

# Fostering Collaboration & Insights: Key Takeaways from the REN Leaders Forum at APAN56

National Research and Education Networks (NRENs) play a pivotal role in the global research and education landscape. These specialised internet service providers are dedicated to catering to the unique needs of academic and research communities within a nation. Their importance lies in their ability to empower researchers by offering them seamless access to resources, data, and collaboration tools. Furthermore, NRENs act as catalysts for international collaboration, enabling institutions to connect and engage in joint initiatives across borders. In essence, NRENs are the backbone of the academic and research ecosystem, fostering innovation, knowledge dissemination, and global partnerships in the pursuit of scientific advancement.

The APAN REN Leaders Forum was a closed assembly of C-Level executives and decision-makers from RENs across the Asia-Pacific region. The forum was designed to facilitate high-level strategic deliberations and served as a platform for exchanges on the evolving challenges, opportunities, and trends shaping the REN community. The inaugural REN Leaders Forum was held at the recent APAN56 Meeting in Colombo, Sri Lanka. The vision of this initiative, as stated by the Convenor of the Forum and Consultant CEO of LEARN, Prof. Roshan Ragel, is for it to be a continuous gathering of REN leaders at APAN Meetings. This inaugural gathering at APAN56 consisted of two 90-minute keynote sessions, followed by discussions between leaders, where they exchanged several ideas and strategies towards enabling their collective growth to empower researchers across the Asia-Pacific region.

## The Landscape of NRENs in the Asia-Pacific Region Today

Over the years, various NRENs in the APAC region have collaborated on impactful research projects in different fields. For instance, they facilitated a research initiative involving Kyoto University in Japan, Bandung Institute of Technology in Indonesia, Hanoi University in Vietnam, and Nanyang Technological University in Singapore. This project utilised cloud computing to create high-speed, cost-effective regional climate prediction systems, revolutionising weather forecasts in areas lacking proper infrastructure. Moreover, as part of Project BeLISAC, NRENs from Bangladesh, Sri Lanka, Nepal, Bhutan, and Laos collectively enhanced the online learning systems in their respective countries, all while actively contributing to the United Nations Sustainable Development Goals (SDGs). Additionally, these APAC NRENs have strengthened their research efforts by collaborating with international organisations like APAN, Internet2, and GÉANT. One notable achievement is their contribution to the 3,000 Rice Genomes Project (3KRGP), in partnership with the International Rice Research Institute (IRRI), the Chinese Academy of Agricultural Sciences, and the Beijing Genomics Institute Shenzhen. This collaboration improved access to vital datasets, accelerating research on food security in the APAC region.

The examples mentioned earlier represent just a small portion of the collaborative research endeavours. NRENs in the APAC region have been actively involved in various domains such as education, telemedicine, e-science, food security, and emerging technologies, among others. In these areas, they have played a crucial role in supporting researchers' endeavours to contribute positively to global advancements. Thus, the REN Leaders Forum served as a platform to facilitate united coordination to help increase the impact of these efforts. Thus, the first keynote presented by the CEO of BdREN, Mohammad Tawrit, delved into the evolving landscape of NRENs. The keynote examined the changing dynamics of NRENs in the APAC region.

Tawrit introduced the NREN Maturity Model, a comprehensive framework designed to assess the strength of NRENs based on 18 primary parameters, each further broken down into numerous sub-parameters. This model serves as a tool to evaluate the maturity of NRENs, pinpointing their strengths and areas for enhancement.

The NREN Maturity Model emerged as a result of the NREN Needs Assessment (NNA), a study conducted collaboratively by TEIN\*CC, LEARN, and BdREN under the Asi@Connect project. Following the release of the NNA report, the NREN Maturity Model was made publicly accessible, with the NREN Maturity Calculator, which is available online. Tawrit extended an invitation to the dignitaries present to utilise the Maturity Model, underscoring that it applies to all NRENs, including those from developed economies. Using data from the NNA study and the 2020 Asi@Connect Compendium, Tawrit presented findings based on the following parameters to emphasise the strengths and challenges NRENs in the APAC region face today.

Adequacy of Human Resources	Among 21 NRENs in the APAC region: 5 are short of both technical and non-technical staff, while 2 are in need of only non-technical staff.
	There is a considerable opportunity for improvement in addressing the gender imbalance across all NRENs in the APAC, where currently only 30% of employees are female.
Expertise of Human Resources	Least Developed Countries (LDCs) lack expertise. Middle-income countries (MICs) and Developed Countries (DCs) have similar levels of expertise.
Financing Sources of NRENs	Capital Expenditure (CAPEX) financing: 12 NRENs fully depend on “government” funding, 2 are fully “self-funded”, 4 follow a “hybrid” approach that combines both self and government funding and 1 follows “other” financing method.
	Operational Expenditure (OPEX) financing: 12 NRENs depend fully on “government” funding, 5 are fully “self-funded”, 1 follows a “hybrid” approach that combines both self and government funding and 1 follows “other” method.
Financial Stability	Among the 14 NRENs that participated in the NNA study, 5 were found to be “Highly Stable”, 5 were “Stable”, 2 were “Partially Stable”, and 2 were found to be “Unstable”.
	Among 10 other NRENs in the APAC region that weren’t involved in the study: 5 were found to be “Highly Stable”, but the status of the other 5 couldn’t be determined owing to a lack of data.
NREN Traffic	Among 22 NRENs in the APAC region, all feed research traffic, 11 serve commodity traffic, 10 provide CDN traffic, and 15 have Domestic Internet Exchange connectivity.

	<p>NRENs in developed economies may find their sustainability with vast research traffic. However, NRENs in developing economies will struggle to remain sustainable with just research traffic since it is too insignificant to create an impact. Instead, they should prioritise the development of flagship services to stamp their presence and impact.</p>
NREN Coverage	<p>Among 20 NRENs in the APAC region in connecting the universities with their network: 3 NRENs have connected over 80% of the total number of universities in their respective countries, 4 NRENs have 50-80% of their universities connected and the rest 13 have less than 50% universities connected.</p>
	<p>NRENs that have exceeded 80% coverage have fewer opportunities for horizontal expansion compared to those which have connected 50-80% of their universities. However, NRENs with lower coverage rates might have obstacles in their expansion which need to be identified for their sustainable growth.</p>
Interface Bandwidth	<p>To universities: Only PREGINET offers a maximum of 100G bandwidth. 10 NRENs Offer a maximum of 10G, 5 NRENs offer a maximum of 1G and the remaining 4 NRENs offer less than 1G bandwidth.</p>
	<p>To research institutes: Only SingAREN offers a maximum of 100G bandwidth. 3 NRENs offer maximum 10G, 7 NRENs offer a maximum 1G and the rest of the 10 NRENs have either less than 1G bandwidth or have no connectivity to research institutes.</p>
Traffic Mapping and Utilisation of NREN Bandwidth	<p>Since 2017, the Asi@Connect network has witnessed consistent year-on-year growth in its traffic. Although there was a decline in 2020 due to the pandemic, traffic growth has resumed since 2021.</p>
	<p>By analysing NRENs' research traffic data between 2018 and 2022, it was found that traffic in Least Developed Countries and Lower Middle-Income Countries decreased. Whereas in Upper Middle Income Countries and Developed Countries, NREN traffic increased.</p>
	<p>Data related to traffic links showed a decrease in access link traffic but an increase through other links like transit+access, backbone, and gateway links.</p>
Landscape for NREN services	<p>Adopting the GÉANT framework for categorising services, the analysis identified that NRENs in the APAC region have room to improve in the "collaboration" and "identity" services categories.</p>

	<p>The most sought-after services that are still not provided by NRENs in the region are High-Performance Computing, Virtual Labs, Computing/Storage, and Access to Journals.</p>
	<p>Moderately demanded services that remain unprovided by NRENs in the region are Security, IoT, and Content Filtering.</p>
	<p>It is crucial for NRENs in developed nations to support those in developing nations in building flagship services. Moreover, other NRENs having any flagship services [e-Library underlined by ThaiREN, e-Learning pointed out by both ThaiREN and IDREN and DDoS protection stated by NKN] at their repository may come forward for the rest of the NRENs to leverage on them.</p>

In his concluding remarks, Tawrit highlighted several important points. He urged NREN leaders to utilise the NREN Maturity Model as well as to contribute and come forward with their insights to improve it at APAN57. He emphasised keeping their NRENs updated by filling in appropriate data in the Asi@Connect compendium portal. Tawrit encouraged NREN leaders to collaborate and share knowledge through promoting each of the NRENs’ flagship services. He also stressed the importance of knowledge sharing, especially regarding advanced services like AI, Security, and IoT, and invited NRENs from developed economies to share their expertise on the latest technologies. Following the keynote presentation, a panel discussion began, where the NREN leaders in attendance shared their perspectives. Key ideas shared during this discussion are detailed below.

### The Importance of Financial Stability for NRENs

Subsequently, the President of SingAREN, Dr. Francis Lee Bu Sung, provided his insights on the financial capability aspect of the NREN Maturity Model. He highlighted that an organisation’s stability relies on diversified funding sources. Therefore, NRENs that solely depend on government funding, in his opinion, might not qualify as stable. He elaborated, “When governments change, you have to advocate your case anew.” Building upon these viewpoints, Dr. Lee underscored the importance of operational expenses in an NREN’s survival, stating, “While the government may allocate \$2 million for new equipment, maintaining it incurs ongoing costs, which the NREN must bear alone. Lacking a sustainable financial model places an NREN in a precarious position.”

Recognising these inputs, the panel invited government-funded NRENs to share their perspectives. Chief Network and Systems Engineer of DrukREN, Karma Jamyang, responded by underscoring the variations in political landscapes among nations. He shared that DrukREN, as a fully government-funded NREN, has established strong connections with Bhutan’s education community. By crafting proposals that incorporate their collective inputs, DrukREN consistently presents a robust case to convey the significance of the NREN to the Royal Government of Bhutan.

Tawrit expounded further, clarifying that the model doesn’t solely rely on the presence of government funding as an indicator of stability. Rather, there are two pivotal factors to consider. Firstly, whether the government is urging the NREN to attain self-financing, and if not, whether it is providing sustained, long-term financial commitment. “Crossing these thresholds implies NREN stability. It is well-implied that

today's financial stability doesn't necessarily guarantee long-term sustainability and that's why the maturity model needs to be updated at regular interval" Tawrit stated.

However, taking into account all these perspectives, Tawrit welcomed suggestions on the "NREN Maturity Model". All collected suggestions may then be analysed by a group of experts who might suggest necessary changes to be approved in subsequent "REN Leaders' forum" at APAN meetings. Once approved, necessary modifications will be made in the maturity calculator portal.

## NRENs Need Greater Visibility and a Suite of Services

Expanding upon the insights offered by the panellists, the Past Chairman of APAN and the leader of CERNET, Prof. Jilong Wang, recognising the REN Leaders Forum as a collaborative platform, advocated for enhanced collaboration among NREN leaders to effectively demonstrate their capabilities. These efforts to gain visibility could involve sharing reports outlining their requirements or technical agendas. While these efforts could elevate the reputation of NRENs, Prof. Wang recognised the critical significance of stable funding, pointing out that it influences the range of activities that can be pursued.

During the panel discussion, the CEO of REANNZ, Amber McEwen, brought forth another essential aspect to assess an NREN's maturity: member satisfaction. She elaborated on how REANNZ dealt with difficulties like the potential loss of government funding or member institutes considering departure. These challenges were surmounted due to researchers advocating for the necessity of an NREN in New Zealand. Another parameter she highlighted was the creation of a diverse range of services. This notion encourages collaboration among all NRENs to collectively establish centralised capabilities that bring benefits to the entire research and education community.

During his keynote, Tawrit also highlighted that NRENs in the APAC region show deficiencies in the collaboration and multimedia service categories. When comparing services between GÉANT-participating nations and Asi@Connect participant economies, Tawrit pointed out that the Asi@Connect project's NRENs have notable opportunities for enhancing their services, particularly in the Identity and Multimedia service categories. Furthermore, each NREN has a series of flagship services. On average, most have 3 such services, while some have as many as 5 flagship services. The most common of these is video conferencing with on-prem Zoom licences alongside access to global research and education services. Commenting on these findings, Tawrit said, "If we can monetise any service, then we can call it a flagship service. If we do so, then we can share this knowledge with other NRENs."

## Building a Sustainable Future for RENs Through Collaboration

Following the panel discussion, the President of SingAREN, Dr. Francis Lee Bu Sung, delivered the second keynote at the inaugural REN Leaders Forum. His keynote focused on enabling successful collaborative efforts between NRENs. He introduced his concept, "The 3 C's of Collaboration": Communication, Coordination, and Cooperation. Effective communication serves as the foundation, followed by coordinating actions and fostering cooperation on a broader scale. He further stressed the importance of transparent communication, trust-building, mutual benefits, transparency, and clear governance in collaborative efforts among NRENs.

Dr. Lee then presented case studies to demonstrate the impact of NREN collaboration, particularly the evolution of the TEIN network into Asi@Connect. He emphasised the role of NRENs in the APAC region in helping the network become the success it is today. He also discussed collaborative initiatives beyond the

APAC region, such as APOnet and AER, which have increased network resilience to empower researchers globally. Local collaborations were highlighted as essential for NRENs, as he emphasised that such efforts help NRENs build trust and relationships within their local research and education community. In closing, Dr. Lee encouraged the audience to contemplate the future and posed questions for consideration. These questions served as the foundation for the second panel discussion that followed, where the NREN leaders in attendance shared several perspectives on what makes a successful collaborative venture.

## Addressing the Lack of Local Collaborative Efforts by NRENs

While acknowledging the importance of local collaboration, Prof. Wang expressed that a significant challenge faced by NRENs is the limited collaboration among the universities they represent. Despite being a collective entity of universities, many NRENs lack substantial local collaboration. As a starting point to address this issue, he recommended the inclusion of more university personnel in forums like APAN Meetings. Similarly, Prof. Ragel emphasised that although collaborative initiatives bring numerous benefits, NRENs should also introspect and explore further possibilities. He observed that while numerous researchers publish papers on subjects like AI and High-Performance Computing, only a small fraction engage with APAN. This observation underscores the importance of formulating strategies to enhance engagement between NRENs and the broader research and education community.

## Commercial Pragmatism is Needed to Maximise the Impact between NRENs

The newly elected Chairman of APAN, Prof. Shinji Shimojo, pointed out that a pivotal catalyst for successful collaborative endeavours is funding. He pointed out that government agencies and not-for-profit institutions like APNIC frequently offer funding to support collaborative initiatives. Ms. Amber further conveyed that, as CEOs of NRENs, they are accountable to both member institutions and a board of directors. Consequently, every decision made requires an approach of commercial pragmatism. This practical mindset extends to collaborations with other NRENs, allowing both parties to maximise their impact.

## The Need for Empathy Between Collaborators

Addressing the essential elements of a successful collaboration among NRENs, Tawrit highlighted the significance of empathy. He shared that empathy is crucial for sustaining collaboration, particularly for those NRENs in economies categorised as Lower Developed or Lower Middle Income. “Without empathy, effective collaboration becomes unattainable,” Tawrit stated. Tawrit further called upon developed NRENs to back NRENs from developing nations, asserting that such support would foster development and pave the way for reciprocal assistance. Further, Prof. Ragel added that the mutual benefit of collaborative efforts doesn’t necessarily have to be of equal monetary value. Rather, even if other resources could be exchanged, as long as both parties gain something, it’s a successful collaboration.

## The Importance of Learning from Other RENs

During the REN Leaders Forum, the Senior Officer for Research and Information at Tsukuba Business-Academia Cooperation Support Centre, Mitsuru Kameya, representing the Ministry of Agriculture, Forestry and Fisheries Research Network (MAFFIN, a Japanese NREN), provided an in-depth perspective on Japan’s three RENs and how they collaborate with each other. Expanding on these observations, Prof. Ragel

emphasised the value of learning from all RENs within a nation. He noted that certain challenges are common across all nations. Notably, in some nations, these challenges might impact one REN but not the others. Prof. Ragel underscored the importance of communication and collaboration among RENs to exchange insights and knowledge that can prove valuable in addressing these universal challenges.

## The Way Forward for the REN Leaders Forum

As the final panel discussion wrapped up, the REN Leaders Forum at APAN56 concluded on a high note. Throughout the day, this inaugural gathering had proven to be a successful platform for REN leaders to come together, exchange ideas, and engage in open discussions. It provided an invaluable opportunity for these leaders to freely discuss their experiences, strategies, and visions for the future. These discussions not only shed light on critical aspects of NREN development but also ignited a spirit of collaboration among the participating REN leaders.

In light of the fruitful discussions and the collaborative atmosphere that prevailed throughout the forum, Prof. Ragel proposed these themes as the focal points for the forthcoming REN Leaders Forum at APAN57. He envisioned an even more dynamic and diverse gathering, potentially featuring speakers from both developing and developed NRENs. This inclusivity would ensure that the next forum would be enriched with a broader range of perspectives, thereby fostering a deeper understanding of the challenges and opportunities that lie ahead in the world of research and education networking.