APAN:
Fast & Deep Connectivity
for
International Research & Education

Dr Markus Buchhorn
General Manager, APAN Ltd

Asia Pacific Advanced Network

Connecting People, Cultures, Research and Education

National Research and Education Networks…?

- NREN: Parallel the internet
  - Run by the sector
- Freeways for Research and Education, connecting:
  - Universities/Higher Education/K-12
  - Government agencies, cultural institutions (GLAM), hospitals, …
  - Facilities: Telescopes, accelerators, Supercomputers, Cloud, …

NREN: A matter of scale

- Data, data, data – PB/s now
  - Needs storage, analysis tools, compute capacity, trust fabrics, …
- People, people, people
  - Research is highly collaborative – and competitive
- NRENs: 10's-100's Gb/s – with tiny user base
  - Demand for throughput is high

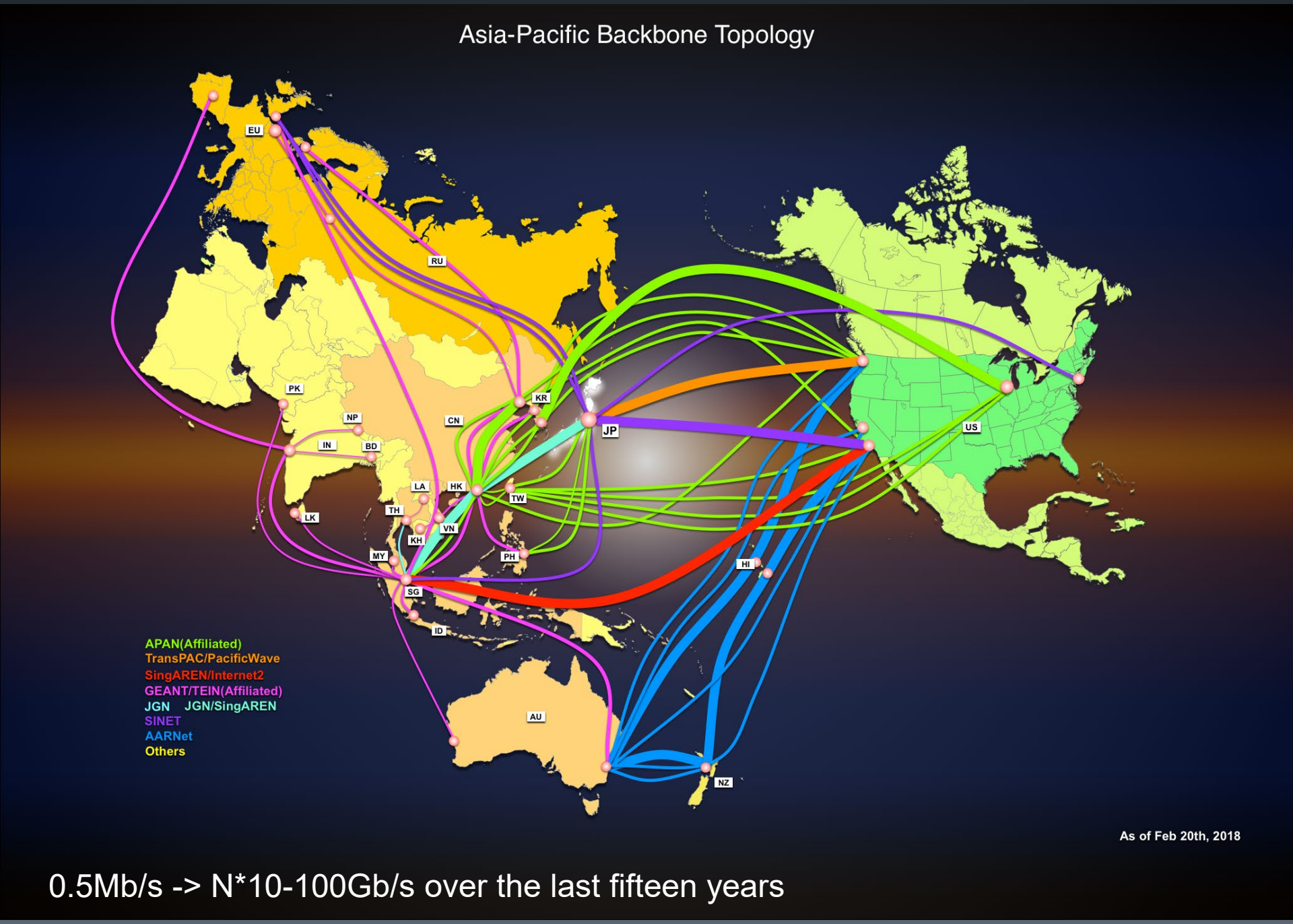
NREN partnerships: RRENs

- *Regional R&E network partnerships*
- Work on common interests/needs across a region
- Aggregate demand and supply
  - Two bilateral links can join 3+ countries
- Support cross-border activities
  - Most research and education is internationally collaborative

The Asia Pacific…

- More than half the world's population
  - Rapidly growing proportion of global R&D
  - Rapidly growing population in education at all levels
  - Strong social pressures around food, health
  - Immense diversity

- APAN: Partnership of NRENs
  - 17+ Economies as primary members, 22+ Affiliates, Associates, Liaison and Industry partners
  - Formed 1995, incorporated 2009
  - Independent, self-governing, many investors
  - Started with high speed links of 1-2Mb/s… *within the region*



0.5Mb/s -> N*10-100Gb/s over the last fifteen years

Challenges

- APAN economies range
  - from >1.2billion to <1 million people,
  - from very-developed to very-developing

- NRENs have very diverse models – they have to!
  - As companies, partnerships, government agencies, lead entities
  - Funding through subscriptions, project grants, fee-for-service, …
  - Offering service portfolios, networks and up:
    - Domestic connectivity, international connectivity
    - Computing, storage, collaboration, certificates, identities, data management, training, project support, software development, …
    - Harmonising is hard!

APAN's role

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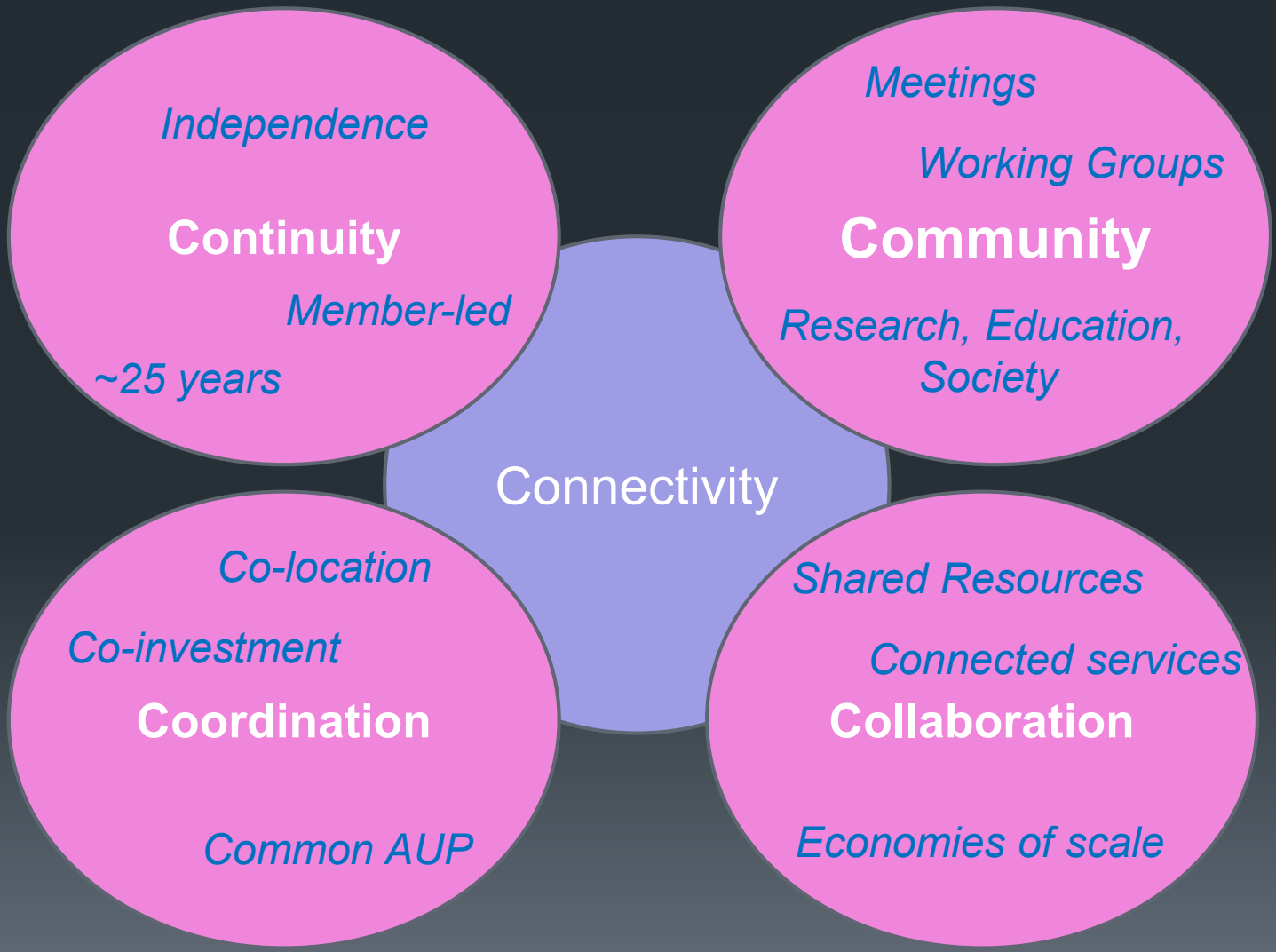

Community: focus on users

- *Enhance opportunities, access, and adoption of resources*
- Research, Education and Societal Benefits
  - Applications: Agriculture, Earth Systems and Sensing, Culture and Arts, Astronomy, HEP, Bioinformatics, Medicine, Education, Disaster Management (natural, medical, etc.), …
  - Tech: UC, IPv6, HDTV, Future Int., SDN, IdP Fed., Grid, Cloud, …
- Two major meetings (plus conference!) each year
  - *300+ attendees*
  - *APAN-48: KL-MY, ~~49: Kathmandu-NP~~, 50: HK, **51: PK**, 52: ID*
- Participation and engagement with many community events
  - Within the region, and globally

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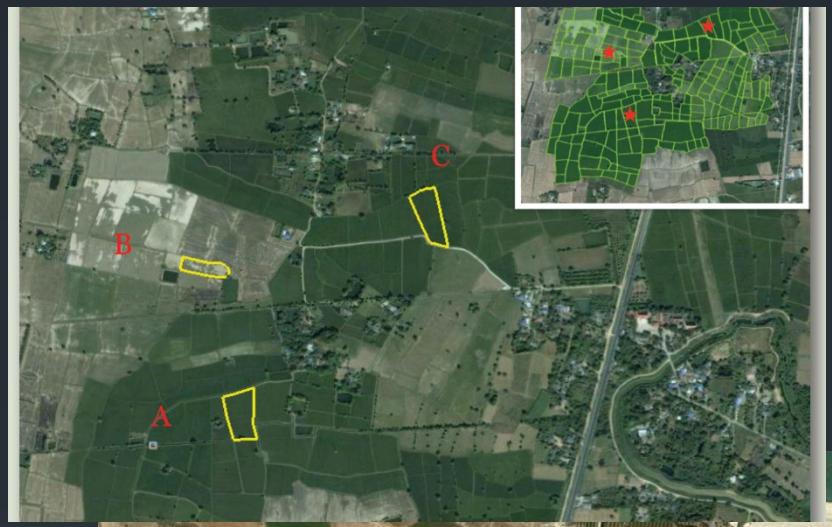
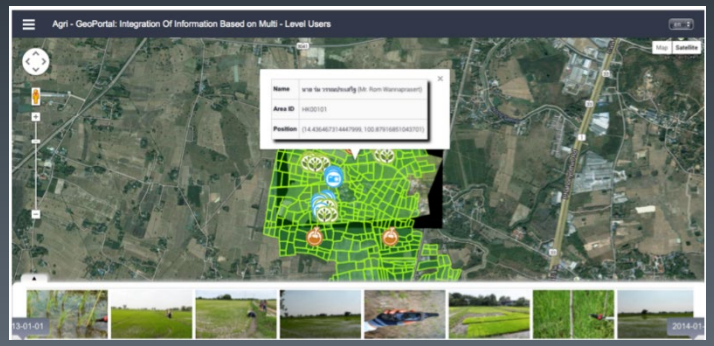
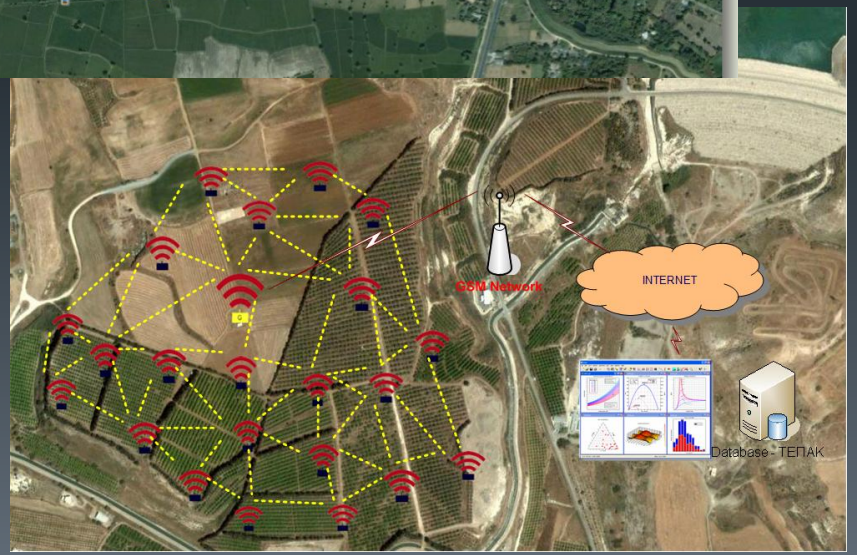
APAN Supports… Agriculture







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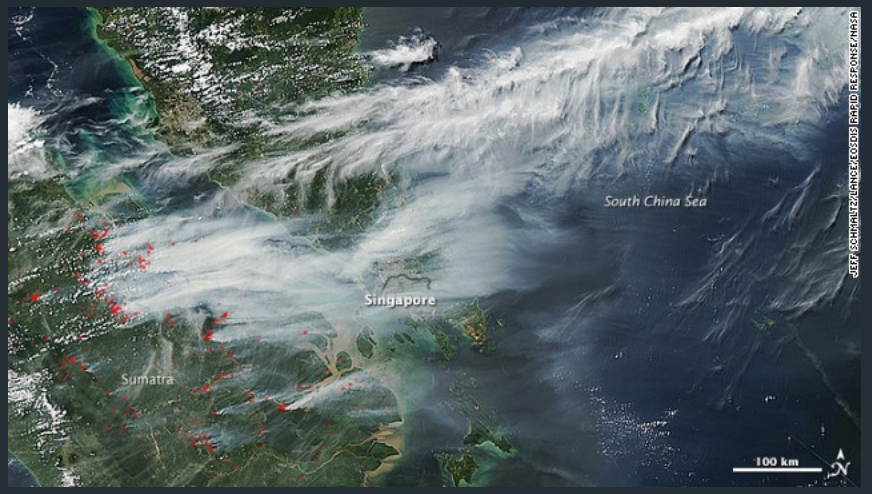
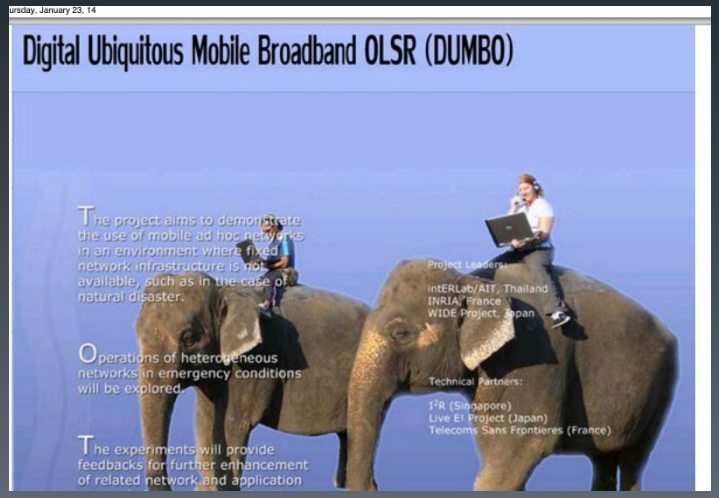
APAN Supports… Disaster Management





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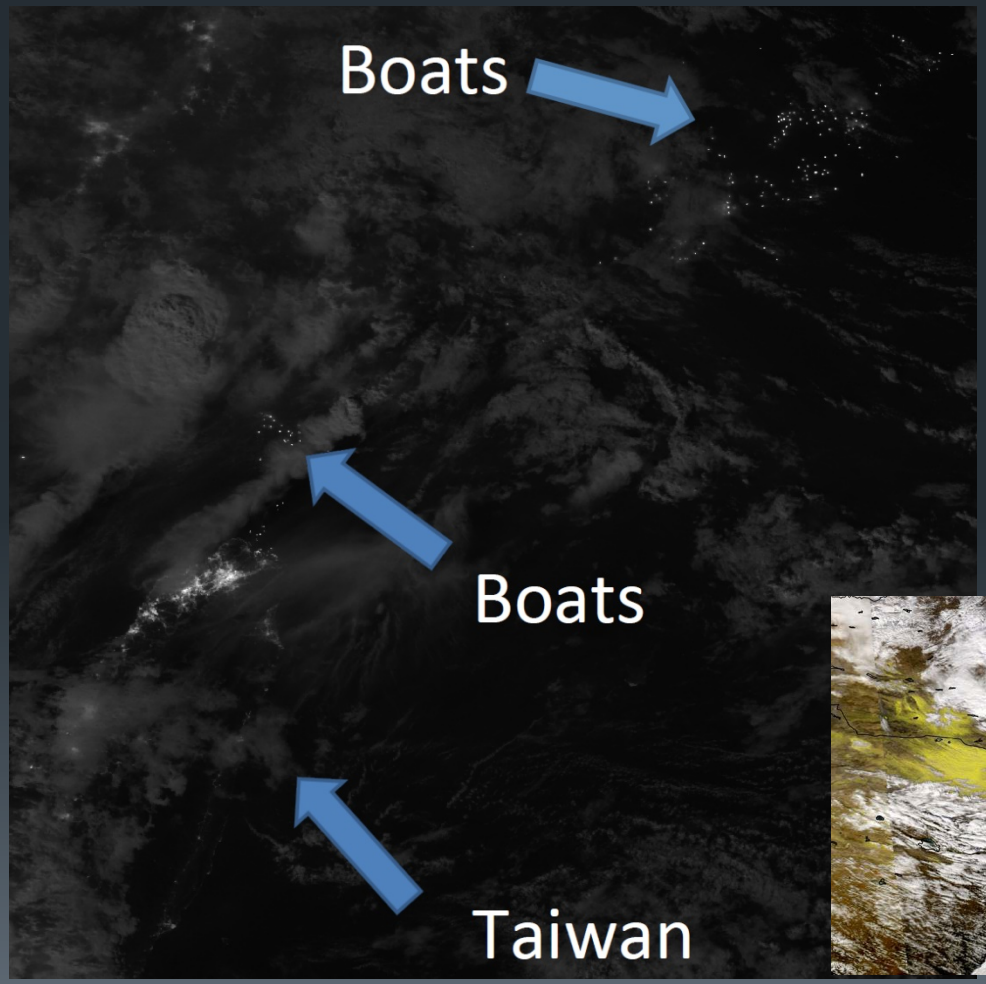
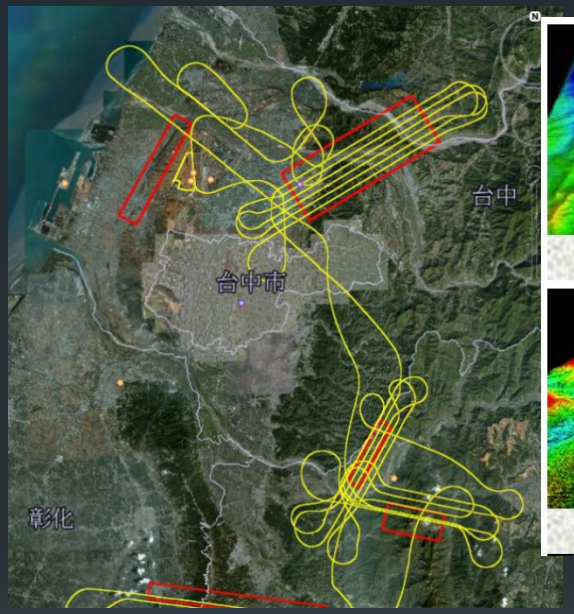
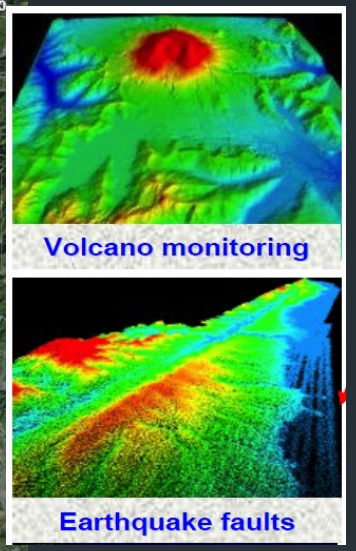
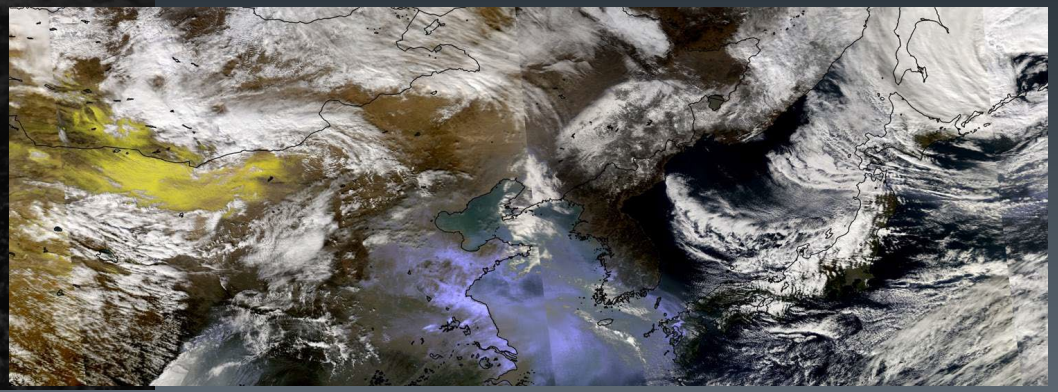
APAN Supports… Remote sensing









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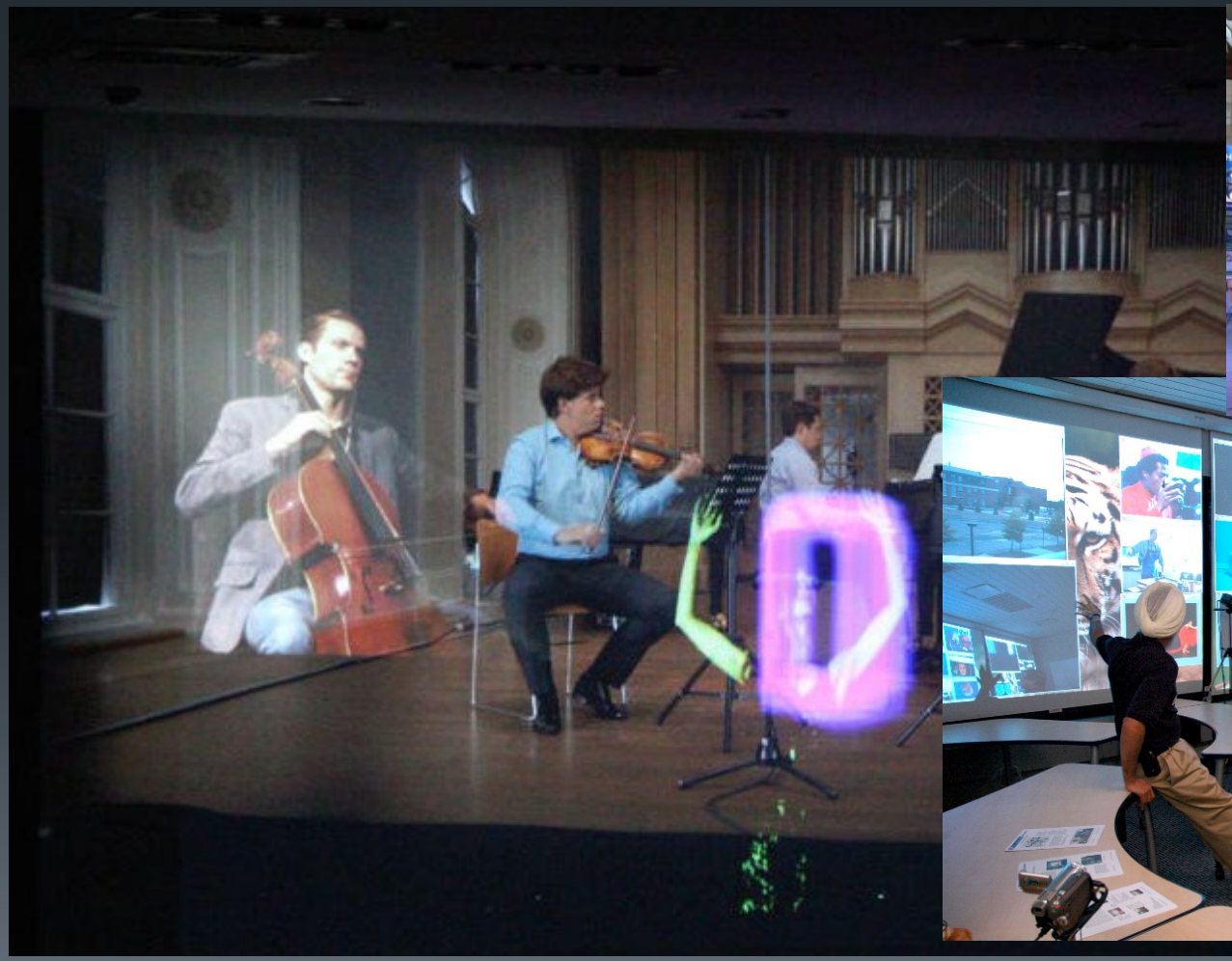
APAN Supports…Collaboration, Education



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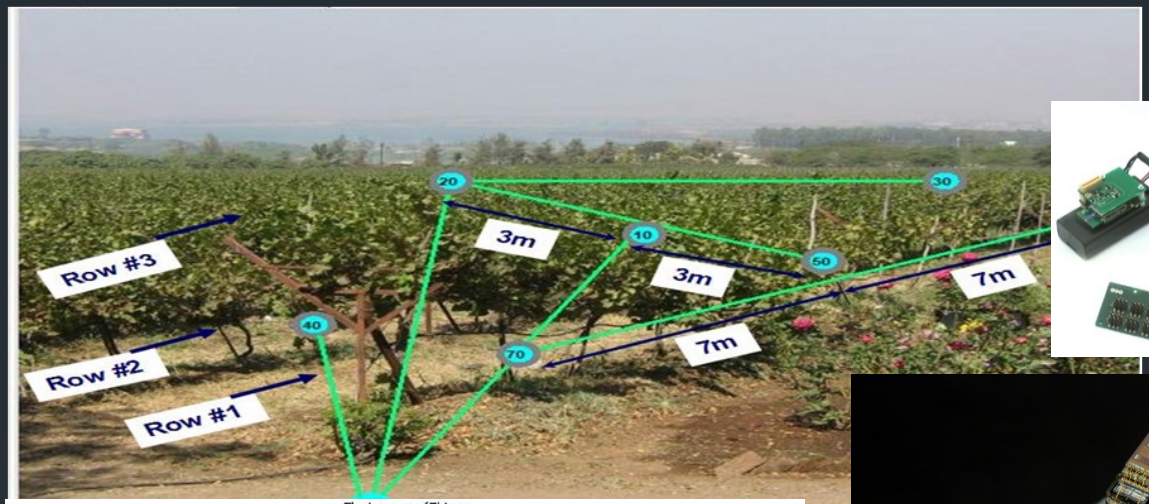
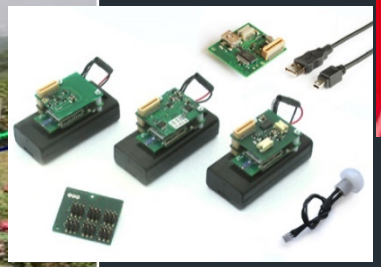
APAN Supports… Internet of Things

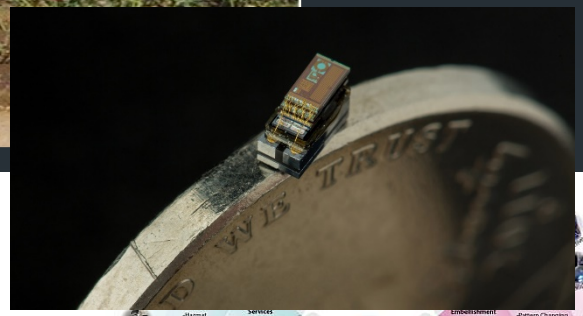


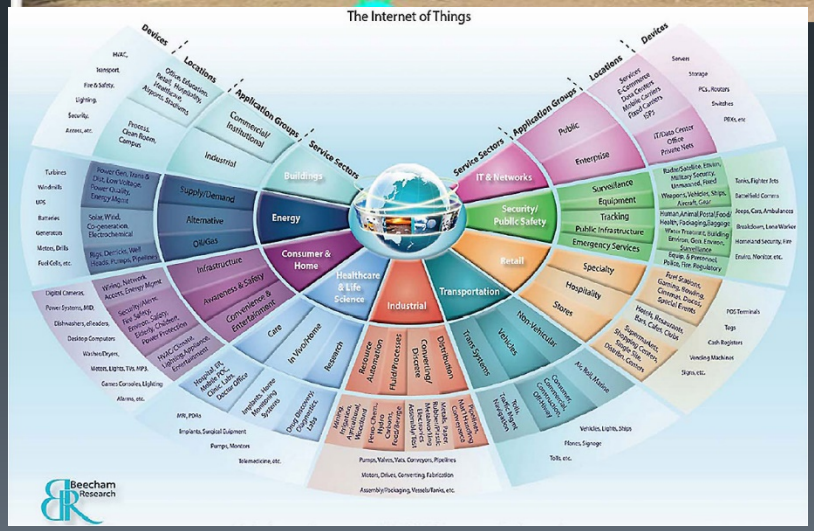


sense-t

from sensing to intelligence

Economy-wide sensor network





THE YIELD TECHNOLOGY SOLUTIONS ®

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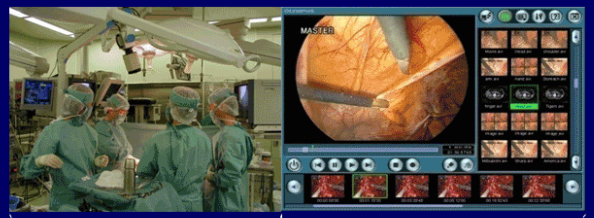
APAN Supports… Telemedicine

[1] Live Video Dist

Operating Room

Images of Procedure



Japan side: Kyushu University

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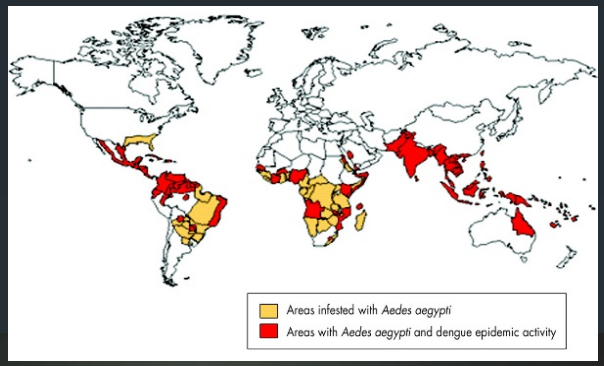
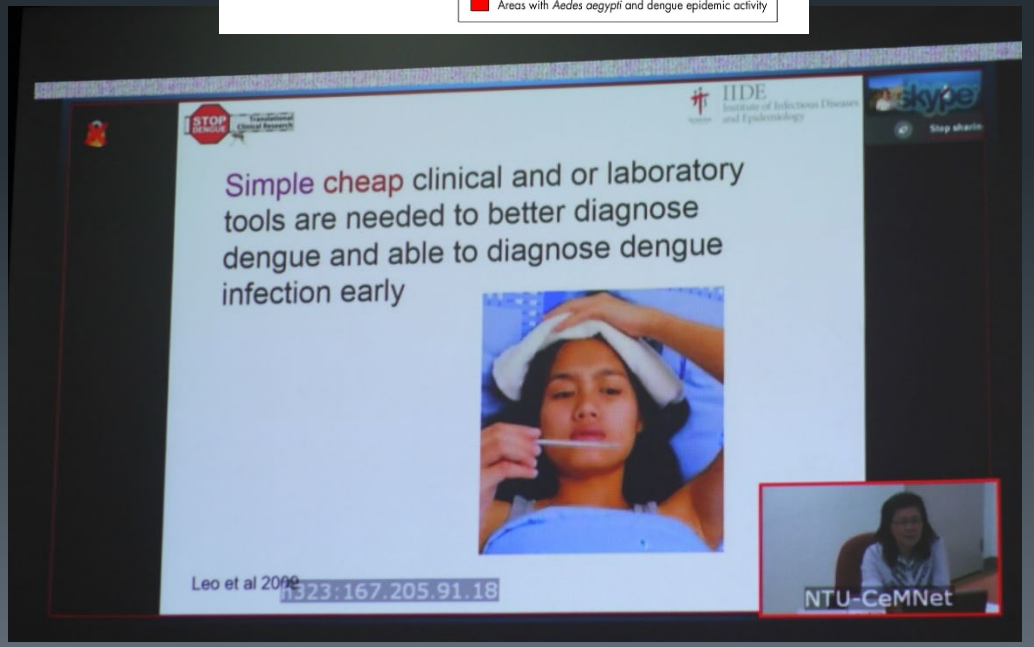
APAN Supports… Health partnerships





APAN is very open

- Opportunities to partner:
  - R&D with willing, and technically literate partners
  - Support life-changing initiatives, at scale
- We want to know what is/will be possible!

Questions?

- And hopefully some answers…