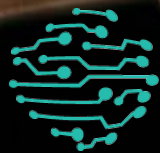


## GNA-G AUTOGOLE / SC19-NRE-020

### SUPERCOMPUTING 2019

SC'19 – November – Denver, Colorado, USA

John Hess, Tom Lehman, Harvey Newman, John MacAuley,  
Joe Mambretti, Hans Trompert, Marcos Schwarz,  
Gerben van Malenstein and many others



global network architecture



SURF



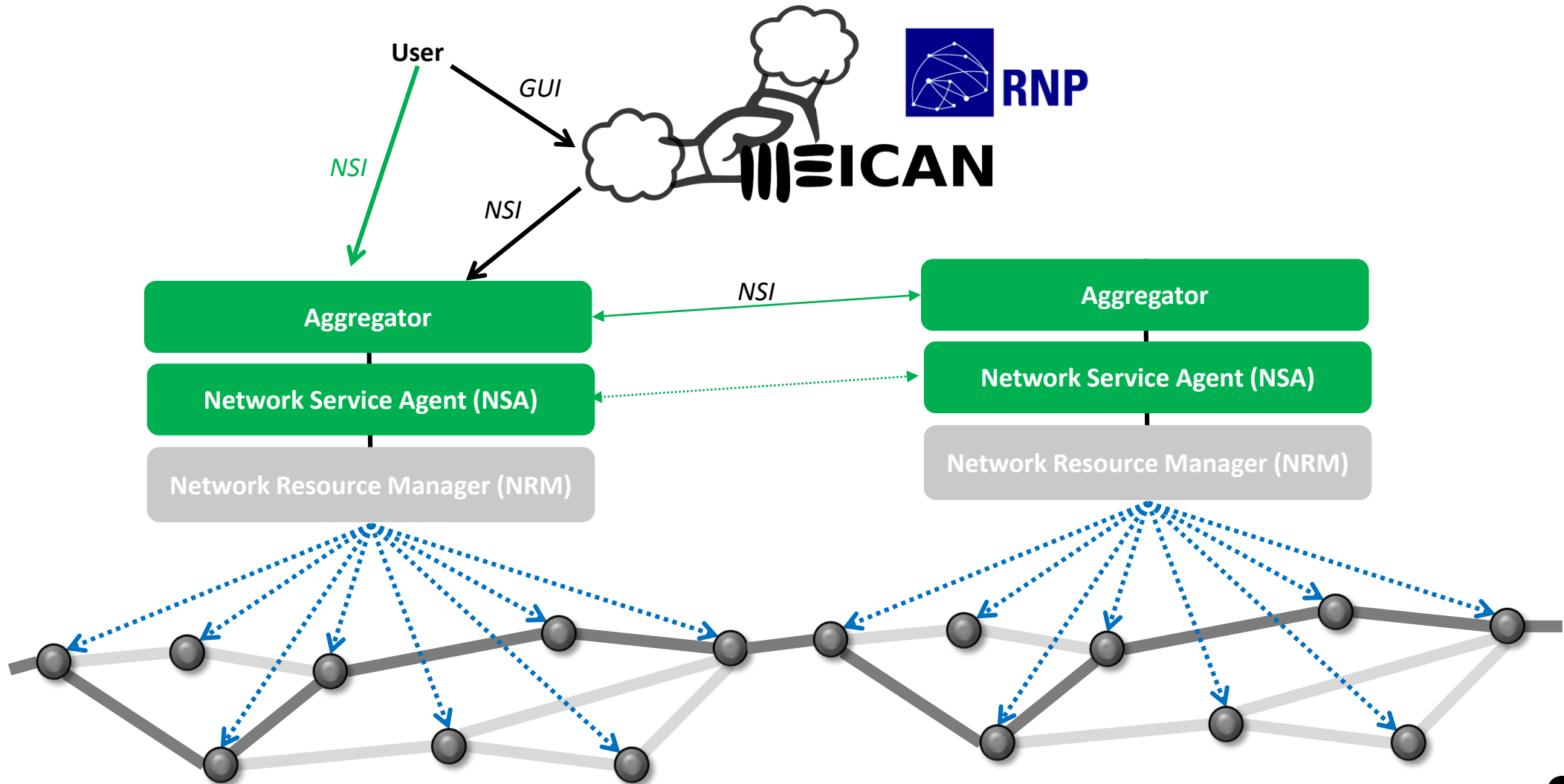


# global network architecture



Schematic overview of the AutoGOLE

# AutoGOLE: multi-domain network services on-demand

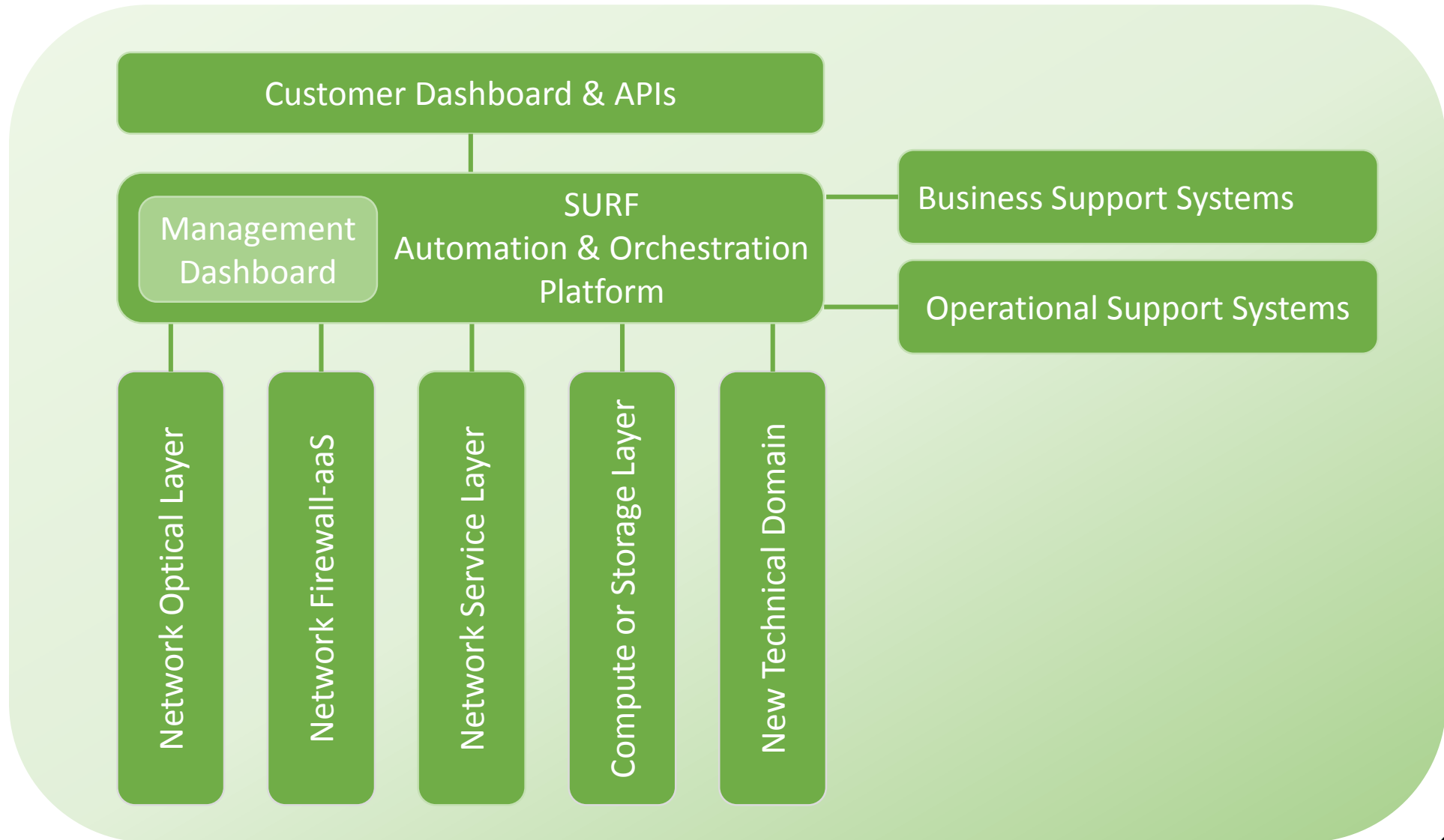


# Themes

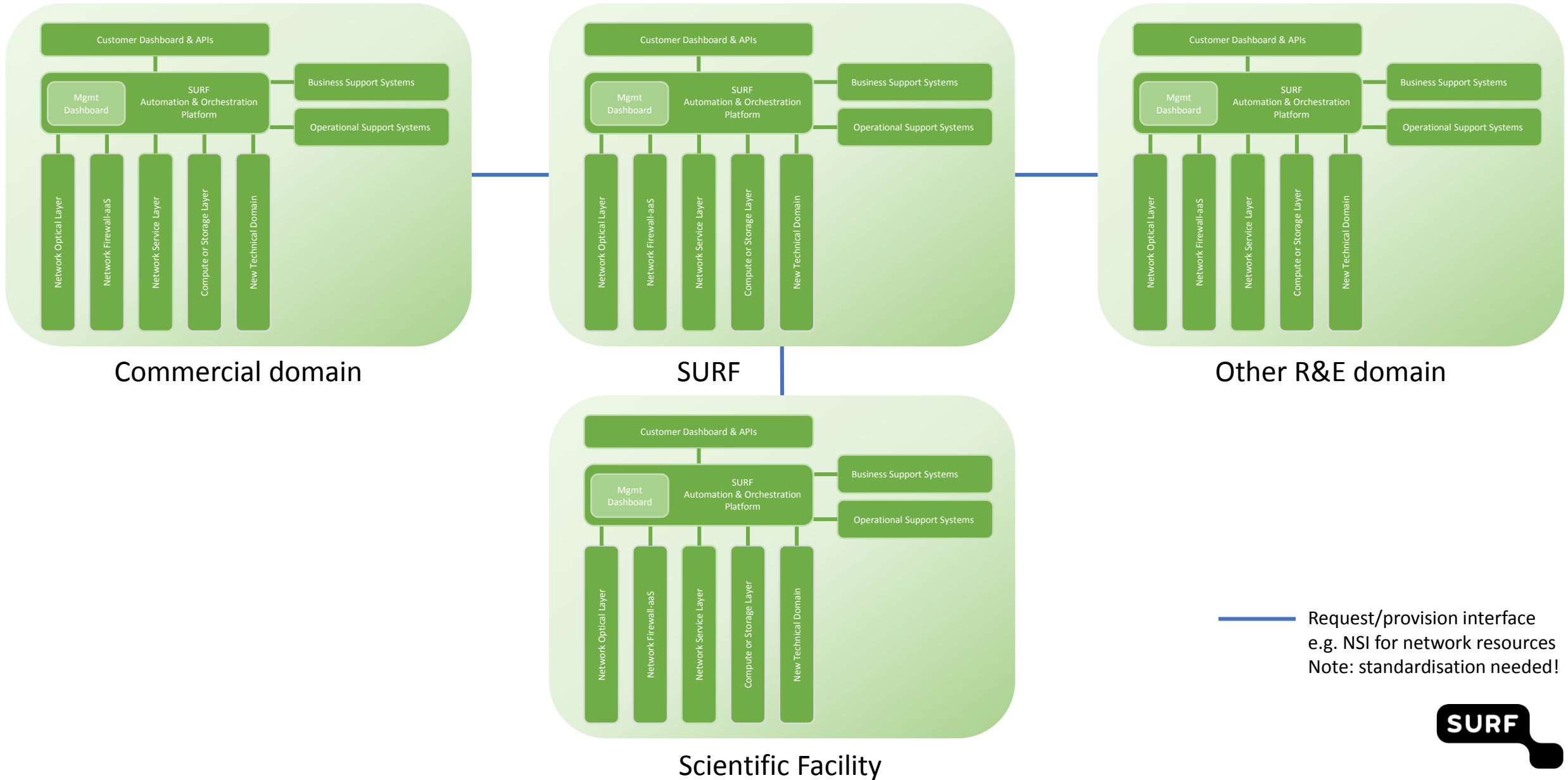
# Themes

- Commercial cloud suppliers already deliver commodity network + compute + storage
- What about the R&E networks and Science Facilities?
  
- From pilot to production
- Moving towards automated provisioning by NOCs
- Implementations, dynamic ANA
  
- Evolving MEICAN
- Features, multi-resource provisioning, ...

## SURF vision on Automation & Orchestration: mid term, adding optical layer and research on new technical domains



# Vision on Automation & Orchestration: multidomain interoperability, R&E + Commercial + Scientific Facility



# Activities 2019



# AutoGOLE activities 2019

- Connecting more networks around the globe using NSI
- Dynamic ANA planned for this year, expecting scaling up to other regions
  - Starting by segment CHI-MON-AMS
- MEICAN software development by RNP
- Expanding AutoGOLE with connectivity to DTNs through SENSE

# SENSE



# SENSE

- SENSE overview and SENSE-RM slides

# SENSE

- SENSE overview and SENSE-RM slides

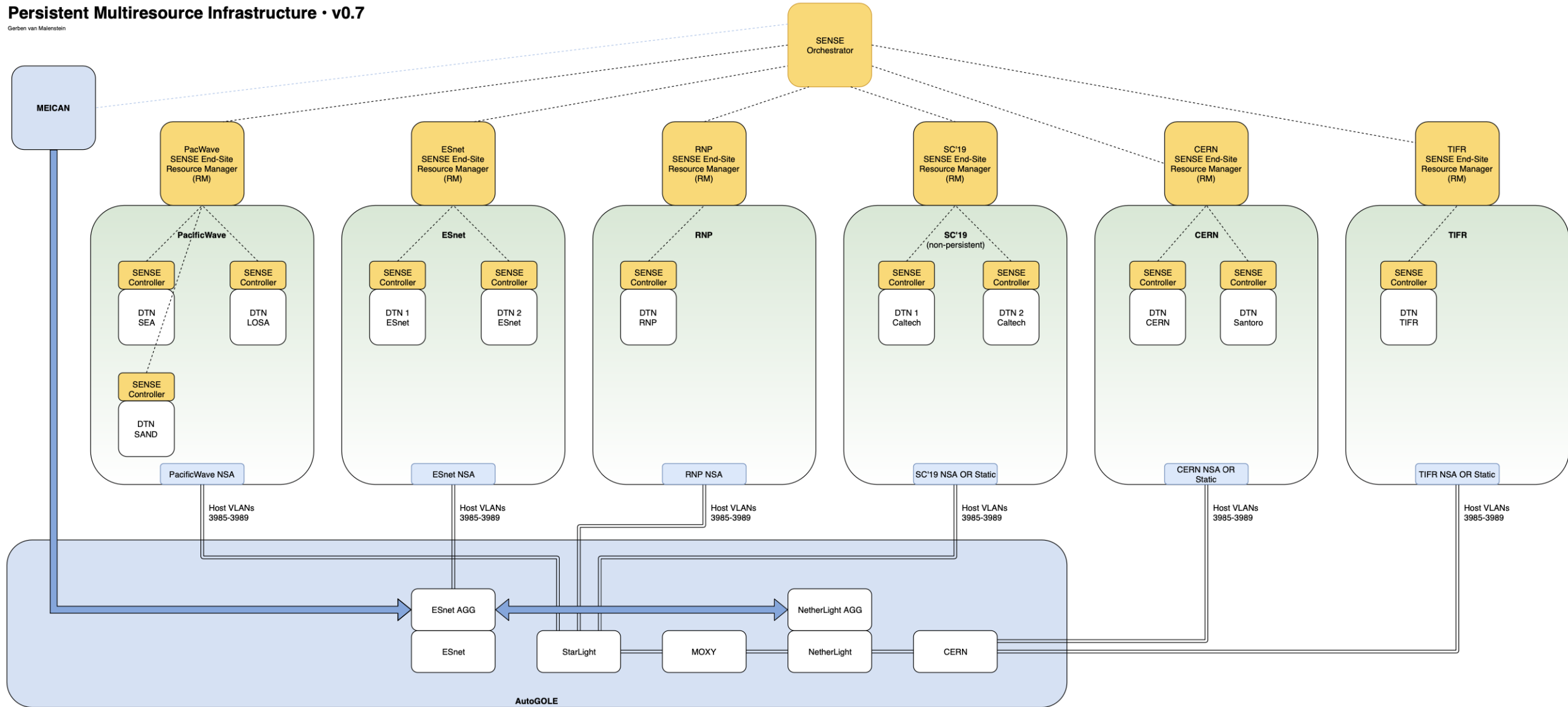
**SC19-NRE-020**  
**~~Demonstration~~**  
**Lessons learned**



# SC19-NRE-020 - Overview

Persistent Multiresource Infrastructure · v0.7

Gerben van Malenstein



# SC19-NRE-020 - Lessons learned

- Perform first data plane test as early as possible, the devil is in the details
- Data plane Los Angeles DTN to CERN DTN was not completed
- OpenNSA does not support NSI Explicit Route Object (ERO)
- implies that the PCE cannot be triggered to choose alternate path
  
- SENSE-Resource Manager (RM) does not run on Ubuntu
- While the CERN DTN does
- Containerize SENSE-RM?
  
- The value of this demonstration is not in the result, but in what we discover and learn

# SC19-NRE-020 – Next steps

- Towards **Persistent Multi-resource Infrastructure**
- Debugging data plane by improving control plane
- Various approaches: adding ERO to OpenNSA?
- Open-sourcing OpenNSA?
- Adding a specific aggregator temporarily?
- ... ?

# Directions

# AutoGOLE activities 2020

- **Production**

dynamic ANA

- **Innovation**

towards multi-resource provisioning





**ANY QUESTIONS?**



Gerben van Malenstein



[gerben.vanmalenstein@surfnet.nl](mailto:gerben.vanmalenstein@surfnet.nl)



[www.surf.nl](http://www.surf.nl)



[linkedin.com/in/vanmalenstein](https://www.linkedin.com/in/vanmalenstein)

« **DRIVING INNOVATION TOGETHER** »

**SURF**