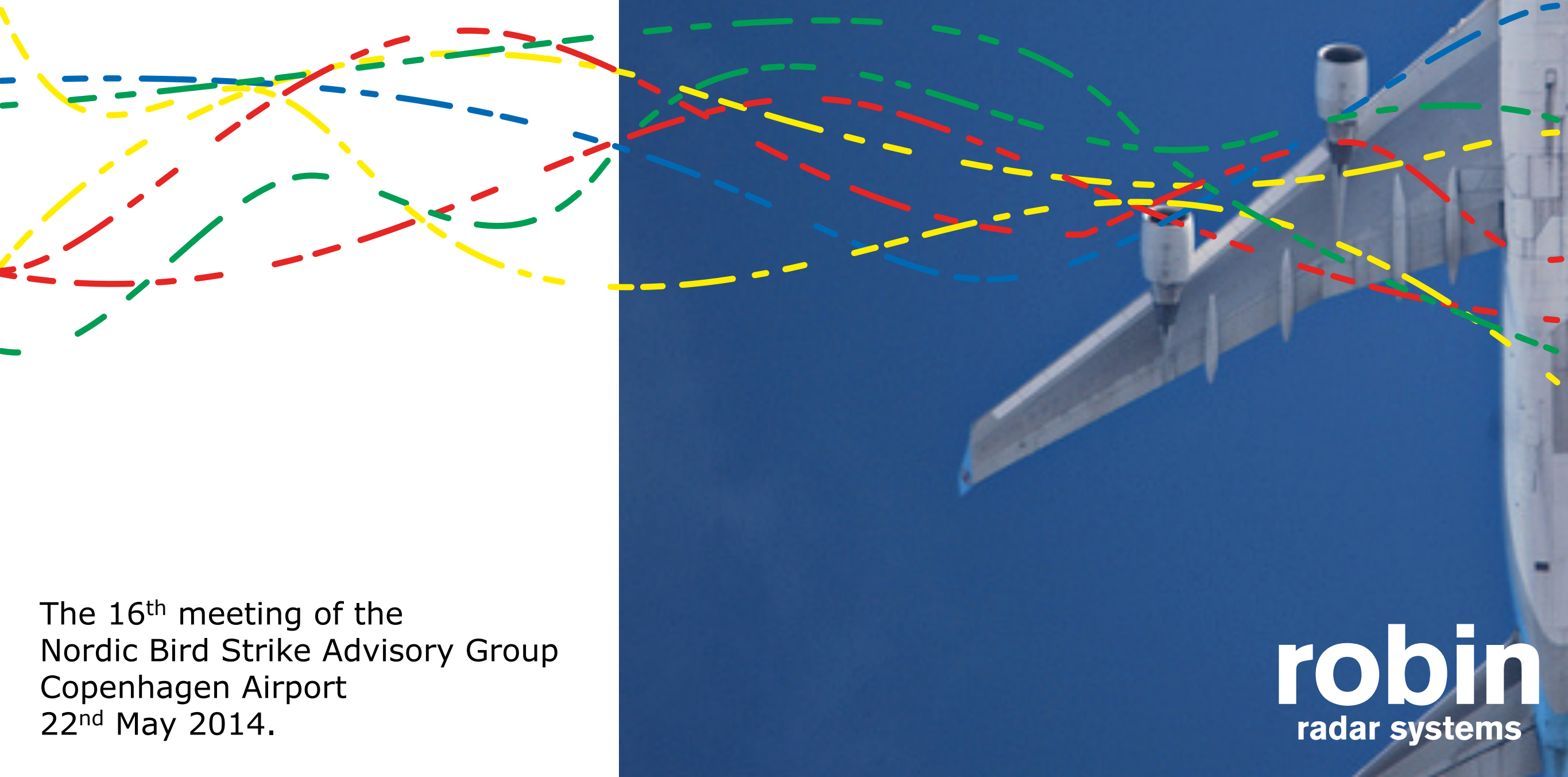


Next Generation Bird Strike Mitigation: effective use of avian radar at Civil Airports



The 16th meeting of the
Nordic Bird Strike Advisory Group
Copenhagen Airport
22nd May 2014.

robin
radar systems

Mission

**increase flight safety
for humans, bats and birds**



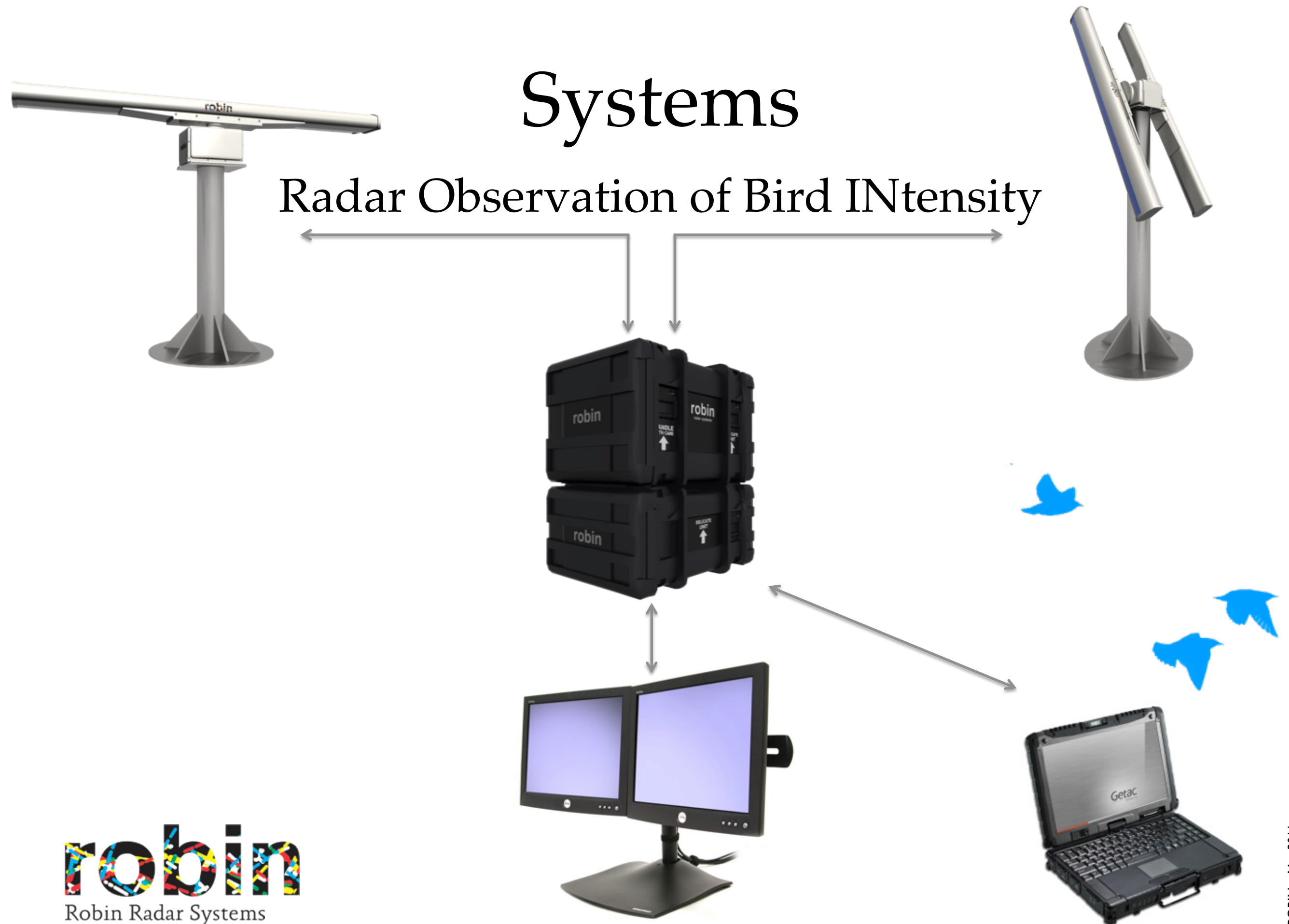
```
graph TD; A["increase flight safety  
for humans, bats and birds"] --> B["Prevent Bird Strikes  
in Aviation"]; A --> C["Reduce Environmental  
Impact of wind farms"]
```

*Prevent Bird Strikes
in Aviation*

*Reduce Environmental
Impact of wind farms*

Systems

Radar Observation of Bird INtensity





TNO innovation
for life



Royal Netherlands Air Force
Ministry of Defence



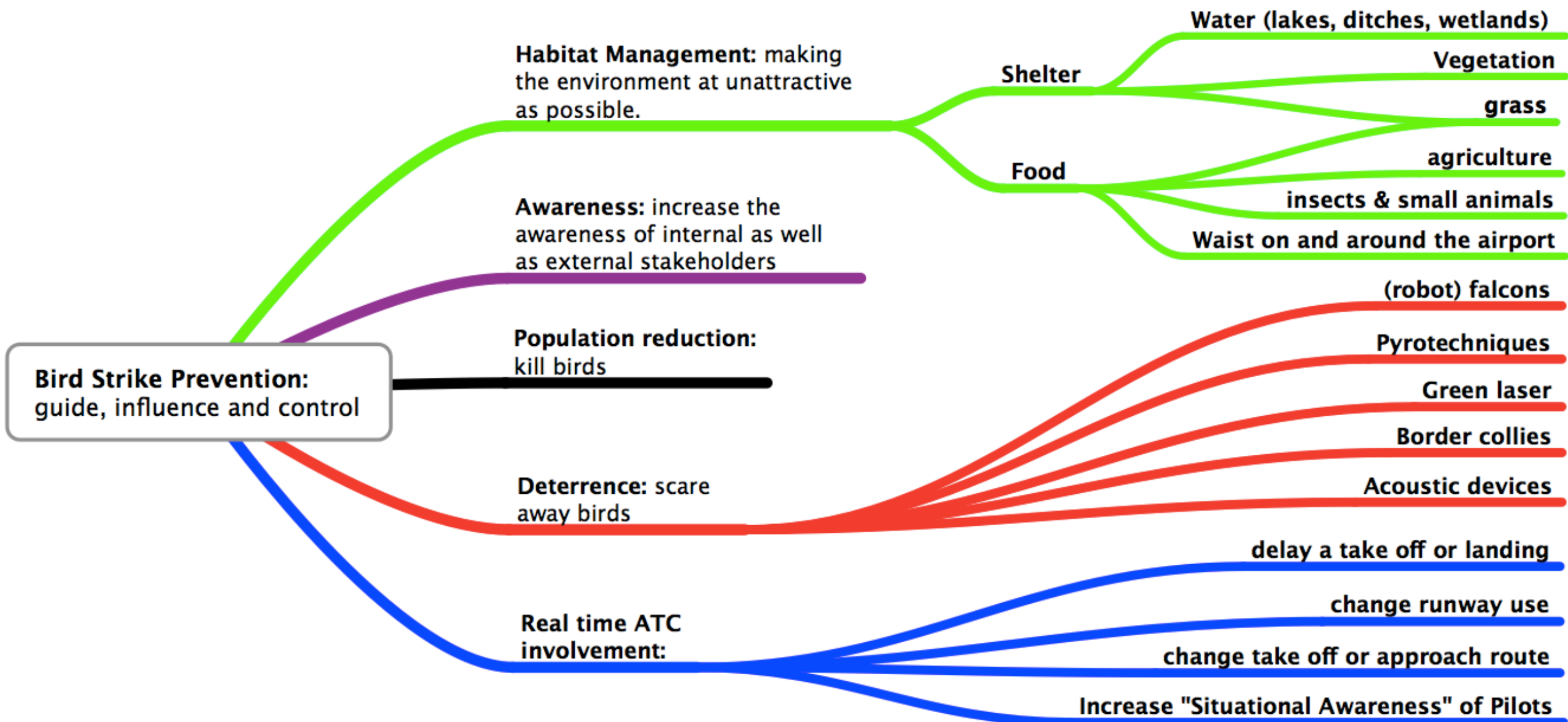
Rabobank



Next Generation
Bird strike mitigation

Counter measures

Elements of a Bird Hazard Management Program





There is no silver bullet!

Trends

- The amount of especially large birds is increasing world wide
 - The amount of flight movements is increasing world wide
 - The awareness around 'bird strikes' is increasing, resulting in more public and political pressure to mitigate risk
-



As part of effective Bird Hazard Management Programs,
larger, more innovative airports in the world
Start making use of Bird Radars

...and for good reasons:

Capabilities

“You can’t manage it if you can’t measure it.”

- Thousands of bird movements simultaneously
- Up to 10 km
- All around
- During day, night and low visibility conditions.
- Including their exact location, height, direction, speed and fight path



So you see birds,...

...and then what!?

Tactical Benefits

Using bird information in real time

Extending the eyes
of Bird Control Units

*“For me, the Robin Radar is like a
high tech ‘Ultimate Binocular’”*






“Quite a few bird strikes happen during fog. When we can’t see a thing, ...radar becomes our ears and eyes.”

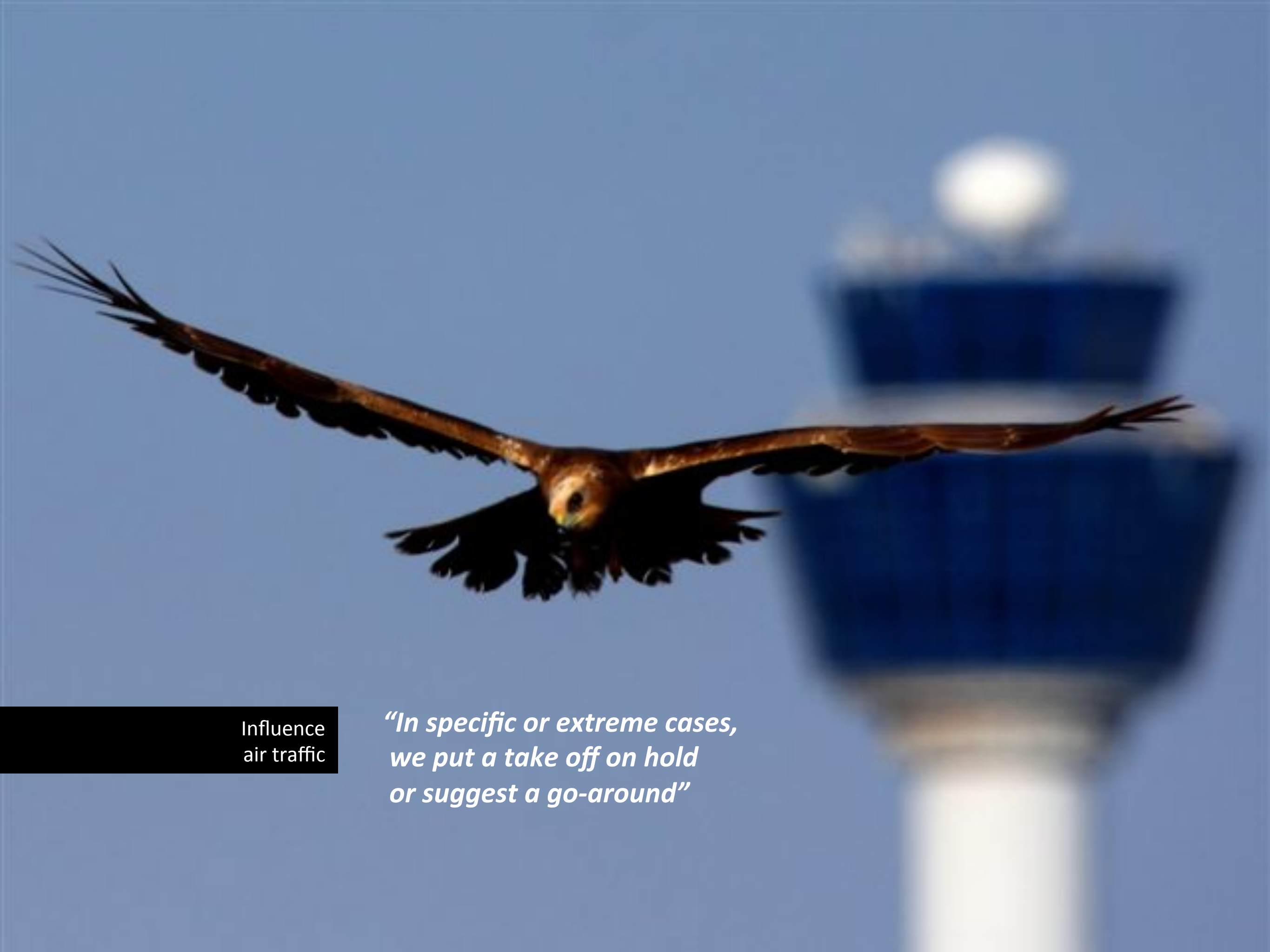
See the bigger picture
even when visibility is low



A night view from an airplane cockpit looking out over a runway. The runway is illuminated by a series of red lights along its edges and a central line of white lights. The numbers 1 through 6 are visible on the runway. The wings and engines of the airplane are visible in the foreground. In the background, city lights are visible under a dark sky.

See the bigger picture
even when visibility is low

*“Before Avian Radar,
we were blind at night.”*



Influence
air traffic

*“In specific or extreme cases,
we put a take off on hold
or suggest a go-around”*



Increase the 'Situational Awareness' of pilots

"Once a landing is set in motion I will not evade birds but I do appreciate a warning to be prepared."

Communication
tool



*"We both look at the same live image.
I see my own exact location on the map
and that of my colleague. That really
helps in communication and divide tasks."*

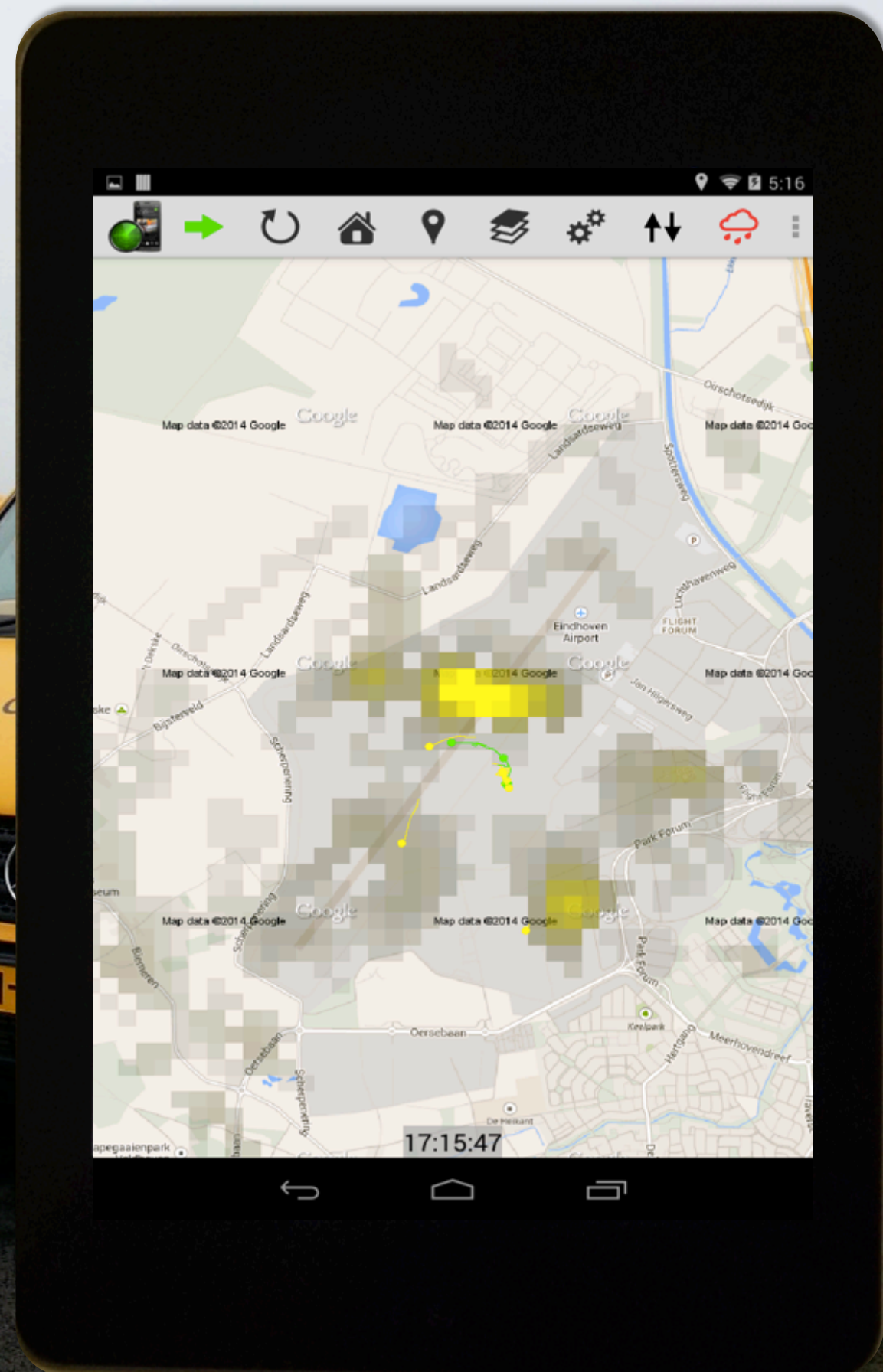
Help
set priorities



*"I was deterring a falcon at runway 1
when the system notified my a large flock
of geese was approaching runway 4."*



Real time
data analysis



'Light version' Ground
movement radar

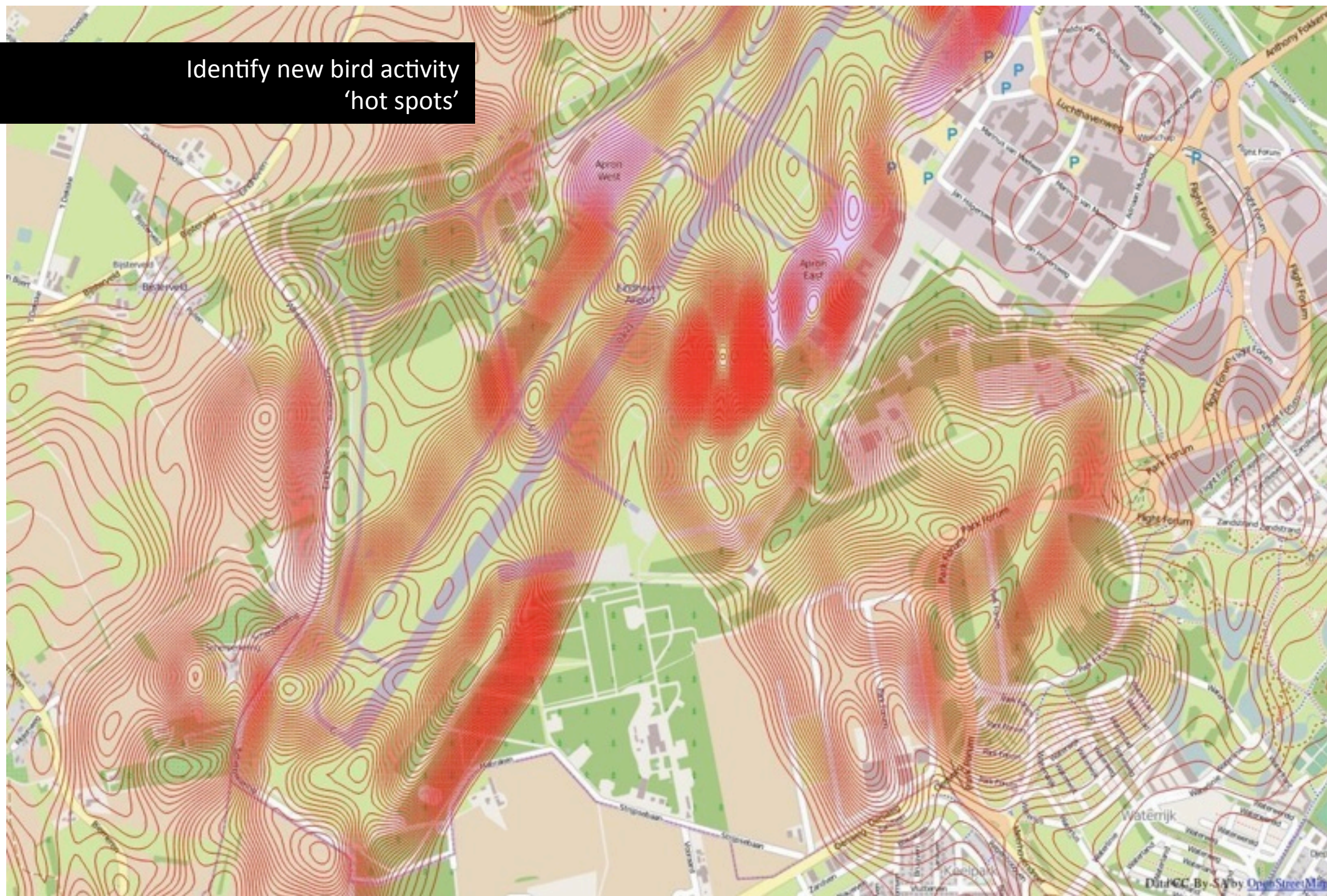
*“By detecting planes and vehicles and
integrating (ADS-B) transponder
information, the system supports
avoiding runway incursions”*



Strategic Benefits

Using bird information for analysis

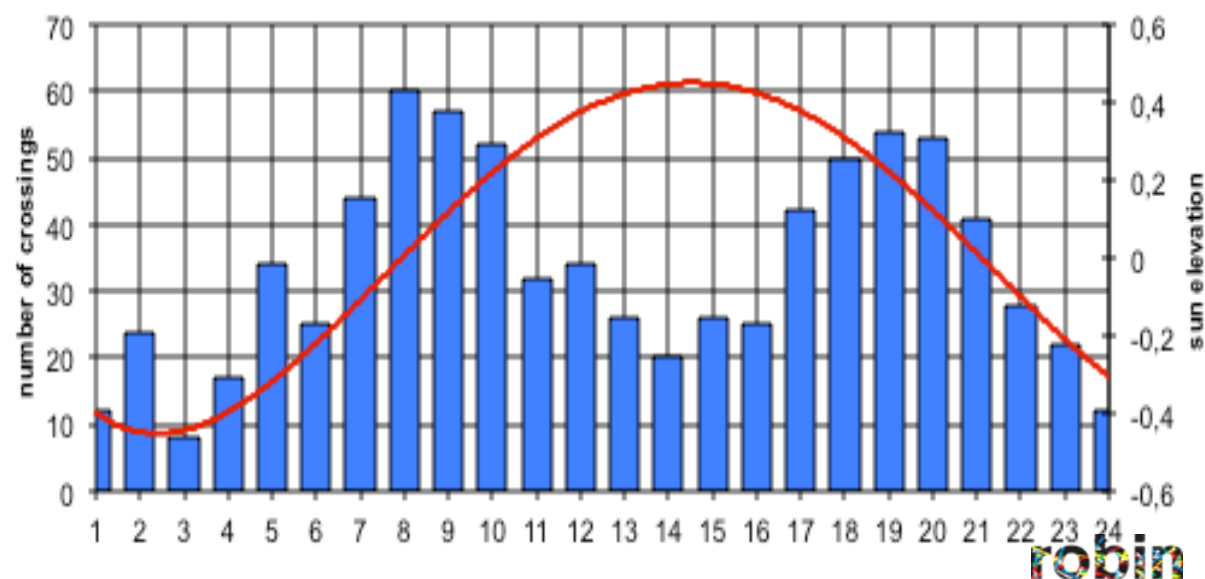
Identify new bird activity
'hot spots'



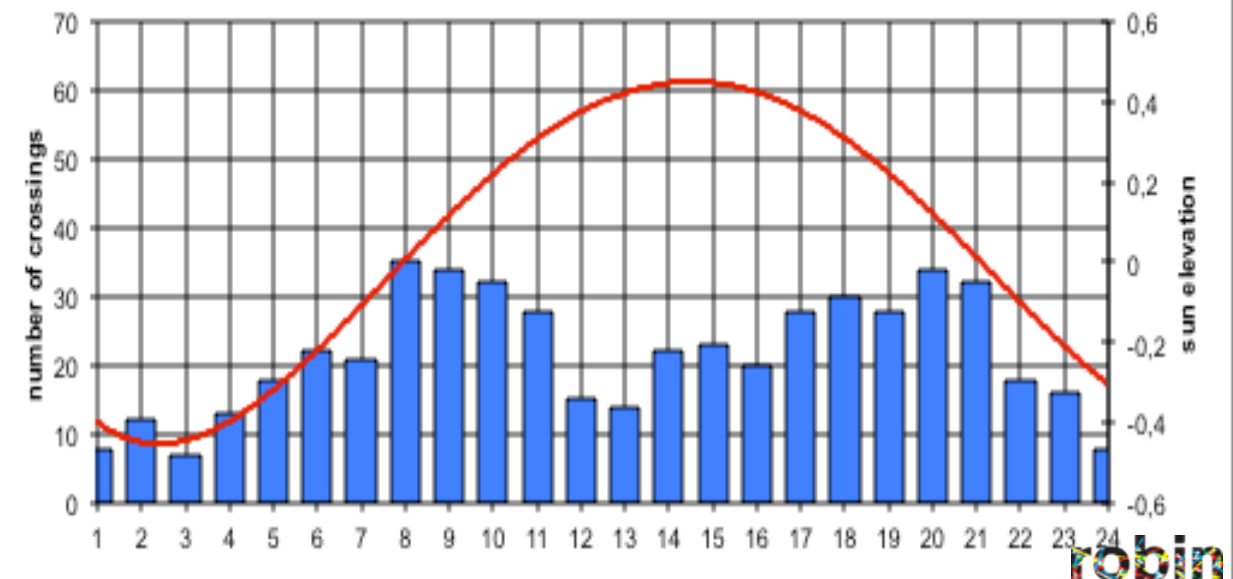
Determine the effectiveness
of mitigation policies

“We invest in numerous bird strike mitigation measures, ranging from grass policies to politically sensitive population reduction. We want to quantify how effective these investments are.”

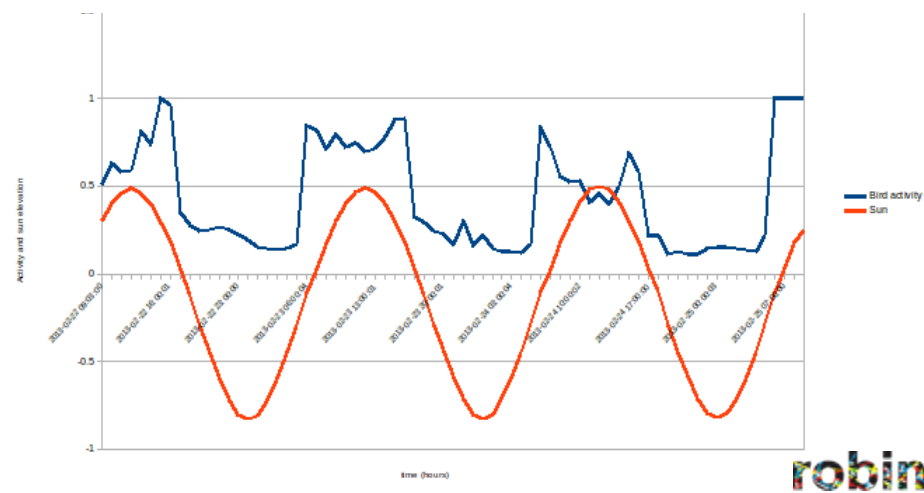
Daily average run way crossings per hour 2012



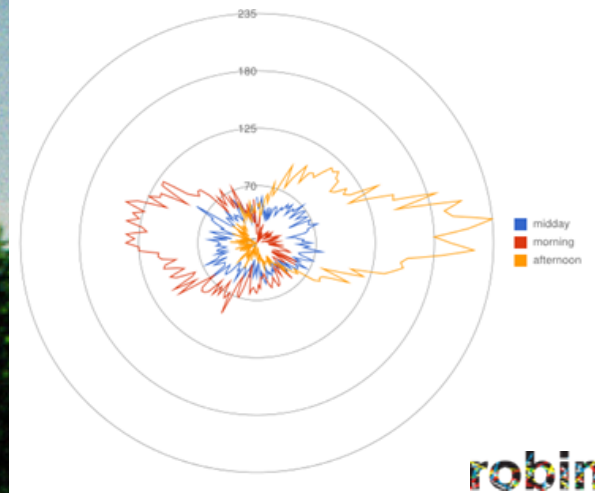
Daily average run way crossings per hour 2013



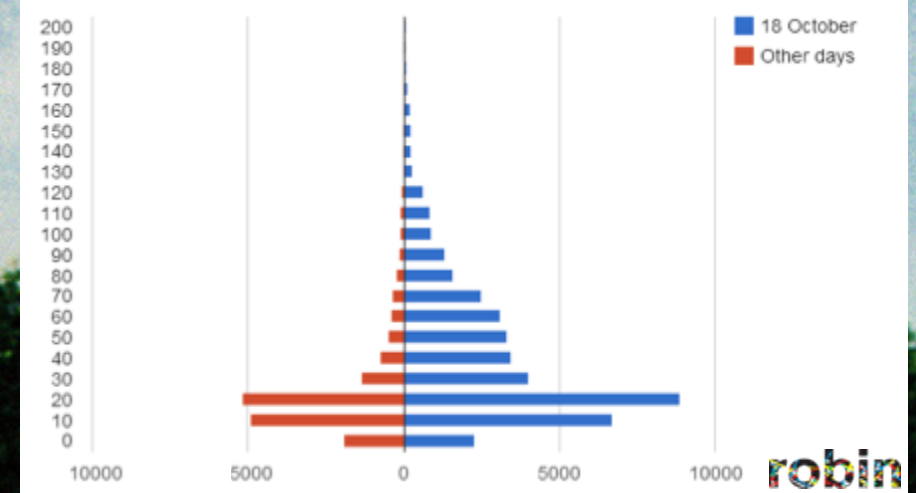
Bird activity versus sun elevation



Flight directions



Height distribution



*“We aim to make the airport vicinity as unattractive as possible for birds .
We needed to understand their behaviour before we could start influencing it”*

Unique quantified information
as input for Habitat Management

Convert bird behaviour patterns
into risk profiles



Bird activity
Runway 1



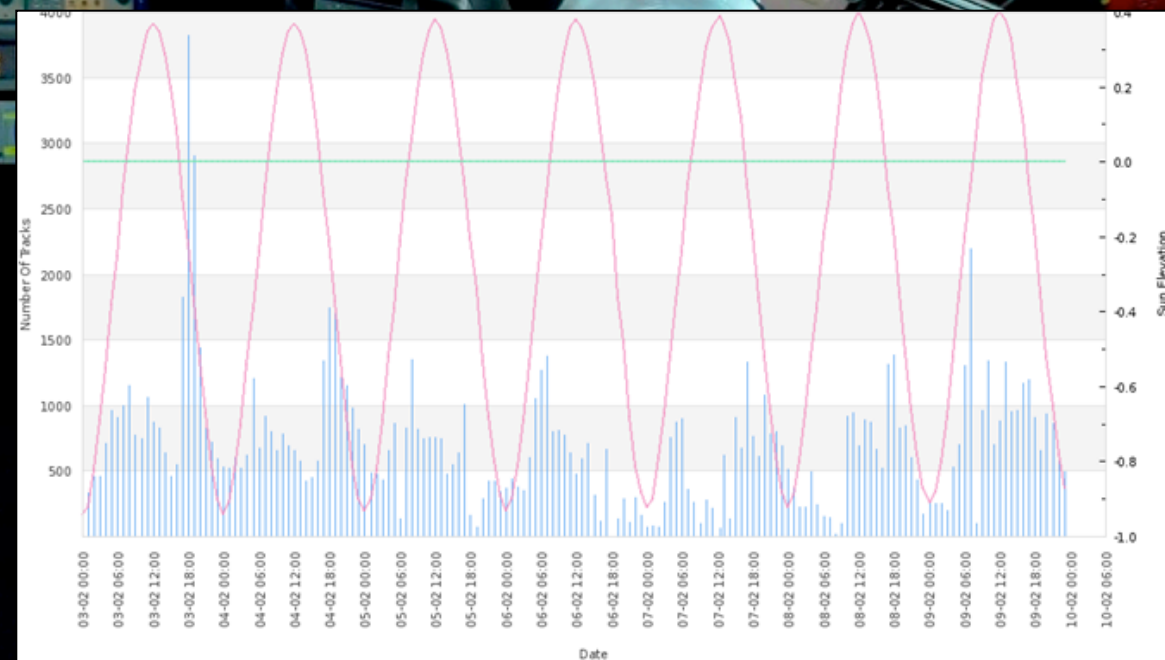
Bird activity
Runway 2



Bird activity
Runway 3



Bird activity per hour (in a 7 day period)

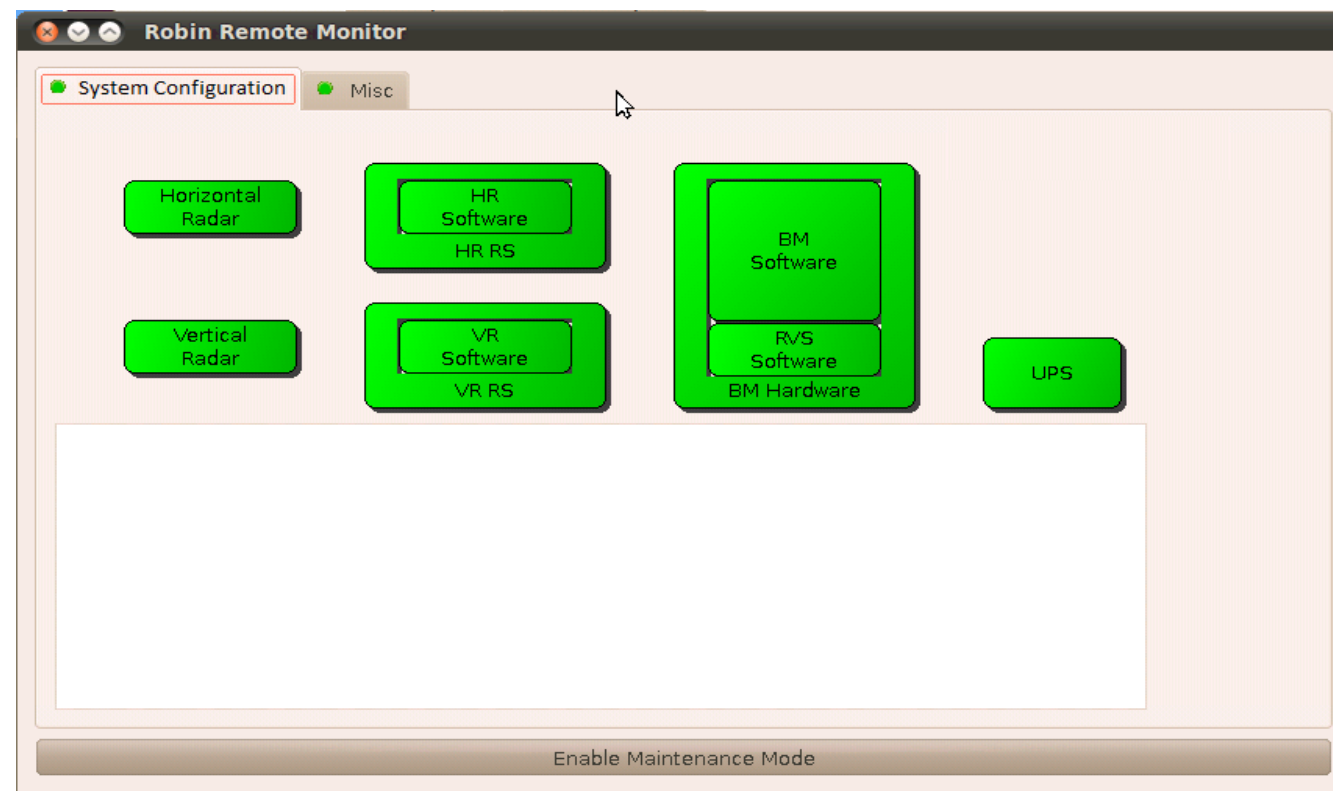


*“In June we start using runway 3
at 7 am because we’ve learned
hundreds of gulls typically cross
it between 6:00 and 6:30”*

robin

*“From an Asset Management point of view,
integration IT and remote control are key”*

Remotely monitor and control
system components



Maintenance Dashboard

Last update system state: 2014-02-12 13:33:17 [Refresh data](#) Page will refresh in 42 s

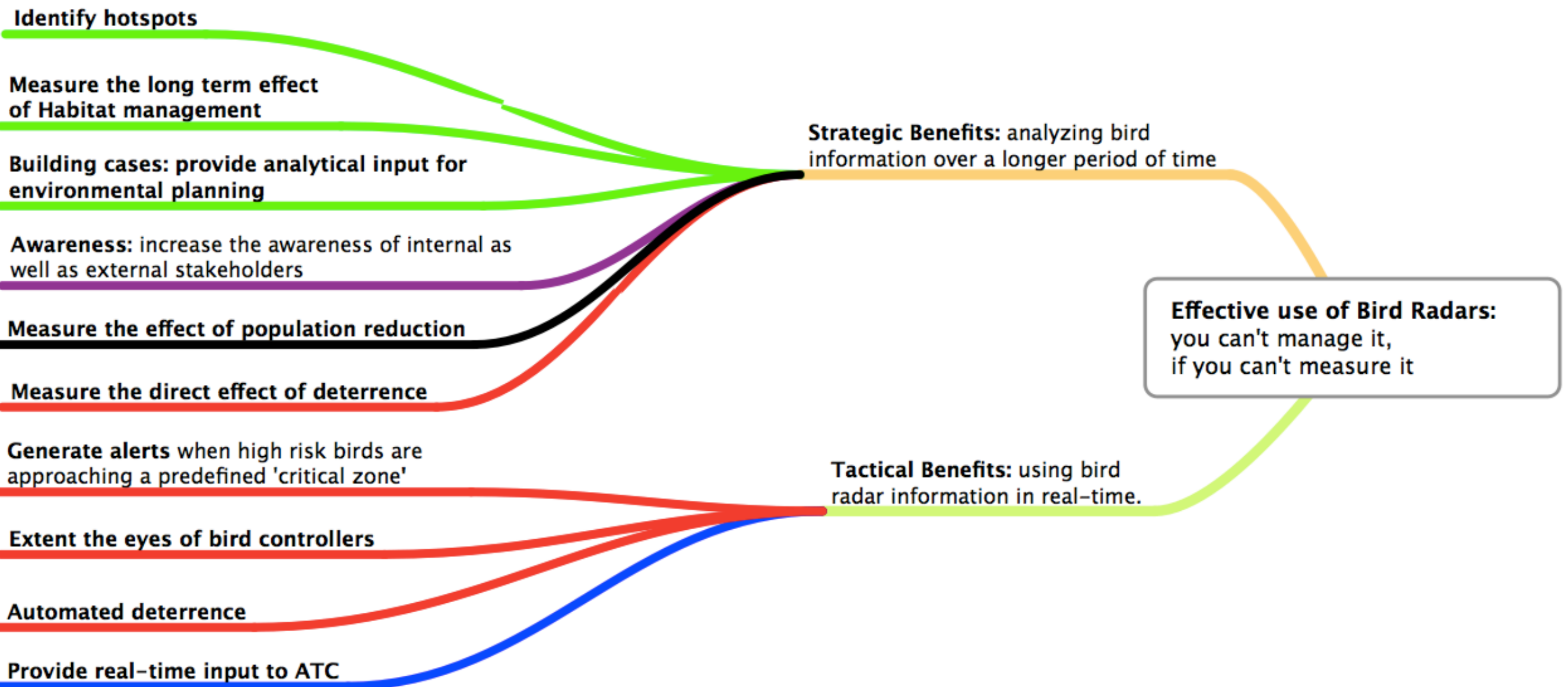
System name	Component	Current status	Graph
Misc	DBHARDWARE	●	
Misc	DBSOFTWARE	●	
Misc	ROUTER	●	
Misc	WEATHERSTATION	●	
Schiphol Polderbaan	BMHARDWARE	●	
Schiphol Polderbaan	BMSOFTWARE	●	
Schiphol Polderbaan	HRADAR	●	
Schiphol Polderbaan	HRHARDWARE	●	
Schiphol Polderbaan	HRSOFTWARE	●	
Schiphol Polderbaan	RVSSOFTWARE	●	
Schiphol Polderbaan	UPS	●	
Schiphol Polderbaan	VRADAR	●	
Schiphol Polderbaan	VRHARDWARE	●	
Schiphol Polderbaan	VRSOFTWARE	●	

- System operational
- System warning
- System failure
- System status maintenance
- System status unknown

robin

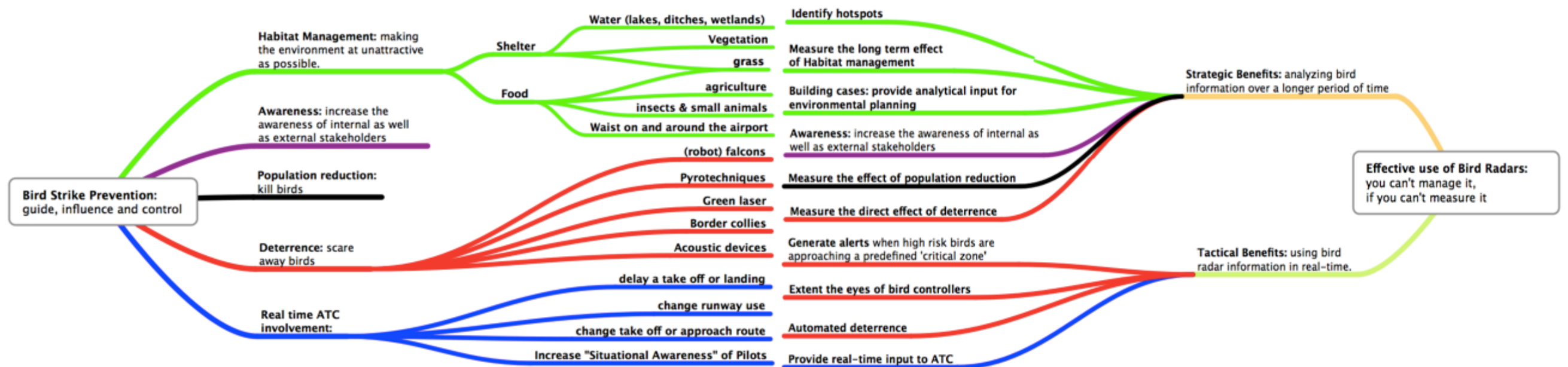
Radar Capabilities

How Bird Radar fits in effective Bird Control



Radar Capabilities

How Bird Radar fits in effective Bird Control



References

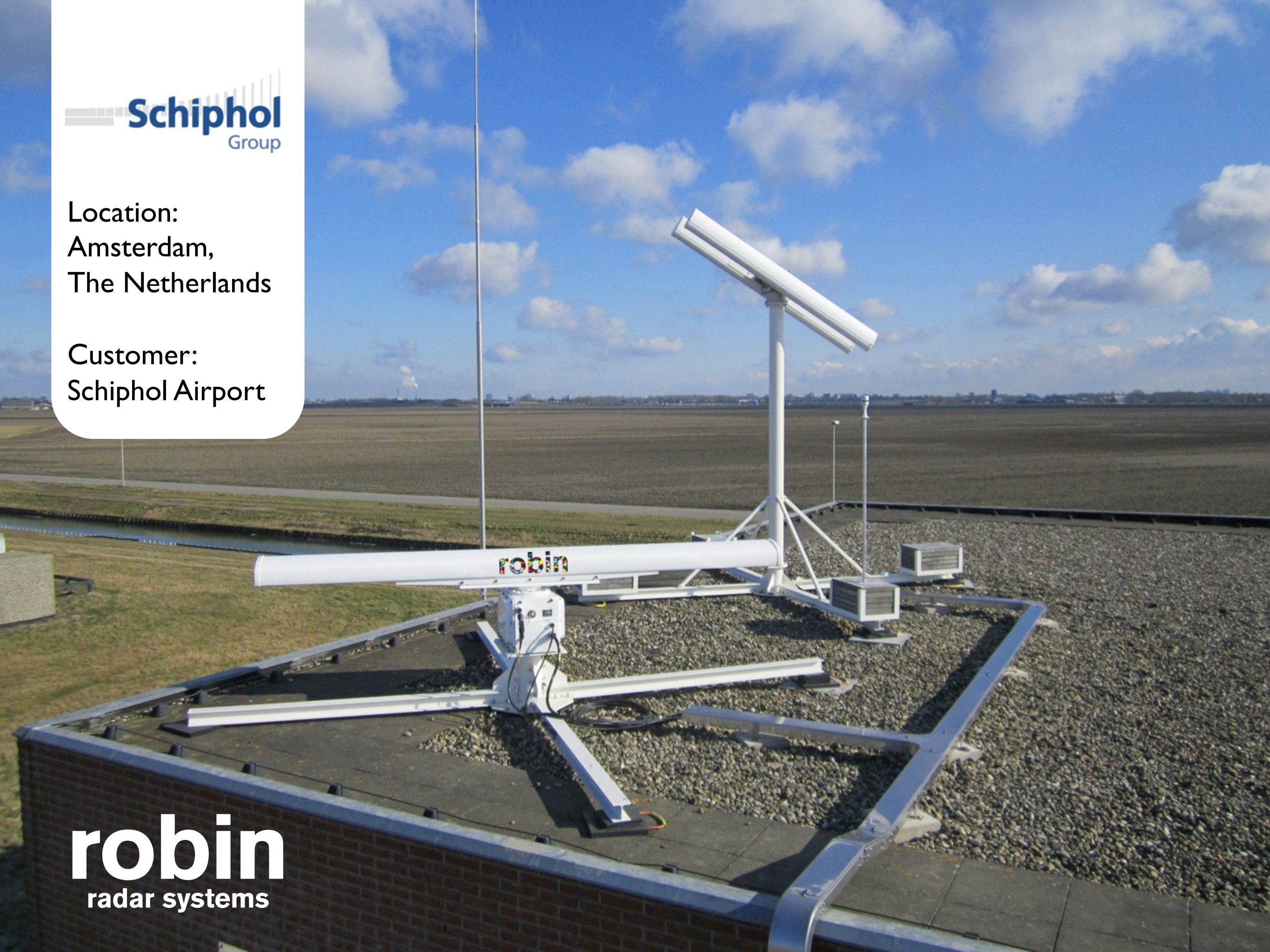
Robin systems in European aviation



Location:
Amsterdam,
The Netherlands

Customer:
Schiphol Airport

robin
radar systems





Location:

Glons

Belgium

Customer:

Royal Belgium Air
Force

robin
radar systems



Location:
Hatay Airport,
Turkey

Customer:
DHMI



robin
radar systems



robin

Mobile version to
assess multiple
locations
throughout
Europe

robin
radar systems

EindhovenAirport 

Location:
Eindhoven,
The Netherlands

Customer:
Eindhoven Airport

robin
radar systems





Location:
Wier & Millingen
The Netherlands

Customer:
Royal Dutch Air
Force

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radar systems





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radar systems