**Survival strategies for NRENs**

**Summary**

NRENs, existing or emerging, face challenges to convince government and donors that they need additional support in order to survive. Especially emerging NRENs need an overview of successful cases where NRENs have managed to attract additional funding so that they become sustainable organisations providing state of the art ICT services for Higher Education and Research.

In the presentation three strategies, with successful cases, will be presented. These three strategies can be summarised as:

1. Service focussed approach
2. Member group expansion approach
3. Public good as mean for existence

In practice a combination of these approaches will be found in the NREN Business Model that is developed in close harmony with the member constituency.

**Content**

In February 2016 an article was published in the Physical Review Letters (Abott, B.P. et al) announcing that gravitational waves, as predicted by Einstein more than 100 years ago, had actually been observed by LIGO (Advanced Laser Interferometer Gravitational-Wave Observatory). Although this observation is of huge importance and it will take years, if not decades, before the full impact becomes clear, this is not the reason why I mention it here at this WACREN conference. It is the “**et al**” behind the name of the principle author Abott, that I want to bring to your attention. The “et al” stands for more than a 1,000 researchers, (of which three had deceased at the time of publication) spread out over the whole world who have participated in either writing the paper or verifying the conclusions from the data of the observation.

In 2020 the Euclid satellite will be launched with as main mission to find out where all the dark matter and dark energy in the universe is. For this goal images of more than a billion galaxies will be made and sent to the science operation centre in Madrid. The data will then be distributed to eight scientific data centres and made available for the research community. This research community consists of 130 institutions, with 1300 consortium members and more than 700 researchers will use the data.

Academic projects such as LIGO and Euclid cannot exist without the support from National Research and Education Networks. These projects might seem far away from the average African scientist, but there are also examples closer to home that depend on operational national and regional networks, such as the SKA project in Southern Africa, pan-African malaria research and global warming research.

Despite the importance of NRENs for the projects mentioned above, they still face challenges to convince the HEI and Research sector, government and potential donors that extra support is necessary in order to survive. The primary customer base of NRENs consists of research and higher education institutions and in principle these institutions have to provide the revenues to cover the expenditures of the NREN, as NRENs are not only not-for-profit organisations, but also not-for-loss organisations: they need to be financially sustainable. The NRENs often have to compete for the provision of Internet services for their members with large monopolists or (even larger) global commercial companies. Emerging NRENs more than often face challenges to convince their stakeholders in order to survive and there are several strategies that other NRENs have deployed and can be used as examples for emerging NRENs. Most of the examples and views in this paper can be found in the web portal “The Case for NRENs”, a repository of resources to support funding, advocacy and the advancement of national and regional R&E networks. For more details of what is presented in this paper go to [www.casefornrens.org](http://www.casefornrens.org).

The most basic approach for the NREN (that in the end is not sustainable!) is to compete the commercial ISPs on tariffs only. It is true that in emerging ICT markets this approach initially seems successful, because of the combined buying power of the NREN members. But as the proportion of ICT savvy people and companies in society increases (ironically partly because of the efforts of the NREN) the ISP tariffs will start to fall and with tariffs as the only distinguishing factor the members will be tempted to switch to the cheapest provider for their Internet services. In the longer run NRENs cannot compete with the commercial ISP market. The mere volume of the bandwidth capacity of the latter companies can even enable them to, temporarily, provide services at a loss with as goal to drive the NREN out of the market. For example, in the CAREN project in Central Asia KazRENA, the Kazakh NREN, was forced to leave the project because the Kazakh Telecom, the Kazakh telecom incumbent, was offering cheaper Internet tariffs to universities and research institutes, despite the 90% funding of the CAREN connectivity by the EC. This was possible because Kazakh telecom is reselling international connectivity at rates that are more than 25 times as much than what they have to pay Russian providers for this connectivity. It is evident that it was impossible to offer cheaper tariffs against a rate that was already subsidised for 90%. As KazRENA did not provide other services than international bandwidth to bind the members it was forced to accept the lower tariffs with the incumbent in tead of CAREN, or else perish.

In the strategies presented below it is important that the needs of the main stakeholders are identified. In most cases these stakeholders are government and the potential members of the NREN. The strategy of the NREN should be directed towards meeting the needs of these of these stakeholders. The most ideal case is when both stakeholders are convinced of the added value of the NREN and are willing to provide the support that is necessary to reach sustainability. This position is called the “Sweet Spot” as it is where every NREN would like to be.



Figure 1 The NREN Sweet Spot

The classical approach, is to bind the Higher Education and Research sectors by providing additional services that are not provided by standard ISP's. As a start-up activity, lower tariffs are of course an effective mechanism to attract the first cohort of members. However, Internet access as the sole item in the service portfolio of the NREN should be avoided. It takes time, up to a year or more, to develop and implement ICT services and convince the members of the added value for their institutions. If the NREN waits with the new services until the ISP tariffs start to fall and they begin to feel the heat of tariff competition it will be too late.

Examples of such services are Security services, Federative Identity Management, access to on line educational content, access to shared research facilities such as High Performance Computing and massive storage, national caching services and ICT training and support.

Of course these additional services need to be financed. In this sense it is important to take notice of the “pain level” factor: when NRENs start to provide bandwidth at lower tariffs this should never give rise to lower expenditures of the members for external ICT services and bandwidth. In most cases the budget allocation for these services is the maximum that the institutions can manage without endangering other processes within the institution (they have reached their pain level). As the current ICT budget is what they are willing and able to pay, the institutions have become accustomed to this amount and they will be more than satisfied if they will receive more for the same amount. However, the moment that the total expenditure is lowered, the savings will be reallocated to other budget lines and be lost for the NREN activities.

Members of NRENs that provide a broad service portfolio will be less inclined to switch to a commercial provider if that means that they will lose access to the other services. These extra services however do introduce some tension into the system: NREN services will always cost money that then cannot be spent on precious bandwidth. Therefore the NREN needs to convince the members of the added value of the services. The NREN members also have a role as they will have to recognise the added value of the non-bandwidth services for their primary processes.

An example of an NREN that provides a broader service portfolio than mere bandwidth is MARWAN, the Moroccan NREN ([www.marwan.ma)](http://www.marwan.mo)). Besides a 1 Gbps international link and up to 100 Mbps links to its members, MARWAN also provides services such as Google Global Cache service, the Moroccan Identity Federation, eduroam, and access to the National Computing Grid. It should be noted that MARWAN is fully funded by government, but still has chosen the strategy to offer a broad service portfolio.

A second approach can be to broaden the primary customer base to other related customer groups, such as libraries, hospitals and NGO's. The national regulator might object to this approach, but examples of the successful expansion of the user groups are known and the expanded user group provides a more solid base of the business model. In this approach it is again important to identify and determine the services needed to satisfy the stakeholder needs. The diversification of the member groups will lead to different member sub-groups that each have their own needs. Criteria that characterise the value added services are for example:

 ​**Gap reduction**

* Reduce the distance between network services and the needs that have been identified

 **Service uniqueness**

* Offer services that cannot be supplied by commercial ISPs

 **Economy of scale**

* Exploit the economies of scale that the R&E networking community offers (NREN members are often from large communities that, if joined, represent mayor buying potential)

 **Localisation**

* Provide services that members can customise to the particular needs within their communities

Members outside of the traditional HEI and Research sectors are hospitals, government, secondary, and sometimes also primary, education. The service portfolio of the NREN will have to be differentiated to meet the specific characteristics of the needs of the member sub-group. To facilitate the differentiation of the service portfolio the Case for NREN site provides a template that can be expanded into one’s own services portfolio.

With respect to broadening the scope of the potential member groups the focus on the primary member groups (Research and Higher Education) will be diluted and a word of warning is in place. These primary member groups will only accept this if it is ensured that broadening the member base will not be at the cost of the support given to them. From my own experience I can report that in the ‘90’s of the previous century SurfNET, the Dutch NREN, was called back when it proposed to serve the secondary education sector as well as the higher education sector. The HEI’s were afraid that this would lead to lower support levels for the advanced service level that they needed.

A third approach is to broaden the profile of the impact of the NRENs in the area of the public good[[1]](#footnote-1). The most used argument of the added value of NRENs is that ICT in Higher Education is necessary to boost the economy of a country as they will pave the way to an ICT oriented service economy. It is of course best if other, NREN neutral, entities point this out. A recently published report of the World Bank called Digital Dividends[[2]](#footnote-2) provides an excellent insight in how nations can reap the broader development benefits from using the digital technologies that are rapidly spreading in the world. Although the term NREN is not even mentioned once (worthy as a true NREN-neutral report!), it does provide an overview of aspects and argumentations that NRENs can make use of. For example, that the digital revolution can give rise to new business models, but not when incumbents control market entry. Or, how digital technology can make workers more productive, but not when when they lack the know-how to use it. These and other approaches to Reaping the Digital Dividend makes the report a “must read” for those who have need of arguments that demonstrate the added value of NRENs for society in general.



Figure 2 Adoption to Technology vs. Quality of Education

To illustrate what the report presents I would like to show you a graph from the report where, per country, the adoption to technology (x-axis) is set out against the quality of education and entrepreneurship (y-axis). The result is a scatter diagram that shows a strong positive relation between these two parameters. The eye opener however is when you give different colours to lower income/lower middle income/upper middle income/high income countries. The lower income countries are found in the lower left corner (poor adoption to technology and poor quality of education and entrepreneurship) and the high income countries are found in the upper right (good adoption to technology and good quality of education and entrepreneurship). These are the arguments to put forward if you want to profile the NREN as public good.

The Case for NRENs portal provides examples of NRENs that have successfully convinced their government of the economic added values of NRENs, such as the Canadian NREN CANARY and the New Zealand NREN REANNZ.

No NREN, existing or emerging, is the same, neither are the national setting circumstances the same. There is no one size fits all solution for an NREN, but by giving an overview of existing strategies emerging NRENs can pick the most suitable tactics as part of their own strategy. This strategy should be discussed with the major stakeholders in a step by step dialogue that should result in an NREN Business Model that describes all elements of the NREN organisation, such as Mission, Service Portfolio, Network Infrastructure, Organisation Structure and last but not least the Financial Plan.

To come back to the LIGO observation and Euclid mentioned at the beginning of this presentation: I am convinced that the future will not see mayor scientific developments at the merit of one person, there will always be large scientific collaborations at the basis of every next step in science and NRENs will play an important role in making this possible. But we need other ammunition to get the stakeholders on board. Hopefully this presentation has provided you with that ammunition.

1. In a strict sense ICT/Internet is not a public good as it exclusive, even though it is non-rivolous. Access to ICT technology is usually restricted by fees. [↑](#footnote-ref-1)
2. Digital Dividends, World Development Report of the World Bank, February 2016 [↑](#footnote-ref-2)