Avinor Remote Towers – Experiences from Norwegian operations

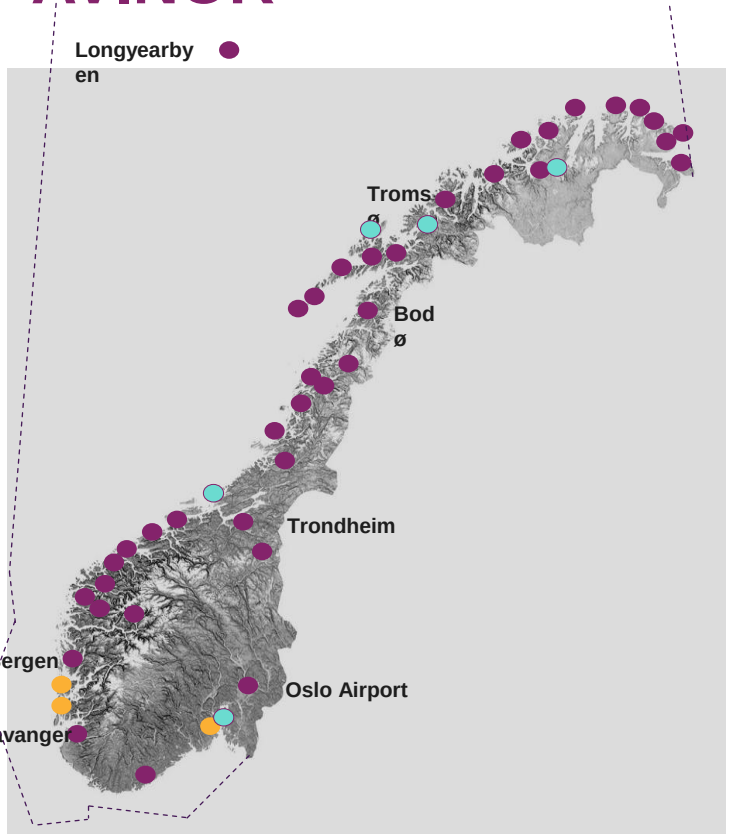
Jens Petter Duestad

26-27 April 2023

AVINOR

AIR NAVIGATION SERVICES

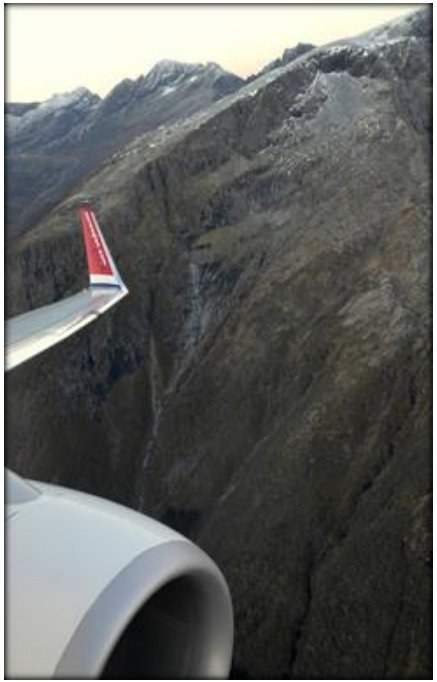
AVINOR



FACTS

- 3,000 Employees
- Limited company, owned by the Norwegian Government
- Operates 43 airports in Norway
- Self-financing – no government grants

AVINOR – AIR NAVIGATION SERVICES



Wholly owned subsidiary of Avinor AS –

SERVICES:

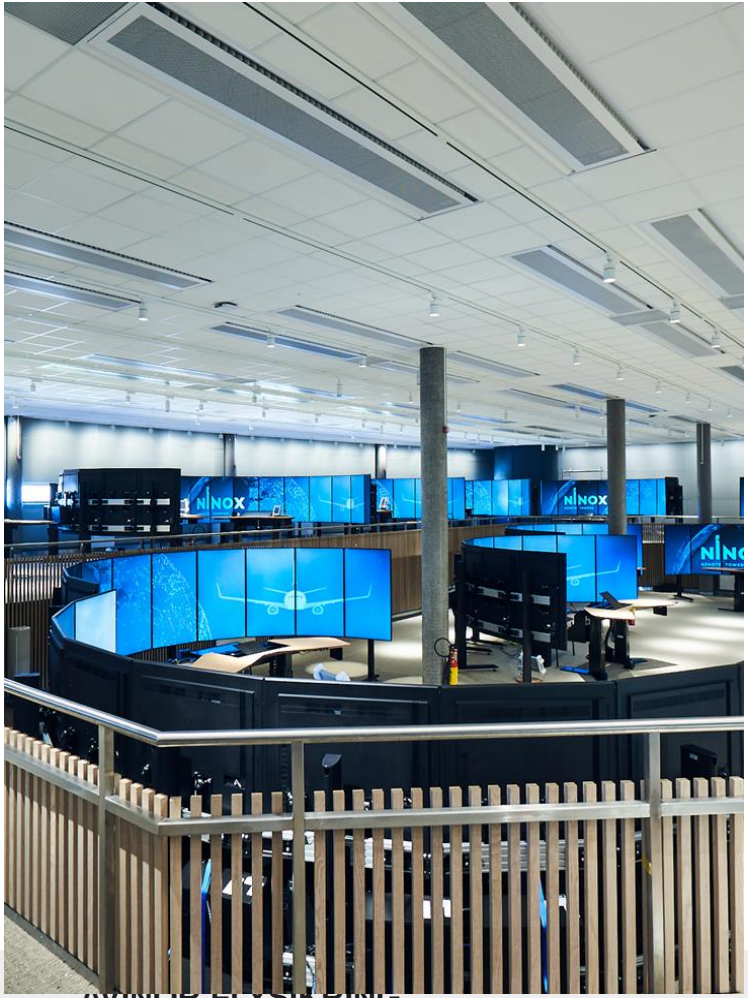
- TWR/APP-services (20 units)
- Aerodrome Flight Information Services (Remote)
- En-route Services in Norwegian airspace, including NAT-airspace (Bodø Oceanic)
- CNS SERVICES
  - Communication
  - Navigation
  - Surveillance
  - ATM-systems
- Consultancy, system installation and commissioning, weather observation services, HF-communication services

Ambition 2017 - Naive?

- Strategic decision in the Avinor Group in 2014 to implement Remote Tower at 15 airports. Varying in size from Røst to ~~Bodø~~ Molde
- Staged implementation starting operations at AP-1 in ~~Q3-2018~~ Q4 2019– ending with ~~AP-15 at the end of 2020~~ Q3 2024
- Initial operation in a Contingency RTC with 5 workstations and a ~~supervisor~~
- Parallel construction of a Main RTC with 16 workstations – ~~planned completion in 2019~~ Operational Q2 2022
- Overall Program Cost: 130 million EUR/ Technology: 60 million EUR/In-house deliverables: 70 million EUR

FIASCO?

AVINOR



Avinor Remote Tower Program – Status APRIL 2023

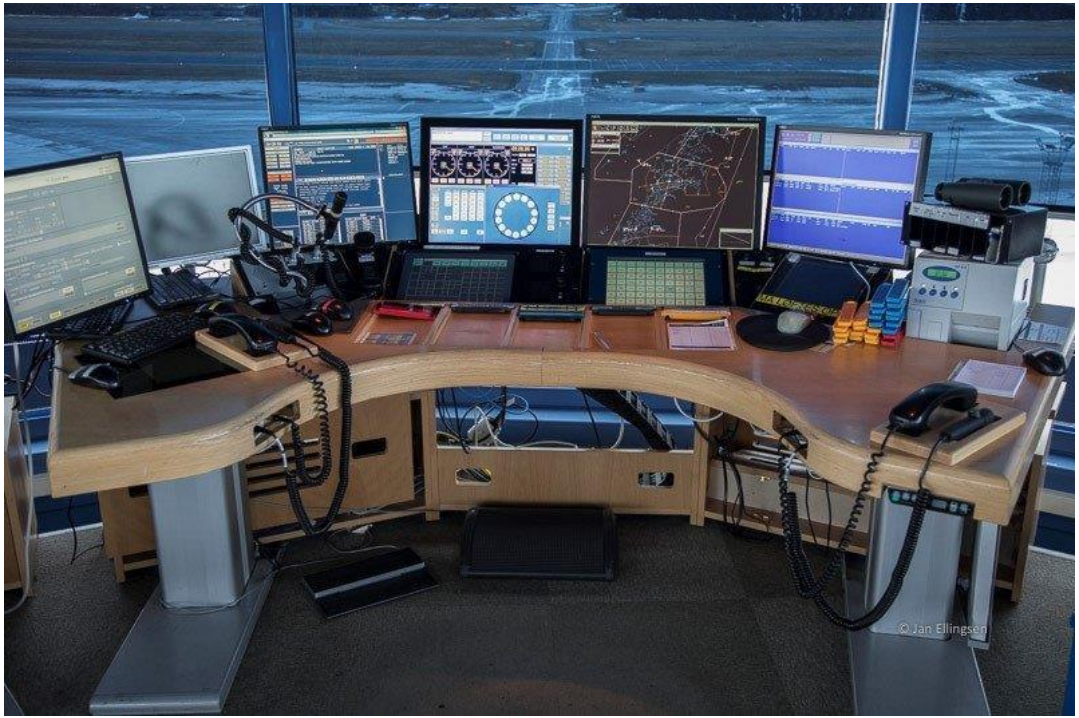
- First airport operational 2019
- Transition to RTC in May 2022
- 11 airports operational
- Final SW delivery 2024
- 3 more airports operational late 2024

- **Worlds largest Remote Tower Centre**

What are Remote Towers/RT

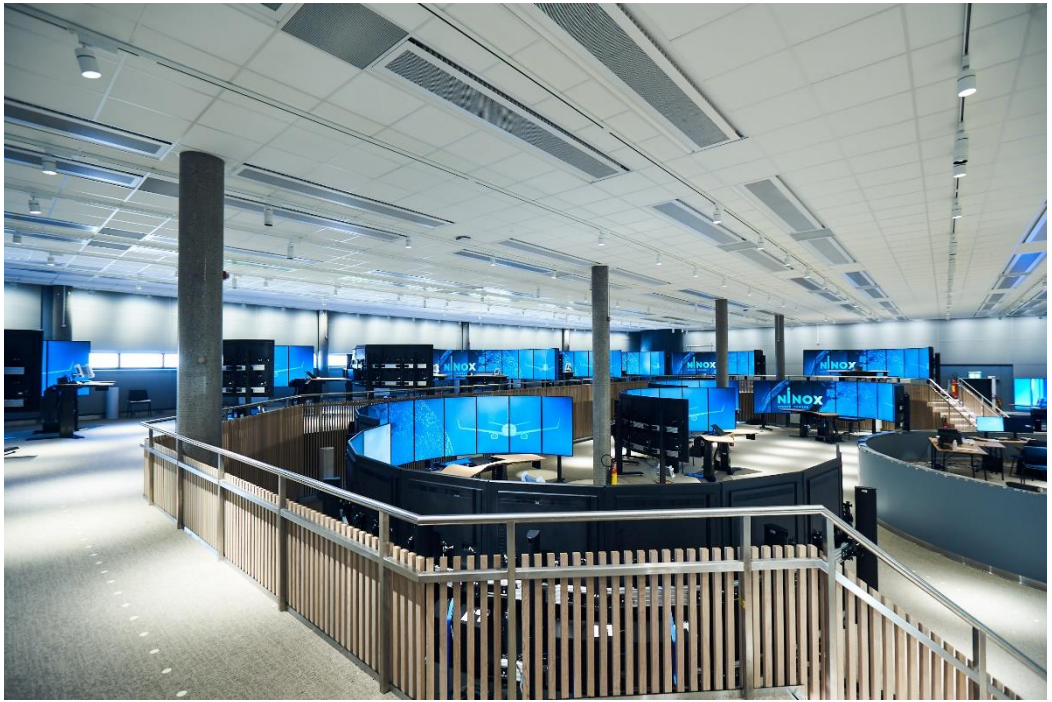
- According to EASA*:
  - ‘remote tower’ means a geographically independent facility from which aerodrome ATS is provided principally through indirect observation of the aerodrome and its vicinity, by means of a visual surveillance system. (It is to be seen as a generic term, equivalent in level to a conventional tower); NOTE: The actual distance to the serviced aerodrome may vary from hundreds of metres to many kilometres.
  - ‘visual surveillance system’ means of a number of integrated elements, normally consisting of optical sensor(s), data transmission links, data processing systems and situation displays providing an electronic visual presentation of traffic and any other information necessary to maintain situational awareness at an aerodrome and its vicinity.
- *Det europeiske byrå for flysikkerhet (European Union Aviation Safety Agency)

Where are we coming from?



HIGH LEVEL SYSTEM REQUIREMENTS

- Visual detection capability (20/20 vision or visual acuity 1.0)
- Equal or better situational awareness compared to a regular TWR (PTZ, 360-IR og IR-Zoom, LRF, Information on Heads-Up-Display)
- Equal or improved level of safety



TECHNOLOGY

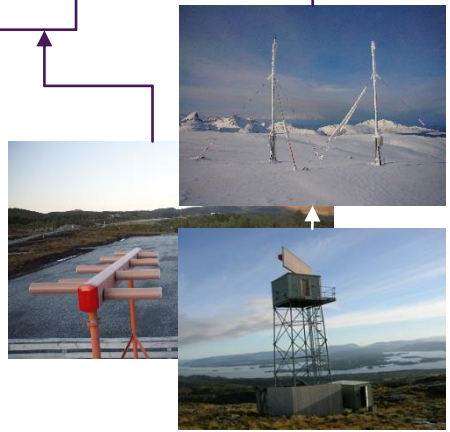
Optical sensors:
- 360-camera
- 360 IR-camera
- Pan-Tilt-Zoom (PTZ)
- IR-Zoom
- Signal Light Gun (SLG)
- Laser Range Finder (LRF)

Local servers

AVINOR NETWORK (REDUNDANT DESIGN)

Airport lighting systems

MET-sensors (AWOS)

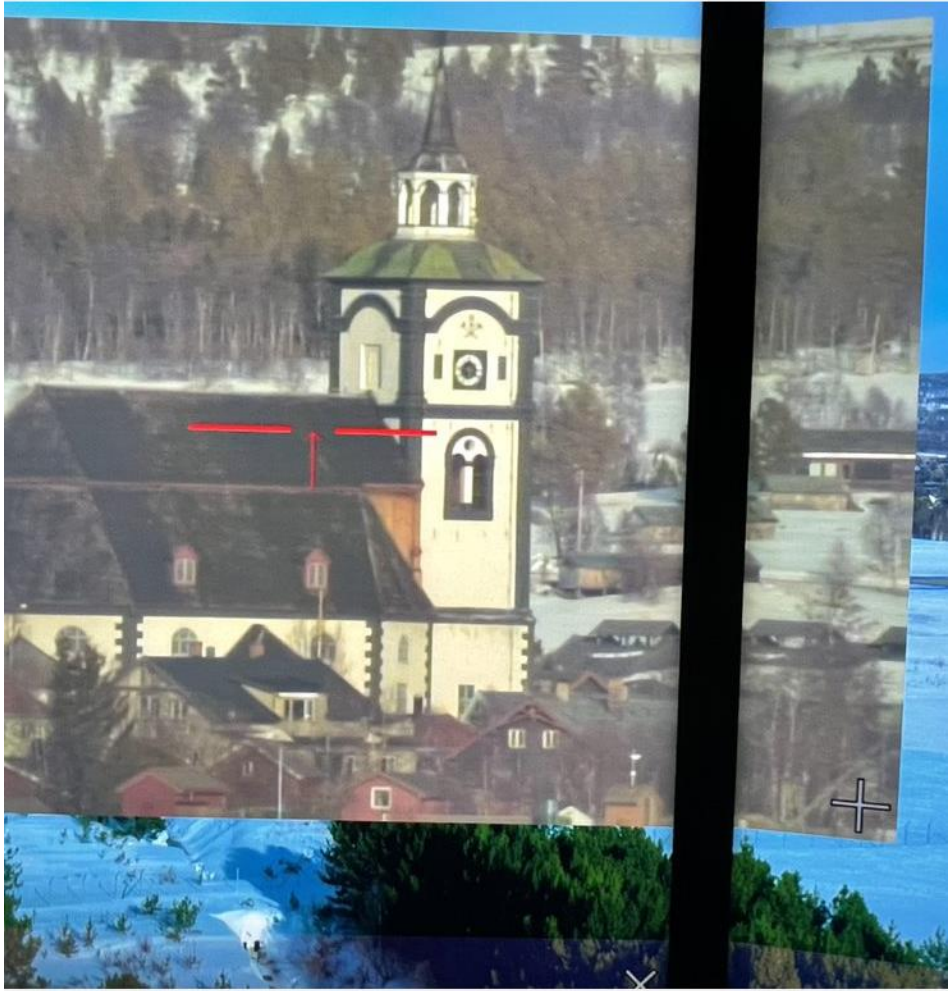


COM-NAV-SUR

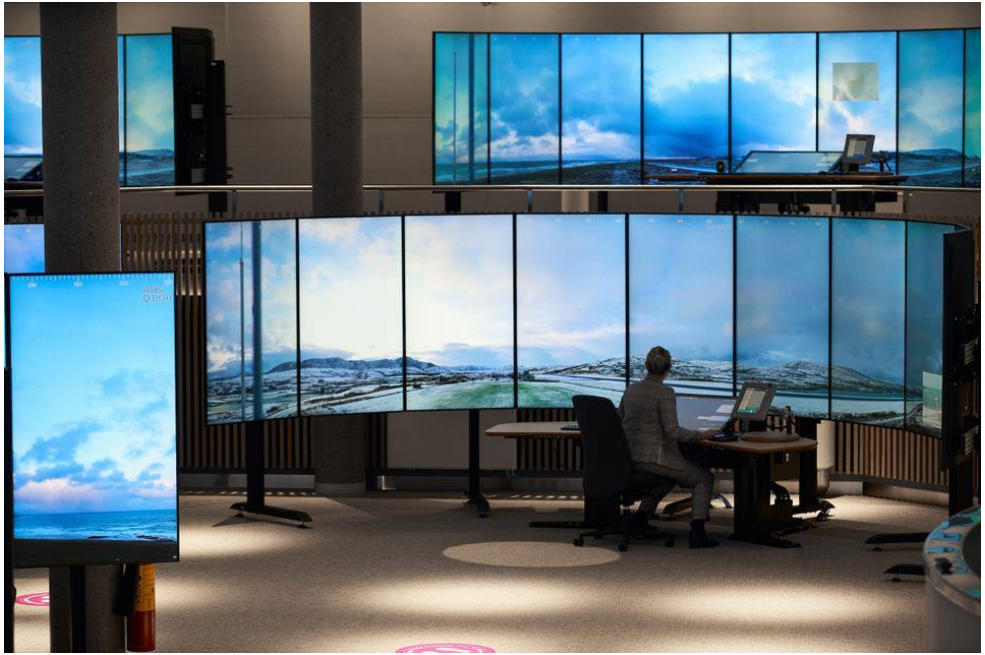
REMOTE TOWER CENTRE

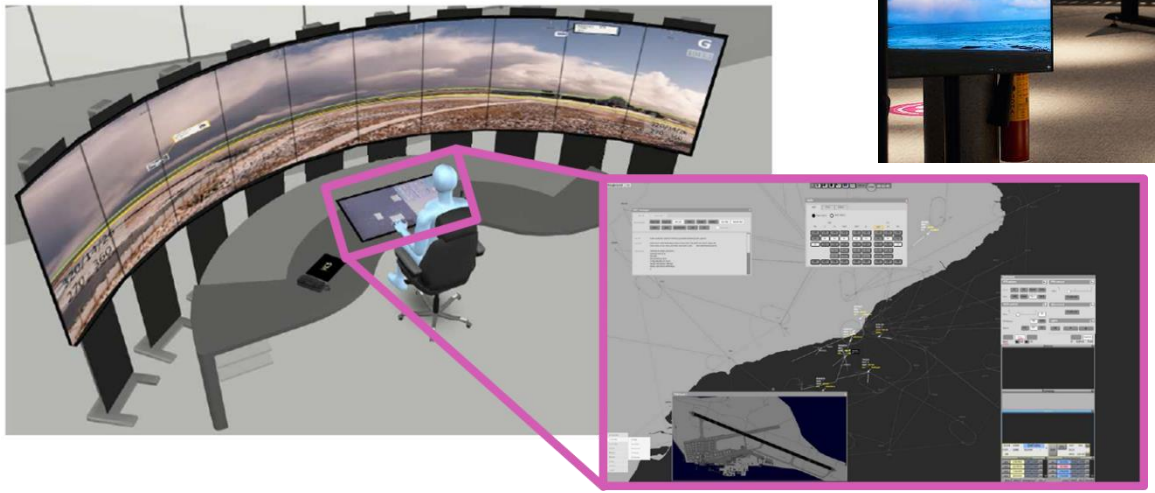

KONGSBERG

PTZ – Marvelous tool, but?

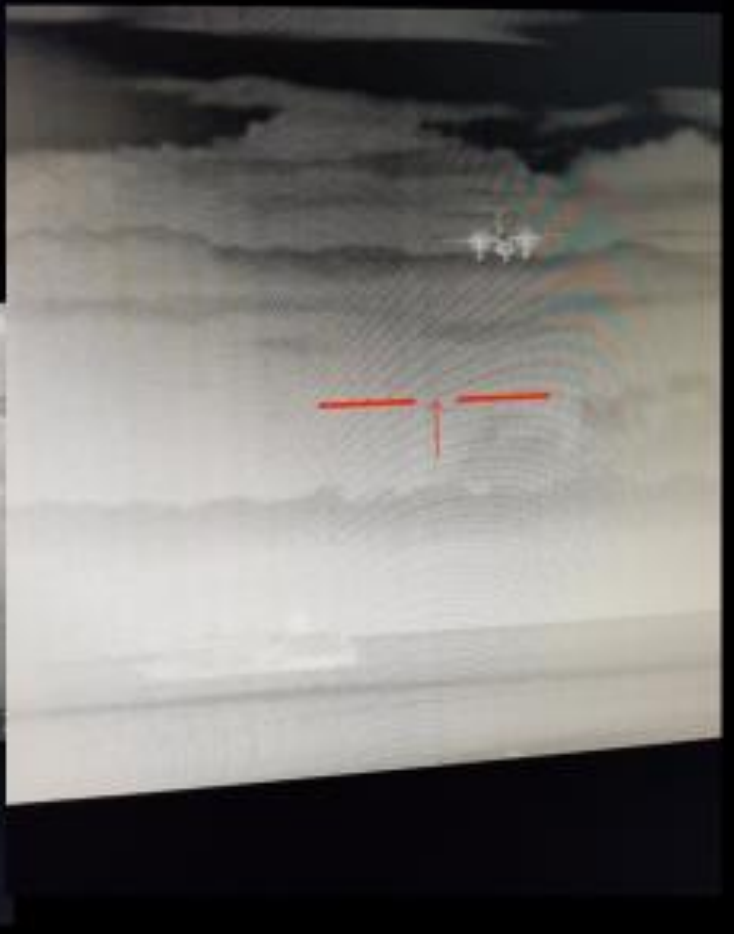


Remote Tower Module

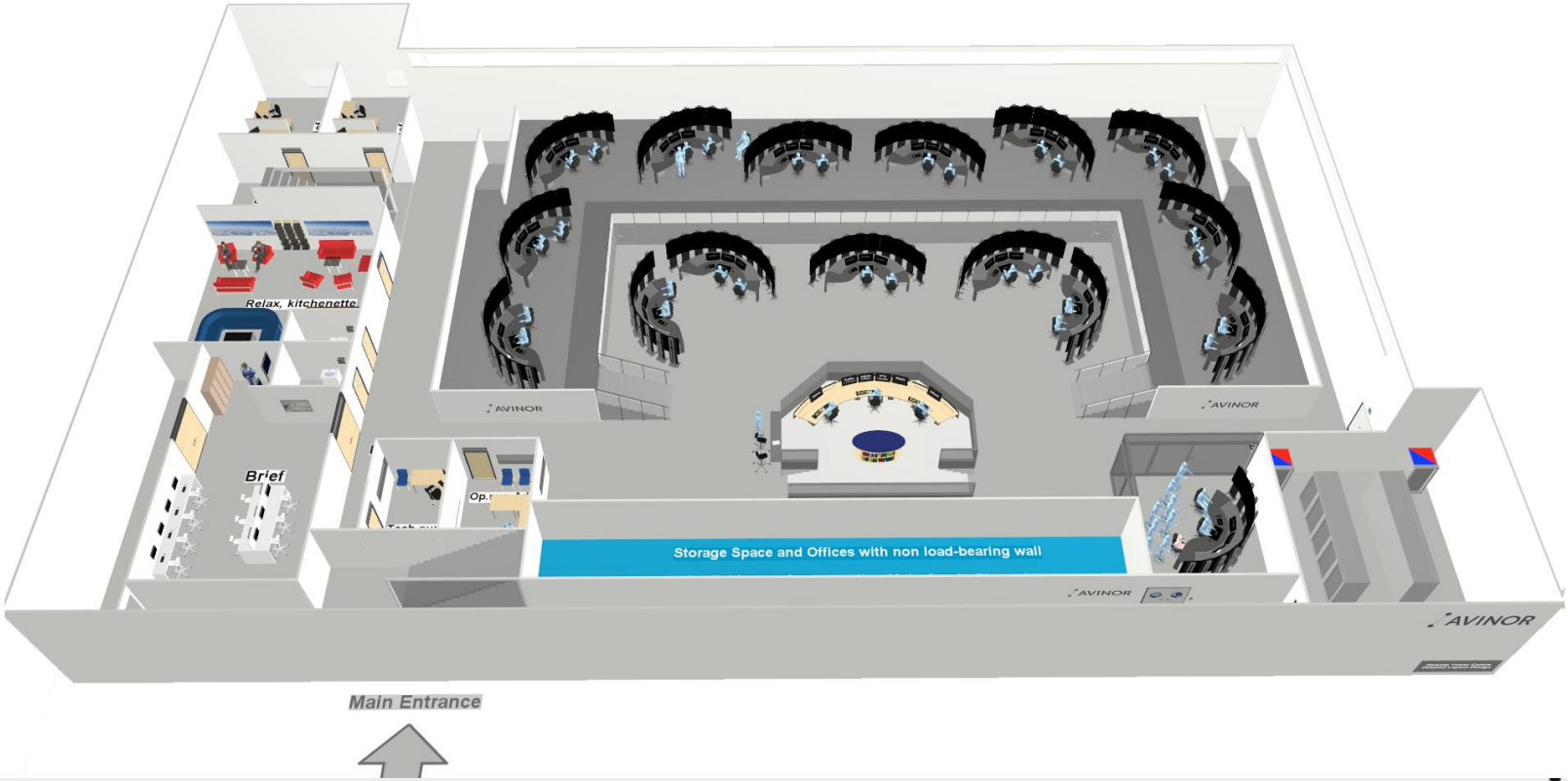




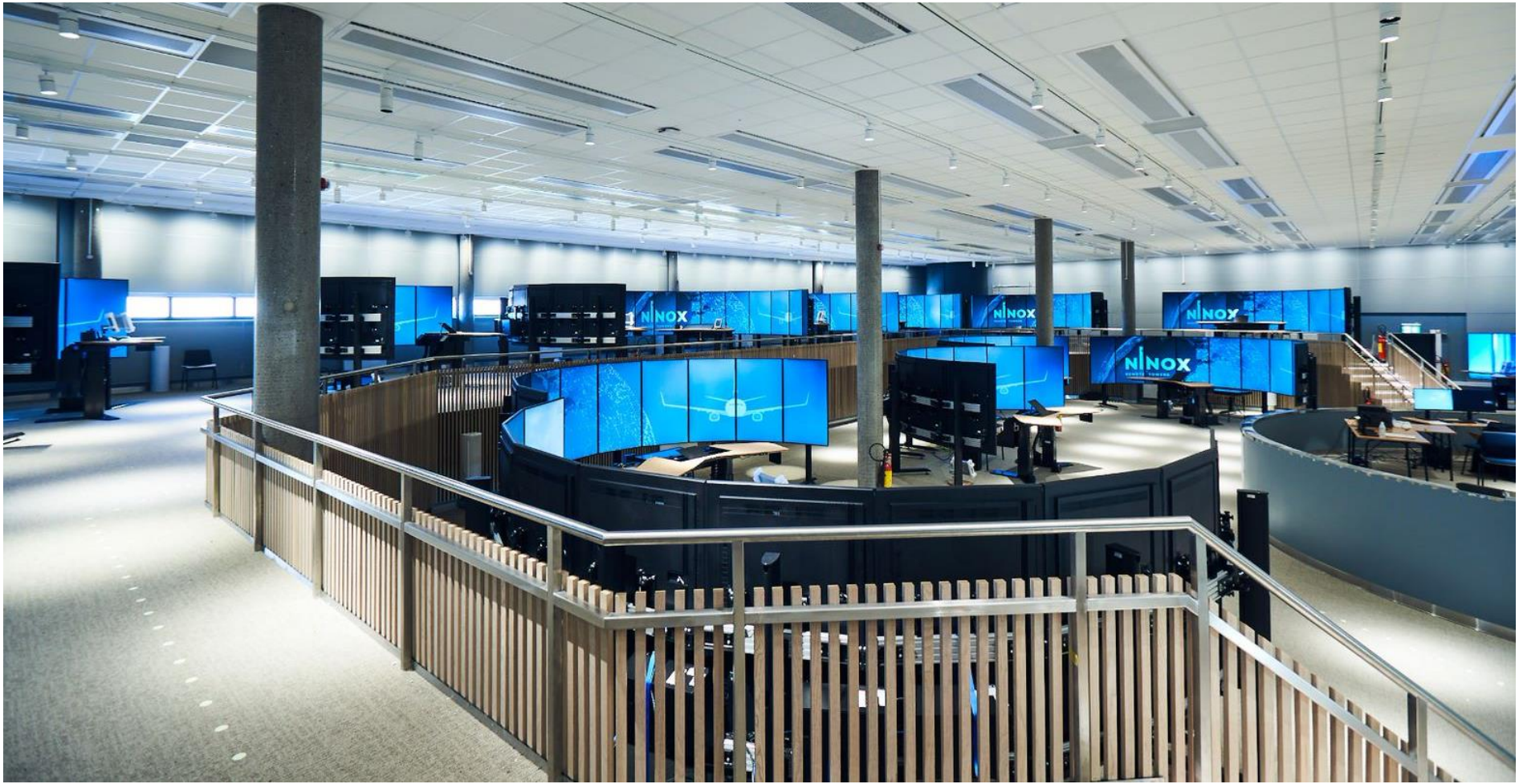

ATIS
Q1018



Remote Tower Center




AVINOR
AIR NAVIGATION SERVICES
REMOTE TOWERS CENTRE
BODØ, NORWAY
67° 16' NORTH, 14° 21' EAST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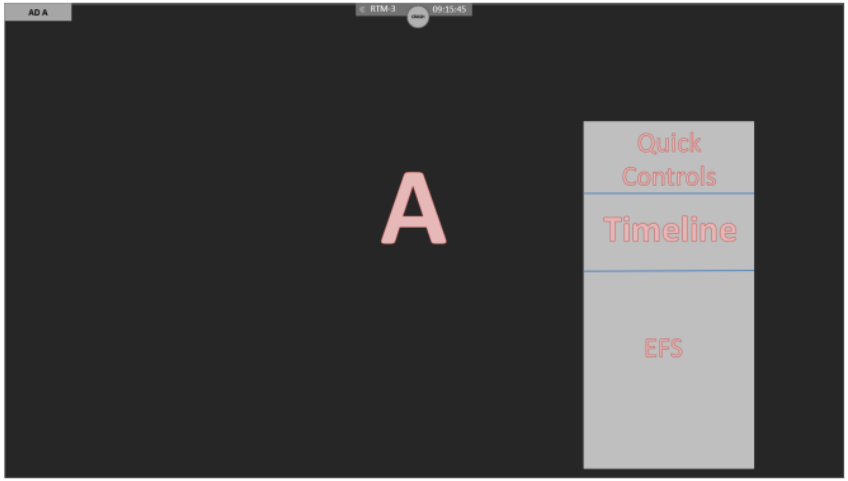
Modes of Operation – one AFISO

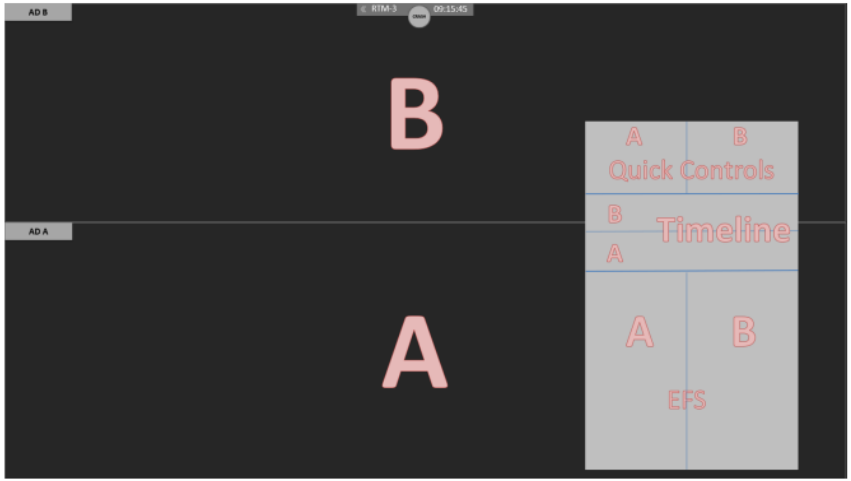
• Single	One RTM serves one airport
• Advanced Sequential	Two RTMs serves 2 Airports simultaneously. Aircraft on only one airport. Simultaneous aircraft movements not allowed
• Multiple/multi	One RTM serves more than one aerodrome simultaneously
• Facilitator	Multiple Endorsements

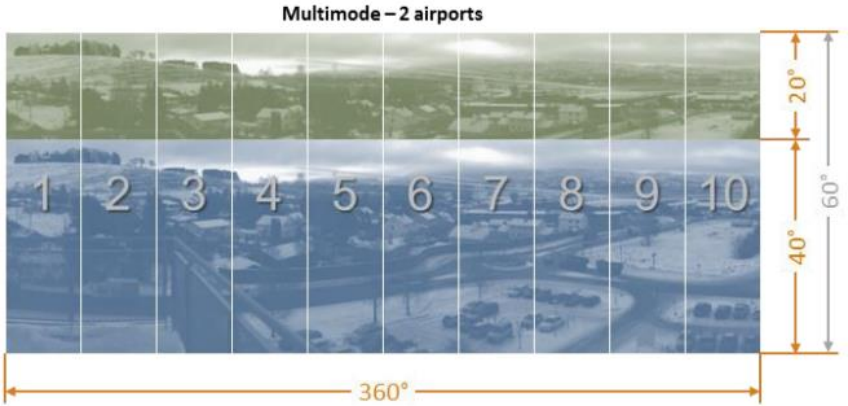
Mode of Operation: Single Aerodrome



Conceptual layout of HDD and HUD in Single Mode

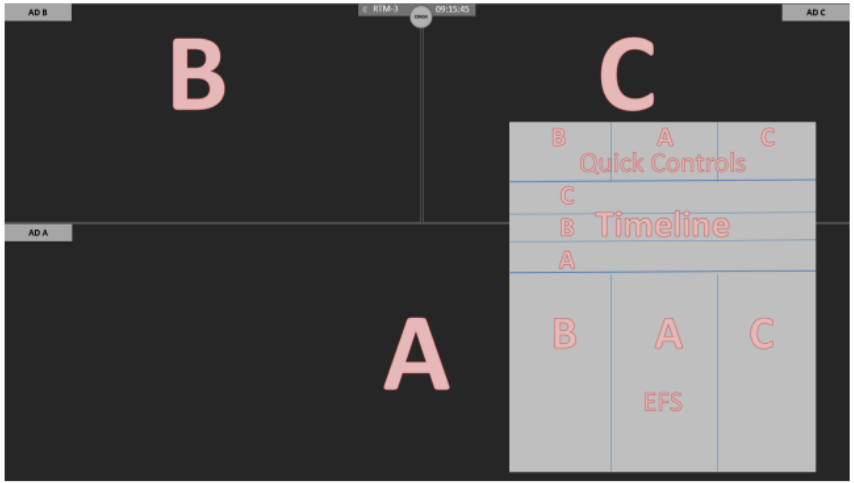
Modes of Operation: Multiple Mode 2 Aerodromes

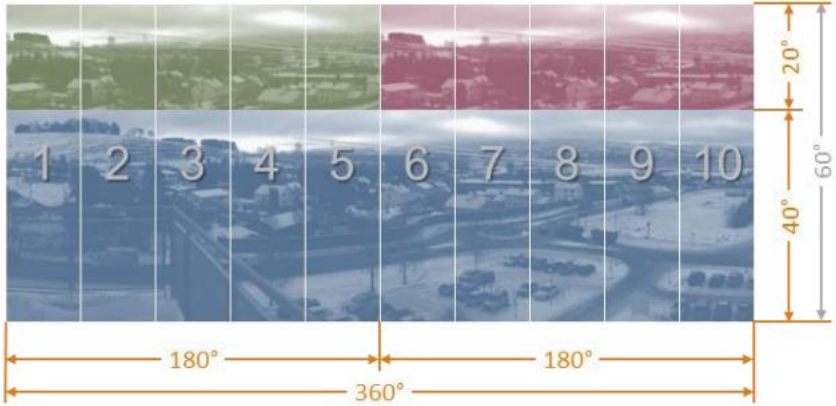




Conceptual layout of HDD and HUD in Multi Mode

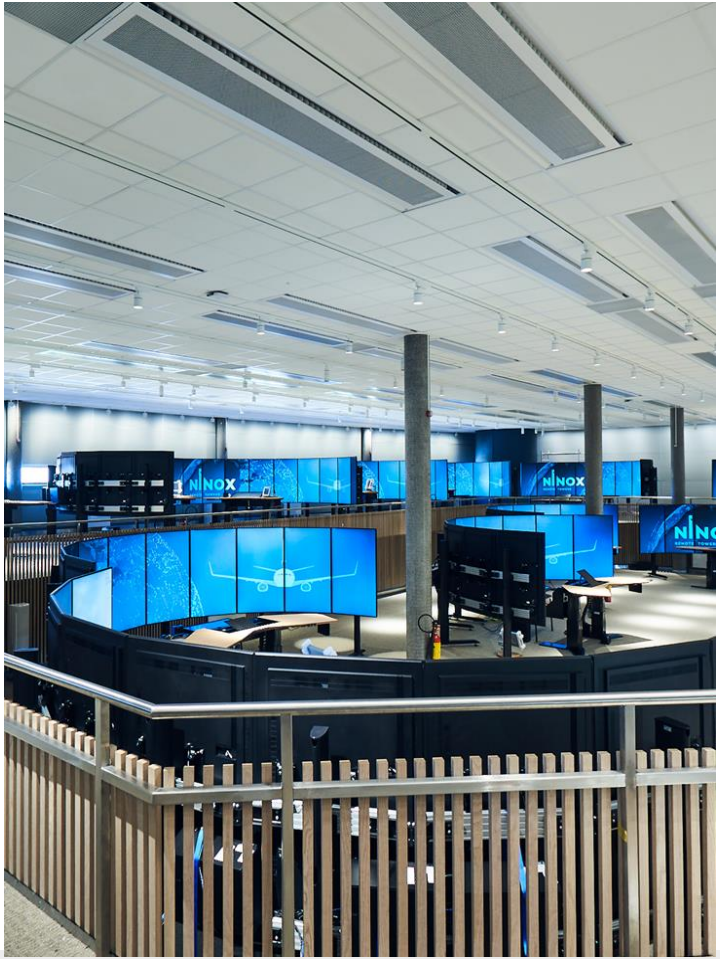
Modes of Operation: Multiple Mode 3 Aerodromes





When operating/viewing more than one aerodrome, the operator can set the desired VFOV distribution. The default video segments (pan position) to be displayed for the 180 deg display slot, as well as default VIS and IR tilt angle (vertical FOV) in all of 20, 30 and 40 degree display slot sizes, shall be individually defined for each aerodrome.

Understanding the Change to RTS



Avinor Remote Tower Program

Top level risks

- CAA approval
- Change Management

To Conclude

- Remote Towers is more than an equipment change
- Technology is important but not the only enabler to make operations a success
- The consideration of the human is key to make this a success for safety and business expectations

- Still as valid as in 2017
- In addition:
  - Quality Trumps Time Always