U-space CONOPS and research dissemination conference

1 October 2019

Opening ceremony

U-space

SESAR JOINT UNDERTAKING

Florian Guillermet
Executive Director, SESAR Joint Undertaking

U-space

SESAR
JOINT UNDERTAKING

U-space in action - Seeing is believing!

Koen De Vos
Senior Drone Expert
European Commission
DG MOVE – Mobility and Transport

U-space

SESAR
JOINT UNDERTAKING

Preparing a new era Drones and U-Space: Where is the EU going?

European Commission
1 October 2019

@BuIc_EU

Mobility and Transport

Disruptive: what vision?

Embrace a new aviation paradigm

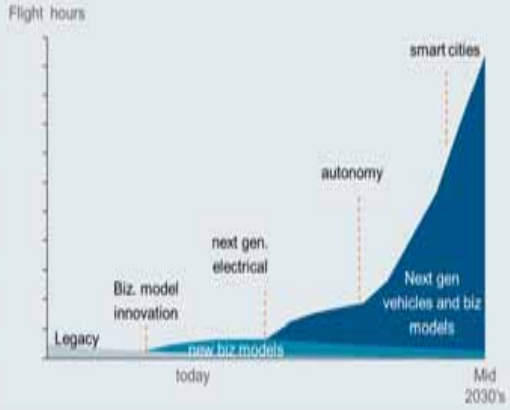
Diversity

Emergency Response, Humanitarian Aid & Disaster Relief, Conservation, Bird Mitigation Disease Control, Defense, Healthcare, Agriculture, Weather Forecasting, Maritime, Waste Management, Energy, Mining, Construction Planning, Infrastructure Development & Inspection, Insurance, Realty, Urban Planning, Personal Transportation, Airline Inspection, Telecommunications, Internet Access, Outdoor Industry, Tourism & Hospitality, Live Entertainment, Sports, Film Industry, Advertising, Retail Delivery, Manufacturing & Inventory Management, Law Enforcement, Fitness, Food Services Industry, Journalisms & News Coverage, Gaming, Space, Education, Security, Search & Rescue

3

We're taking an integrated approach to bring innovation to the sky

A strong market need



Technology

Manageable projects

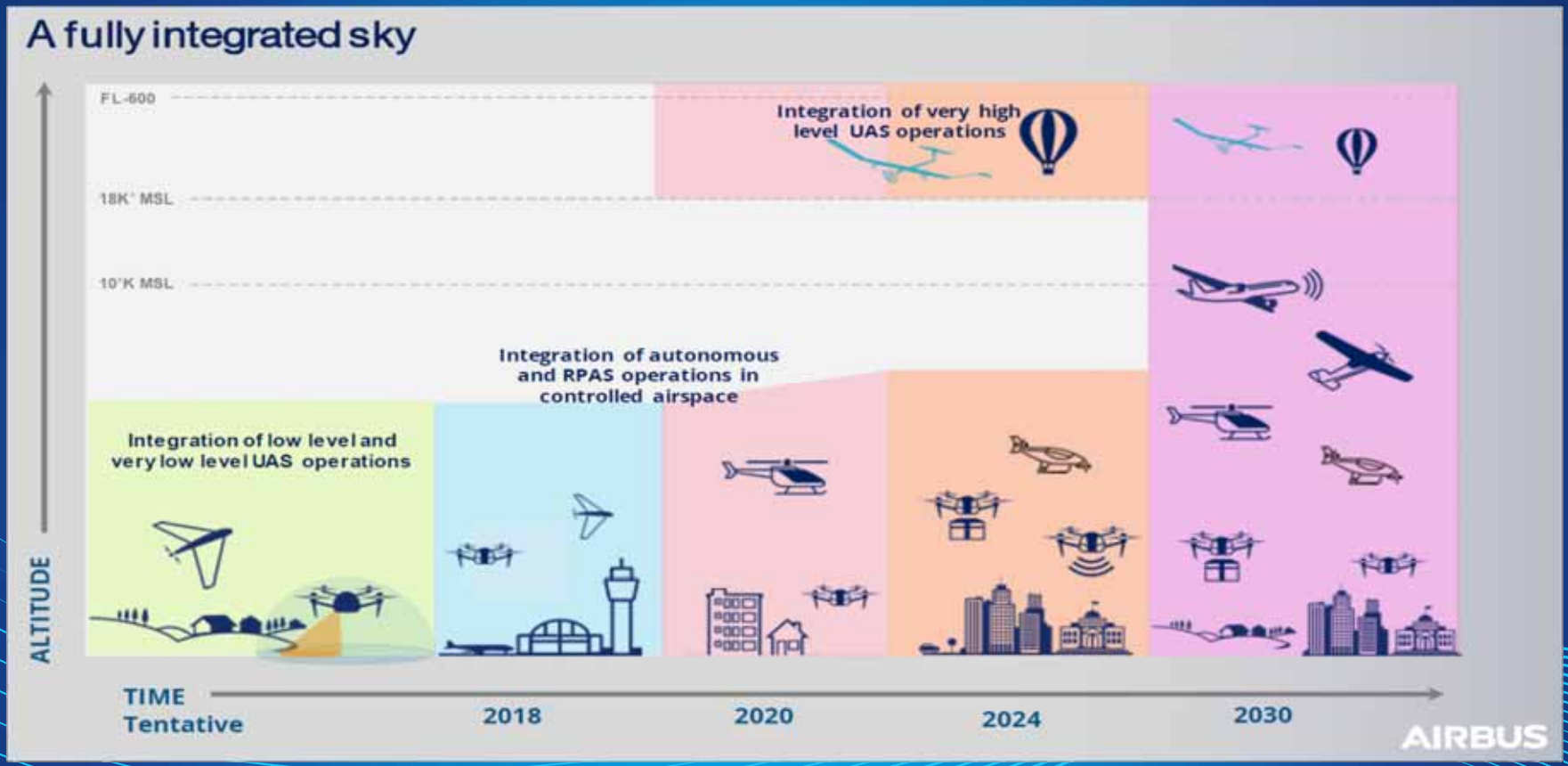
An ecosystem approach engaging with partners and authorities early on

AIRBUS

European Commission

U-Space – what's next?

How will the aviation market look like?



CREATING SINGLE DRONE & U-SPACE SERVICES MARKETS

Decarbonization

zero-pollution ambition

reductions to air, water & noise pollution

Digitization –

connected and automated mobility

@Bulc_EU

Mobility and Transport

European Commission

CREATING SINGLE 'DRONE AND U-SPACE' SERVICES MARKETS

OBJECTIVE OF THE COMMISSION:
KEEP DRONE OPERATIONS
SAFE
SECURE
GREEN
RESPECTING PRIVACY

@Bulc_EU

Mobility and Transport

European Commission

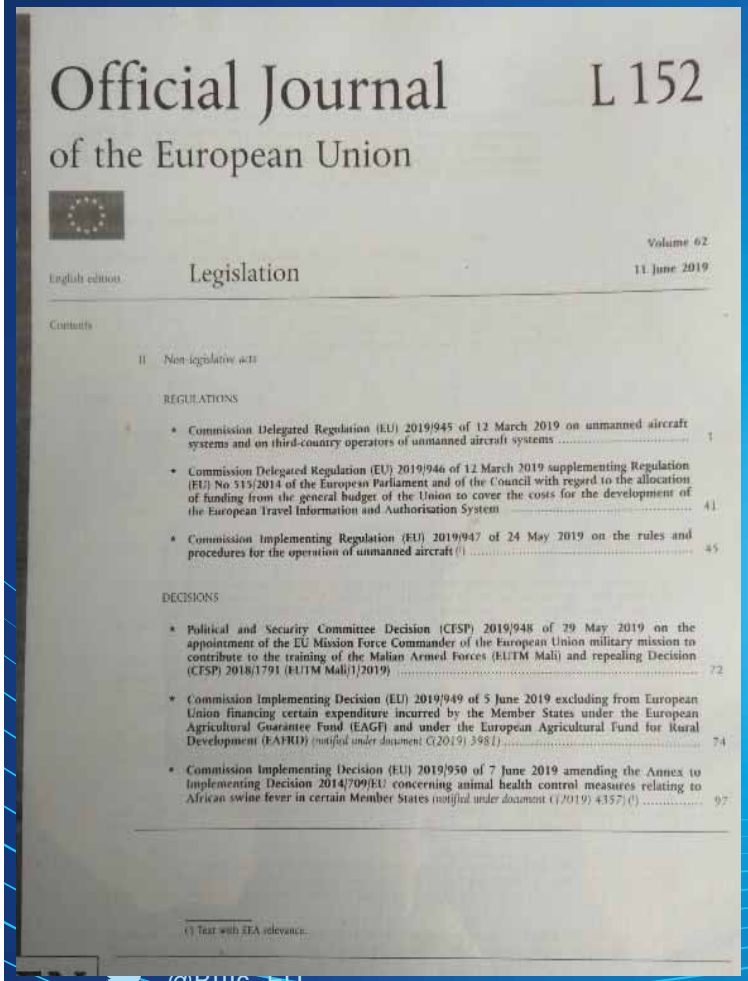
CREATING SINGLE ‘DRONE AND U-SPACE‘ SERVICES MARKETS

@Bulc_EU

Mobility and Transport

European Commission

Making a drone service business now



Official Journal of the European Union

L 152

Volume 62

English edition: Legislation

11 June 2019

Contents

II Non-legislative acts

REGULATIONS

- Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems 1
- Commission Delegated Regulation (EU) 2019/946 of 12 March 2019 supplementing Regulation (EU) No 515/2014 of the European Parliament and of the Council with regard to the allocation of funding from the general budget of the Union to cover the costs for the development of the European Travel Information and Authorisation System 41
- Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (1) 45

DECISIONS

- Political and Security Committee Decision (CFSP) 2019/948 of 29 May 2019 on the appointment of the EU Mission Force Commander of the European Union military mission to contribute to the training of the Malian Armed Forces (EUTM Mali) and repealing Decision (CFSP) 2018/1791 (EUTM Mali/1/2019) 72
- Commission Implementing Decision (EU) 2019/949 of 5 June 2019 excluding from European Union financing certain expenditure incurred by the Member States under the European Agricultural Guarantee Fund (EAGF) and under the European Agricultural Fund for Rural Development (EAFRD) (notified under document C(2019) 3981) 74
- Commission Implementing Decision (EU) 2019/950 of 7 June 2019 amending the Annex to Implementing Decision 2014/709/EU concerning animal health control measures relating to African swine fever in certain Member States (notified under document C(2019) 4357) (1) 97

(1) Text with EEA relevance.

Put regulatory framework in place

- First piece of puzzle...

Drones extend the aviation market

- EU rules reflect "Operation centric approach"
  - Open category: buy and fly – strict limits
  - Specific category: assess the risk
  - Certified category: traditional certifictaion

European Commission

Move to more complex operations:

U-SPACE

FRAMING THE MARKET FROM A DRONE OPERATOR PERSPECTIVE:

- WHO SUPPLIES U-SPACE SERVICES
- U-SPACE SYSTEM
- PRINCIPAL SERVICES
- LINK WITH ATM

European Commission

Move to more complex operations:

U-SPACE

DIGITAL SYSTEM:

- NETWORK
- BE CONNECTED
- SHARE FLIGHT INTENT

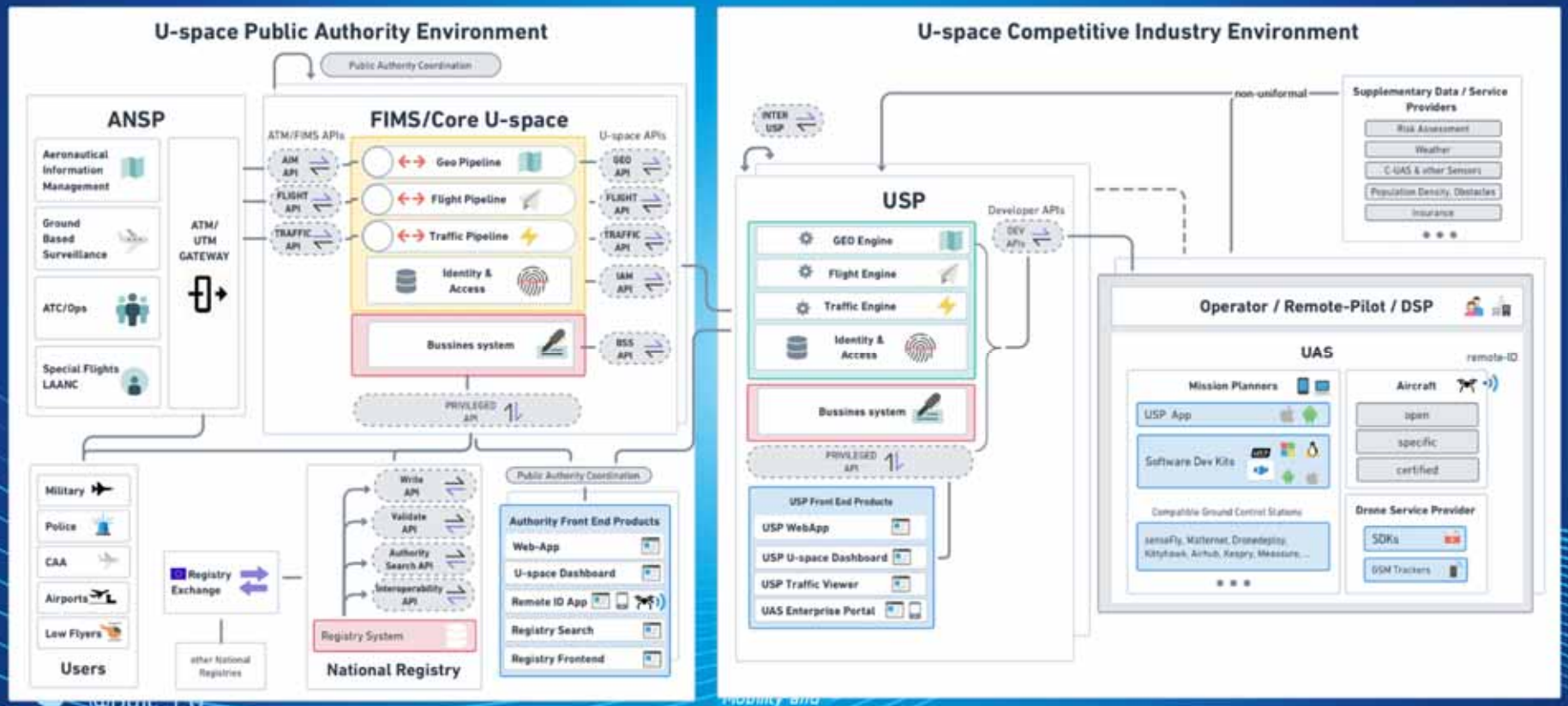
@BuIc_EU

Mobility and Transport

European Commission

U-Space – what's next?

U-space as the internet of flying CONNECTED things – the SYSTEM



What can we learn from you?

- Performance requirements?
- Where did you fly?
- What U-Space services delivered?
- How did you interact with ATM?
- How did you ensure connectivity?

European Commission

Deliver the U-Space

When wants Europe deliver the U-Space?

Official opinion: before December

EASA committee: 2020

Adoption Commission: end 2020

Let's share best practices!

- SESAR reporting
- U-Space demonstrator Network
  - Questionnaire
  - Meet on 3 December in Amsterdam

European Commission

CREATING DRONE SERVICES AND U-SPACE SERVICES MARKETS

Real disruption!

@BuIc_EU

Mobility and Transport

European Commission

Thank you
And see you in Amsterdam

Brussels - October 2019

@BuIc_EU

Mobility and Transport

Philippe Merlo

Director European Civil-Military Aviation, Eurocontrol

U-space

SESAR JOINT UNDERTAKING

Introduction to U-space

The European UTM solution

Robin Garrity
ATM Expert, SESAR Joint Undertaking

U-space

SESAR
JOINT UNDERTAKING

U-space

The Vision

What is “U-space”?

Definition:

“U-space is a set of ***new services*** relying on a high level of ***digitalisation and automation*** of functions and specific procedures designed to support safe, efficient and secure access to airspace for ***large numbers*** of drones.”

- *Services*: All drone operators can safely plan, manage and execute their missions and business needs without needing aviation knowledge through making use of U-space services.
- “… *large numbers* …” : It is easy to fly a single drone, but hundreds of drones, among manned aircraft and over cities, is a considerable challenge, that needs …
- … “digitalisation and automation …” : It is not possible to manage a busy drone environment using a traditional ATC model.

U-space will assure the success of this entirely new aviation paradigm

U-space Partnership

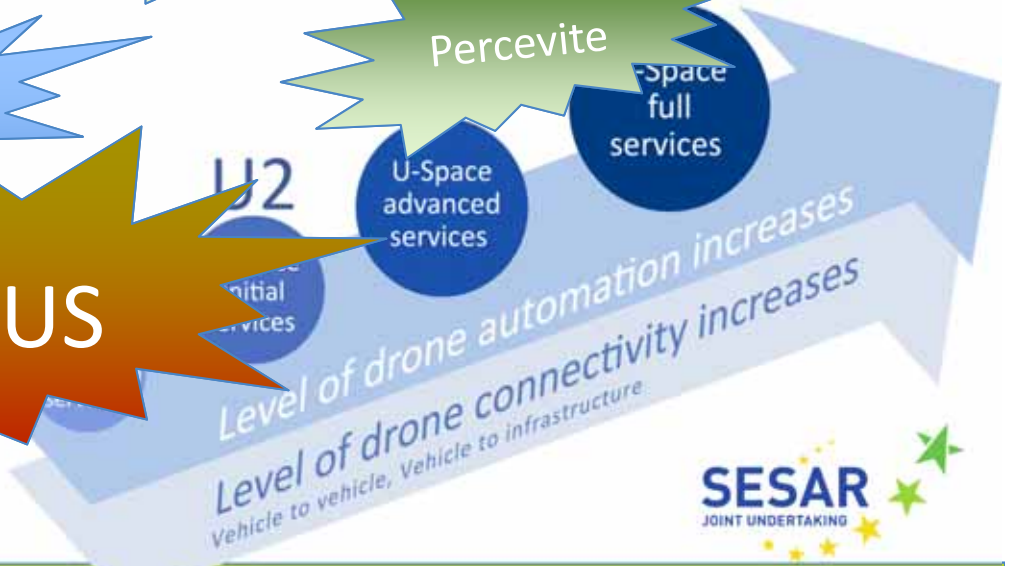
S
E
F
U
L

U-space

We Demo[illegible] U2 and explore U3

PODIUM
GEOSAFE
GOF
VUTURA
DOMUS
EuroDrone
DIODE
SAFIR
USIS
SAFEDRONE
CORUS
CLASS
Dreams
DroC2om
Impetus
Secops
Terra
AIRPASS
Percevite

	Services	capabi[illegible]
U1	100%	9[illegible]
U2	72%	97%
U3	8%	0%



SESAR JOINT UNDERTAKING

U-space

What do we need to do?

We could group our many requirements into three areas:

- Technology, procedures and infrastructure
  - What is needed to fly drones safely and securely in Europe?
- Service provision
  - Can multiple service providers work in the same airspace at the same time?
- Maturity
  - Are we ready to deploy U-space?

Today our sessions will attempt to address each in turn.

SESAR JOINT UNDERTAKING

Introduction to U-space

SESAR added value for U-space

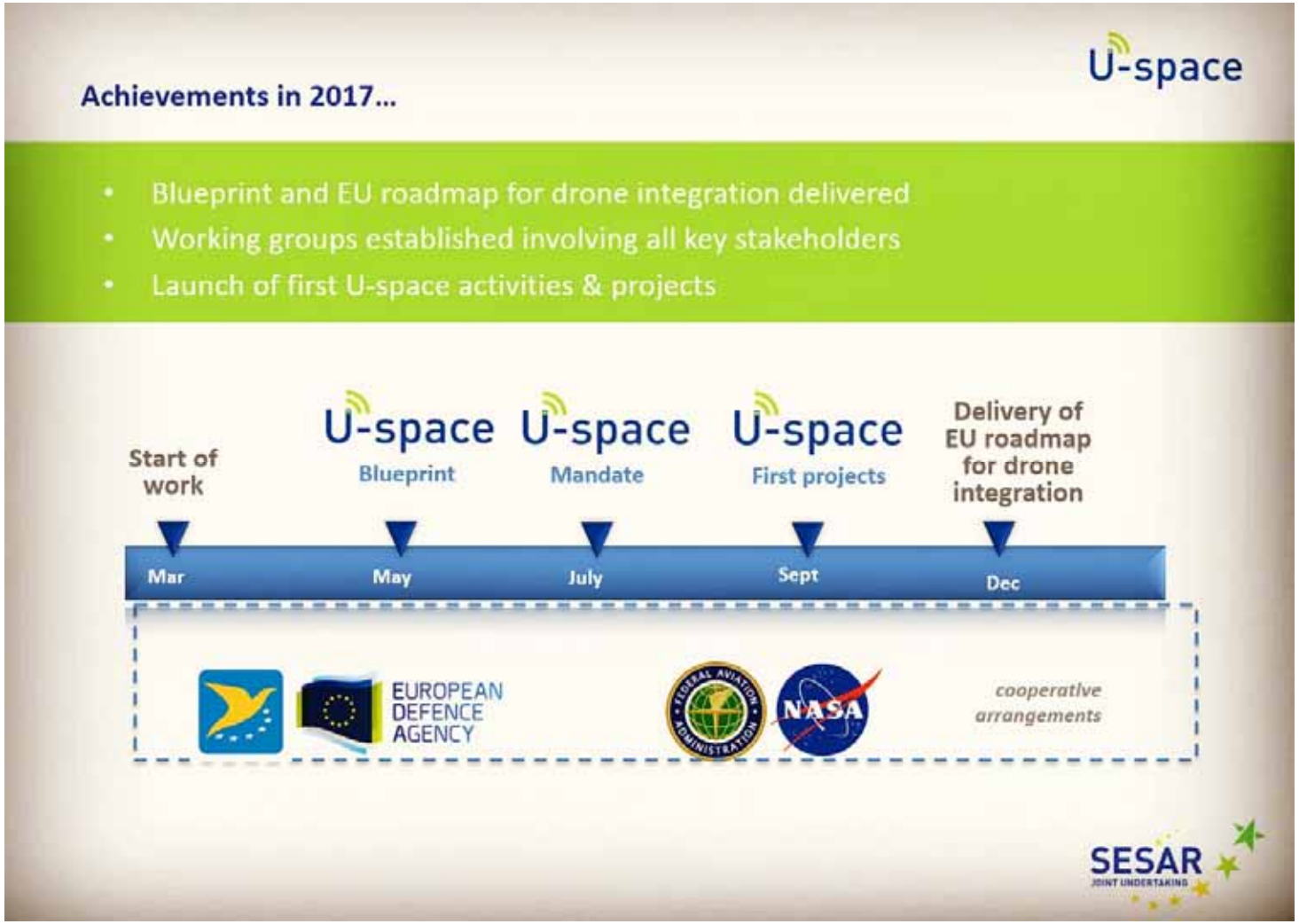
Ludovic Legros
U-space programme manager, SESAR Joint Undertaking

U-space

SESAR
JOINT UNDERTAKING

U-space

2 years ago



U-space working group in October 2017

SESAR JOINT UNDERTAKING

Nowadays

+ €33 millions

125 legal entities

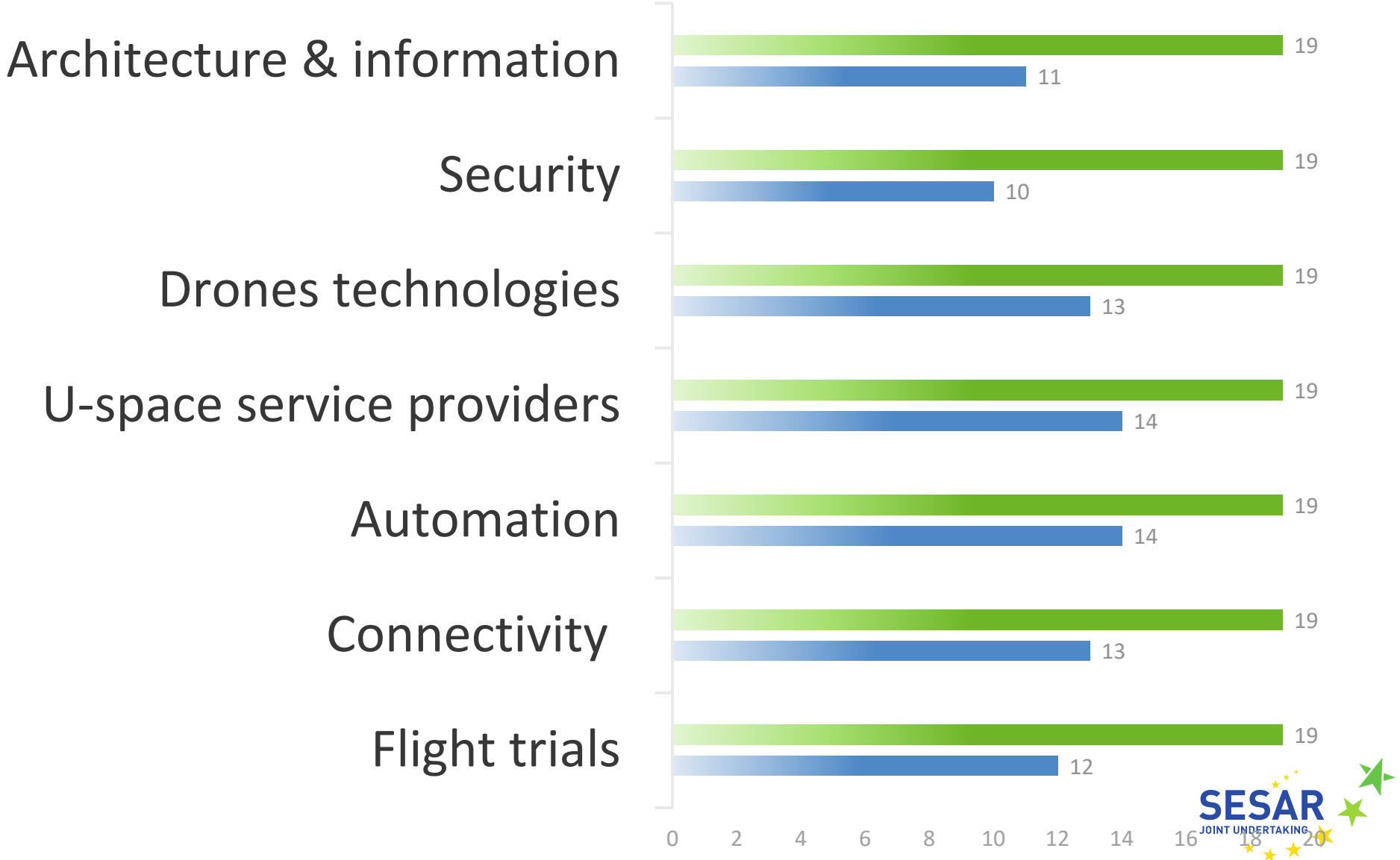
SESAR JOINT UNDERTAKING

19 projects

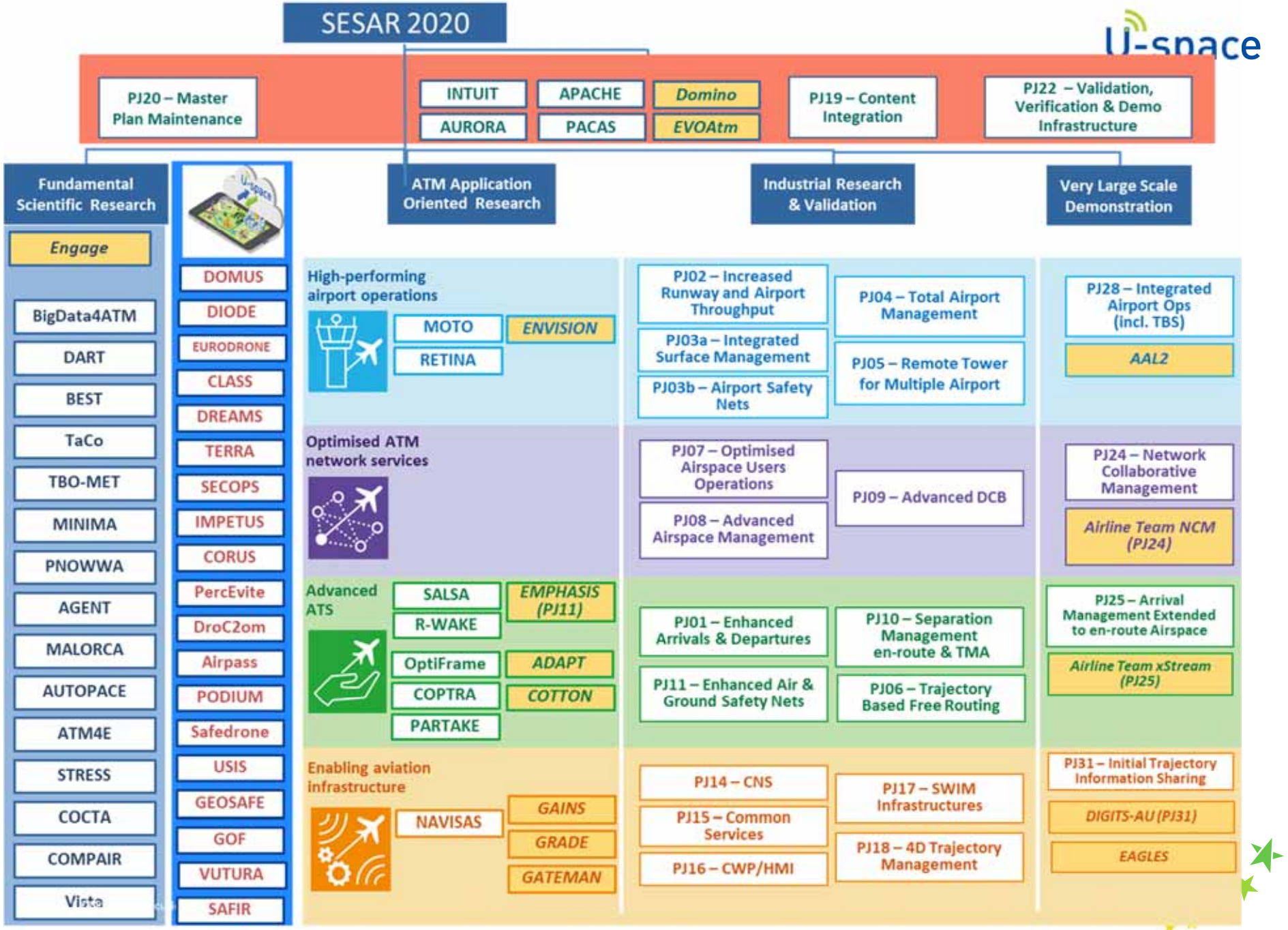
2 years

U-space

Topics addressed by the SESAR portfolio



SESAR JOINT UNDERTAKING


SESAR 2020
U-space
PJ20 – Master Plan Maintenance
INTUIT
APACHE
Domino
AURORA
PACAS
EVOAtm
PJ19 – Content Integration
PJ22 – Validation, Verification & Demo Infrastructure
Fundamental Scientific Research
ATM Application Oriented Research
Industrial Research & Validation
Very Large Scale Demonstration
Engage
BigData4ATM
DART
BEST
TaCo
TBO-MET
MINIMA
PNOWWA
AGENT
MALORCA
AUTOPACE
ATM4E
STRESS
COCTA
COMPAIR
Vista
DOMUS
DIODE
EURODRONE
CLASS
DREAMS
TERRA
SECOPS
IMPETUS
CORUS
PercEvite
DroC2om
Airpass
PODIUM
Safedrone
USIS
GEOSAFE
GOF
VUTURA
SAFIR
High-performing airport operations
MOTO
ENVISION
RETINA
PJ02 – Increased Runway and Airport Throughput
PJ04 – Total Airport Management
PJ28 – Integrated Airport Ops (incl. TBS)
PJ03a – Integrated Surface Management
PJ05 – Remote Tower for Multiple Airport
AAL2
PJ03b – Airport Safety Nets
Optimised ATM network services
PJ07 – Optimised Airspace Users Operations
PJ09 – Advanced DCB
PJ24 – Network Collaborative Management
PJ08 – Advanced Airspace Management
Airline Team NCM (PJ24)
Advanced ATS
SALSA
EMPHASIS (PJ11)
R-WAKE
PJ01 – Enhanced Arrivals & Departures
PJ10 – Separation Management en-route & TMA
PJ25 – Arrival Management Extended to en-route Airspace
OptiFrame
ADAPT
COPTRA
COTTON
PJ11 – Enhanced Air & Ground Safety Nets
PJ06 – Trajectory Based Free Routing
Airline Team xStream (PJ25)
PARTAKE
Enabling aviation infrastructure
PJ14 – CNS
PJ17 – SWIM Infrastructures
PJ31 – Initial Trajectory Information Sharing
NAVISAS
GAINS
PJ15 – Common Services
DIGITS-AU (PJ31)
GRADE
PJ18 – 4D Trajectory Management
EAGLES
GATEMAN
PJ16 – CWP/HMI

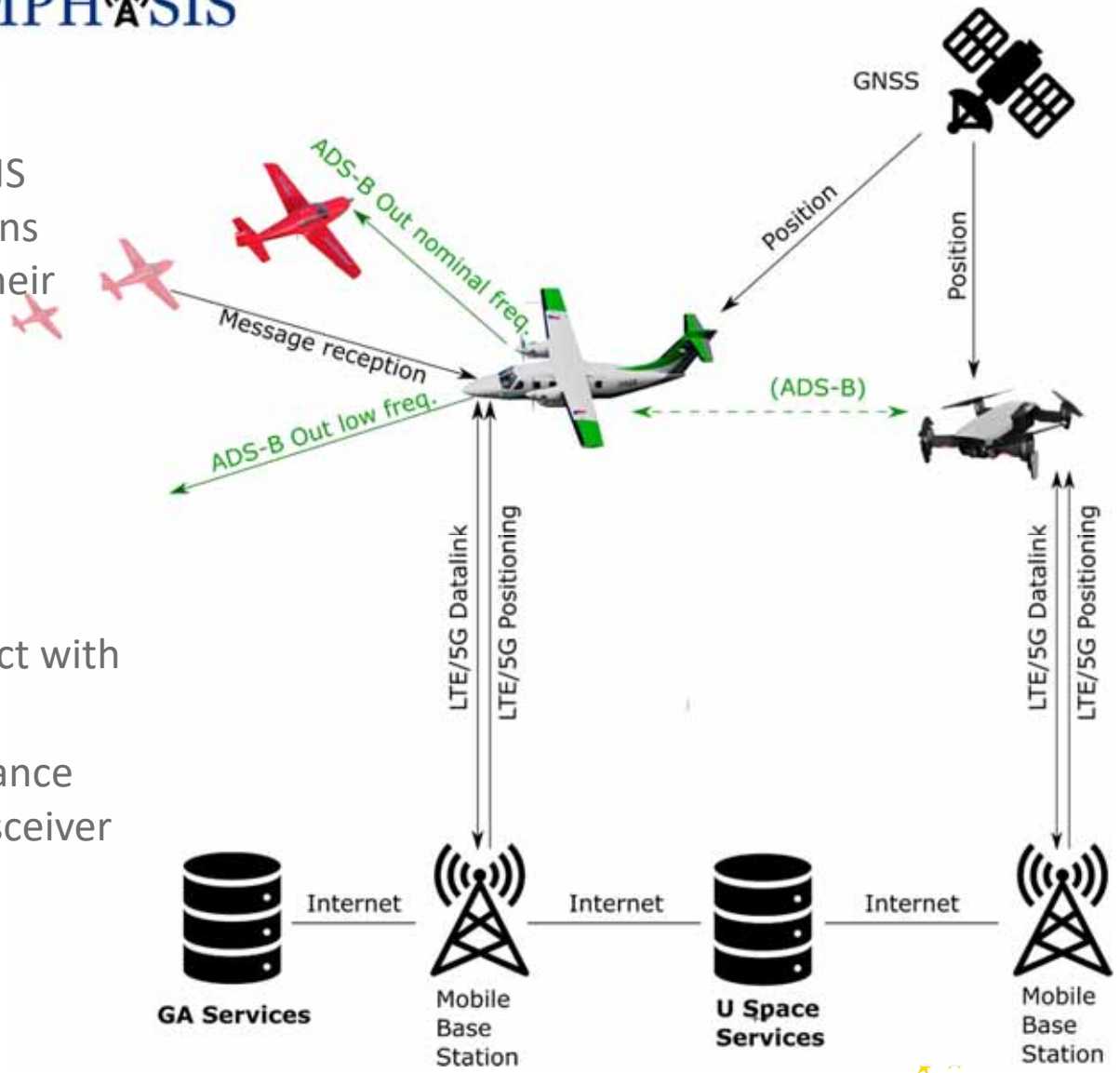
U-space

EMPowering Heterogenous Aviation through cellular SIgnalS

EMPHASIS

The project explores affordable CNS functions for low altitude operations of GA and Rotorcraft to increase their operational safety and their **interoperability with** commercial aviation and **drones.**

- Use of 4G/5G for positioning
- Use of 4G/5G datalink to interact with GA **and U-space** services
- Affordable cooperative surveillance through low power ADS-B transceiver



Honeywell
TAU (Tampere)
Airbus D&S
Evektor

Full speed in 2019

2nd edition

3rd edition sept..2019

U-space architecture

Programme consolidation
(up to Feb. 2020)

Prepare the demonstrations
10 projects

Flight trials

Conclusions

Other U-space projects deliveries
9 projects, more than 100 technical deliverables

2018 — Oct. — Jan. — Apr. — Jul. — 2019

Brussels, 1 October 2019

U-space

Programme consolidation objectives

Services and capabilities coverage	• Considering environments, technologies, missions. • Gaps to be considered in future R&D activities.
What are the SESAR recommendations to ensure a proper deployment of U2	• Needs for new standards and regulations, • Update of existing standards and regulations.
Regarding U3 and U4, what is the current maturity of the services and capabilities and what are the SESAR recommendations	• Needs for new standards and regulations, update of existing standards and regulations. • New/updated service/capability definitions, future R&D activities.

SESAR JOINT UNDERTAKING

U-space

SESAR tangible results

Maturity of the services

Clarification of the U-space concept

Technical feasibility

Standardisation & regulation

Requirements

Performances

SESAR JOINT UNDERTAKING

Maturity of the services

			Scenario 1: BVLOS oil spill
Number of UTM services providers in the shared airspace			2 or more
Validation Scenario	**Mission**	Geometry: Linear/Multipoint/Stationary/Mix	Multipoint
		Range: Short-few meters/Long-km/Mix	Long
		Type: Surveying/Inspection/Transport	Surveying
		Day/Night/Mix	Day
	Environment	Urban/Rural/Suburban/Mix	Mix
		Forestry/Maritime/Other	Other
	Airspace	Green/Amber/Red/Mix	Red
		Cross-border	No
		Unmanned/Mixed (Interaction Aviation/ATC/Airport)	Mix
	Type of flight	Manual/Partly automated/Fully automated/Mix	Fully automated
		VLOS / BVLOS/Mix	BVLOS
		Open/Specific/Certified/Mix	Specific
	Density of drones operations	Number of drones	1
		Number of operators	1
		Max nb of simultaneous flights	10
		Type of drones (Rotor/Fixed wings/Both)	Fixed wings

We demonstrate U2 and U1

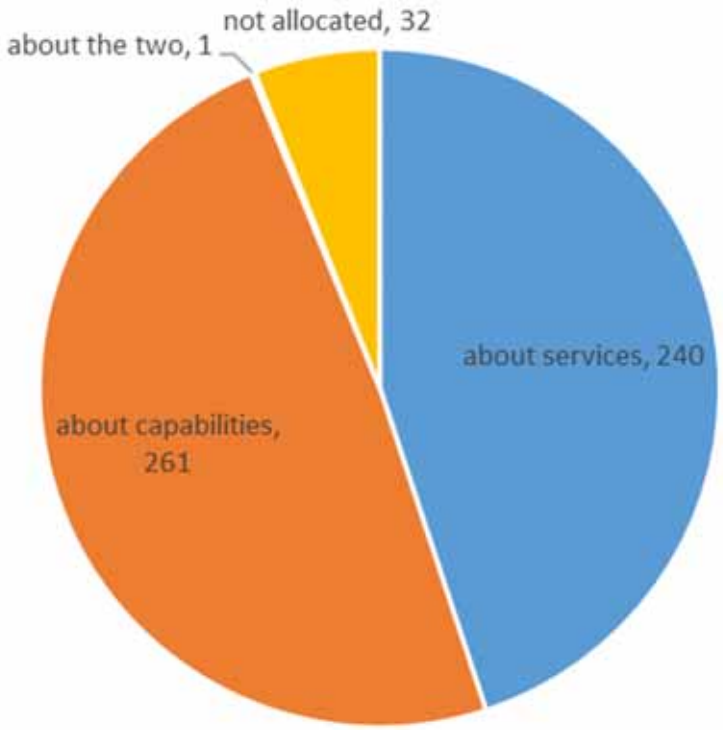
We explore U3 and U4

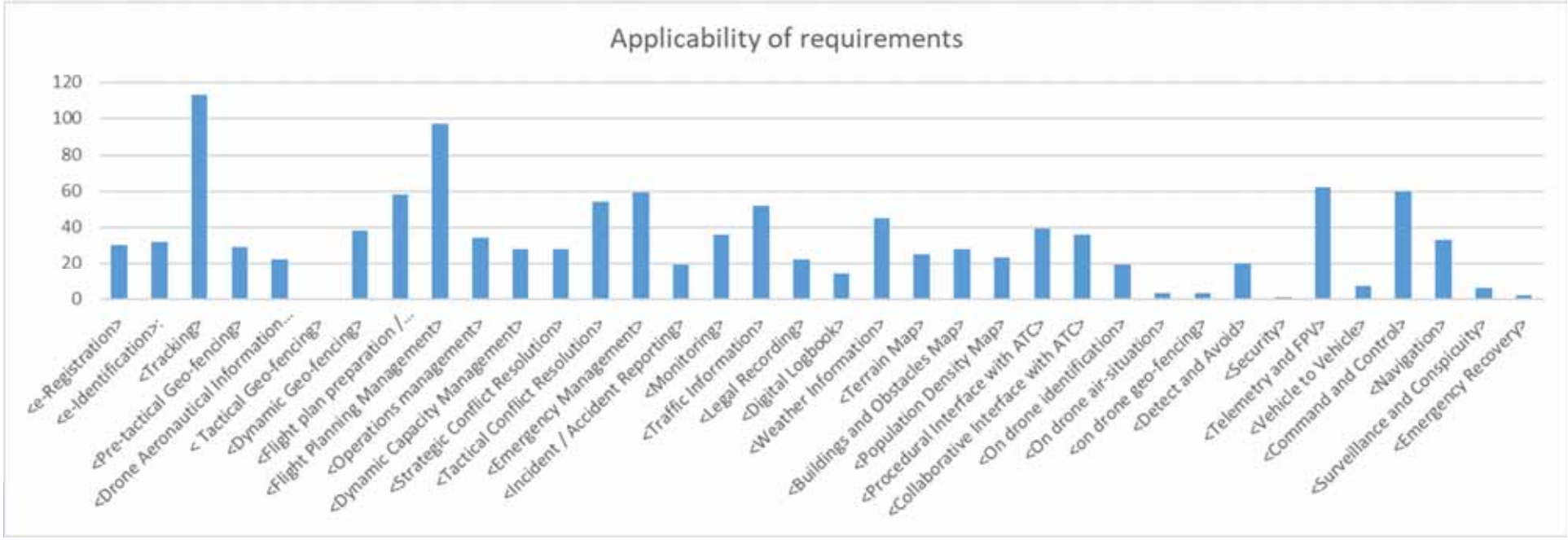
We go a step further

Requirements

Baseline 2

- 534 requirements
- 483 directly in relation with the CONOPS
- From ER to VLDs

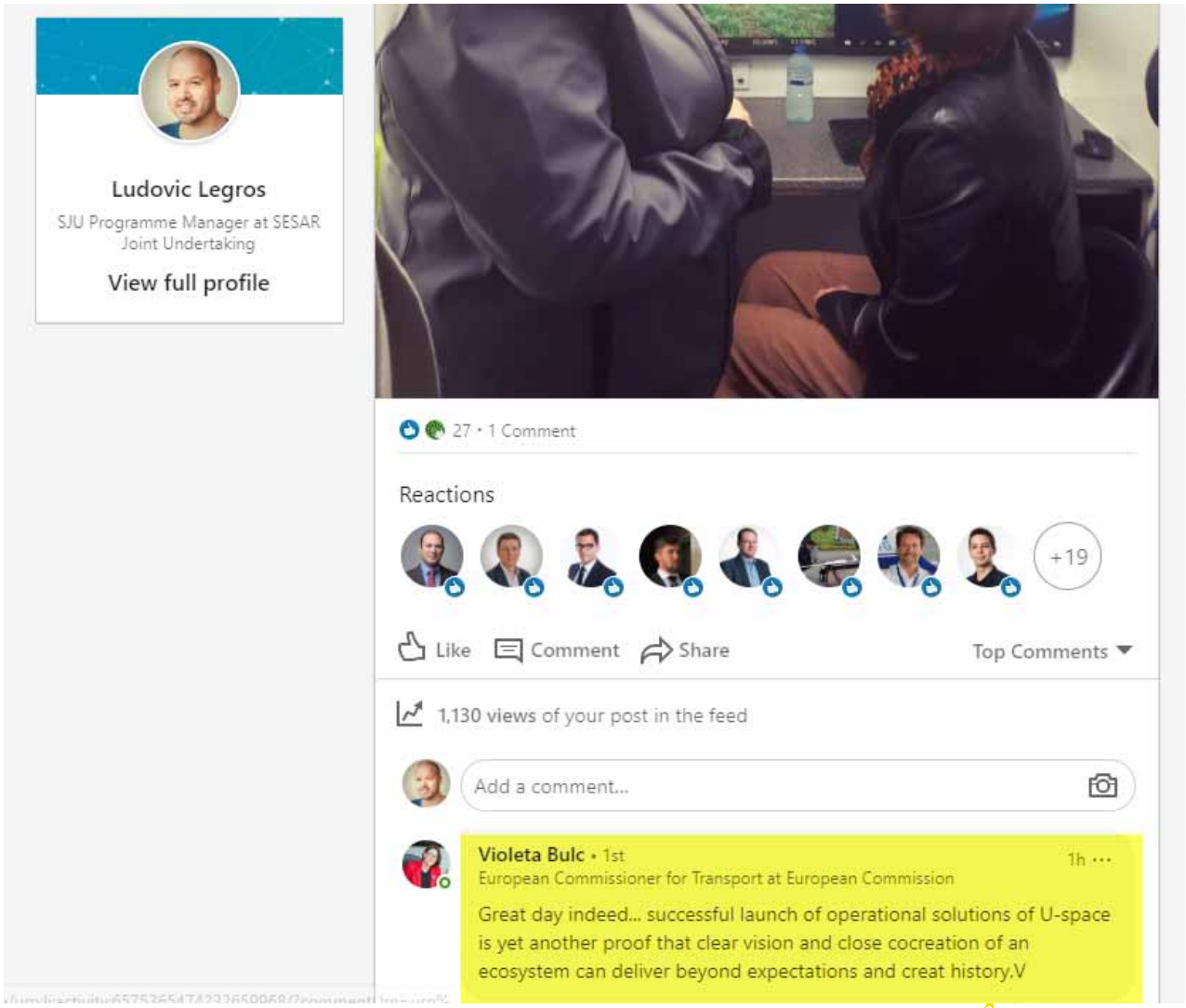




"successful launch of operational solutions [..] is yet another proof that clear vision and close cocreation of an ecosystem can deliver beyond expectations and create history"

Violeta Bulc

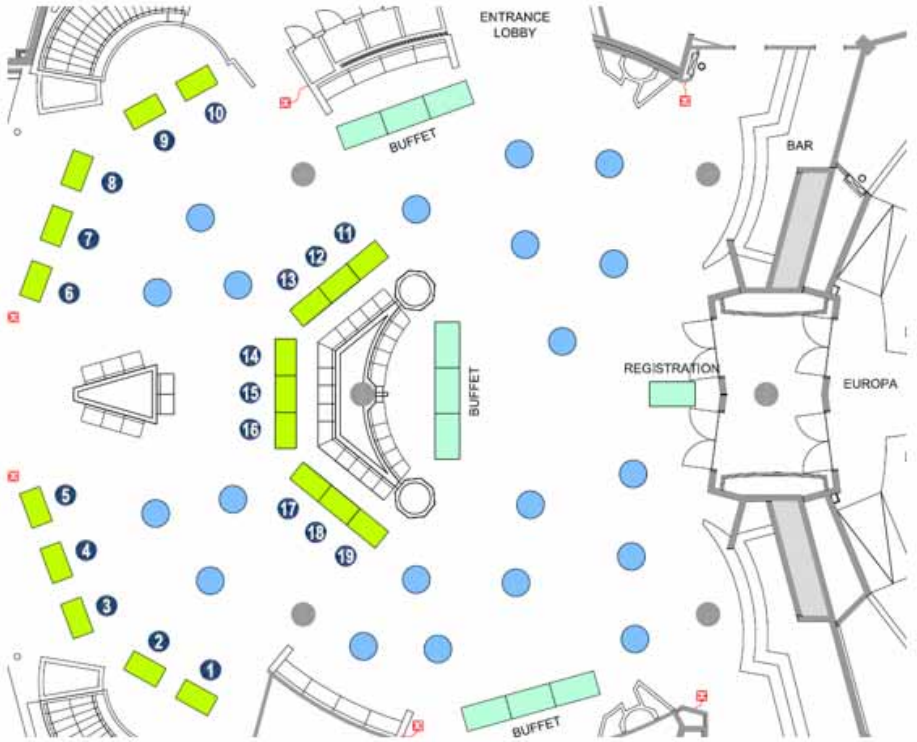
European Commissioner for Transport



U-space growth

Meet the SESAR projects

- What is needed to fly drones safely and securely in Europe?
- Can multiple service providers work in the same airspace at the same time?
- Are we ready to deploy U-space?



TRIAL Flight Trials

Connectivity

Automation

U-space service providers

Drones technologies

Security

Architecture & information

1. **DROC2OM** - DRONE CRITICAL COMMUNICATIONS
2. **USIS** – U-SPACE INITIAL SERVICES
3. **DIODE** - D-FLIGHT INTERNET OF DRONES ENVIRONMENT
4. **GEOSAFE** - GEOFENCING FOR SAFE AND AUTONOMOUS FLIGHT IN EUROPE
5. **CLASS** - GROUND BASED TECHNOLOGIES FOR A REAL-TIME UNMANNED AERIAL SYSTEM TRAFFIC MANAGEMENT SYSTEM
6. **CORUS** - CONCEPT OF OPERATIONS FOR EUROPEAN UTM SYSTEMS
7. **PODIUM** - PROVING OPERATIONS OF DRONES WITH INITIAL UTM
8. **PERCEVITE** - SENSE AND AVOID TECHNOLOGY FOR SMALL DRONES
9. **VUTURA** - VALIDATION OF U-SPACE BY TESTS IN URBAN AND RURAL AREAS
10. **EMPHASIS** - EMPowering Heterogeneous Aviation through cellular SIgnalS
11. **IMPETUS** - INFORMATION MANAGEMENT PORTAL TO ENABLE THE INTEGRATION OF UNMANNED SYSTEMS
12. **DOMUS** - DEMONSTRATION OF MULTIPLE U-SPACE SUPPLIERS
13. **EURODRONE** - A EUROPEAN UTM TESTBED FOR U-SPACE
14. **AIRPASS** - ADVANCED INTEGRATED RPAS AVIONICS SAFETY SUITE
15. **GOF U-SPACE** - FINNISH-ESTONIAN "GULF OF FINLAND" VERY LARGE U-SPACE DEMONSTRATION
16. **DREAMS** - DRONE EUROPEAN AIM STUDY
17. **TERRA** - TECHNOLOGICAL EUROPEAN RESEARCH FOR RPAS IN ATM
18. **SAFIR** - SAFE AND FLEXIBLE INTEGRATION OF INITIAL U-SPACE SERVICES IN A REAL ENVIRONMENT
19. **SECOPS** - AN INTEGRATED SECURITY CONCEPT FOR DRONE OPERATIONS
20. **SAFEDRONE**

U-space

SESAR JOINT UNDERTAKING

Thank you for your attention

U-space

SESAR
JOINT UNDERTAKING