Transition To Remote Tower Operations And The Human Element

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PROGRAMME OVERVIEW

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

TECHNOLOGY

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

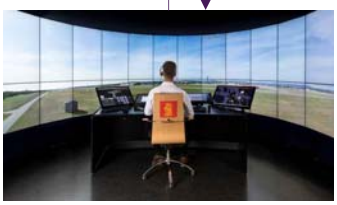
Local servers

AVINOR NETWORK (REDUNDANT DESIGN)

Airport lighting systems

MET-sensors (AWOS)

COM-NAV-SUR

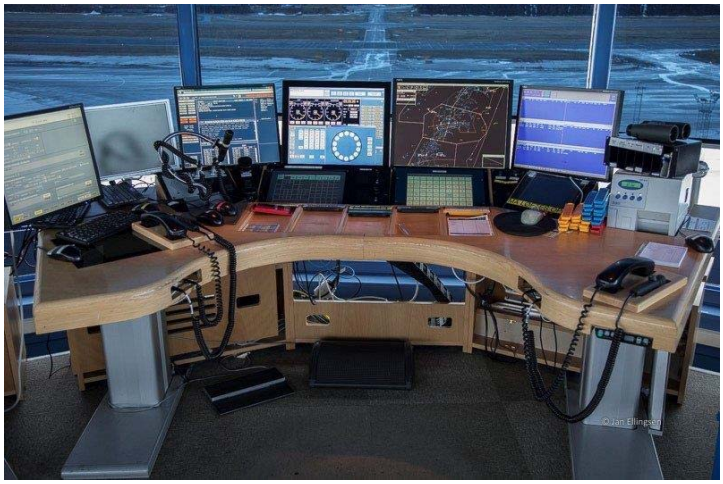


REMOTE TOWER CENTRE

AVINOR FLYSIKRING

AVINOR

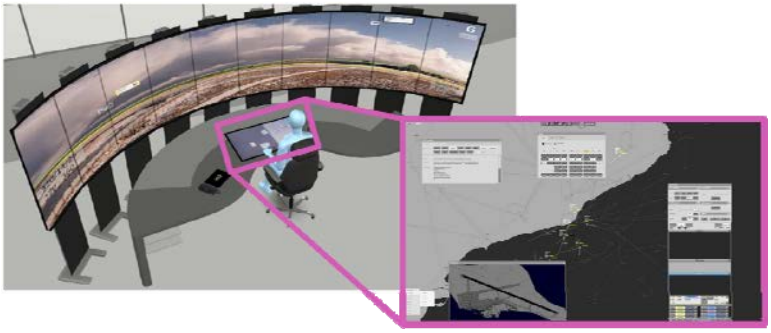
Where are we coming from?



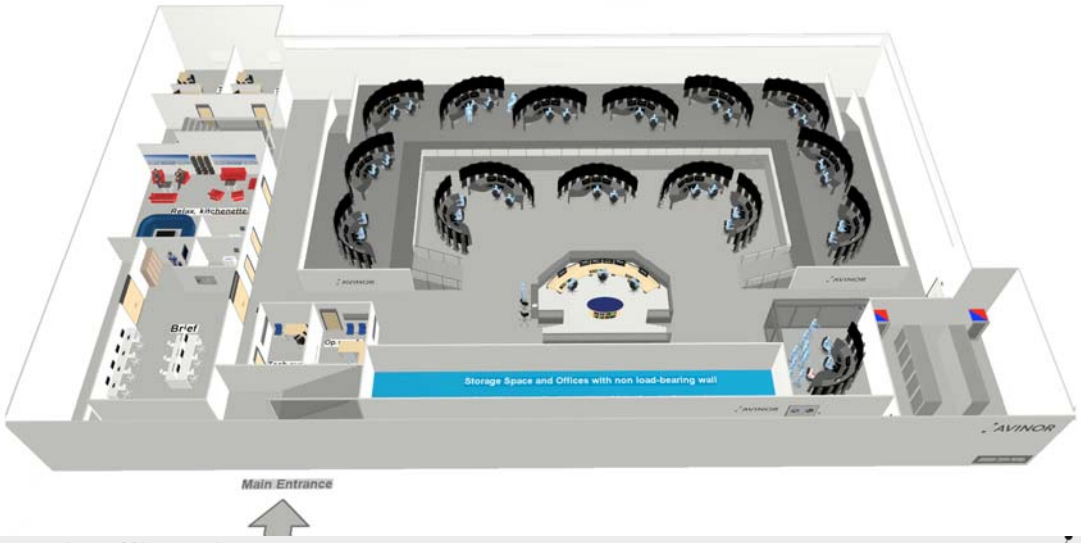
AVINOR FLYSIKRING

AVINOR

Remote Tower Module



Remote Tower Center

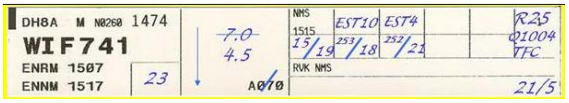


Modes of Operation

- Single — One RTM serves one airport
- Sequential — One RTM serve more than one airport in sequence i.e. a defined period between airports being served
- Multiple/multi — One RTM serves more than one aerodrome simultaneously

Understanding the Change to RTS

Change in HMI and Procedures



BUILDING THE SAFETY CASE

- Operational Concept for Single RT operations developed
- Concept was base for a functional hazard identifcation work shop. Goal:
  - ✓ Identify and assess hazards;
  - ✓ Establish safety objectives for the RT concept
- The Functional Hazard Assessment (FHA) was brought further to a Preliminary System Safety Assessment (PSSA). Goal:
  - ✓ Establish initial safety requirements to the system as a whole (technology, procedures, people);
  - ✓ Safety requirements formed part of tender documents
- A similar process to assess human factors:
  - ✓ Work shops to establish main drivers and requirements to the system – particularly for the development of technology
  - ✓ HP Requirements formed part of tender documents

MAIN AREAS OF THE HUMAN PERFORMANCE CASE

1. Roles and responsibilities
   a) Operational methods
   b) Tasks
2. Human and systems
   a) Task distribution (human/system)
   b) System performance
   c) Human Machine Interface
3. Team and team communication
   a) Team
   b) Task distribution between teammembers
   c) Team communication
4. Working environment
   a) Design of controller working position
   b) Physical working environment
5. Organisation and staffing
   a) Accept and job satisfaction
   b) Competency requirements
6. Training
   a) Training plans

TRANSITION INTO OPERATION

- ***Acceptance:***

The proposed solution is acceptable to affected human actors

  - ✓ *Changes in roles and responsibilities*
  - ✓ *Impact of changes on job-satisfaction*

- ***Competency***

Changes in competence requirements are analysed

  - ✓ *Knowledge, skills and experience requirements*
  - ✓ *Impact on operator licensing*
  - ✓ *Possible interference between existing and new knowledge and skills*

- ***Staff:***

Changes in staffing requirements and staffing levels are identified

  - ✓ *Impact on staff levels*
  - ✓ *Impact on shift organization*
  - ✓ *Impact on workforce location*

- ***Recruitment and Selection:***

The impact on recruitment and selection processes has been considered

  - ✓ *Changes in operator´s profiles*
  - ✓ *Changes in selection criteria*

- ***Training:***

Training needs are identified for the affected human actors

  - ✓ *The content of training for each actor group*
  - ✓ *The duration of training for each actor group*
  - ✓ *The required types of training (classroom, simulator, OJT)*

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
- Requirements stemming from:
  - SES and SESAR
  - ICAO Doc 4444 – Procedures for Air Navigation Services Air Traffic Management
  - ICAO Doc 8964 (FAA ATCS MED) – Manual of Civil Aviation Medicine

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