



## SESAR Deployment Manager workshop

# TopSky - Tower implementation

April 2018

Thales return on experience

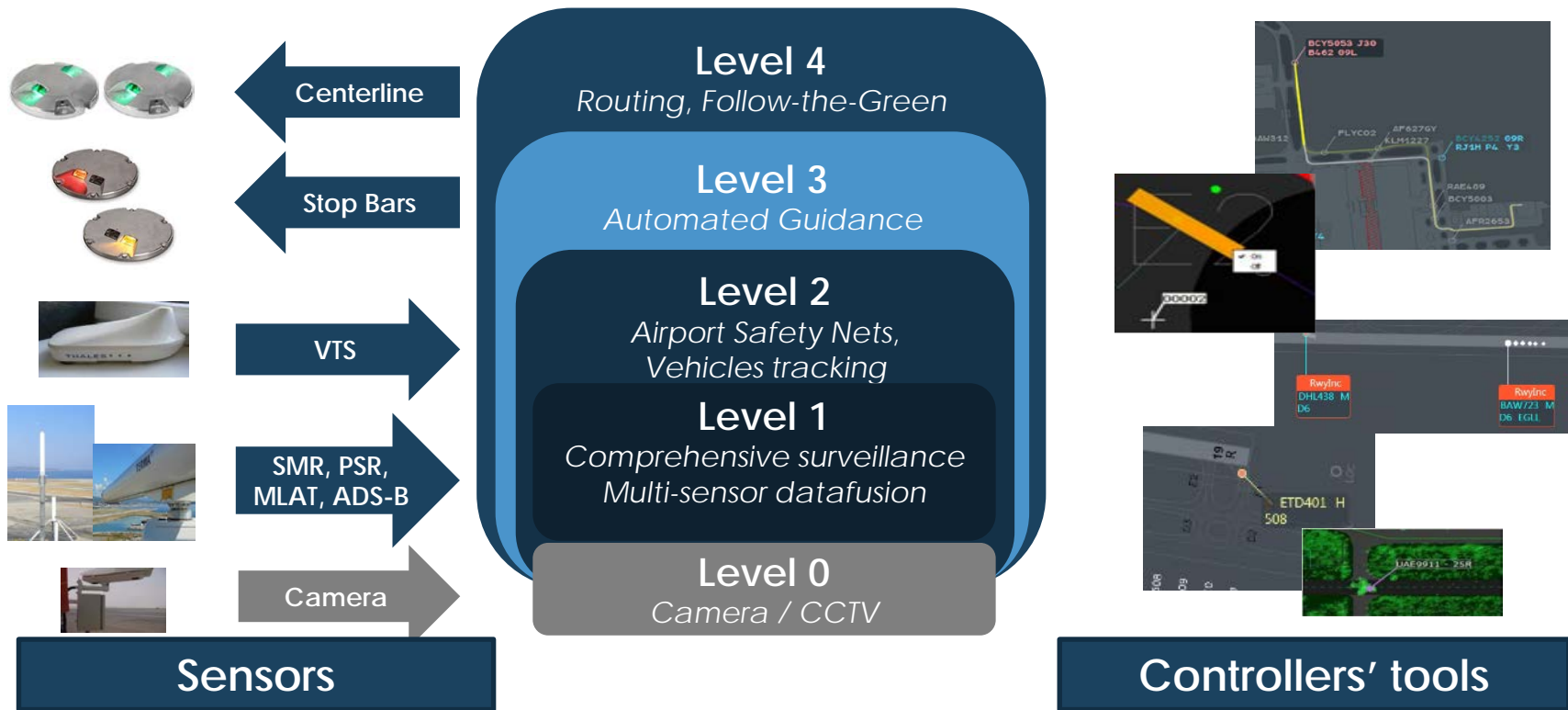


# Summary of the presentation

- A-SMGCS high level concept
- Alerts and levels of services
- Thailand experience
- Nice experience
- Conclusion by SWOT

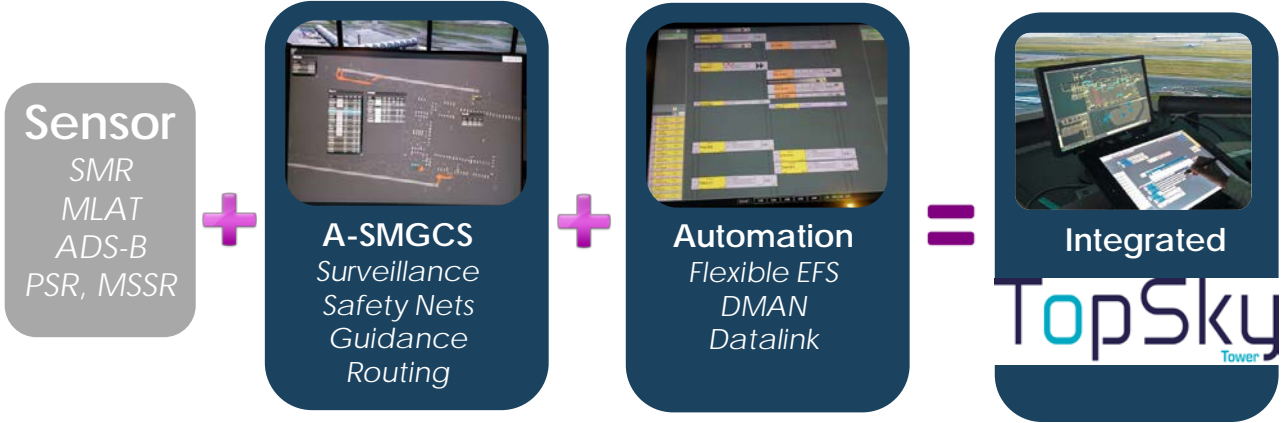
# TopSky-Tower: The full implementation of A-SMGCS levels

## Advanced Surface Movement Guidance & Control System



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# Integrated Tower Working Position



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# TopSky-Tower: Conflict levels

## 4 incremental levels of conflict detection



Flight plan

Surveillance



Input needs

**Level D - SSN Alert**  
*Surface Safety Nets Alert*

A major incident **will happen** if no action is taken

**Level C - SSN Warning**  
*Surface Safety Nets Warning*

A major incident **may happen** if no action is taken

**Level B - CMA**  
*Conformance Monitoring*

The clearance you passed has **not been been respected/followed** by the mobile

**Level A - CATC**  
*Conflicting ATC clearances*

The clearance you are about to pass may **not be coherent** with FPL and surveillance information

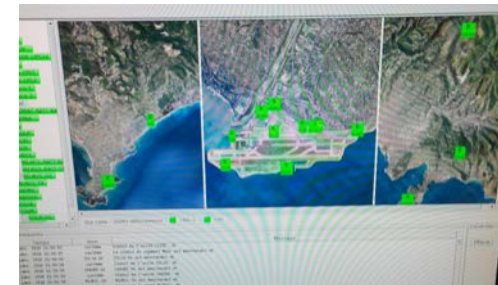
Provided services

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# Return on experience: NCE - Nice Côte d'Azur airport, France

Component	Status
A-SMGCS	Level 2 operational
MLAT/WAM	In house
ADS-B	In house
VTS	In house
SMR	In house knowlegde



## Good practices

- Control team involved at the very beginning of the engineering process
- Some clear needs and shared objectives defined between stakeholders

## Difficulties

- Standards aleas, actually no real difficulty linked to entry into service of the system

# Return on experience: Thailand country wide project



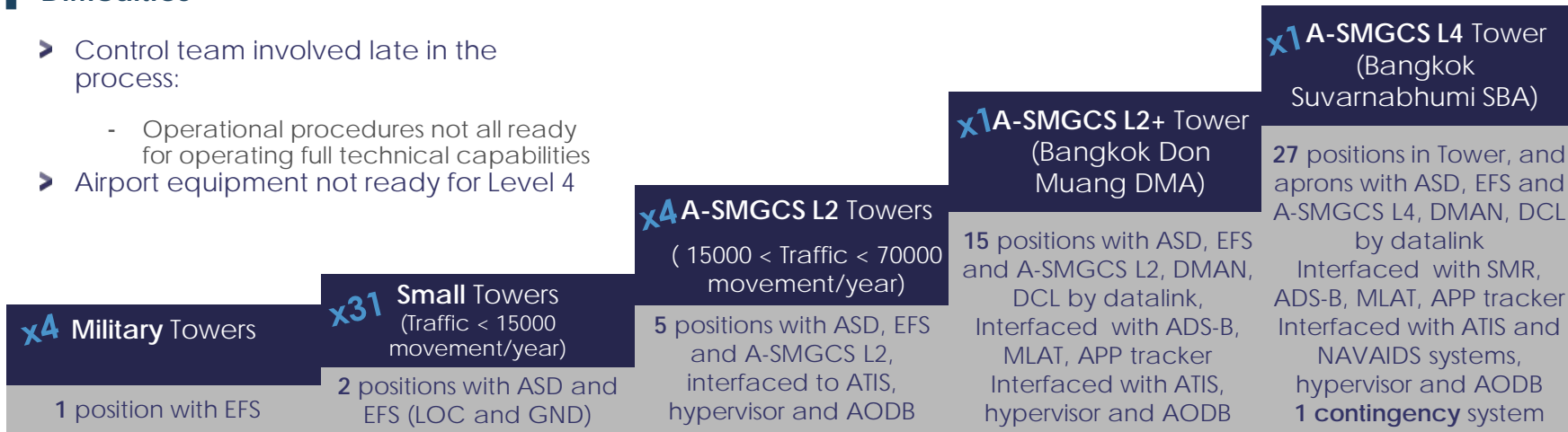
## Good practices

- A clear distribution at the beginning of the expected levels of services across Towers
- Safety nets implementation
- Routing implementation

## Difficulties

- Control team involved late in the process:
  - Operational procedures not all ready for operating full technical capabilities
- Airport equipment not ready for Level 4

Component	Status
A-SMGCS	Level 3 operational (+CMA) Level 4 pending
MLAT/WAM	Third party
ADS-B	Third party
VTS	None
SMR	In house knowlegde
FPL	In house



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# Conclusion – SWOT

## STRENGTHS

- A lot of available features
- A tendency to reach ATC level of service and even more
- A more and more centralized tool in the Tower

## OPPORTUNITIES

- When Automation and Surveillance are integrated, huge possibilities for further implementing:
  - Conflicting ATC clearances
  - Conformance Monitoring
  - And more...

*And therefore to reach the current level of implementation which is state of the art on APP/ACC*

## WEAKNESSES

- Very dependent on:
  - Sensors quality (air and ground)
  - Airfield complexity
  - Third party interfaces
- A standard not very known by all customer leading to wrong approach of expectations

## THREATS

- Too many stakeholders and non turnkey projects (sensors and ATC delivered aside by third parties) often lead to technical and therefore operational limitation when transition starts
- Even if speeds are lower than in the air, anticipation is a challenge and conflict may appear quicker:
  - Implementation of complex features (CATC/CMA) may lead to controller extra work
  - A too challenging implementation of level of service may lead to controller extra work
- Implementation of level not compatible with surveillance means leads to controller dissatisfaction



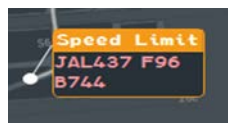
# Backup slides

# TopSky – Tower Key Concepts – Surface Conflict Alerts (SCA)



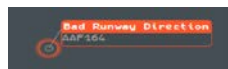
## Target Movement Analysis :

- Checked against predefined rules
- ICAO compliant
- Airport procedures
- All rules are configurable



## Controller Presentation:

- Visual and Sound Alert
- Target Highlighting
- Configurable colors depending on Severity



Based on rules from ICAO Doc 4444

Runway Incursion Conflicts	<ul style="list-style-type: none"> <li>▪ Aircraft is aligned or taking off while another object is in the Obstacle Free Zone of the runway</li> <li>▪ Aircraft is approaching or landing while another object is in the Obstacle Free Zone of the runway</li> <li>▪ Arriving aircraft with traffic in the critical areas (when protected)</li> <li>▪ An aircraft is engaging the runway in the wrong direction</li> <li>▪ Conflicts due to aircraft or vehicles taxiing on the runway not according to the direction of the airway in use</li> <li>▪ Infringement of Stop-bar status</li> </ul>
Area Incursion Conflicts	<ul style="list-style-type: none"> <li>▪ Incursion of an aircraft or vehicle into restricted areas</li> <li>▪ Incursion of an aircraft or vehicles into protected areas</li> <li>▪ Incursion of an aircraft or vehicles into a closed runway</li> </ul>
Taxiway Conflicts	<ul style="list-style-type: none"> <li>▪ Conflicts between taxiing aircraft:                             <ul style="list-style-type: none"> <li>- Opposite conflicts: two mobiles run one against the other;</li> <li>- Crossing conflicts: two mobiles run in a taxiway crossing point;</li> <li>- Rollup conflicts: two mobiles run in the same direction but they are too close.</li> </ul> </li> <li>▪ Aircraft approaching stationary traffic</li> <li>▪ Conflicts between vehicles on the maneuvering area and taxiing aircraft</li> </ul>

Need to be **adapted** to Operational Procedure  
Short term alerts, only based on surveillance data

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# TopSky – Tower Key Concepts - Predictive alerts

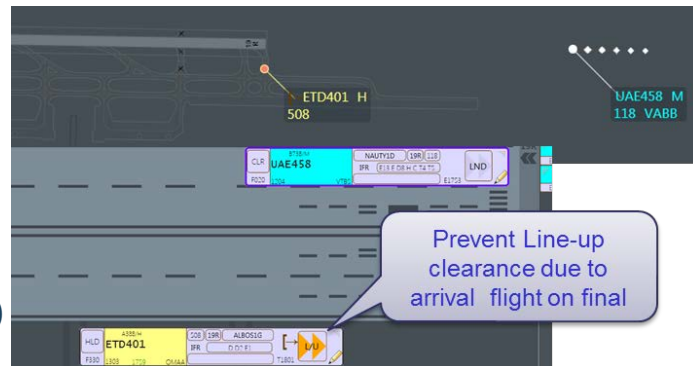
## New alerts required for Europe

Conflicting ATC Clearances (CATC)

Conformance Monitoring Alerts for Controllers (CMAC)

Predictive means to prevent RMCA alert situations

Based on Surveillance and on Controller inputs (clearances)



### Conformance monitoring alerts

- Targets not following assigned routes,
- Targets exceeding taxiways speed limits,
- Targets moving without controller's clearance (i.e. runway access without given line-up clearance)

### Conflicting ATC Clearance

- Conflicting clearance given by controllers (i.e. a given clear to land to an aircraft after having done a line-up clearance to another aircraft using the same runway).

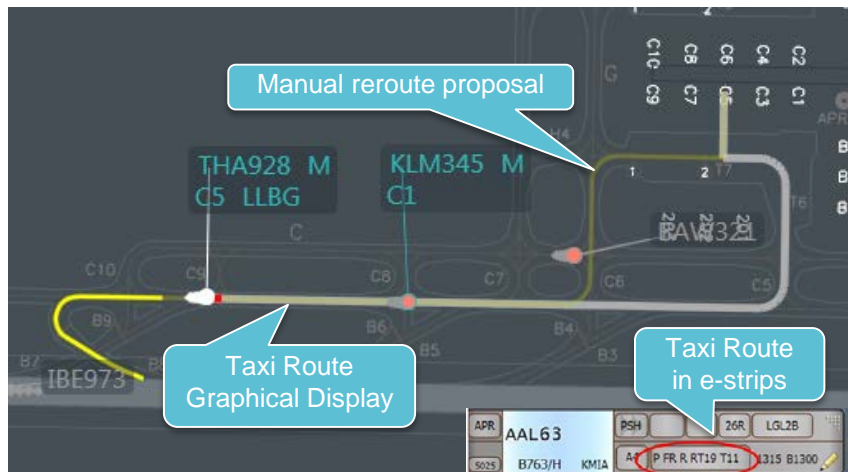


The fact that the **system knows the controller's clearances/instructions** is an important requirement for the Airport Safety Support Service to function correctly.

The Airport Safety Support Service works on the assumption that **every mobile entering the Runway Protected Area (RPA) or Restricted Area must/shall have a clearance from the controller.**

# TopSky - Tower Advanced Features: Routing, Route Conformance monitoring

- Routing function provides automatic computation and assignment of taxi routes to Flight Plan as soon as Runway and Stand information are received or modified



## Routing function provides :

- Accurate Taxi time computation
- Automatic computation and assignment of taxi routes to Flight Plan
- Dynamic workflow to ease coordination between Working Positions

## Routing display :

- Route is graphically displayed from aircraft to destination.
- Taxi route written in strips and lists
- Automatic/Manual route change

Smooth routing interface for a centralized and coherent management of the trajectory



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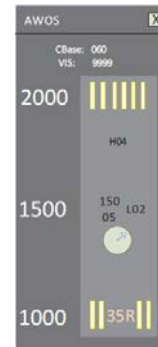
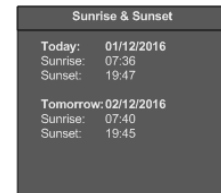
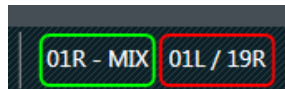
# TopSky-Tower: Environment data

## Management of roles for CWP

- Allocation of roles for each CWP
- Elementary sectors

## Management of runway and taxiway status

- Runway in use
- Runway closures
- Taxiway availability



## Display of environment data

- QNH
- ATIS letter
- Daylight time
- Local Meteo data (AWOS)
- NAVAIDS status