THALES

Together • Safer • Everywhere

A Vision for Safe & Efficient UAS Operations

P. FOSSIER
VP, Technical – Land & Air Systems

thalesgroup.com

Introduction & Contents

THALES

The Rise of the Drone…

2.7B€
COMMERCIAL DRONES

---- 2016 GLOBAL ----

PERSONAL DRONES
1.7B€

7M
DRONE REGISTRATIONS ANTICIPATED BY 2020 IN USA

37K+
REMOTE PILOTS CERTIFIED IN USA

TECHNOLOGY NEWS | Mon May 9, 2016 | 11:29am EDT

UPS-backed Rwandan blood deliveries show drones' promise, hurdles

3 Ways Drones Could Change the Insurance Industry

Here's how the insurance industry could save as much as $6.8 billion per year by using remote-controlled drones.

Jordan Wathen (TMFValueMagnet)
Sep 22, 2016 at 11:43AM

Santa delivered the drone. But not the safety and skill to fly them

Sunday, 8 Jan 2017 | 12:50 PM ET

The New York Times

Interpol warns of drone attacks by terrorists on critical infrastructures

By IANS | Feb 14, 2017, 10.32 AM IST   Post a Comment

THALES

Expected Timing of UAS Commercial Services

Photography & Movies | Building/Mining Progress | Agriculture
Critical Infrastructure Examination | Bushfire Surveillance

Tower Maintenance | Traffic Watch | Shark Watch
News Reporting | Police Monitoring | Crime Scene Exams
Bushfire Surveillance

Point-to-Point & Package-to-Pickup Point Delivery
Medical Sample &   Transplant Delivery
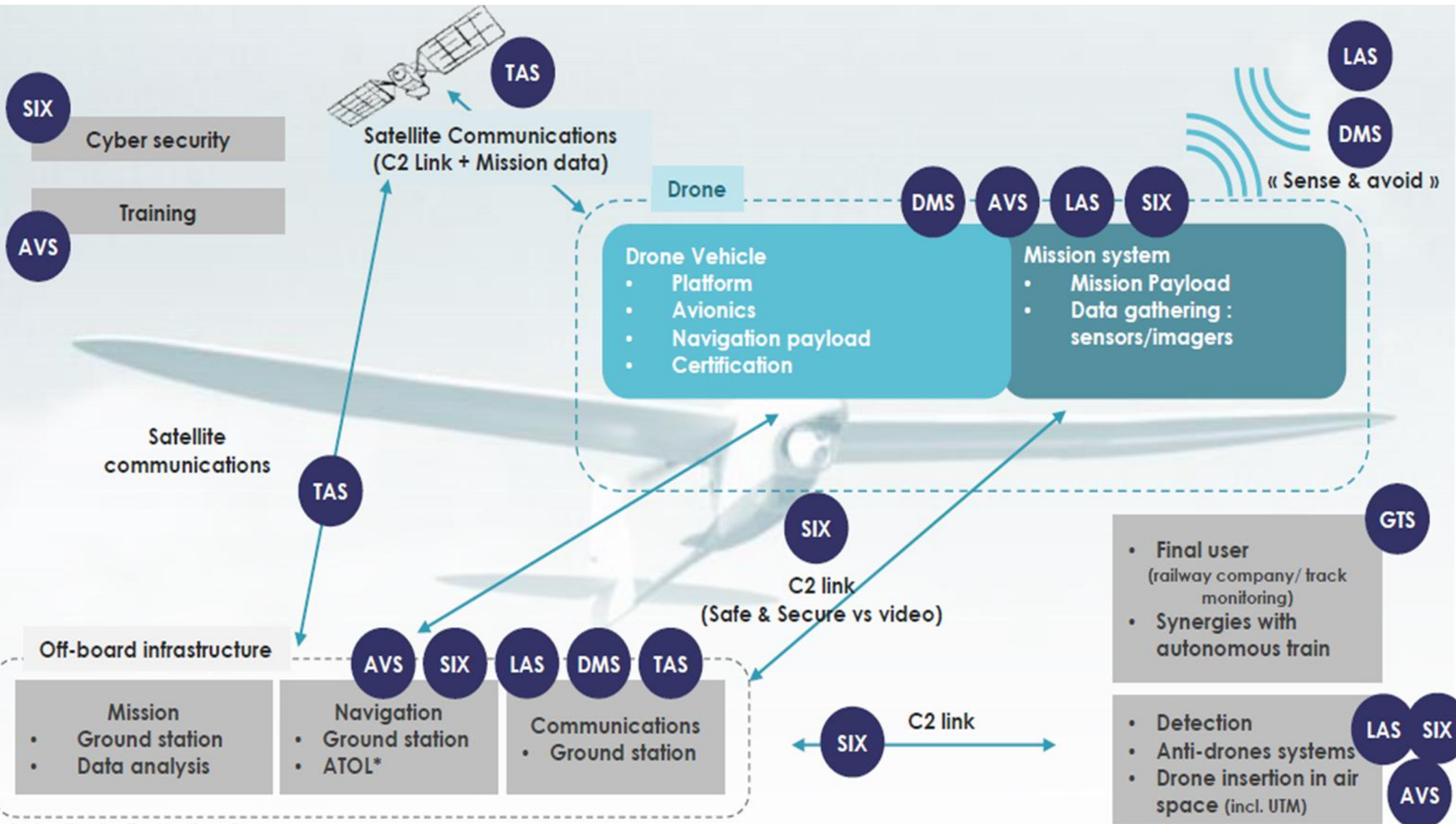
Point-to-Many Point Delivery
Direct-to-Home Delivery

Personal Air Transport
Uber Drone

NOW   1   2   3   4   5   6   7   8   9   YRS

THALES

Thales in all segments

SIX Cyber security

Training

AVS

TAS

Satellite Communications
(C2 Link + Mission data)

LAS

DMS

« Sense & avoid »

Drone

DMS **AVS** **LAS** **SIX**

Drone Vehicle
- Platform
- Avionics
- Navigation payload
- Certification

Mission system
- Mission Payload
- Data gathering : sensors/imagers

Satellite communications

TAS

SIX

C2 link
(Safe & Secure vs video)

GTS

- Final user
  (railway company/ track monitoring)
- Synergies with autonomous train

Off-board infrastructure

AVS **SIX** **LAS** **DMS** **TAS**

Mission
- Ground station
- Data analysis

Navigation
- Ground station
- ATOL*

Communications
- Ground station

SIX C2 link

- Detection
- Anti-drones systems
- Drone insertion in air space (incl. UTM)

LAS **SIX**

AVS

THALES

Digital Transformation : four technology pillars

Connectivity

Big data

Artificial intelligence

Cyber security

THALES
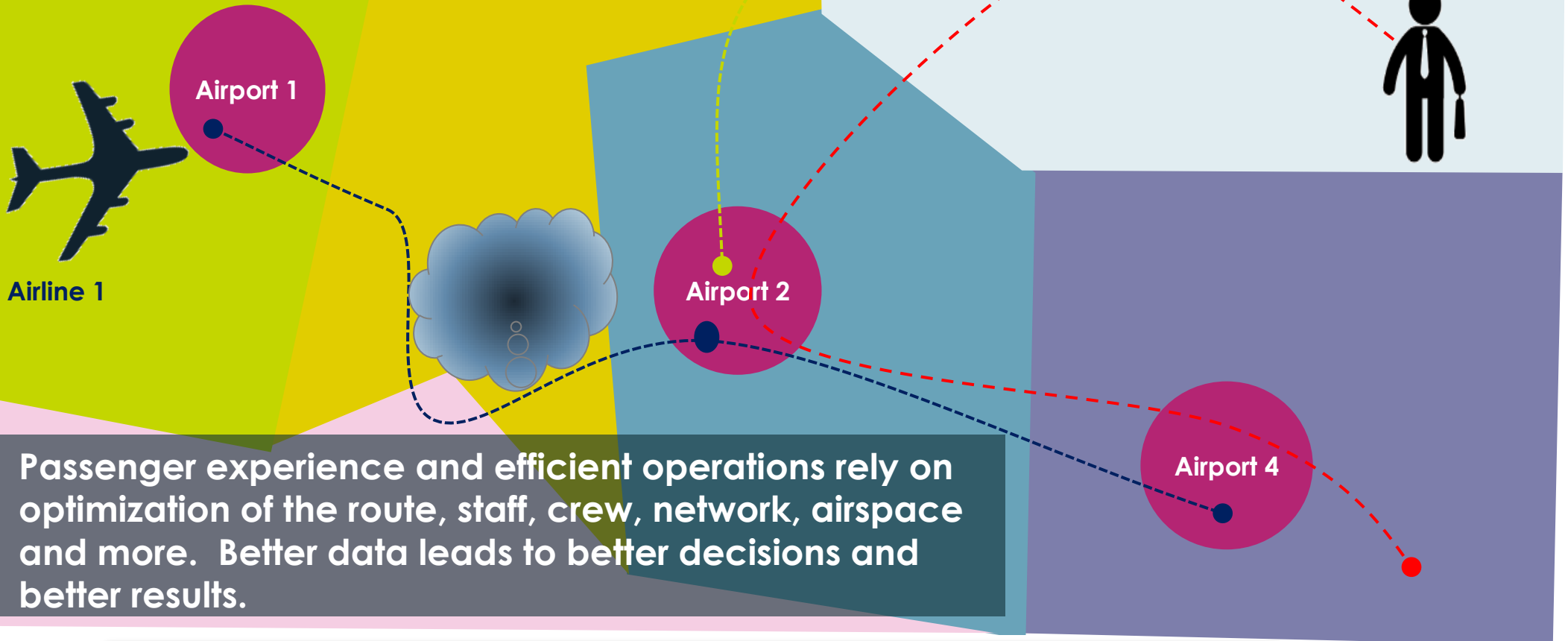
Digital collaboration is the key to optimizing aviation flight operations

Transporting a passenger from one city to another can involve many distinct entities – multiple aircraft operators, airport authorities, ANSPs, MET offices.

Airline 2

Airport 3

Airport 1

Airline 1

Airpart 2

Airport 4

Passenger experience and efficient operations rely on optimization of the route, staff, crew, network, airspace and more. Better data leads to better decisions and better results.

Improving global efficiency & safety

THALES

Control of Drones – Moving Toward High Levels of Automation

Yesterday's Ops

Today's Reality

The Future….

THALES

8

THALES

INNOVATION AND DIGITAL TECHNOLOGIES
Drone operations now and in the future?
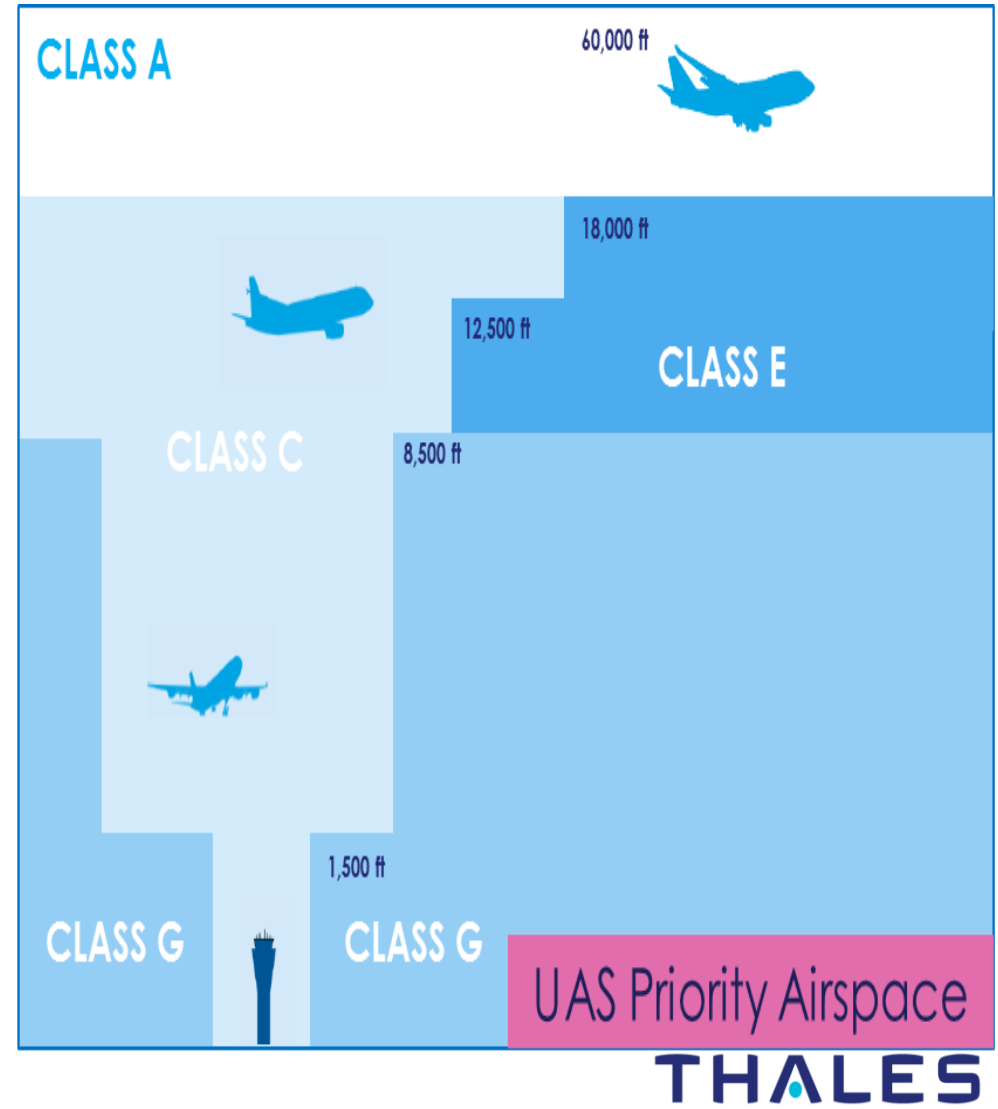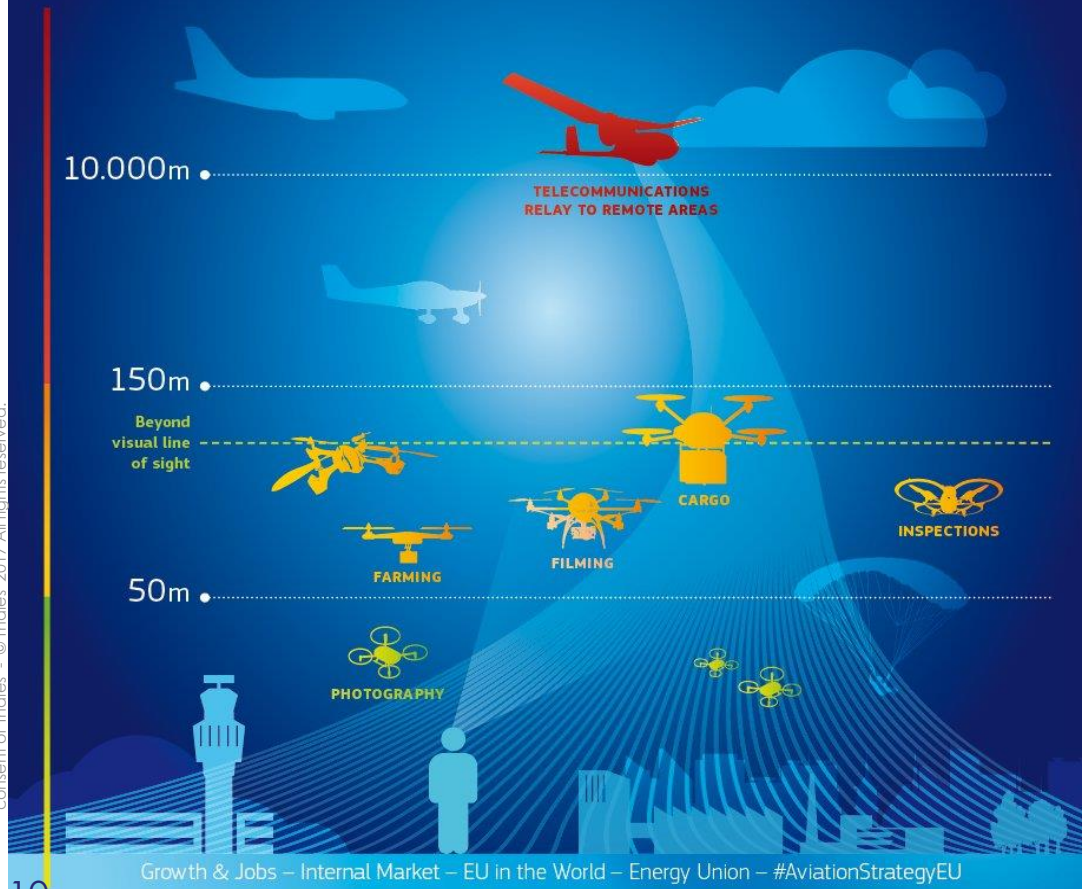
10.000m
TELECOMMUNICATIONS
RELAY TO REMOTE AREAS

150m
Beyond
visual line
of sight

CARGO

INSPECTIONS

FARMING

FILMING

50m

PHOTOGRAPHY

Growth & Jobs – Internal Market – EU in the World – Energy Union – #AviationStrategyEU

CLASS A
60,000 ft

18,000 ft

12,500 ft
CLASS E

CLASS C
8,500 ft

1,500 ft

CLASS G
CLASS G

UAS Priority Airspace

THALES

The UAS Operating Environment

Registry Function
Drone / Vehicle Registration
Operator / Pilot Certification

UAS Traffic Mgmt. Function
Airspace Management
Flight Authorization
Conformance Monitoring
Identification /Localization

Air Traffic Management

Counter-UAS Function
Non-Cooperative Detection
Identification/Tracking
Alerting & Notification
Drone Disablement

Military Command & Control

UAS integration into controlled airspace

Air Traffic Mgmt.

Military Operations

UAS Traffic Mgmt.

Police Operations

Controlled Airspace

No Fly Zone

Local authority delegation

Special events Protection

Permanent Air surveillance

Uncontrolled Airspace

This pictorial diagram depicts the key systems, players and concepts related to UAS operations. It is important to note that when properly integrated, UTM and C-UAS enhance the performance of the other system by sharing information which helps each system perform its distinct functions for effectively.

THALES

A Wider View of UAS Integration

Enabling Safe & Efficient Operations

THALES

Guiding Principles of an Effective UTM Solution

Enables safe, secure and efficient professional & recreational UAS operations in all environments

Balances responsibility between UTM and UAVs depending upon UAV performance capability

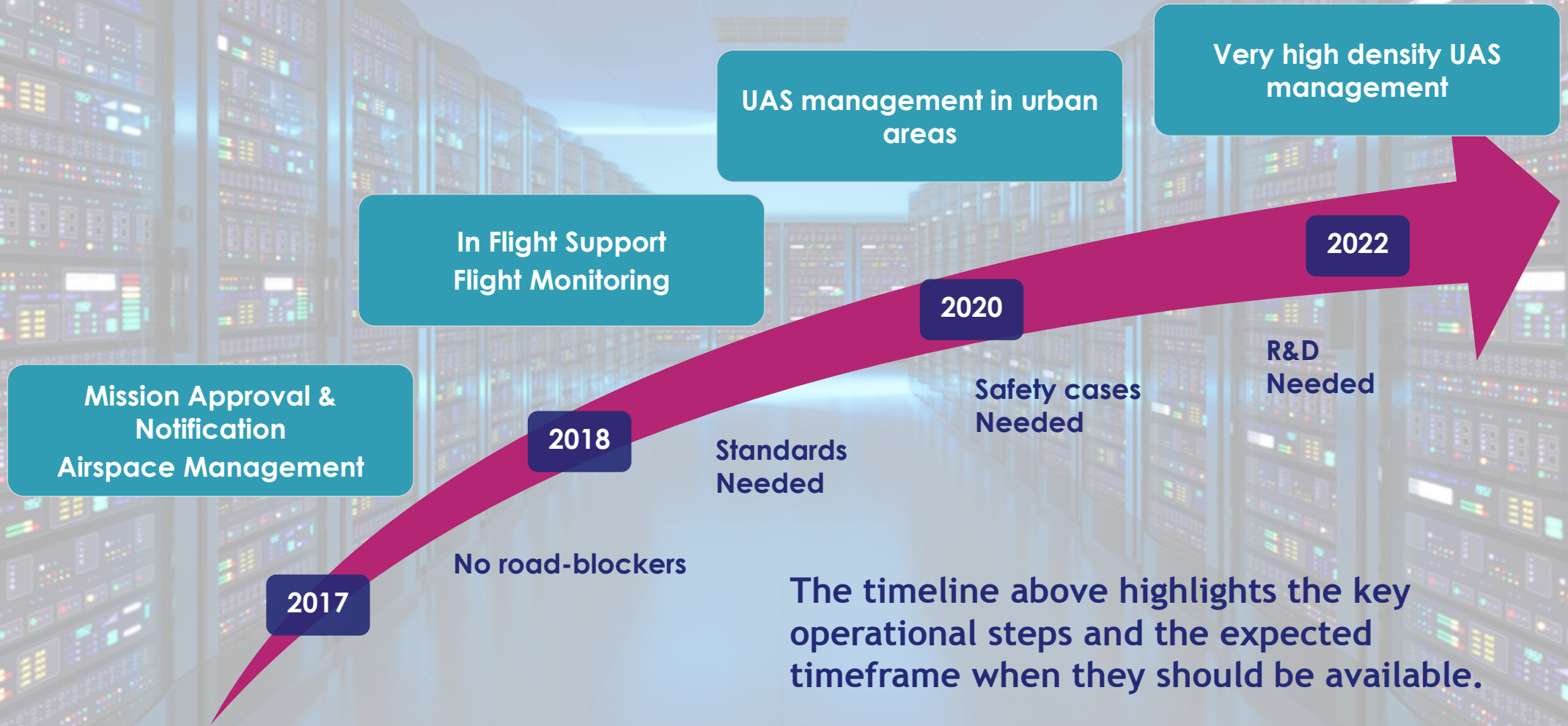Ensures coordination and de-confliction between manned and unmanned operations

Intelligently leverages autonomy, both in UTM and in the vehicle

Organizes and manages efficient use of uncontrolled airspace to deliver safety and security

Delivers the services at a price that is insignificant compared to the end-user's cost structures

THALES

UTM Roadmap

Just as UAS vehicles and operations are changing rapidly, so too must the UTM solutions which will manage and secure those operations.

Very high density UAS management

UAS management in urban areas

In Flight Support Flight Monitoring

2022

2020

R&D Needed

Mission Approval & Notification Airspace Management

2018

Safety cases Needed

Standards Needed

No road-blockers

2017

The timeline above highlights the key operational steps and the expected timeframe when they should be available.

THALES

Conclusions

Project conclusions

Conclusion

- Future RPAS operations may be safely integrated into non-segregated airspace using existing ATC processes
- Lower performance RPAS could result in an increase in ATC workload
- A Mode S transponder is essential to avoid surveillance issues & facilitate integration
- For routine access to non-segregated airspace, detect & avoid capability is required
- RPAS considered predictable in emergencies
- Instrument Rating not fully applicable to RPAS

SESAR Showcase
Amsterdam, 14-16 June 2016

Technologies

As new technologies emerge to advance the drone flying experience, the industry maintains a singular focus on interoperability and safety requirements needed to relax regulatory constraints

Digital Transformation

Integration Journey

THALES

"*Drones overall will be more impactful than I think people recognize, in positive ways to help society.*"

– Bill Gates

THALES