

APRP

The Asia Pacific Research Platform

Research at the speed of thought.

Yves Poppe
GRP conference
UCSD, San Diego, Ca
Sept 16-18th 2019



How can smaller countries keep up with the rapid capital intensive evolution in the pursuit of theoretical and experimental science?

- Cloud Computing, IoT, data mining, data analytics, supercomputing and remote access to shared scientific instruments have become essential to ensure the wealth, security and perennity of nations.
- Super Computing simulation and analysis have become a source of discovery and new product development. Extraordinary amounts of data are collected and revolutionize storage. Genomics and personalized medicine as well as Cloud Computing require ultra high security and reliability, fast data replication and disaster recovery.
- Exascale computing is seen as the next Frontier with the USA, Europe, Japan and China allocating each in excess of one billion US\$ to be the first to reach this milestone by the early 2020's.
- The only sensible way forward to compete effectively is to collaborate to remain relevant and competitive in this new phase of economic and human development.

Research Network or Research Platform or both?

- Progress and results in all disciplines depend on improved communications, collaboration and remote access to computing facilities, huge data files and to shared scientific instruments.
- The vast majority of Researchers are not ad hoc communications specialists and do not care about VLAN's or fine tuning GridFTP or Globus throughput rates. They want an easy API to access compute, data or instruments securely, efficiently, wherever they are located.
- The next gen infrastructure will be a Platform facilitating research at the speed of thought.

Genesis of the Asia Pacific Research Platform

- First proposed by Yves Poppe of NSCC at the closing plenary of the APAN44 conference in Dalian, PRC in August 2017.
- An APRP session was organized in the context of APAN45 held in Singapore in conjunction with SCA18 (Super Computing Asia) in March 2018.
- Jeonghoon Moon of KISTI, Korea was chosen as Chair and Andrew Howard of ANU, Australia as co-chair.
- An APRP workshop was held at APAN46 in Auckland, New Zealand in August 2018
- NSCC Singapore and SingAREN organized the Data Mover Challenge (DMC) with winners to be announced at SCA19 in Singapore.
- A 100gbps APRP network connecting Australia, Japan, South Korea and Singapore was demonstrated at SC18 in Dallas in November 2018 in collaboration with our US, Canadian and European counterparts.

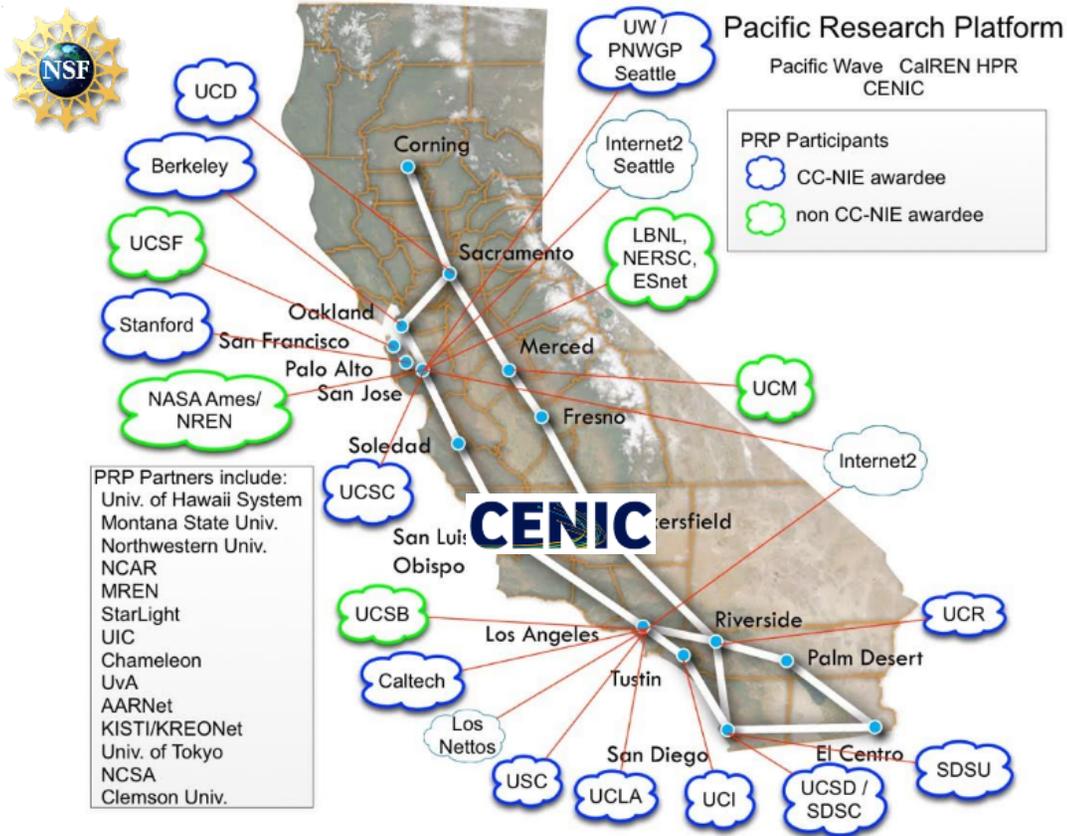
Genesis of the APRP con'td

- APRP was accepted as a Working Group in APAN and held its first WG meeting at APAN47 in Daejeon, Korea in february 2019.
- An APRP session was organized at SCA19 held in Singapore in March 2019 with emphasis on the need for a Research Platform connecting ASEAN countries especially in the context of the planned shared Supercomputing infrastructure and facilities.
- Given the success of the first Data Mover Challenge it was decided to follow up with a DMC20 challenge with winners to be announced at SCA20. The topology for DMC20 is a textbook implementation of a Global Research Platform connected at 100Gbps.
- The second APRP WG meeting took place at APAN48 held in Putrajaya, Malaysia in August 2019. Great progress was announced in international connectivity and in deployment of domestic Research Platforms

APRP, next steps

- Demonstrations at SC19 in Denver in November 2019
- Ongoing tests for the DMC20 participants.
- DMC20 results and an APRP ASEAN session at SCA20 in Singapore late february 2020
- APRP WG meeting at APAN49 in Kathmandu, Nepal, early March 2020
- APRP WG meeting at APAN50 in Hong Kong. August 2020
- APRP WG meeting at APAN51 in Feb/March 2021 in Islamabad, Pakistan
- Deployment of national ScienceDMZ's

Pacific Research Platform (PRP)



PI: Larry Smarr, UC San Diego Calit2

Co-Pis:

- Camille Crittenden, UC Berkeley CITRIS,
- Tom DeFanti, UC San Diego Calit2,
- Philip Papadopoulos, UCSD SDSC,
- Frank Wuerthwein, UCSD Physics and SDSC

PRP Is a project started early 2016, under a NSF Grant, to facilitate secure very high speed data communication to facilitate collaboration between advanced researchers dispersed over a number of major universities and laboratories, and to provide remote access to super computing and storage facilities as well as to major shared scientific instruments.

Early may 2017 the US National Science Foundation approved expansion of PRP to a national level as NRP (National Research Platform) to link the approx. 100 of the major US research universities and the DoE national labs.

NSF CC*DNI Grant
 \$5M 10/2015-10/2020

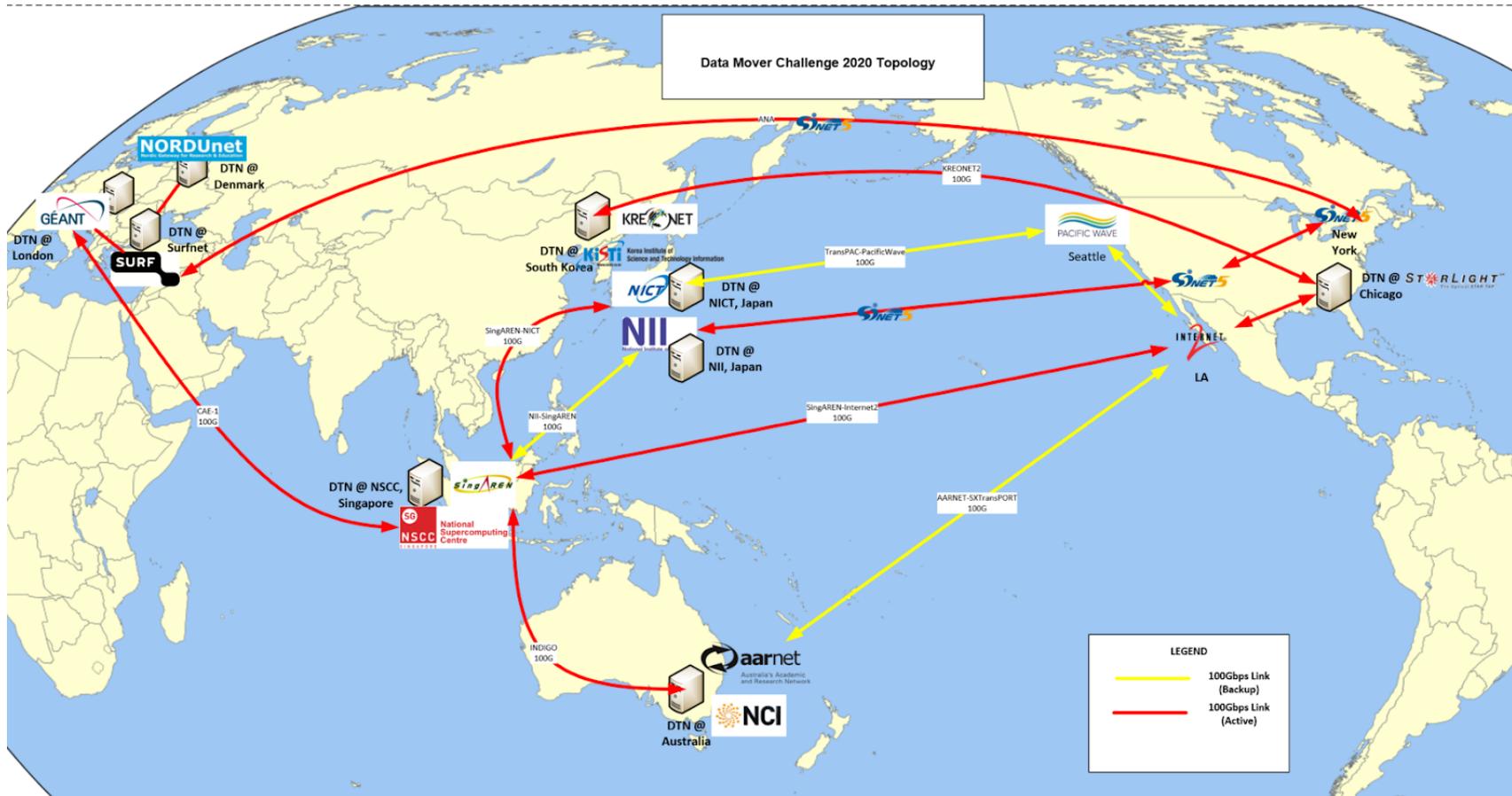


From PRP to NRP to GRP (Global Research Platform)



PRP's Current International Partners:
 Netherlands,
 Rep Korea
 Japan
 Singapore
 Australia

Data Mover Challenge 2020 topology

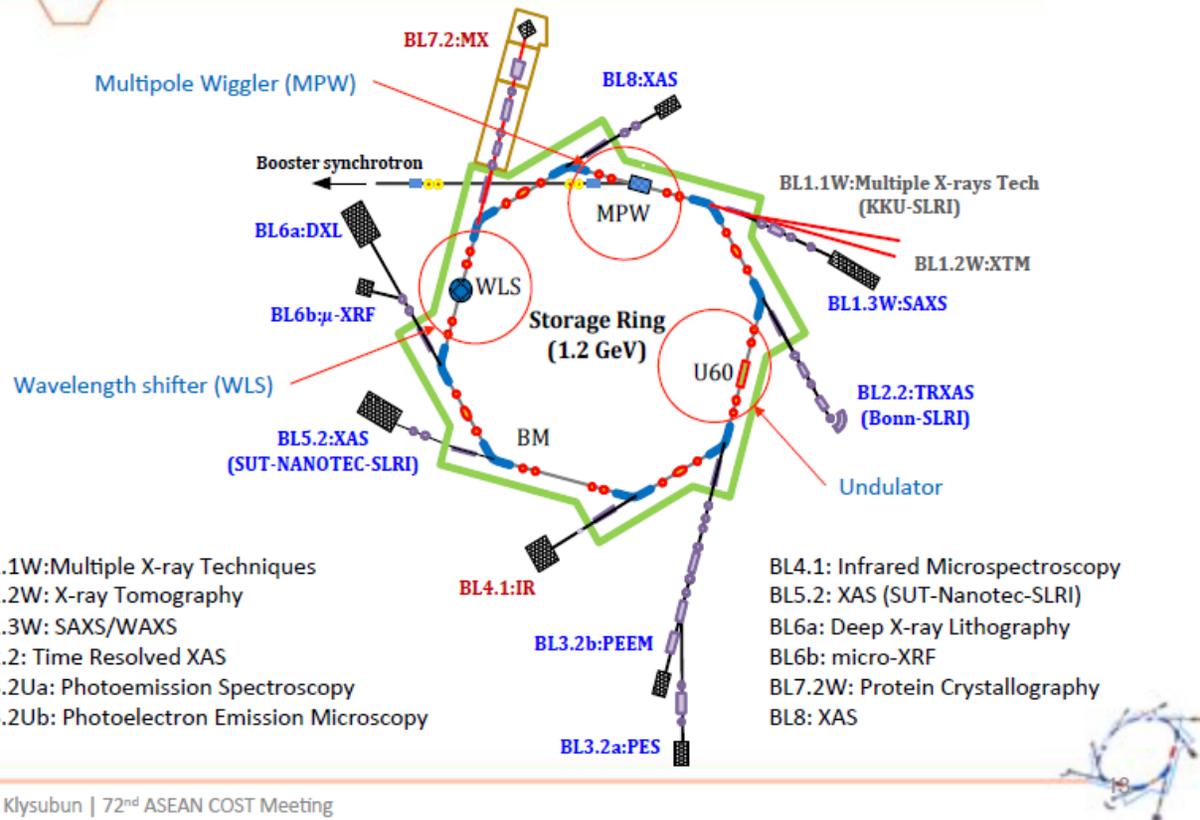




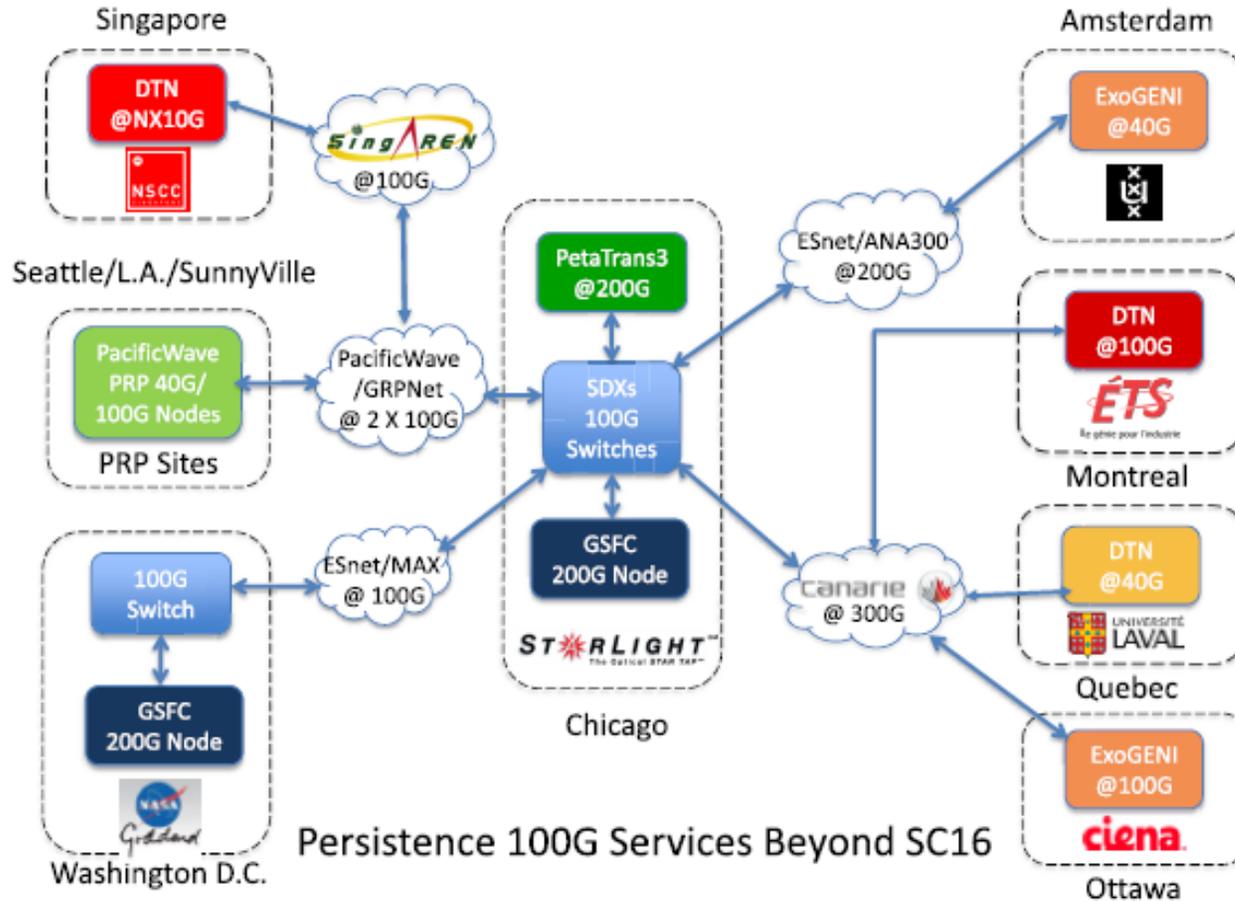
Beamlines at Siam Photon Source

Case in point within APAN region:

APRP is the ideal vehicle for remote high speed access and interaction with this unique facility and the considerable amounts of data it generates.



PetaTrans: Petascale Sciences Data Transfer



First steps
towards a
Software
Defined R&E
data exchange
(SDX)

Some projects running on NSCC's Aspire1 where Research Platforms are a must

GenomeAsia 100K Consortium

GENOME@NANYANG TECHNOLOGICAL UNIVERSITY



The GenomeAsia 100K initiative aims to sequence 100,000 genomes from North, South and East Asia populations, with the goal of accelerating precision medicine and clinical application for Asian patients by leveraging new information and understanding from the collected genomics data.

Collaborating with NTU acting as host to the initiative to utilise NSCC's infrastructure to undertake the computational analysis of massive datasets for accelerating downstream analysis and experiments leading to new knowledge and insights in Genome science.

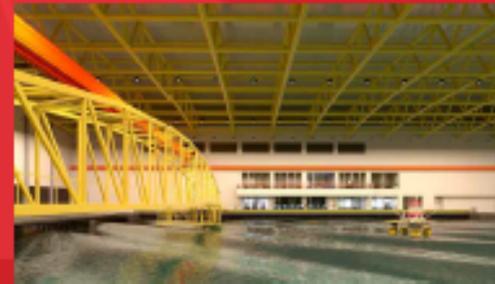
National Precision Medicine Initiative

Led by Prof. Patrick Tan (Deputy Director, Biomedical Research Council of A*STAR and NSCC Steering Committee member) the NPMI will be a key partner and user of NSCC's supercomputing, advanced networking, visualisation and data wormhole highspeed connectivity to globally located healthcare information resources.

Numerical Ocean Basin

TECHNOLOGY CENTRE FOR OFFSHORE AND MARINE, SINGAPORE
(TCOMS)

A state-of-the-art Ocean Basin facility is being developed by TCOMS@NUS in Singapore, comprising a deep tank equipped with wave and current generation systems to simulate ocean environment. NSCC partners TCOMS to provide the computational power required for the numerical modeling of waves and current flows of test models and experiments for marine and offshore structures.



Platform for Deep Learning

STRATEGIC PARTNERSHIP WITH NVIDIA:

Towards a Deep Learning platform leveraging on Theano, Caffe, TensorFlow and Torch on our 128 Tesla K40 GPU nodes.



Data Wormhole



High bandwidth, low latency, transcontinental data transfer gateway in collaboration with International Centre of Advanced Internet Research (iCAIR), University of California San Diego (UCSD) to support our participation in the Global Research Platform, an extension of the Pacific Research Platform.

Creativity requires the courage to let go of certainties

Erich Fromm