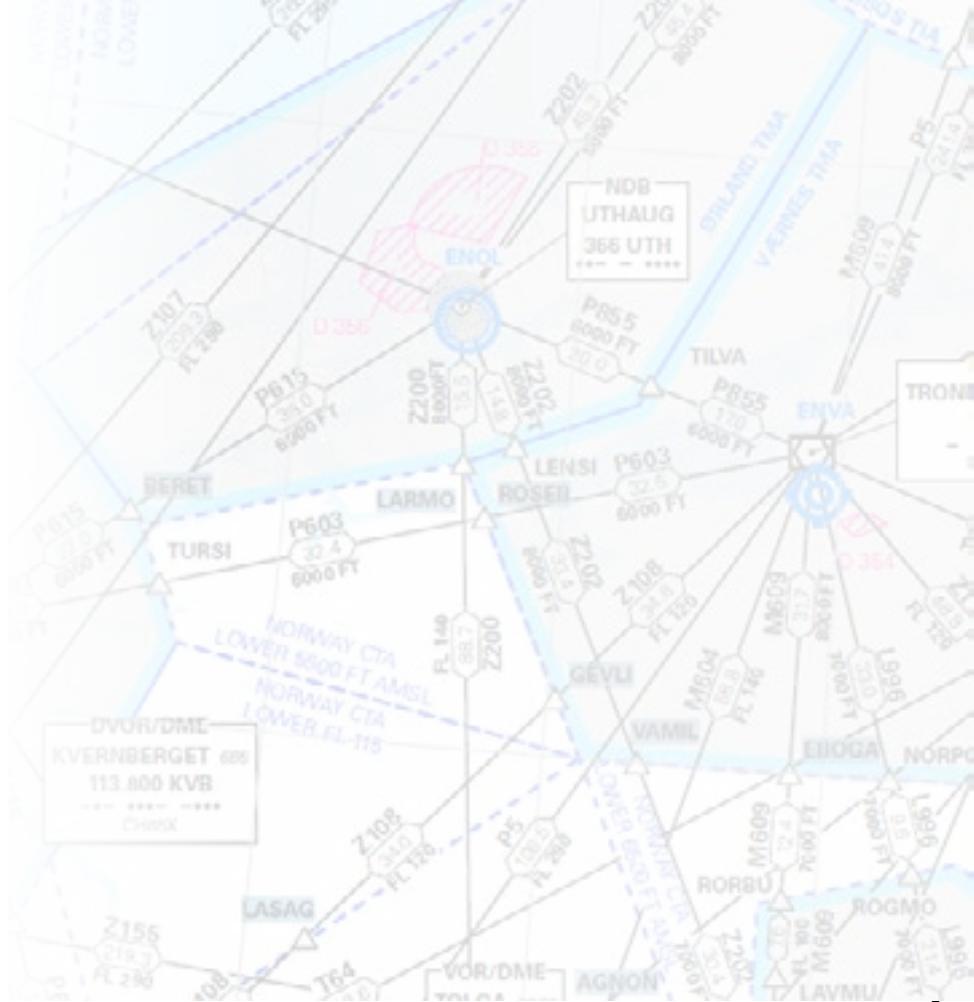




Andreas M. Edvardsen  
Avinor AS

Jonathan Weaver  
CGX AERO

- Background
  - Avinor
  - Aeronautical
- Production prior to GIS
- The PANDA project
- Production today
- Road ahead
  - ADQ – Aeronautical Data Quality
  - Examples



# The significance of aviation in Norway

- Most important mode of transport for travel over 300 km
- Of vital importance to Norwegian trade and industry
  - 13% of all domestic flights are related to the oil and gas sector
  - 500,000 helicopter flights per year are related to oil and gas
- 30% of all tourists arrive in Norway by air
- Fundamental significance for the health sector, particularly in northern Norway
  - 400,000 annual patient trips with scheduled flights
  - Large number of assignments with helicopter and ambulance aircraft
- Enables countrywide cultural and sporting activities (5% of all domestic flights)



# Avinor - Organization



- 46 airports
  - International, National, Regional
  - Local
- Air navigation services - towers and en-route control centers
- Air navigation installations (radar systems etc.)
- Head Quarters in Oslo

## Avinor - Key figures 2012

- 46 million passengers
- 814 000 aircraft movements
- 3000 employees
- Limited company, wholly-owned by the government
- Self-financing – no government funding
- Income: NOK 8622 million (\$1460 million / €1090 million)





# The aeronautical database prior to GIS

- The AIS ENV Database
  - Developed by Avinor in the beginning of 1990s
  - Based on Oracle 8
- New Requirements
  - Adherence to the AIRAC system
  - Norway ECAC State, part of EAD program
    - AIXM standard
    - Temporality



- Limitations
  - Outdated
  - Only Oracle 8.0.6 - Limitation
  - No support for the AIXM format
  - No support for temporality

# Cartography system prior to GIS

- **LGIS/Cartography**
  - Developed by Avinor in the beginning of 1990s
  - GDS (Graphic Data System)
  - CAD with GIS functionality
  - AIS ENV Database
- **New requirements**
  - Compliant with ORBIT
  - Temporality
  - More automated production
  - Integration against procedure design



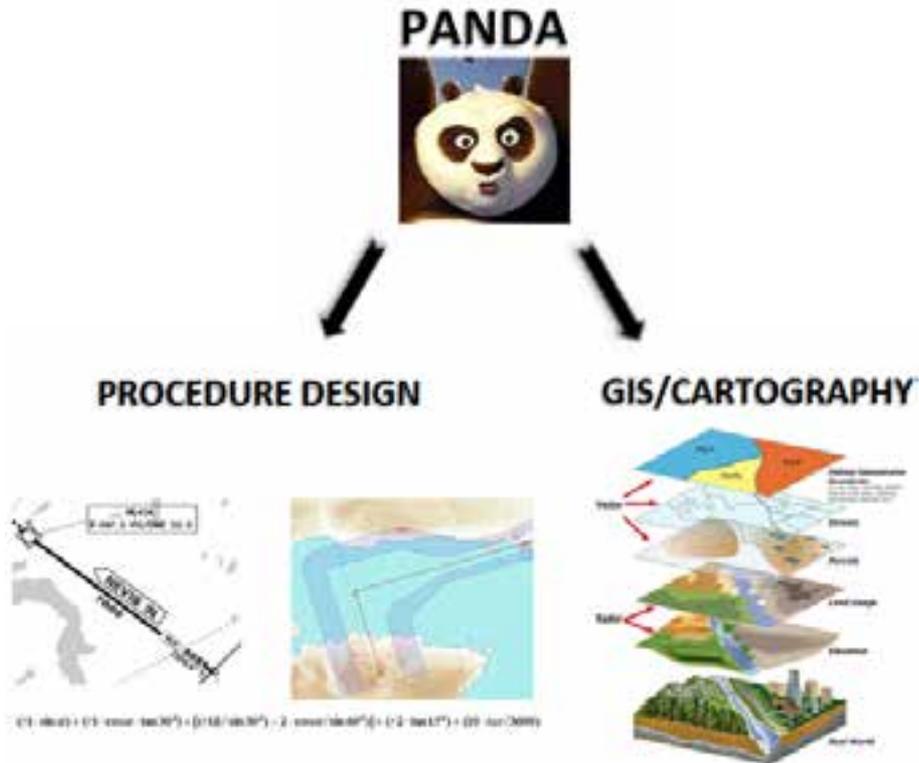
- **Limitations**
  - Not compliant with ORBIT
  - GDS phased out
  - Limited support - No maintenance
  - No handling of temporality
  - Not support for interoperability
  - Work on one amendment at a time
  - Traceability

# Procedure Design prior to GIS

- Procedure Design
  - LGIS module for procedure design
  - Plotting of background charts
  - Design performed by hand
- New Requirements
  - Calculation and analyses of obstacles and terrain
  - More efficient revisions of procedures
  - New navigation methods demands greater accuracy
  - RNAV and SCAT I procedures
  - ICAO recommends use of automated procedure design
  - Difficult to document that the degree of accuracy is fulfilled



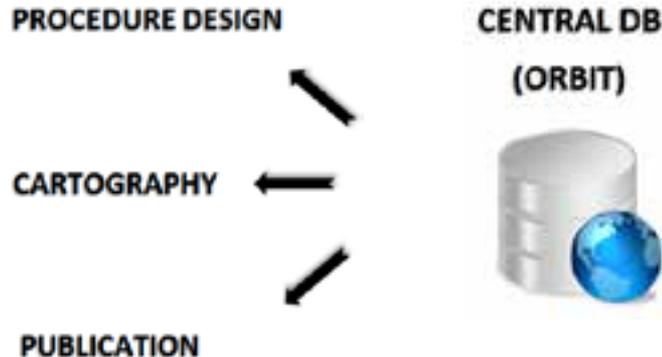
# The PANDA project



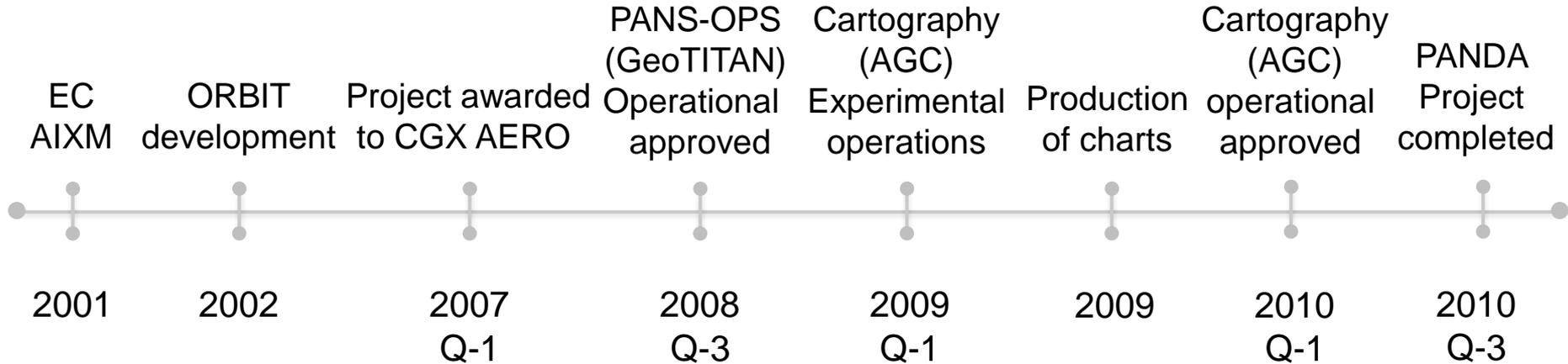
- PANDA - Procedure for Air Navigation, Design and Aeronautical charting system
- Project Goal: To have a new software system for automated procedure design and cartography

# ORBIT – The Avinor aeronautical database

- ORBIT – Oracle database
  - Eurocontrol - AIXM specification – 2001
  - Development of ORBIT – from 2002
  - XML exchange format
  - Basis for PANDA



# The PANDA project – Timeline

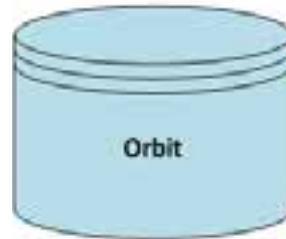


# Today – Overview components

- Procedure design
  - GeoTITAN
    - Developed by ENAC and CGX AERO
    - Software for Procedure Design
  - Ai Sky Data
    - Developed by CGX AERO
    - Interface between GeoTITAN and ORBIT
- Cartography
  - AGC – AIP GIS Charting
    - Developed by CGX AERO
    - Cartography tool based on the Esri Platform

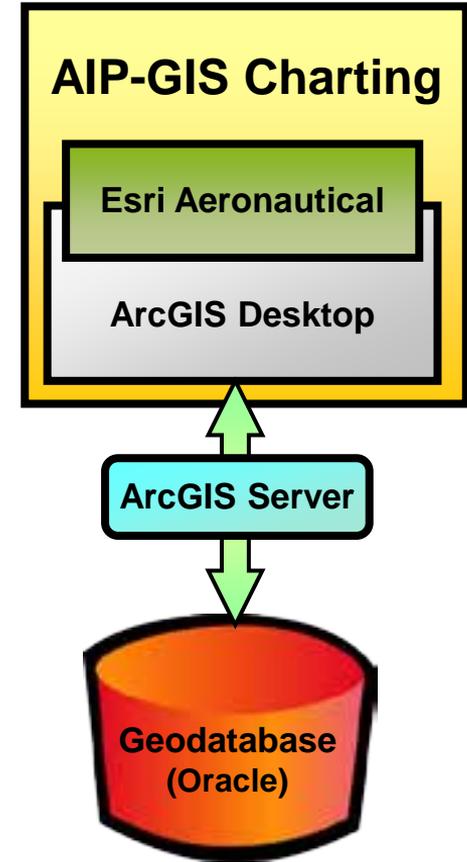


# Today – Overview workflow



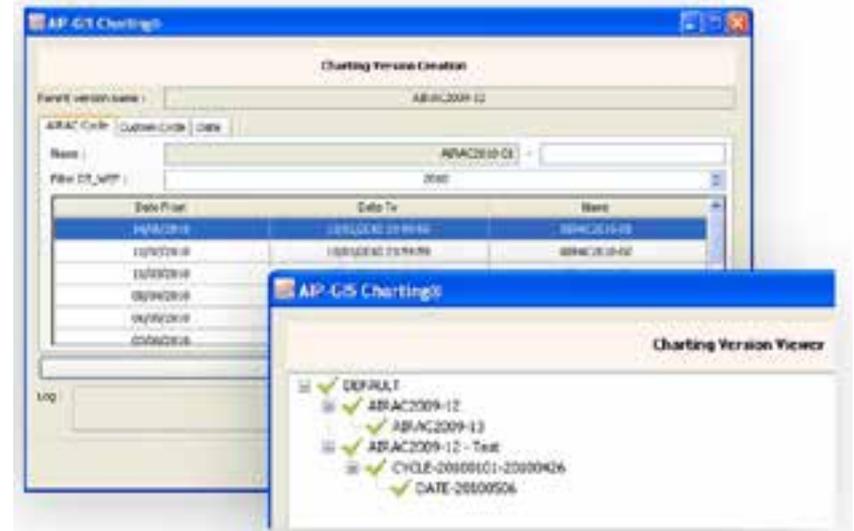
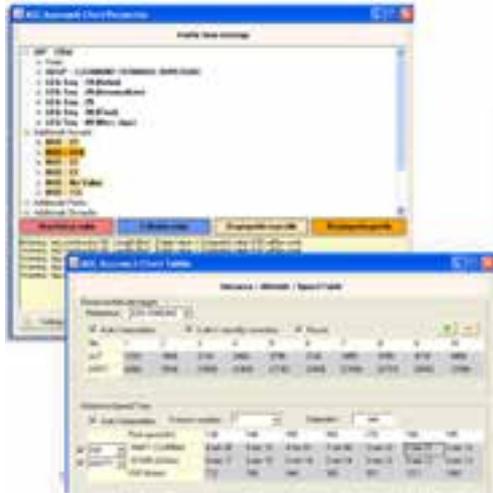
## Today – Components charting system

- Desktop Software (deployed through CITRIX)
  - ArcGIS Desktop (ARCINFO)
  - AIP-GIS Charting (based on Esri Aeronautical)
- ArcGIS Server – Advanced Enterprise
- Database - Oracle 10.2.0.3.0



# AIP-GIS Charting - Cartography

- Revision management
- Cartographic production tools
  - Off View Trajectories
  - IAC Wizard for Tables and Profile View



# Cartography today – Summary

- Cartography – Gains
  - Automated data management / chart production
  - Powerful functionality
    - Built on a world leading GIS platform
    - Multi user environment
  - Supports temporality – work on more than one amendment at the same time
  - Open communication between Avinor's other GIS systems and applications
- Cartography – Status
  - 5-6 cartographers currently working with AGC
  - Avinor in Norway / Partners in France, Germany, Sweden and England
  - 375 charts created within AGC
  - Types of chart: IAC, SID, STAR, VAC, Enroute, Area, Offshore Area, TSA AMC



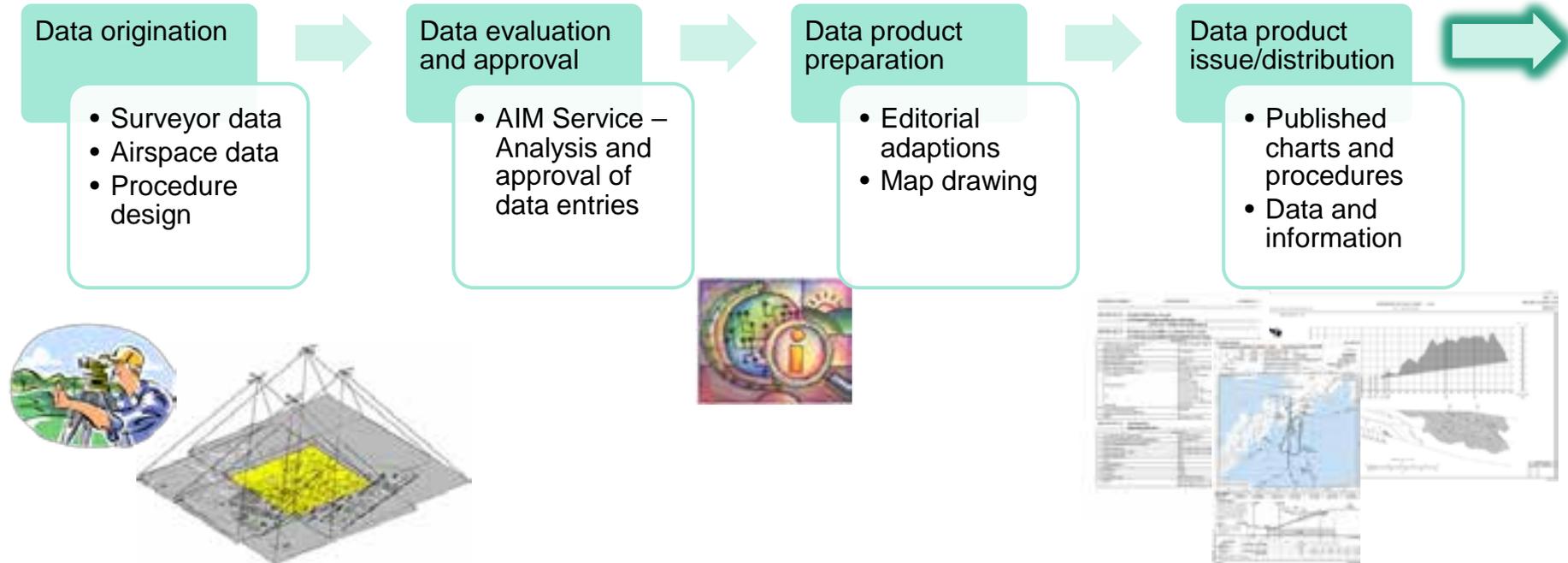
# Road ahead

- ADQ requirements
  - Meeting the challenges of ADQ
  - Limited manual editing
  - Traceability
  - Business rules



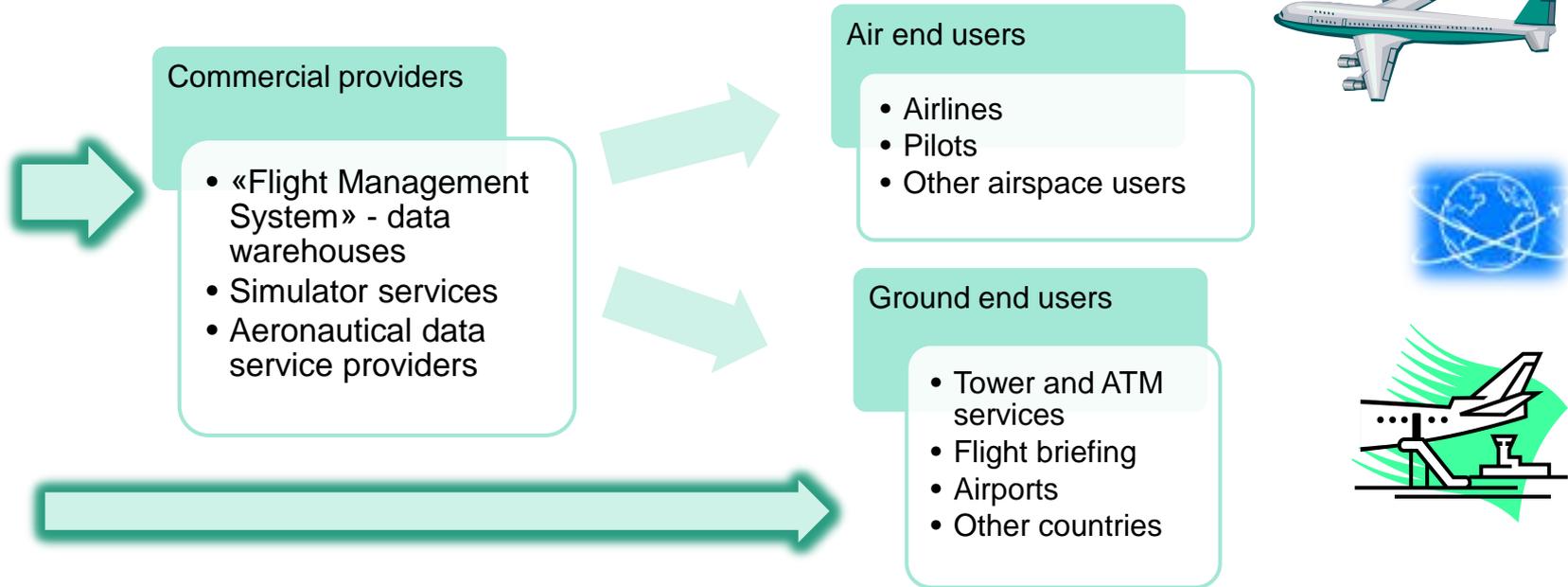
# ADQ – EU regulation 73/2010

- Regulating the value chain from data origination to publication



## ADQ – Next step

- Finally all the way to the users (= ADQ2)
- Further regulation 2020?



## Road ahead

- ADQ requirements
  - Meeting the challenges of ADQ
  - Limited manual editing
  - Traceability
  - Business rules
- Cartography: Upgrade to the latest release of Esri and CGX AERO product
  - ArcGIS 10.x + AGC 4.x
  - Develop production line in AGC for ground based types of charts
- Integration of Data Reviewer Checks and Quality Control built-in functions
  - GIS Data Reviewer
  - Job Tracking for GTX (Workflow Manager)



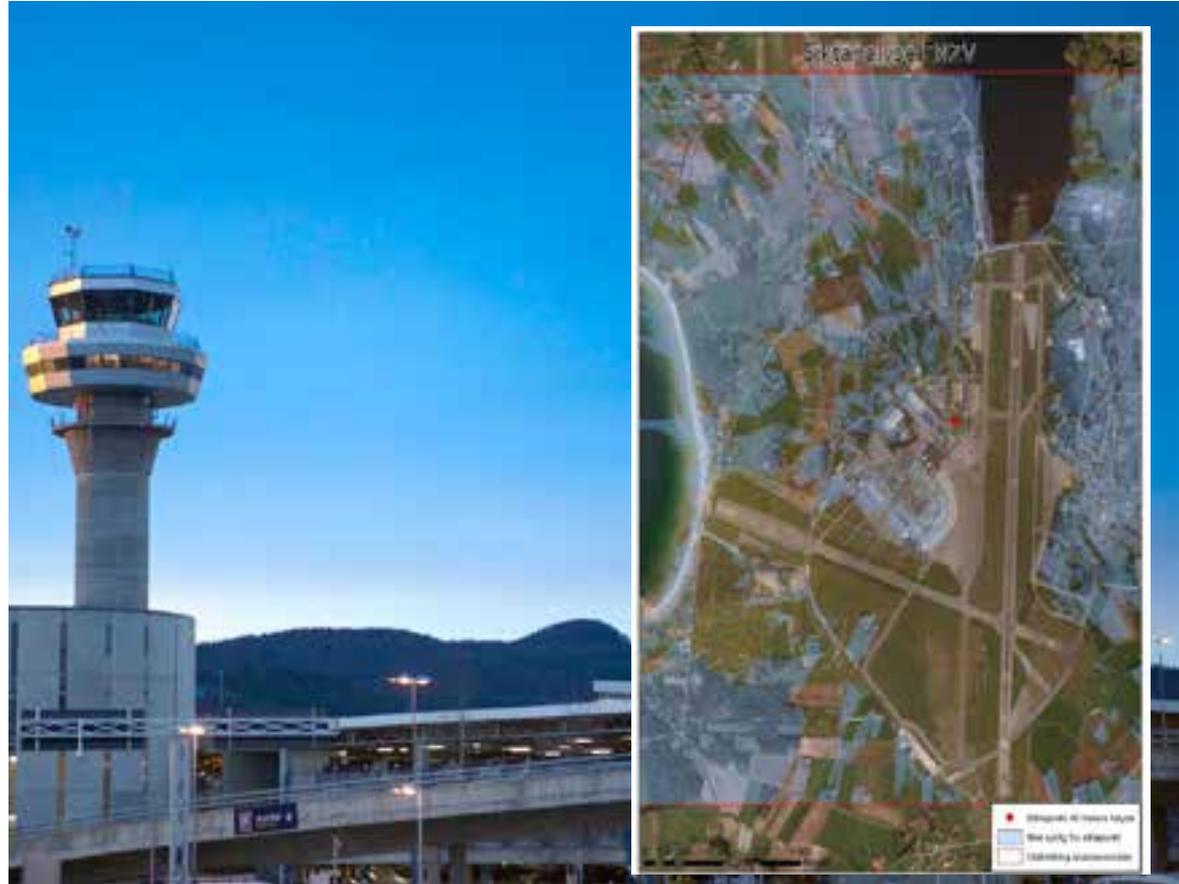
## How Avinor see GIS playing a role in the future

- Aeronautical
- Airport Management



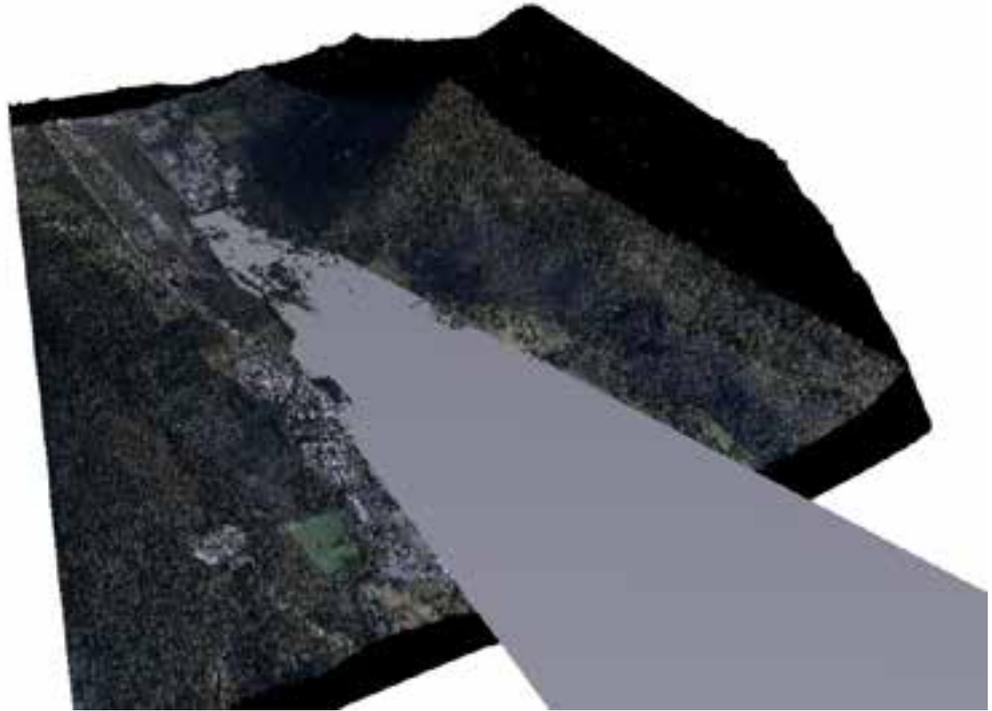
# Analysis

- Line of sight
  - From towers
  - Instrument coverage



# Analysis

- Obstacle surfaces
  - What's penetrating?



# Facility management

HEM Plania Work Order Edit

Detaljer Legg til Rediger Bakgrunnskart

Tegnforklaring

Rapporter

Number of work orders pr runway light

- 0 to 11 workorders
- 4 to 7 workorders
- 2 or 3 workorders
- 1 workorder

Runway lights

Work Orders: SLGR1

ID	228-XH1051
RefName	SLGR1
WO_Date	2:00 AM 5/30/2011
Segment	M+A4/2
LampType	TOC G/G
Descr	L
WO_Nr	681 756
Status	In progress
Month	5
X	282 918,59
Y	6 679 645,91
Position	282918.593300001/66796

Zoom til Rediger

# Bird strike



# Bird strike



# Bird strike

- Bird strike prevention app





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