulletins as well as a number of international publications.

The updated publication specifically includes the information on Dinaledi schools initiative which is aimed at improving the throughput of learners with Mathematics. The publication also includes data on matric Physical Science completions, which was previously not included, as well as some data on foreign direct investments. The purpose of these improvements is to assess the extent to which innovation is actually succeeding in producing the better outcomes that could be useful for the economy. Moreover, the publication includes a lot of data on the work done at the universities in different fields of interests, and data on collaboration between South Africa and other countries. A fairly complex diagram of data on the mobility of researchers into and out of South Africa is also included because that is quite critical, given that there has been a perception that South Africa is suffering a continuous brain drain, which results in a loss of research capability. This is however not entirely true as evidenced by the data.

The indicators in the booklet are structured around the 2002 National Research and Development Strategy indicators logic model framework and includes technical progress as well as technological improvement and innovation, which would achieve the creation of wealth, improvement in business performance and an improved quality of lives. In simple economic terms, this would mean that the more a country can innovate the more theoretically that country becomes more competitive relative to its peers, and that in turn

enhances the industry and encourages the country's ability to export more and not to rely on imports to keep the economy going.

At the moment South Africa is suffering from a huge current account deficit with the shortfall between exports earnings received and the money that has to be paid out on the imports of goods and services being among the largest in the world. That places downward pressure on the currency and makes it more volatile because the country is highly dependent on international investors to buy the government bonds or shares in order to gain foreign exchange, and that in turn generates a lot of volatility in the currency which is inimical in encouraging investment. At the end of the day, with a lower currency, inflation rates turn to escalate, interest rates turn to be higher than they ought to be and then the economic growth rate ends up being lower than what it should be. This is the role that technology plays, but in order for it to play that role there is a need for appropriate human capital resources, especially in science, engineering and technology (SET). In order to do so, the future R&D capacity needs to be enhanced as quickly as possible and the interface with international sources of technological expertise also needs to be improved in order to bring new ideas and enhance local competitiveness.

It is important to bear in mind that NACI is undertaking this type of work with a specific objective of trying to facilitate the implementation of the NDP, and there is no point in talking about the NDP and trying to achieve its targets if one cannot actually measure how you are doing against those targets. The booklet shows that the country is in fact falling behind on many of these targets and it is therefore important to note that and to be able to assess where we stand in that regard. One of the objectives of the NDP is that over 25% of university enrolments should be at postgraduate level by 2030 but we still have a long way to go there. The other objective of the NDP is to improve the access to Mathematics and Physical Science especially in underprivileged schools, hence the importance of Dinaledi schools to try and assist in achieving that.

Looking back twelve years ago, there were one and a quarter (1¼) million students that began schooling at our public schools, but twelve years later in 2014, only 2.5% of them managed to get 60% for Mathematics and only 1.6% managed to get 60% for Physical Science. This is the country`s biggest economic challenge. The other big challenge with

regards to Schooling 2025 is that 20% of learners should leave grade 12 with at least 50% in Mathematics and Physical Science by 2014 but we are way off at the moment, and that figure should rise to 1/3 by 2025.

When one looks at the statistics, some of them are encouraging. There has been a gradual increase of SET enrolments in the undergraduate and postgraduate enrolments relative to the overall enrolments, but that cannot carry on easily without an improvement in matric Mathematics and Physical Science pass rates. There is an undeniable link between unemployment and educational outcomes and unlike countries such as Spain and Greece who have higher unemployment because of political and general economic problems, in South Africa there is a direct link between the probability of being employed and the level of education that one has. Government has been attempting to improve outcomes through the Dinaledi schools mechanism which seems to be overall successful, although this is only based on four years of statistics. The pass rates at Dinaledi schools have on average been a bit higher than that of non-Dinaledi schools.

In recent years, South Africa has had an extraordinary success in terms of improving the number of scientific publications. There has been a general rising trend which is a worldwide phenomenon and with the advances in information technology, people have been publishing increasingly more worldwide. The percentage of South Africa's share of worldwide publications has been in a rising trend, although it flattened a little in 2013. Moreover, South Africa has maintained its level of citations relative to the rest of the world and knowing that the ratio of South Africa's economy in relation to the world economy has been about 0.3%; the fact that our share of the world publications is around 0.75% is actually encouraging. The level of research in South Africa is pretty good compared with many other countries and what is interesting is that the increase in the number of publications has been fairly diverse and has taken place across all scientific fields with half of the publications in the Natural Sciences. The problem remains in converting that into the actual successful outcomes for the South African economy.

Another new measure that was included in the updated booklet is an assessment of the extent to which the scientific research has actually been engaged with the rest of the world and this is very positive. When one includes the top ten world group of countries

with whom South Africa have collaborated with on research, 84% of the research have been in collaboration with someone from these top ten countries. There has been an increase in collaboration with BRICS countries, as well as with the rest of Africa.

Another objective of the NDP in relation to SET is to increase the proportion of university staff with PhDs from a baseline of 34% to 75% by 2030, and it also targets production of more than 100 doctoral graduates per million population per year, which is about 5 000 new doctoral graduations per year with at least 3 000 of these in SET. The current figure is around 2 000. From a social perspective, there is a need to think about increasing the number of African postgraduates and especially the number of female postgraduates, since they are solely lagging at the moment if one looks at the total. The academic sector at the top-end is still predominantly dominated by white males.

In terms of the number of researchers per 1 000 people employed, South Africa is doing amazingly well given the paucity of the number of people involved. Just about 1.5 persons per 1 000 employed are involved in research in line with Brazil but less than china; and that compares with the figures in the order of 7 per 1 000 amongst the overall OECD, and looking at the likes of the United States, Britain, and Russia, it is an average of about 7.8 per 1 000 employed.

To improve the STI outcomes, there is a need to try and increase the number of people involved in research for the country. Compared to South Africa, the countries such as Egypt, Morocco and other African countries have a higher propensity of persons doing research relative to the overall population. Around 90% of the research in South Africa is being conducted at the universities and universities of technology and the trend has been increasing. The flip side to this is that the private sector just sits back and relies on government to produce all the expertise through various academic institutions and that is not a sustainable way forward. However, the encouraging thing is that the universities are increasing the output of doctoral graduates and as a result, the number of doctoral graduates virtually doubled since the global economic recession in 2008, which contrast very significantly with general R&D spending in the country.

One of the important manners of improving technology in the country is the interaction with international bodies. The 1996 White Paper on Science and Technology pointed that as South Africa becomes more and more integrated into the world, there is a need to identify niche markets to effectively compete in; to encourage more investment and to give a competitive edge on other countries economically. Moreover, the NDP points to the need for taking advantage of accelerated technological abundance and to reduce the product life cycles, resulting from the speed with which IT is spreading. This does create opportunities for new industrial firms to enter more product segments much more readily than it has been the case before.

South Africa pays out so much more to access technology than what it receives in terms of selling its technology abroad, and this is in the order of around 10 or 20 to 1. Around 2 billion dollars is being paid for accessing technology while about 100 or less million dollars is received for selling technology, and that is a big cost for the current account balance. Although the impact of foreign direct investment is unclear, it has been going widely up and down and one of the reasons for the big fluctuation could be as a result of big deals such as Walmart buying out Massmart or Barclays buying out ABSA. There are no fundamental new investments seen as a result of South Africa being an attractive source of technology development.

Another great concern is the manner in which the country is losing the ability to protect its own locally produced technology. The number of patent family applications have fallen off quite dramatically and instead most people who develop new innovations go abroad to patent those innovations. In previous years, around 35-40% of South Africa's patent applications were within South Africa, but over the most recent period measured, this has dropped dramatically to around 15%. This is a warning sign to government not to be overly zealous with some regulations that are put in place and to improve the competency of patent offices to be able to do things more effectively. The current situation is such that most patents filing are done at the United States, Britain and WIPO and more recently some people are even going to Australia and China to do their patenting. To a lesser extent, the distribution of industrial design applications at the South African intellectual property protection office have also been on the decline.

Another objective of the NDP is to render the country less dependent as a primary commodity producer having to sell basic minerals and resources to the rest of the world to buy our way; but rather to try and diversify and manufacture more of what can be beneficiated in South Africa. This would mean that more R&D and commercialisation of South Africa's innovation because this is the only way to actually rectify the huge deficit in the country`s current account balance of payment, and also to generate more jobs domestically and not just to rely on the mining and agricultural sectors. According to the NDP, the state needs to play an active role in funding of the private sector R&D as well as on driving its direction.

However, there have been some few areas where South Africa appears to have gained in competitiveness and one of those that stand out is the pharmaceuticals sector, where the share of the world export market has increased. Aerospace also has done well in the past, although the country has lost out badly with the global financial recession, but it seems to have picked a little momentum again recently. In the computer, electronics and optical sector, there seems to be a slightly rising trend that is emerging. All these show that there are some positive outcomes, but there is a need to internalise the benefits into South Africa than to continuously export.

In relation to wealth creation, one of the objectives of the NDP is the upscaling of manufacturing which should include encouragement of labour intensive manufacturing closer to townships, and to promote IT enabled service exports to attract business process outsourcing from countries such as the US, UK and India. South Africa has become relatively successful in some areas of service industries to actually develop certain niches and expertise but would remain very cynical when looking at the NDP's objective that the economy should grow by about 5.4% per annum. Last year’s growth was actually 1.5% and this year one is looking at 2% and in the current forecast, it’s very difficult to see the country rising above 3% before 2019. This is a long process and at the heart of it is developing the resources to do R&D which is going to make people more employed and maybe improving education outcomes, especially in Mathematics and Physical Science.

Currently only 57% of the South Africa's labour force participates in the economy; and the intention is to increase this to 65% by 2030. The manufacturing and also the manufacturing value-added have recently been declining, meaning that although more publications are produced relative to the amount of expenditure on research in this country; that is not translating into an improvement in manufacturing value-add, to create jobs and to reduce the country's trade deficit. Whilst GDP may be growing at somewhere around 2-3% per capita, this growth rate is far less and last year with a 1.5% GDP growth, the population grew by that same amount. This means that there is virtually no improvement in the average living standards in South Africa and virtually no increase in employment either.

The manner in which a loss of confidence by the business community is decreasing is disturbing and this result in even less R&D and even less capital investment. The total fixed capital investment has been falling off quite sharply in the last year or two, in line with the economy, but certainly one would have wanted more investment to try and limit the economic deterioration. The government capital investment is observed to have continued growing at the rate of around 10% per year in the last few years and parastatal organisations which were investing massively in the last decade have hardly increased their investment in recent years, which is one area where we could be investing massively.

The private sector, which accounts for nearly two thirds of all the capital investments, has had negative growth for the first time since the recession in 2009/10. It seems that businesses (companies and close corporations) have been building deposits as opposed to fixed capital formation. They have been building-up cash reserves and just rolling over day to day running of their businesses, hoping that there won’t be a major downturn and even if there is, they have a lot of cash in the bank with balance sheets looking very sound. Business is not being proactive in trying to invest more heavily because they lost confidence and this has to be resurrected. There is a need for government to instill the desire to research, bring out new products and go forward. Another reflection of this is the average debtors’ days because from an economic point of view one would think that businesses would be struggling to pay off their debts but this is not the case. They have

actually been paying them off even faster except for the last year or so where there has been a deterioration. This may mean that they are just sitting on their cash rather than investing in R&D and this is where the government's role is more important by creating an environment that is conducive for more R&D investment.

The labour force participation rate is actually at 57%, with a not so significant improvement over the last few years. Employment in agriculture as a percentage of total employment has remained at around 4.6% with a slight drop in 2014. Industry employment remained unchanged for the last three years at 23.5% of total employment and instead the ratio of employment in services as a percentage of overall economic activity increased. The proportion of overall people who are unemployed with only primary education has decreased which is a sign of the improvement of enrolment in schools. About 98% of children go to school and enter high school but an increasing proportion of them end up with no jobs hence there are about 80% of unemployed people who actually have been to high school but cannot get jobs. The extent to which people with educational qualifications beyond high school (diplomas or university degrees) are actually starting to become unemployed is disturbing, although this is still a tiny proportion relative to the proportion of unemployment by people who have matric or less. This is also a function of the fact that so many students who do go to university take the so-called softer options of courses, and not enough go into SET courses.

In terms of the quality of life, there has been significant success in recent years in improving the life expectancy at birth. The NDP's intention is to improve life expectancy at birth to 70 years by 2030, by ensuring that a generation of under 20 is HIV free, and to cut the unemployment rate to 20% by 2015. It is now 2015 and the unemployment rate is 25.2%, meaning that the country has missed out on the first four years of that NDP objective. The intention is to get unemployment down to 6% by 2030 which requires 5.4% economic growth. The achievement of universal primary education by 2015 is not a problem as South Africa is very close to that, it is rather an issue of education quality that is a problem. The good news is that life expectancy has improved since 2005 from an average of 52 years in 2005 to 61 years at present and that is as a function of the rollout of free antiretroviral drugs to people with HIV/AIDS. Unfortunately, it is not because there

are fewer people with HIV/AIDS and on the contrary, there has been an increasing trend in most age groups; although there has been a slight decrease in HIV prevalence amongst the young, which is encouraging. Overall, around 10% of the total population has HIV/AIDS. The success is that fewer people with HIV/AIDS are actually dying, but it is a cost to the economy to distribute the free antiretroviral drugs.

Official results of adult literacy rate indicate that it has improved to 94% and the same improvement is observed with youth literacy rate. The problem is in practice where as an example you would encounter people who are supposed to be literate but the actual effectiveness of that literacy leaves much to be desired. Sadly, the trend in terms of unemployment is rising irrespective of whether one is male or female and the female unemployment is higher than the male counterpart. This is bound to keep rising if the economy unfortunately keeps growing at 2% per annum. Job creation in the formal sector has consistently been above 1-1.5% below the GDP growth in the last few years and so one get 1.5% growth in GDP with no formal sector employment growth whatsoever.

As a way forward for NACI in terms of collecting indicators, Dr Jammine appealed to everyone to share ideas on how the indicators in the booklet can be improved. He also asked the delegates to encourage others who did not attend the workshop and did not get the copy of the booklet to apply to get copies from NACI, so that the data can be spread out, because the more the booklets are disseminated, the easier it will become for not only government but all sorts of institutions and the private sector, to be able to plan around it and to actually try and contribute towards overcoming the deficit that may exist.

NACI is planning to develop a framework for a set of indices that can be used to measure the innovation score card. This will be similar to a human development index that combines health, education and the economy. One of the points that keep coming up the discourses at NACI is to do something that is indigenously sensible and in other words, it is all very well to copy what is being done in America, Britain and China, but South Africa is its own country with its own particular characteristics. Innovation is being used to encourage innovation in what could be called social innovation. This means innovation in ways that can improve the daily lives of the very ordinary people in the rural areas who

may not really be touched by wonderful innovation in respect of cell phone technology or whatever the case might be. Dr Jammine recalled the words of Ms Bussetti that "we are all the NSI, and if we can get the assistance of everyone, South Africa can move in a very successful manner".

2.1 Questions and Discussion

It was noted by one of the delegates that some of the reasons behind the problems at the macro level as highlighted in the presentation could be due to the fact that: 1) government departments in South Africa struggle to coordinate activities, although this would probably be the case all over the world; 2) the Science Vote dispensed by the Department of Science and Technology (DST) is low (i.e. roughly 25%) which coincides with the lack of cooperation and this could possibly exacerbate the problem; 3) South Africa has been promising a 1.5% of R&D expenditure as percentage of GDP for a long time but this not happening. The question asked is what do the three factors contribute to the figures presented?

Another delegate commented that both Dr Jammine and Ms Busetti praised research outputs, especially those that universities and universities of technology are doing although they lamented the fact that only a few of those are translated into commercialised products. He also mentioned that later on in the presentation, especially the slide on intellectual property (IP) statistics, it was indicated that the patenting of most of these inventions is directed towards the other countries, other than South Africa The question therefore was therefore on whether there may be other issues contributing to the failure to commercialise university research outputs (in a manner that would benefit the country), other than perhaps the policies that Dr Jammine talked about; or are these very difficult or impossible to deal with?

In his response, Dr Jammine observed that both questions are actually interlinked and he emphasised the fact that R&D as a percentage of overall GDP has actually declined from over 0.9% a few years ago to just over 0.7% at present and this has a direct link to the overall economic growth. Therefore, rather than the current vicious downwards spiral

cycle; it is important to develop a virtuous cycle of increased investment in technology which in turn encourages higher economic growth, which improves the profitability of the business sector, and which in turn encourages them to spend more on R&D. He said if the economic growth rate improves, then tax revenues increase and the government will then have more money available to devote to R&D. Dr Jammine mentioned that there is a missing link between government and the business sector although on the negative point there is a lack of trust that has developed between government and the business sector which is destroying the economy and in addressing that, there may be a need to organise an economic CODESA.

There was a comment that NACI recently had its mandate shifted slightly to become more of an advisory body and there has been lots of quantitative statistics. The question therefore was on whether NACI is doing any qualitative analysis on issues such as whether government is creating an environment that is more conducive to R&D, and if so, what would that look like, what kind of information would go into that and who would do that? A follow-up comment was that the same question can be asked for patents, the qualitative analysis of why there is a decline and who is patenting? In her response, Ms Busetti emphasised the need to first address the most urgent issues facing South Africa noting that the question that remains is on identifying the most urgent problems in terms of technological innovation. She indicated that some of the areas that NACI specifically identified are water, energy, food security and a new area looking at entrepreneurship and innovations in the NSI, including the private sector.

A delegate from Southern African Research and Innovation Management Association (SARIMA) disagreed with some of the comments on outputs from research and the commercialisation of research outputs. She mentioned that there is a lot that has started to happen and the delegates must remember that Technology Transfer offices in South Africa were only put in place about six or seven years ago and so. She appealed for patience as the economic benefit currently being seen in the United States in particular, is from the research that was probably done thirty years ago and that is how long it takes to see the results of research outputs. She is convinced that there is a lot of stuff that is being done in order to commercialise those research outputs; as a lot of South African

universities have fantastic stuff, although it is still early stages to make the impact that one may want to see because it takes time.

She also mentioned that the DST, SARIMA and others are currently working on a Technology Transfer survey which will give statistics on the outputs over the last seven years, which will be very important indicators that can feed into the discussions of whether the country is producing research that is not making an impact. The last comment from the SARIMA delegate was that there is still an innovation funding gap to take products/ technologies that are in their late stage of development into the early stage of commercialisation and that there is no appetite for early stage Venture Capital (VC) in the country which is also a serious gap in the translation of research into commercialisation.

Another delegate emphasised the correlation between foreign direct investment (FDI) and the opportunities for local economic growth and highlighted that there is an issue of conflicting messages received from the Department of Trade & Industry (*the dti*); as an example, in terms of whether FDI is increasing or adding to the local economy, or actually decreasing because whilst the private sector would say that it is decreasing; *the dti* would say that actually the numbers speak conversely (i.e. it is actually increasing). She also commented around the notion of publish-or-perish, of which she noted that there seem to be plans in terms of moving the need for R&D at the university level into the more commercialised sector, although it is not translating quick enough given the current challenges and the gap is around the integrated framework that is missing in terms of the role of the private sector and government, including institutions of learning, to look at what are the commercial needs of the economy and where the country is lacking. An example was made that certain role players in the private sector are often approached by universities quite late in the stage of R&D for support whilst they would prefer to be consulted upfront as partners in the early stages during the development of the plan of action for the R&D approach.

She commented that although innovation is the epicenter of building a knowledge economy, not enough room is being created for that and in terms of the current framework of the economy, the country is not at the maturity stage of industrialisation for most of its innovations and therefore, for the next 20 or 30 years, it will be a challenge with innovation

fighting for a point of entry into that framework; this is a case since it takes about 20-25 years of having to drive, promote and advocate for innovation to become the epicenter of manufacturing or industrialisation framework. It was stressed that the organised business and private sector e.g. Business Unity South Africa (BUSA), South African Chamber of Commerce and Industry (SACCI), etc are not absent as perceived, but they are willing to work with government provided the current model (triangle) in terms of what drives the economy forward changes to ensure that their voice is not just heard but that they are a real partner to labour, government and society (i.e. communities) to drive the economy forward and in ensuring that the vision set out by the NDP is actually achieved.

The delegate from the Southern Africa Innovation Support Programme noted that the small, medium and micro enterprises (SMMEs), which is a very critical element of the private sector is often missed in conversations about big business although it has been demonstrated and proven globally that the support of SMMEs has a far higher chance of stimulating the economy. The SMME sector can create and bring innovations to market much easier, but it seems that government departments are not working in tandem to support the sector. There are lots of innovations that are out there but it's not only the cycle of R&D going into commercialisation, there is a need for a far more integrated support for SMMEs and to consult with NGO sectors that are the mainstream users of innovation. The issue that local innovations are not easily adopted is a challenge that needs to be addressed.

Ms Busetti made an observation that most of the speakers were not actually posing questions, but putting issues on the table for the people in the room and the conversation is exactly what NACI was looking for. She stated that in most cases they are not going to respond, but some of these important issues will be absorbed and taken to NACI Council for further discussion. Ms Busetti elaborated that all the NSI stakeholders are responsible for the system and it is very easy to point fingers at one another, e.g. it is easy for government to distrust business and for business to point fingers at the government. She suggested that what is needed to be done is for everybody to take these issues forward and to work together. She agreed with the small business conversation by having an open and honest conversation and the economic CODESA is something that she supported as suggested earlier.

With reference to the next 10 to 20 years, there was a question on whether a change in the current political structure/dispensation could present an opportunity for policy making in the science and technology sector and on whether it is a good or a bad thing in the science and technology policy making sector. In his response to the question, Dr Jammine referred back to the idea of economic CODESA for people to open up and to reach some kind of compromise as a way forward that everyone buys into; and he believes the NDP might accomplish that, although it was opposed by some section of the society. He however cautioned that one should be very careful that the kind of gloom that has surrounded business confidence over the past year does not gather more momentum in such a way as to destroy every essence of what is there, noting that he still believes that the 5.4% GDP growth per annum is easily attainable, if the right things are put in place and everyone moves in the same direction.

There was another question on whether the rapid decline of local patenting is perhaps partly attributed to the patent office's ineffectiveness noting that there was discussion when the IPR Act was launched that this might act as a deterrent, particularly for business, to cooperate and collaborate with the universities and science councils. NACI was requested to investigate that from the point of view of whether there are unintended consequence of regulations and acts. A concern was also raised on the R&D approach that seems to be still following the traditional linear model and that the words *market* and *opportunity* are not being mentioned. This was followed by a caution on the fact that if there are no targeted programmes that places postgraduate students (research students in particular) through entrepreneurship training, which alerts them to the cost effectiveness of the most likely products and services that they are looking at, there will always be a disconnect between trying to commercialise something that doesn't have a reality when the business views it.

3. Presentation: the South African Innovation Information Portal Framework (Prof. Judy Backhouse)

Prof. Judy Backhouse initiated her presentation by noting that Dr Jammine on two occasions said he is interested on hearing the ideas on accessing more information on innovation. So, she was hopeful that the framework for the innovation portal is going to be one of those ideas that will give some background. She mentioned that she was asked, with the other experts, by NACI to assist with the ideas of conceptualising a portal. Below is the notes on her presentation:

Technology is at the point in which it is providing many opportunities to understand systems better, such as the NSI in terms of what makes it work, what stops it from working and what gets in the way. Its real value and advantage is that currently, an enormous amount of data can easily be collected without an effort. Moreover, there are very sophisticated tools for analysing and visualising data and thus enabling one to understand connections and linkages between data in a way that was not possible in the past.

NACI is proposing the development of a portal which will be a single point of access for stakeholders to draw from and deposit information on measures and analysis on all aspects of the NSI. The overarching vision being to get to a point where there is an updated and accurate information on the state of the NSI in South Africa, although this may be complex and in fact take a lot of work to achieve.

Following some deliberations, looking at some various mandates as well as the importance of what was, and what was not doable, the objectives of the portal are as follows:

- To collect and curate data and information;
- To provide access to that information to stakeholders;
- To assist in bridging identified gaps in the current knowledge of the NSI;
- To decrease fragmentation;

- To get wider perspectives and views of what's going on;
- To reduce duplication efforts because we have a lot of people trying to put together the same kinds of data;
- To facilitate benchmarking. It would be nice to be able to benchmark against other systems for the purpose of understanding our national system of innovation;
- To enhance knowledge, encourage a realistic adoption, and get some sense about realism on what is doable and what is not doable; and
- To contribute to developing an appropriate NSI for South Africa so that we do not just copy what others have done.

The 1996 White Paper on Science and Technology is the conceptualisation of what the NSI is supposed to look like and it proposes a number of broad objectives for the NSI i.e. quality of life, sustainability, etc. One of the characteristics of the South African NSI which is not very obvious in other NSIs, is this breadth of vision about what constitutes a system of innovation. The NACI Act makes a distinction between the NSI and the national science and technology system; with the science and technology system being a subset of the whole NSI. NACI is specifically required to advise on monitoring and evaluation, the overall management and functioning of the science and technology system and the NSI, and there is a distinction that science and technology is part of this greater NSI.

The Ministerial Review Committee in 2012 looked at the functioning of the NSI and their report recognises this inclusive definition of the NSI but also notes the complexity associated with this broad definition. Therefore, the South African policy documents are not just looking at how science and technology feeds into the innovation and business, and how it contributes in makes better lives, but actually have a much broader view which includes innovation, for example in business processes, social innovation, innovations in societal interactions, etc. Although this is very inclusive, it also adds to the complexity in terms of understanding of how the NSI works and if one could get the science and technology part working; that would be a good start.

The Ministerial Review Committee report also recommended transforming NACI into the Office of Research and Innovation Policy (ORIP), with the responsibility of designing information and indicator systems technology and the development of the researchers' database. The report further argues that if the monitoring and evaluation is done properly using both quantitative and qualitative information, this could assist the NSI to operate as a distributor of value in organisations. Moreover, there is a specific proposal that NACI establishes a centralised facility to serve as a repository of everyday information on the NSI and one of the objectives of the workshop is to have a debate on the location of the portal. The NDP takes a somewhat narrow view of the NSI focusing more on S&T and looking at expanding the STI by increasing the R&D spend. However, it also recognised the need to improve operational systems in government and better coordination between departments, which is a good motivation for on the need for data and information to understand in how to bring policy together.

Because the NSI is a complex system, there is no linear process between the inputs and the outputs as the outputs might very often be different to what one anticipated when the inputs were setup; so it is worthwhile to concentrate on this complexity of the NSI. The successful national systems such as the manufacturing economies in America and Germany involve complex inputs and all sorts of complex infrastructure, all of which have to work together in order to get to the outputs being desired at the end of the process. Therefore, it is important for the portal to think beyond a set of inputs and outputs, but to think about the sorts of information and data that will help to unpack all those interrelationships in this complex network of things that are taking place within the NSI.

The expert team started the framework by asking what the people are going to do with the portal, which is a standard practice in information systems. Some use case scenarios we created to explore on what are the people likely to use the portal for and then the team worked backward. The delegates were requested to give more inputs on some other scenarios they can think of for the portal and to critique the suggested use cases, in case they are wrong. Some of the use case scenarios proposed is the monitoring of national key indicators by NACI. What the portal should do is to replace or complement the material that NACI produces in the form of a booklet with an electronic source of data.

The value of electronic data is that one would update it as soon as data comes to light and upload it on a website, instead of waiting once a year to publish the indicators booklet. The advantage of this is having the most up-to-date indicators that are being monitored. Another use case scenario is in reference to supporting policy change for people sitting at the Department of Science and Technology or the National Research Foundation (NRF). Moreover, the researchers would have a place where they can go to get the reliable data that is useful in understanding the NSI.

The portal will consist of a database that stores and relates different sets of data, and to be able to come up with comparison analysis for the different pieces of data put together. As a first step on the implementation of the portal, there would be a dashboard which is an equivalent of the current NACI indicators booklet, and this should be able to show the current status of indicators being measured. A document catalogue instrument would also be built into that because there are so many reports, pieces of research, and other things that come out of different parts of the sector that could be stored in some kind of a catalogue that people can connect to and search. Therefore, inherent in there would be some kind of a search facility to go and look through what data is in there. The most interesting and exciting part would be the development of the data virtualisation functionality. There are very interesting ways of visualising data that make relationships clearer, and what the framework suggests is to get to that point where can build those into the portal.

The Innovation Policy Platform as an example, is based on data belonging to the OECD and the World Bank. These consists of a whole lot of different fields of information relating to a particular component for systems of innovation and therefore one can go and search for different information in there. The European Union Portal is another example and it has information about employment and working conditions, economics, finance, production, technology, research, etc. These two examples have clearly different ways of searching and some elements of the NSI, which is something that the framework is aiming for.

It is important for the workshop to discuss and have engagements around critical things such as the proposed location of the portal, potential uses and users of the innovation

portal, data sharing arrangements, etc. The portal would not work unless people share data and so that needs to be unpacked. When looking at the location, it is important to note that one cannot run the portal without the serious expertise in terms of being able to manage the technology. Therefore, the ideal host needs to be easily accessible by all the stakeholders in the NSI and also have the capacity to curate and maintain the data through the availability of the appropriate infrastructure.

Through the workshop, the innovation information portal development's experts team wanted to discuss some potential uses and users of the innovation portal. The team is hoping to have some engagement around where various stakeholders fits and who then might use the portal. Some input needed is the suggestions about the location of the portal as there has been talks with the number of stakeholders along the way and there were some issues around where the portal will be located. The team also expected to talk about data sharing arrangements because this does not work unless people share data, hence the need to unpack that. Regarding the location, one need to be cautious as it is impossible to run the portal without the serious expertise in terms of being able to manage the technology. Therefore, an ideal host need to be easily accessible by all the stakeholders in the NSI and have the capacity to curate and maintain the data. This does not only involves collecting and storing data into a database, as there is a lot of work that goes into understanding how data goes into a database; how it is put in a meaningful way and maintained, so that it is useful over time. Then there is a need for the infrastructure to keep the technology going.

NACI had initial discussions with some of the data owners and curators of data who are already in the system and some of the issues that emerged from these interactions were that if data is collected by an organisation for a particular purpose, it may not be possible to use it for another purpose. There may therefore be a need for a series of conversations at the next level with those responsible for these data sources to start unpacking what the Memorandum of Understandings (MoUs) are needed. There are also issues around the quality of data because if one ends up with data that is flawed, people could stop trusting the portal and not utilise it. Other issues are related to the data storage formats and there should be conversations around the tools and media to be used to extract and transmit

data. There are also issues around the timing and frequency of data collection which has to be worked out with each organisation to make sure that it fits with their time frames. Conversations around these issues have taken place with some organisations (and some were present during this workshop) and the team proposes to start with some kind of a phase one to the portal and to start by mobilising resources as detailed in the report. The budget is not specified at this stage because the team felt that it is something that has to come when one understands the size and the shape of what one is working with.

3.1 Questions and Discussion

It was suggested that the portal should be in the format of an open source platform that can interlink with other systems. It was also commented that as part of information management, there is a need for a data policy that governs access to the data which would also factor in the referencing of data being accessed. The issue of data standards and drawing from international best practices was also highlighted. A delegate from the Education and Training Committee of the South African National Editors Forum (SANEF) asked that they be included in the follow-up discussions on this project as possible users of the portal, and an interface between citizens and the information. Prof. Backhouse acknowledged such a suggestion from SANEF as it address the question of who are the users of the innovation information portal, and expressed the need to hear more about specific user case issues for SANEF.

There was a comment that although the idea of a portal is an excellent one, although on a point of caution, the portals usually have a strange habit to die a silent death, e.g. if the original people who developed it leave the system and it remains without anyone updating the data and taking care of it. It was therefore emphasised that the indicators booklet should ideally continue to be produced at NACI until such a time when the portal is fully functional after which the continued need for the booklet can be assessed.

Another delegate commented on the fact that one of the common mistakes usually observed in the innovation ecosystem is the utilisation of common players only i.e. agencies, academia, government, etc. It is important to think critically when determining

the users of the portal as well as their needs, an example. The utilisation and purpose of the portal information is critical to ensure that those who need it the most are not limited e.g. community, entrepreneurs, etc. He stressed on the point that if this information within the portal is not expanded or disseminated to whom and where it is most needed, it will end up being just a very nice tool that is utilised by people who do not need it the most. Prof. Backhouse again acknowledged this input on the considerations regarding the users of the portal.

The linkage between the innovation policy and all the other policies (industrial policy, energy policy, water policy, etc.) was stressed by a delegate as a critical element given that innovation happens in both industry and society and some of these policies and regulations may be inhibiting the system of innovation. Moreover, it was highlighted that innovation policy has ignored industrial policy and that part of the reason behind the gap between research and outputs is because the industrial policy and the innovation policy don't talk to one another. It was suggested that the portal should take this into account as at its current conceptual form, it is still limited to essentially the Department of Science and Technology and its affiliates. In her response to the various questions and comments, Prof. Backhouse noted that one of the practical challenge and limitation in terms of where one starts is the resources that are needed and that it is often easier to start small and expand from there which is an approach suggested by the framework for development of the portal. She acknowledged that there is a need for consensus on where that small start is.

A delegate from the South African Chamber of Commerce and Industry (SACCI) articulated that there is definitely a role for the private sector and organised business to support, if not partnering with NACI through stakeholder mapping on the need for this technology, i.e. SMMEs, private sector, NGOs and all the relevant stakeholders outside of just the academic fraternity. This might be something that would have not just the right appeal, but would become more locally relevant to South Africa, so that one can maybe use this as a spring board for other projects. It is not just mining data and utilising what is being put onto the portal, but it is really looking at what is the commercial integrity of that, how can we potentially take that further, and who then do we need to partner with as we

continue on this process. So, we would like to support you on that, if possible. Prof. Backhouse acknowledged the comments, and said that is exactly what the team needs, that kind of engagement.

There was a question on whether the portal would also have information on for instance innovation and technology available for sanitation, water treatment and waste water treatment, as well as some link to the research outcomes from the Water Research Commission and the Agricultural Research Council. In her response, Prof Backhouse clarified that although science councils can be part of the portal, the issue of whether there will be information on specific technologies for a specific sector is really an open one. This would require provision for appropriate resource commitments as well as consensus on the extent to which information specific to the particular sectors is available or whether it is rather going to be an overview of the NSI. Another comment from the other delegate was that although it is useful in terms of what type of innovations are available, there are other platforms for research institutions to market their technologies, for example, the Innovation Hub's Open Innovation Exchange, and DST's initiative of the Innovation Bridge that looks into what technologies are available in South African institutions, particularly in certain sectors.

A delegate from the Human Sciences Research Council (HSRC) suggested that the portal should be integrated with other current portals that have already been established within the country e.g. the Africa Portal in the HSRC, which taps onto fundamental special data sets on Africa, the OECD, the World Bank, etc. Prof. Backhouse stressed the importance of not duplicating efforts of other people noting that although there may be a number of portals that provide the same information, there is still nothing that is specific to innovation in South Africa, which is what this portal would create. Therefore, it was agreed that should there be existing information and data resources, it would be important to draw from these instead of duplicating. Moreover, delegates were reminded that a portal by definition is also a gateway into other systems, websites, links, etc.; so one might just have information about information as part of a database.

A delegate from the Department of Science and technology raised an issue was with regards to the form and function for the portal and stressed that how it is structured will

say a lot about how innovation is actually viewed in the country. She recapped on the discussions about how South Africa is trapped in the logic framework of looking at the inputs and the outputs, and she suggested that a conversation need to start on ways of measuring the linkages between the inputs and outputs, and the behavioral changes that need to be incentivised (e.g. public funding of R&D and behavioral changes in private sector organisations).

Another delegate cautioned that NACI had previously tried to carry out a similar initiative in the past but it experienced resistance from the data owners who did not want to share data because there is money and power that could be lost. He recalled that at that stage the idea was that it should be an input to policy making tool. He suggested that one need to look at the portal as the network of portals and not just a research tool, and map the potential users because there may be many more diverse interest groups than just academics wanting to do research. In conclusion, he suggested that the design of the portal could be such that whether it is business sector, academia or the government, one can actually access the information and use it as an input to evidence based decision making and policy making, much more than just to produce the next series of Masters and PhD degrees.

4. Way Forward and Closure (Ms Claire Busetti)

In her closing remarks, Ms Busetti thanked everyone for attending the workshop noting that the reason why it was such a success was because many delegates attended and were willing to share their insights and views. She also highlighted that what came through clearly was that government, academia, private sector and science councils all need to work together and that there seem to be a willingness to do that. She further encouraged delegates to continue bringing forth more opinions and ideas on their current initiatives as the NSI is everyone`s system and NACI is just one of the entities working towards making a difference.

It was stressed that the concept of inputs and outputs and their linkages was important and the fact that so much of that is behavior and culture is also very important. Therefore, she noted that what is needed for the NSI is an innovation culture as demonstrated in through the workshop proceedings although there is still a need to broaden that, as well as the inclusion of private sector. She concluded on the point that the need to incentivise the right behavior and outcome is critical and will certainly be part of some of the recommendations that NACI will come up with. Delegates were encouraged to send their inputs and comments to naci@dst.gov.za.

APPENDIX A

AGENDA:

NACI STAKEHOLDER ENGAGEMENT WORKSHOP 15 May 2015 Venue: Sheraton Hotel Programme Director: Ms Claire Busetti		
AGENDA ITEMS		
TIME		**INTRODUCED BY**
09:00 - 09:30	**Arrival and Registration**	**All**
09:30 - 09:40	**Opening and Welcome**	**Ms Claire Busetti**
09:40 - 10:10	**Presentation: The 2014 South African STI Indicators Booklet Results**	**Dr Azar Jammine**
10:10 - 10:40	**Discussion and Questions**	**All**
10:10 – 10:30	**Tea Break**	
10:30 - 11:00	**Presentation: The South African Innovation Portal Framework/ Other NACI Project**	**Prof. Judy Backhouse**
11:00 - 11:30	**Discussion and Questions**	**All**
11:30 - 11:45	**Way Forward and Closure**	**Ms Claire Busetti**
11:45 - 12:30	***Lunch***	

APPENDIX B

The NACI Stakeholder Consultation Workshop was well attended. As shown below, the 107 delegates that attended were from different government departments and agencies, public high education institutions, private sector, Embassy of Switzerland to South Africa and the media.

Institution	Number of Delegates
Academy of Science for South Africa (ASSAf)	**2**
Central University of Technology (CUT)	**1**
Centre for Public Service Innovation (CPSI)	**2**
Centre for Science, Technology and Innovation Indicators (CeSTII)	**1**
City of Joburg Municipality	**1**
Companies and Intellectual Property Commission (CIPC)	**2**
Council on Higher Education (CHE)	**1**
Department Higher Education and Training (DHET)	**2**
Department of Agriculture, Forestry and Fisheries (DAFF)	**2**
Department of Arts and Culture (DAC)	**2**
Department of Economic Development	**1**
Department of Energy (DoE)	**1**
Department of Environmental Affairs	**1**
Department of Health (DoH)	**1**
Department of Human Settlement (DHS)	**1**
Department of Science and Technology (DST)	**17**
Department of Social Development (DSD)	**1**
Department of Water and Sanitation (DWS)	**2**

Institution	Number of Delegates
Econometrix (Pty) Ltd	1
Embassy of Switzerland to South Africa	1
ESKOM	1
Georgia Institute of Technology	1
Human Sciences Research Council (HSRC)	2
Impala Platinum	1
Industrial Development Corporation (IDC)	2
Innovation System Consultant	1
Institute for Economic Research on Innovation (IERI)	1
Limpopo Development Plan Coordination	1
Maruo Consulting & Investments	1
Medical Research Council (MRC)	2
Mintek	2
National Advisory Council on Innovation (NACI) Secretariat	11
National Regulator for Compulsory Specifications (NRCS)	1
National Research Foundation (NRF)	5
National Treasury	1
Nelson Mandela Metropolitan University (NMMU)	1
North-West University (NWU)	1
Pfizer Laboratories (Pty) Ltd	1
SASOL	1
SiMODiSA	1
South African National Space Agency (SANSA)	4
South African Police Service (SAPS)	4
South African Qualifications Authority (SAQA)	3
Southern Africa Innovation Support (SAIS) Programme	1

Institution	Number of Delegates
Southern African Research and Innovation Management Association (SARIMA)	**1**
Sport and Recreation South Africa	**1**
Statistics South Africa (STATSSA)	**1**
TechnoScene (Pty) Ltd	**1**
The Innovation Hub Management Company	**3**
Tshwane University of Technology (TUT)	**1**
University Of Pretoria (UP)	**2**
University of the Witwatersrand	**2**
Walter Sisulu University (WSU)	**1**
Water Research Commission (WRC)	**1**
Total	**107**