The global need for smarter and more autonomous systems

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Example of the French civil drone industry

CSD&M
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DGAC

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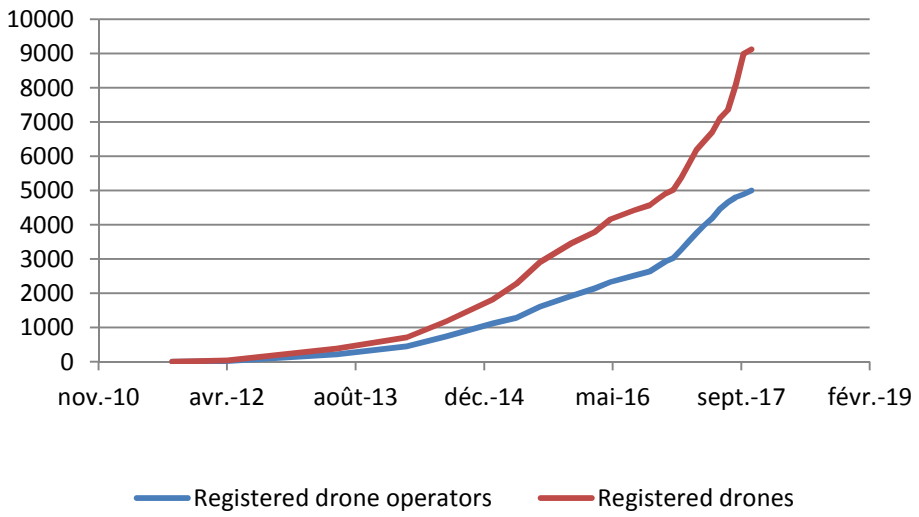
The global need for smarter and more autonomous systems – example of the French civil drone industry

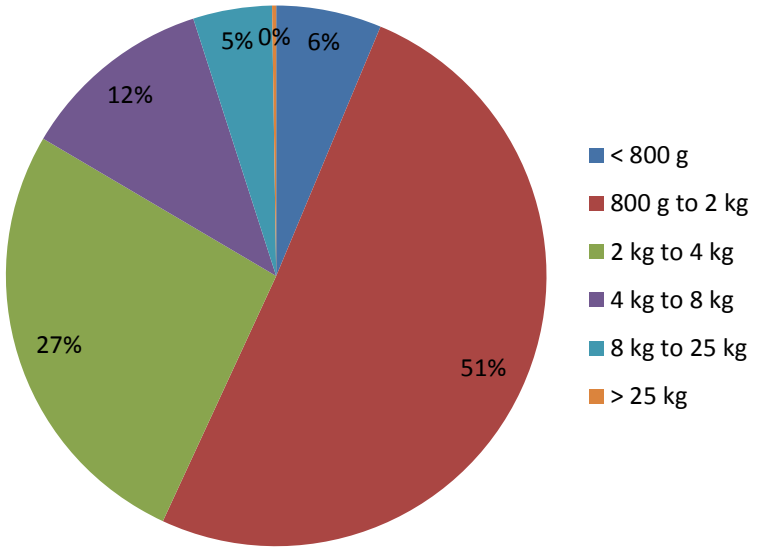
1. The French civil drone industry today
2. The French regulatory framework
3. Brief outlook of drones use cases
4. Challenges to the development of the drone industry
5. Development of an European framework
6. National industrial policy: the Civil drones council

The French civil drone industry today

Registered drones and drone operators in France



Mass repartition of professional drones in France



(source : DGAC/DSAC)

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The French regulatory framework

- **The approach**
  - Ensure safety of people and goods on ground as well as other aircraft
  - Foster the development of the industry
  - Risk-based approach based on operational restrictions

SCENARIO 1 — VLOS

Unpopulated area
Mass < 25 kg
Height < 150 m
Distance < 200 m

SCENARIO 3 — VLOS

Populated area
Mass < 8 kg
Height < 150 m
Distance < 100 m
Safe zone on ground

SCENARIO 2 — BVLOS

Unpopulated area
Mass < 25 kg
Height < 50 m
(< 150 m if mass < 2 kg)
Distance < 1 km
Safe zone on ground

SCENARIO 4 — BVLOS

Unpopulated area
Mass < 2 kg
Height < 150 m
Distance < ∞

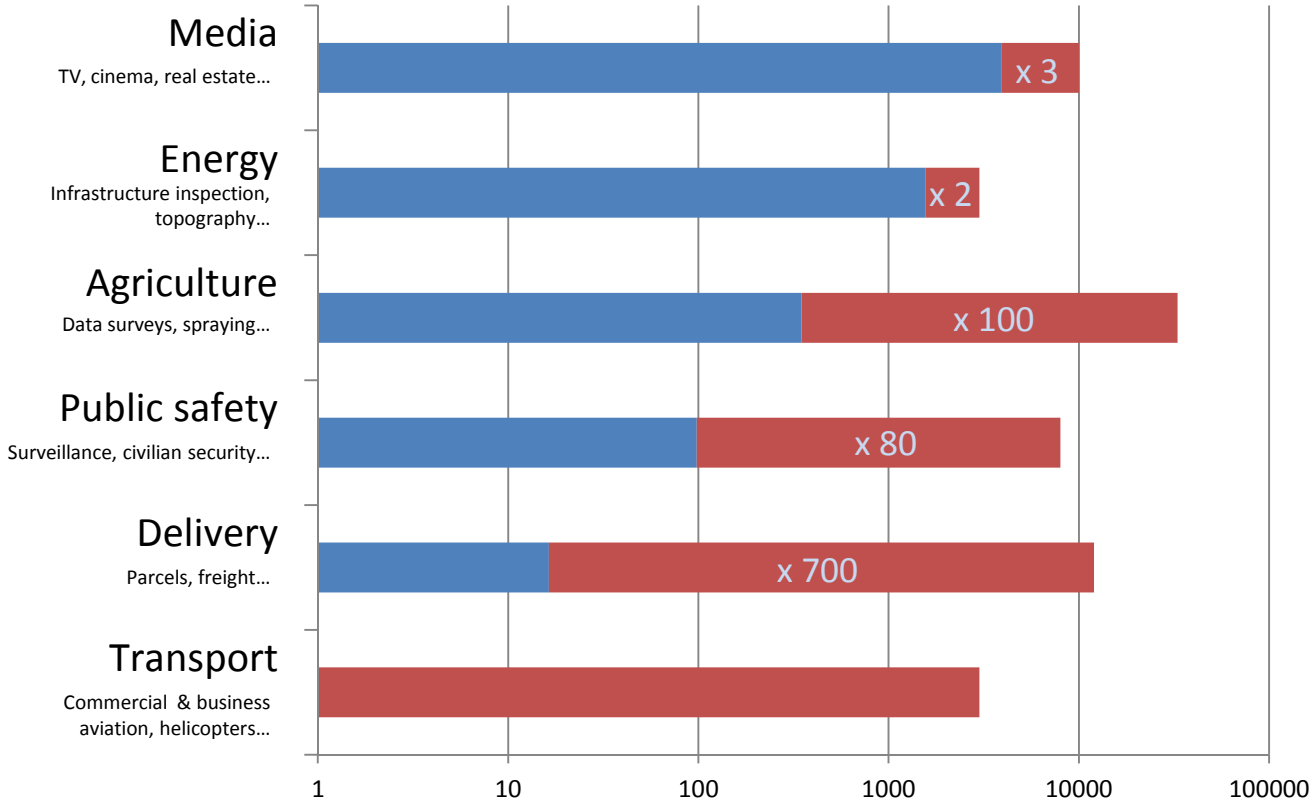
+ law n°2016-1428 (24/10/2016) relative to the reinforcement of the safety of civil drones use

registration, height limitation and e-identification

Brief outlook of drones use cases

Sources :
- ***2016** : DGAC/DSAC*
- ***2035** : SESAR JU*
  (Drone Outlook Study)

Forecast of the evolution of the number of drones by sector in France, 2016-2035



Technical challenges

- Sensors
- Data processing
- Safety methodology
- Autonomy
- Geofencing
- Airworthiness
- Cybersecurity
- Airspace integration
- Quiet propulsion

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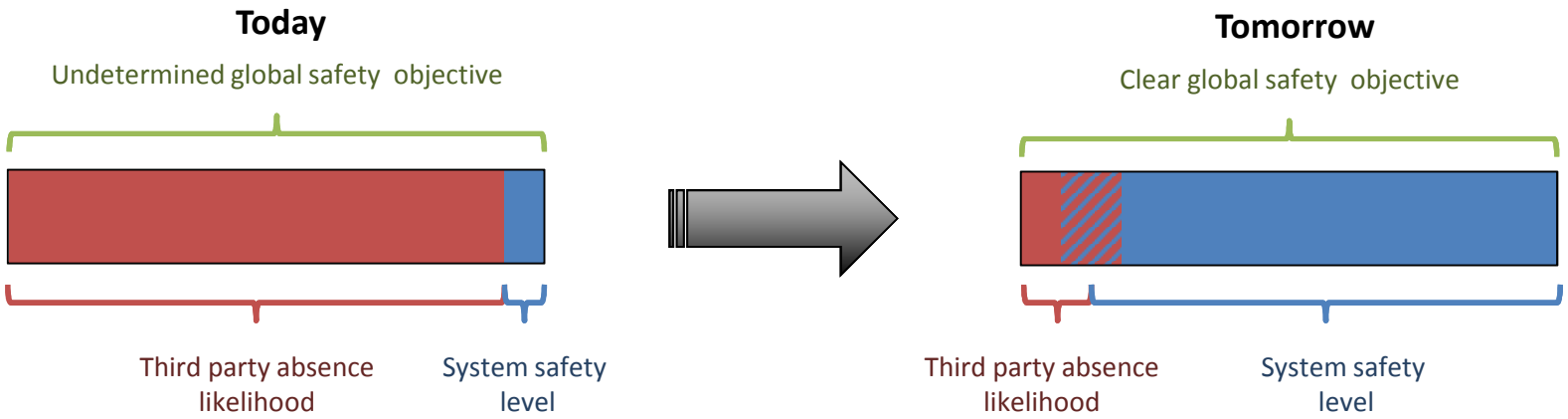
Challenges to the development of the drone industry

- **Regulatory challenges stemming from the technological state-of-the-art**
  - The incremental improvement of a regulation based on operational restrictions is reaching its limits



- **Structural and economic challenges**

Offer → Demand

Players too small to invest at the right level and on the long run, facing long development phases (for SMEs) in order to cover the whole demand spectrum (but niche strategies are valid)	Technical and economical relevance hard to demonstrate compared to existing ground or air-based solutions; experimentations lengthy and costly	Multifaceted addressable market; numerous but unstructured potential customers with specific demands and very cautious strategies (experimentations, few framework contracts)

As well as : acceptability, insurances, frequency spectrum, standardization…

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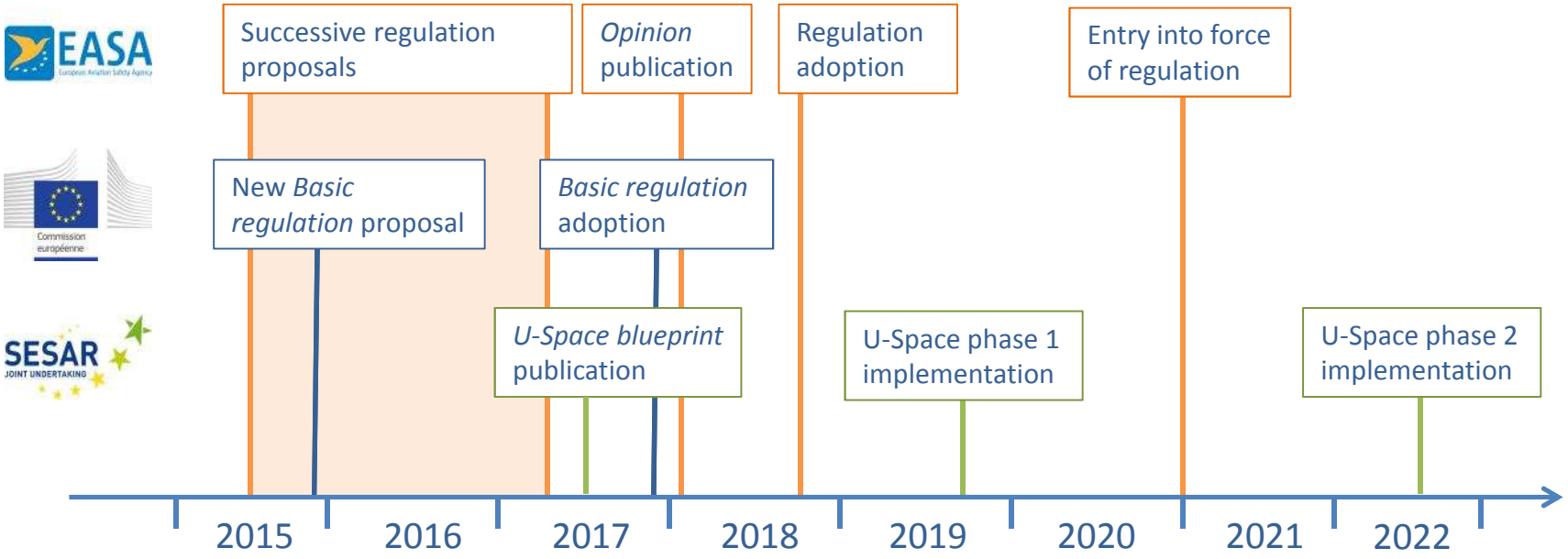
Development of an European framework

- **European calendar**



Ongoing discussions:

- Trilogue Commission/Parliament/Council on adoption of *basic regulation*

  → Extension of EASA's competencies to drones < 150 kg starting early 2018
- Last adjustments of EASA regulation proposal with RMT.0230 Expert group
- SESAR call for proposals in preparation to lay the foundations of U-Space

Development of an European framework

- **Regulation proposal (NPA 2017-05)**

OPEN

- No approval/authorisation
- Operational restrictions
- CE Marking
- Flying zones regulated by each Member State

SPECIFIC

- Authorisation from CAA through *ad hoc* risk analysis carried on by operator or in the framework of “higher risk” standard scenario
- *Or* declaration through “lower risk” Standard scenarios

CERTIFIED

- Comparable to inhabited aviation
- Oversight by CAA

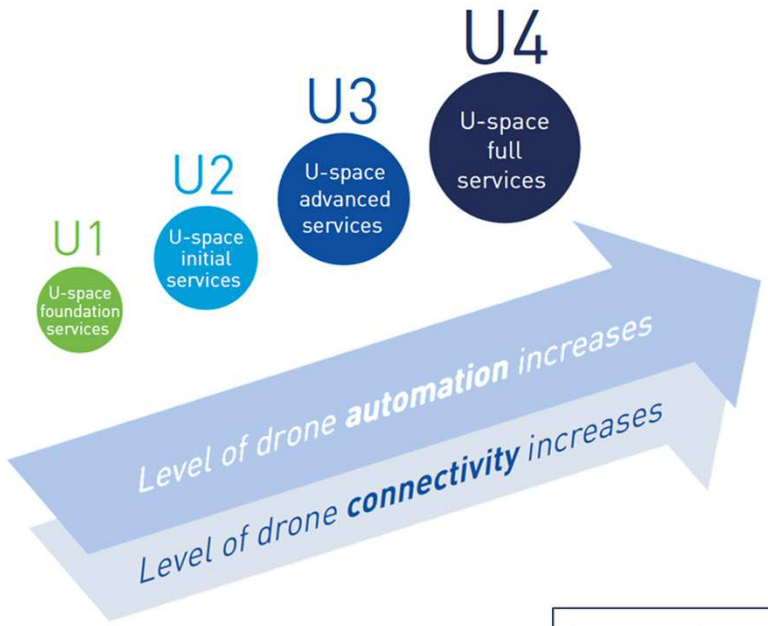
Development of an European framework

- **U-Space & Unmanned Traffic Management**

Objective : allow drone traffic (incl. BVLOS) to thrive while maintaining global safety and addressing security and privacy issues

→ Key enabler of the industry development

→ Only way of integrating numerous drones into airspace



Technological needs:

e-registration, e-identification and geofencing.

flight planning, flight approval, tracking, airspace dynamic information, procedural interfaces with air traffic control.

capacity management, assistance for conflict detection, automated detect & avoid, C2 link reliability.

integrated interfaces with manned aviation, very high level of automation, connectivity and digitalization

Increasing significance of artificial intelligence, decision autonomy, big data… With an added constraint: aeronautical safety level.

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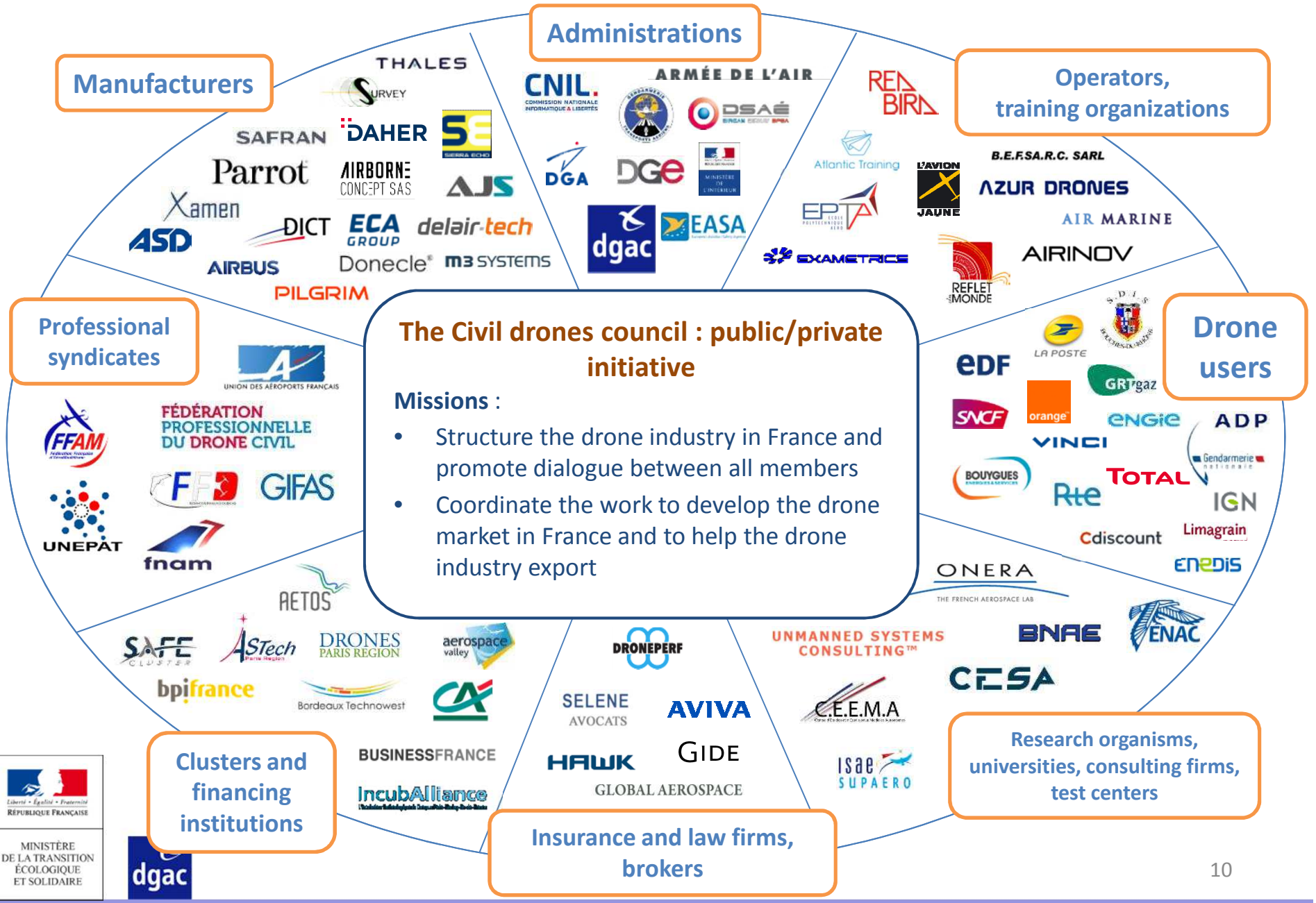
National industrial policy: the Civil drones council



National industrial policy: the Civil drones council

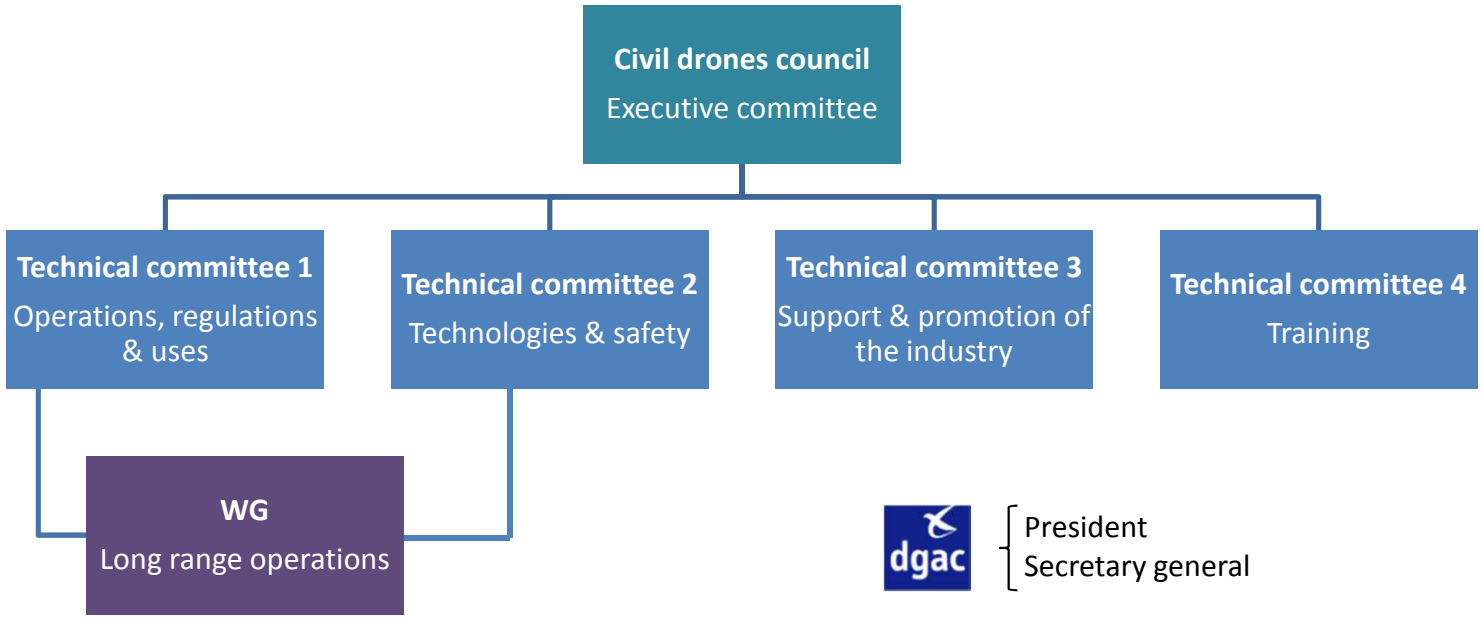
Structure and operation of the Council

Missions :

- Structure the drone industry in France and promote dialogue between all members
- Coordinate the work to develop the drone market in France and to help the drone industry export

Membership: voluntary basis

No state funding for the Council's operating costs



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- President
- Secretary general

Industry
- TC and WG chairmanship,
- New TC and WG proposals

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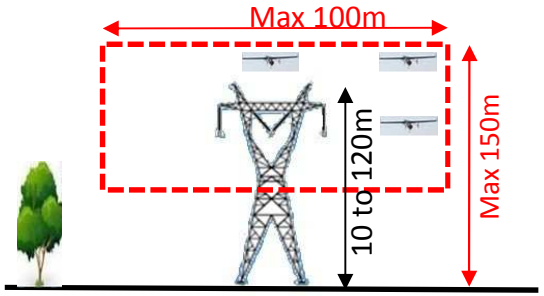
The approach of the Civil drones council

“Long range operations” WG

- A challenging mission envelope:
  - Daily long range surveillance of linear infrastructures (200 km roundtrip minimum) in populated areas and without segregated airspace
- Corresponding to an significant benefit for the industry:
  - Productivity and efficiency gains, significant market in France, unified and proactive end users
  - Many challenges of interest for the industry as a whole
- Many technical and safety-related barriers:
  - Airworthiness (trajectory assurance, communications…)
  - ➔ **From operational restrictions to an appropriate airworthiness**
  - Airspace sharing with other low level users
  - Accounting for the likelihood of ground presence
  - Operator organisational assurance
- Incoming outputs:
  - Short run: from experimentations to preindustrial operations with some operational restrictions
  - → “S4 exemption” **methodology** and European “**Standard scenario”**
  - Long run: allow industrial long range operations
  - → **Demonstrator** of every safety function of long range drones



RTE mission example

The approach of the Civil drones council

“Scenario zero” WG

Demand from end users

- Drone as a professional tool
- Internal use on own ground

But:

× Training requirements
× Administrative procedures

New responsibility allocation

↓ Operator : start and oversee flight at high level
↑ Drone : automatic with a satisfying safety level

Development of acceptable requirements

- Operational concept
- Remote pilot training
- Operator organisational requirements
- Technical requirements (mass, **geo-caging, DAL, *no single failure*, components reliability**…)

Starting 2018

“Restricted” scenario zero

“Full” scenario zero

R&D

The approach of the Civil drones council

“Urban logistics” WG

- Approach: from major logistics hubs in suburbs to micro-hubs in city centre
- Mandate :
  - Use cases study, operational concepts development
  - Application of a safety methodology derived from LRO WG
  - Address cybersecurity and acceptability (incl. noise) issues

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Conclusion

- If when invented, the laser was a “solution without a problem”, civil drones have been immediately seen as useful tools for many industries
- The development of the civil drone industry will be made possible by **disruptive and “aeronautical-level” safe technologies, especially smart and autonomous systems**
- It will have to be organised by regulations and standards that need to be agile, **futureproof** and elaborated with the industry

THANK YOU

Direction générale de l'Aviation civile

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