

# Acknowledgements

- GSI Timing Team: Enkhbold Ochirsuren, Marcus Zweig ...
- GSI ACC IT Team: Peter Pfister, Christoph Handel ...
- CERN Team: Greg Daniluk, Maciej Lipinski ...
- External: Alessandro Rubini, Adam Wujek ...

# White Rabbit Infrastructure at GSI

Dietrich Beck (reporting about work done by others)

Introduction

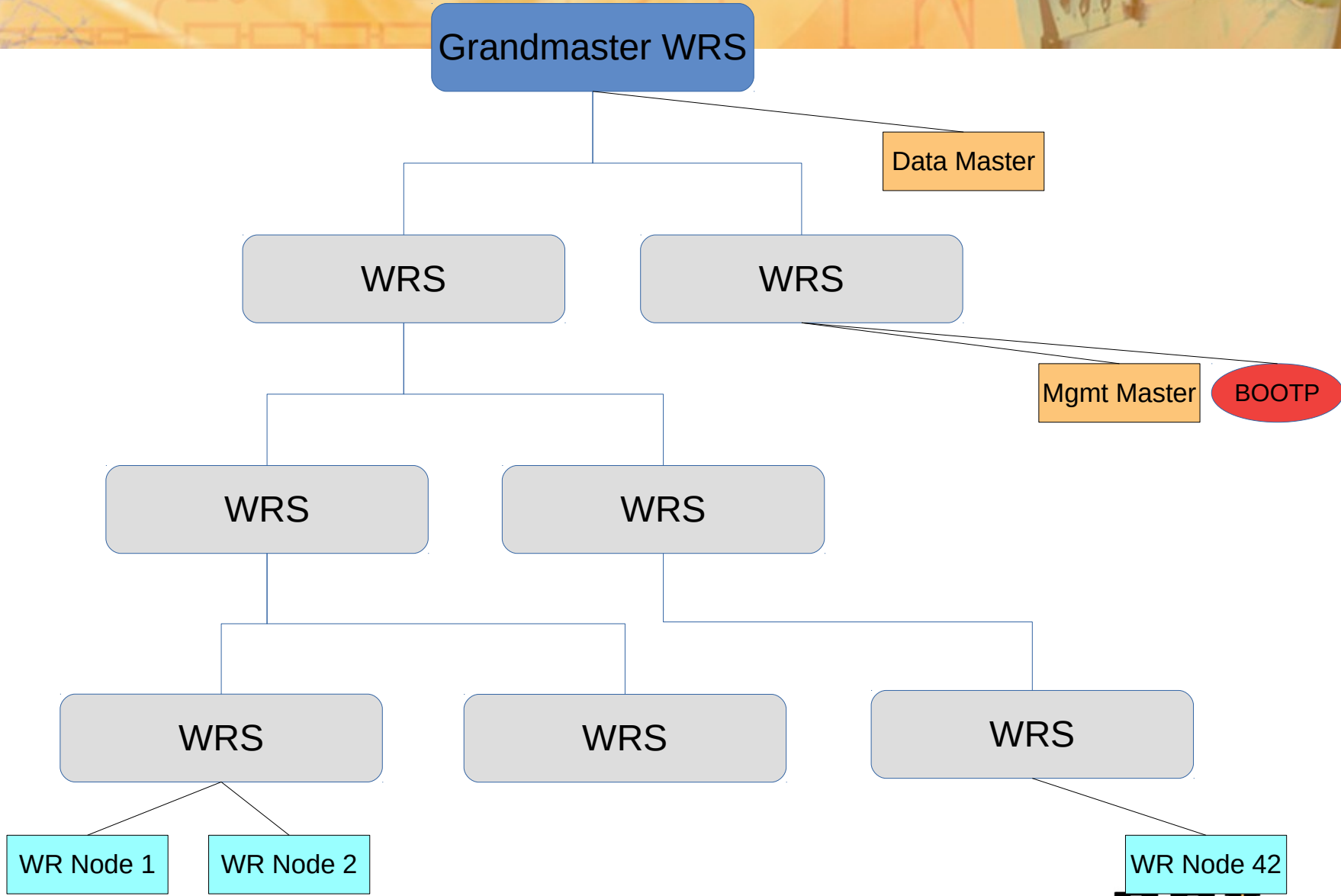
Status 2020

Integration into Accelerator IT Infrastructure

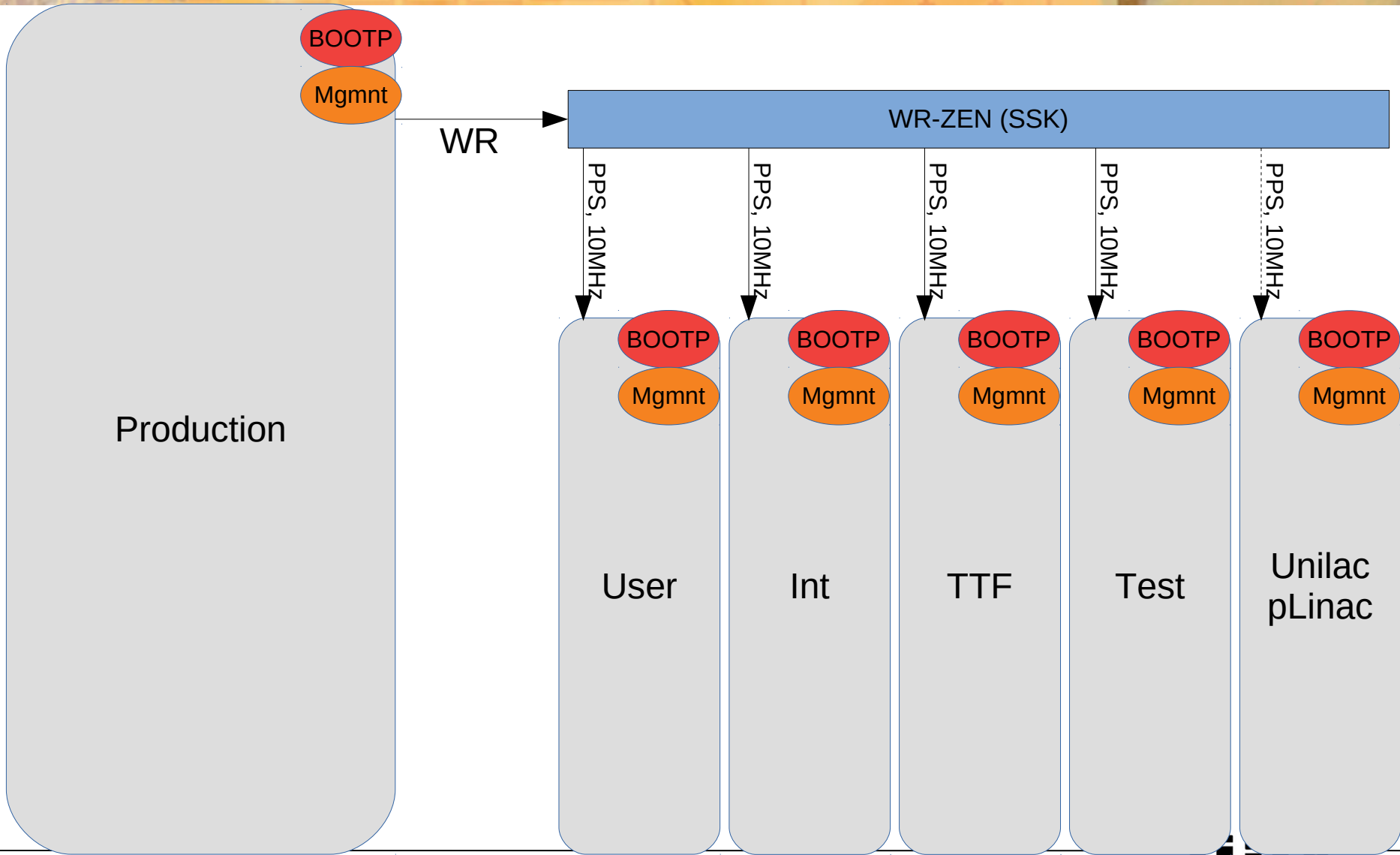
Beam-Operation in 2021

(disclaimer: I am not an IT guy)

# Situation 2020: Production Network



# Situation 2020: Many Networks



# Situation 2020: Issues

- too many BOOTP servers maintained by us
- too many Management Masters (diagnostic, 'node reset') maintained by us
- one (!) layer-3 network for all layer-2 networks
- poor network discovery
- every node may send traffic to the whole network
- no counter-measures against 'unknown nodes'
- ...

Big Mess, does not scale ...

# Idea:

## Ask Colleagues from Accelerator IT

## Ask Colleagues form CERN

### IT

- let's do not re-invent things that are already invented
- some issues are daily business of standard IT
- integrate as much as possible into the environment of ACC IT

### CERN

- intended use (what developers had in mind)
- there exists a draft on 'White Rabbit Guidelines for CERN'
- WRS VLAN implementation (strange for standard IT people!)
  - nodes listening to multiple VLANs
  - unidirectional VLANs
  - (there exist IT techniques to achieve the same thing but I forgot the buzzword)

### ToDo

- add/adjust features of WRS for better integration into an existing IT environment (802.1X, Q-Bridge MIB, LLDP ...)
- learn to use VLAN features of White Rabbit switches
- think about deployment and configuration

# Changes for 2021: Lot's of Help by Others

(example: next slide)

- too many BOOTP servers maintained by us → use redundant DHCP/BOOTP server of IT; all White Rabbit devices and nodes are known to the IT 'IP-backend' (GSI name server ...)
- too many Management Masters (diagnostic, SCU reset) → one management master set-up and maintained by IT
- one (!) layer-3 network for all nodes; caveat: only one VLAN ID managed by IT (consequence of how the IP-backend works)
- poor network discovery → Q-Bridge MIBS/SNMP and LLDP (Adam Wujek); **netdisco**\* set-up and operation by IT
- every node may send traffic to the whole network → WRS VLANs + 'User Guidelines' (CERN Rabbits)
- no counter-measures against 'unknown nodes' → 802.1X (MAC based authentication) implemented on WRS (Alessandro Rubini); use RADIUS server of IT
- migrate from WRS 5.0.1 to WRS 6.0.0++: changes merged and pushed to OHWR (Adam Wujek)

already since < 2021:

- all WRS management ports are on a dedicated 'timing management' VLAN at the ACC IT network: we just connect a WRS to any port of any ACC IT switch and we are fine
- use **icinga**\* for WRS monitoring

\* see <http://netdisco.org/> and <https://icinga.com/>

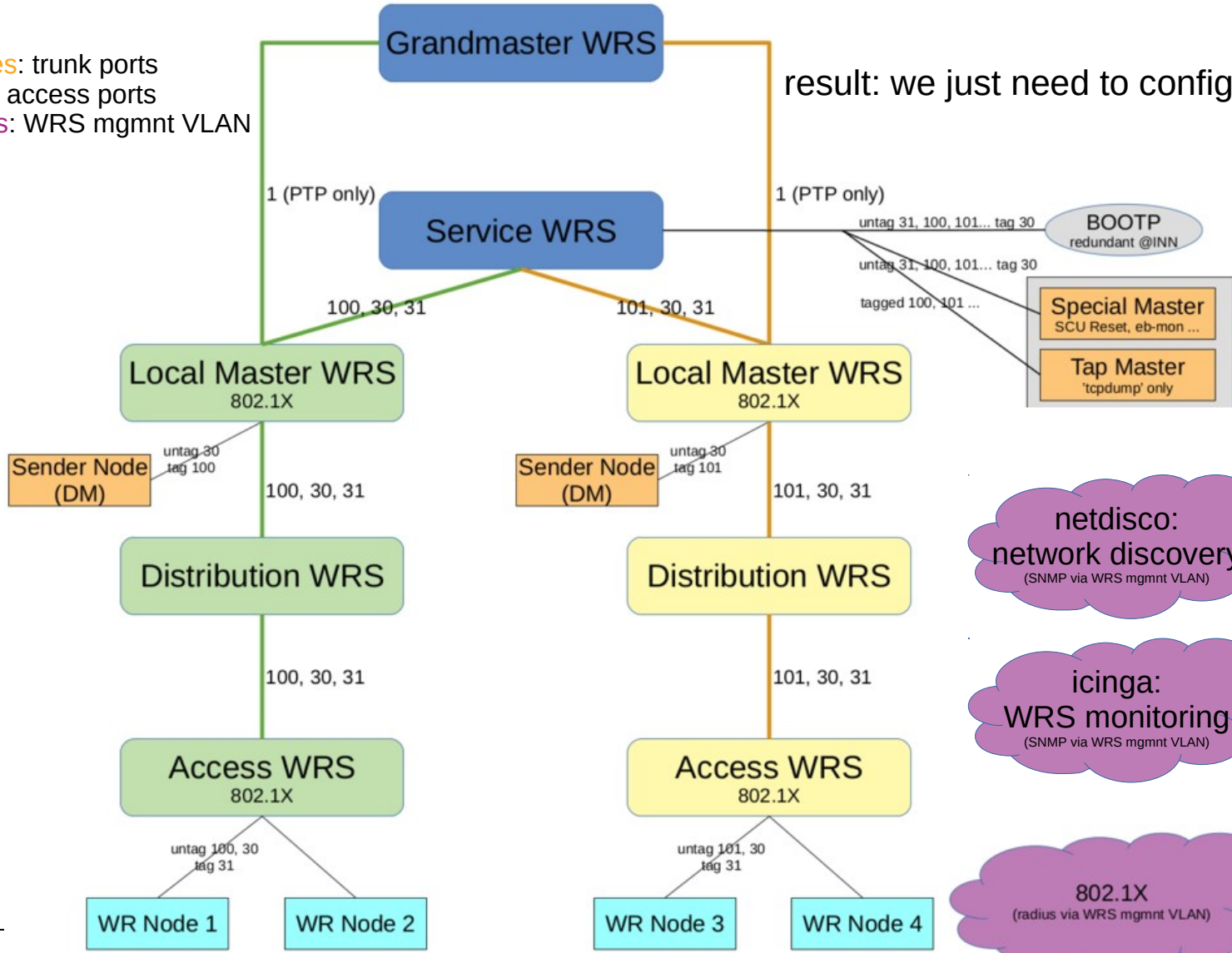
# Example: Two 'Networks'

(today we have five networks)



colored lines: trunk ports  
 black lines: access ports  
 cyan clouds: WRS mgmnt VLAN

result: we just need to configure our WRS



netdisco:  
 network discovery  
 (SNMP via WRS mgmnt VLAN)

icinga:  
 WRS monitoring  
 (SNMP via WRS mgmnt VLAN)

802.1X  
 (radius via WRS mgmnt VLAN)







# Status 2021

## WRS Configuration

- each WRS
  - config via local dot-config
  - has a specific role ('production network', 'distribution switch')
- all dot-configs
  - generated using scripts
  - rolled-out using scripts (ssh); takes a few minutes only

## Status 2021

- five 'independent' White Rabbit network instances
- 113 White Rabbit switches discovered by netdisco today (not all are powered due to shutdown)

## Experience 2021

- 6 months beam-time (24/7)
- in general: very smooth operation
- WR clock stability: checked by our colleagues from the RF Systems (they have an independent clock system, BuTiS). No issues, except in case of real failures like power-cuts, AND:
- Aaarrrrgggggh: <https://ohwr.org/project/wr-switch-sw/issues/239> (sync lost every 49.7 days)

## Todo 2022

- align VLAN IDs used on the WR network with GSI (VLAN IDs shall be unique in the whole facility)
- WRS 6.0.1++ (Adam Wujek found and fixed a few more issues)
- ...