

**BUSINESS
FINLAND**

SMART MOBILITY WORKSHOP

17 May 2019

CHALLENGE COMPETITION WORKSHOP AGENDA

1. Introduction of Business Finland Challenge Competition. Overview of applications - Ulla Lainio, BF
2. Business Finland funding – Olavi Keränen, BF
3. Presentations of Challenge Competition ideas
4. Drone industry in Finland – Tero Vuorenmaa, Robots.expert
5. Concluding remarks and next steps
6. Networking



FUNDING, NETWORKS AND INTERNATIONALIZATION SERVICES

Smart Mobility program runs from 2018 to 2022 with a total budget of EUR 100 million

For companies registered in Finland the program offers innovation funding, market intelligence, networking and internationalization services e.g. trade missions

Targeted at companies, research organizations, municipalities and cities, and e.g. service, ICT and manufacturing industries

Challenge Competition for an own development project or a joint-project with other companies and research institutes

Business Ecosystems generate growth and innovation



NEW LOGISTICS

5G





SMART MOBILITY CHALLENGE COMPETITION

SMART MOBILITY CHALLENGE COMPETITION 10 THEMES

FROM FOREST TO SEA FROM DOOR TO DOOR

1. Cyber security in traffic or in remote operations
 2. Autonomous or automated logistics and supply chains
 3. New system electrification solutions / electric vessels, vehicles or moving machines
 4. Artificial Intelligence and sensor data fusion and open data in smart vehicle or traffic solutions
 5. Disruption of traffic, mobility services and digitalization from user's perspective
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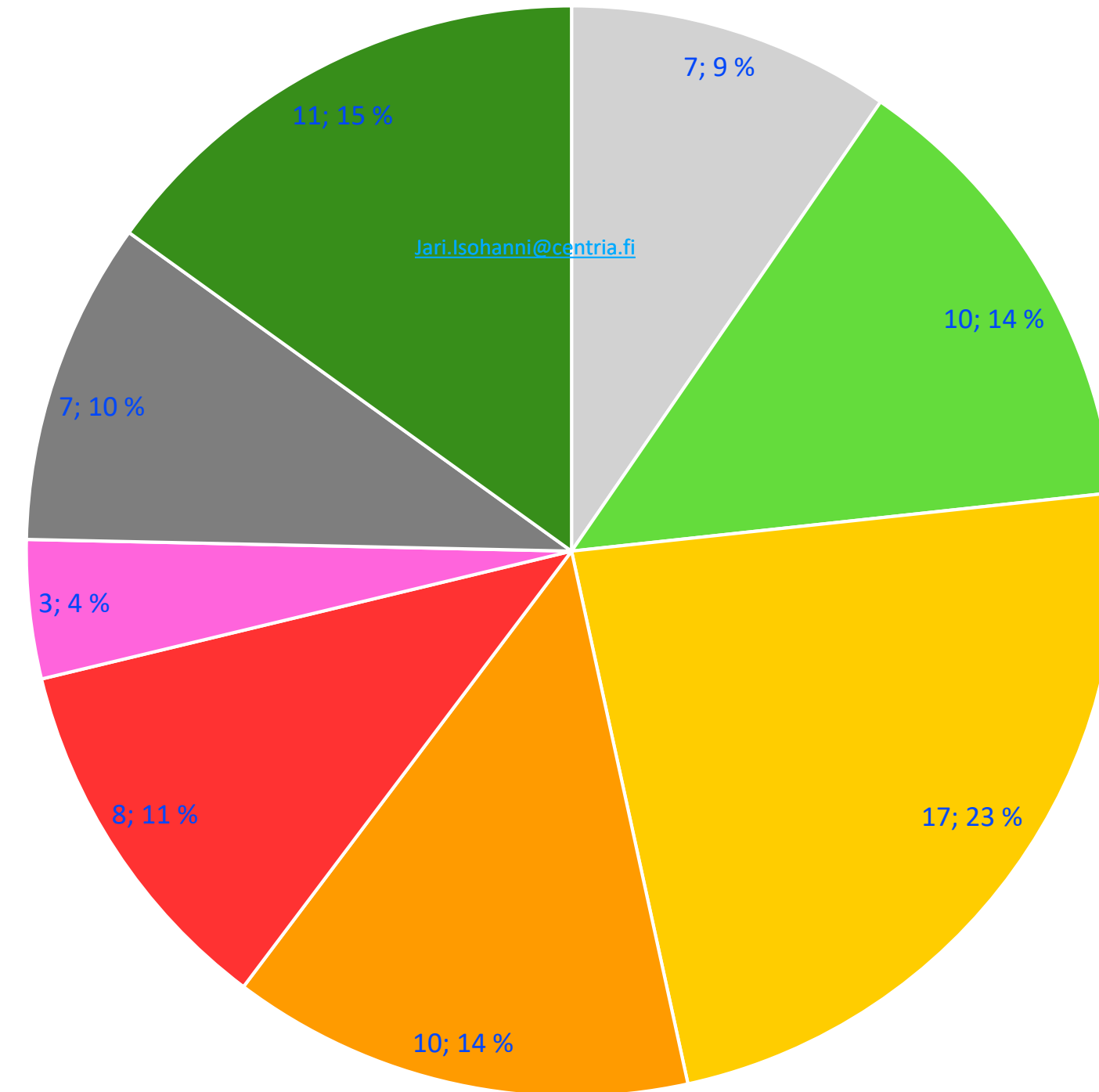
SMART MOBILITY CHALLENGE COMPETITION 10 THEMES

FROM FOREST TO SEA FROM DOOR TO DOOR

6. Analytics and use of open traffic data or integration of system data
 7. Arctic sea traffic and Arctic routes, logistics
 8. Solutions for reaching or under cutting the tightening emission limits
 9. MaaS (Mobility as a Service), transportation of goods and passengers
 10. Other solutions or technologies improving the Smart Mobility theme
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SMART MOBILITY CHALLENGE COMPETITION IDEAS = 73 pcs

Number of Ideas



■ Drones ■ Marine Industry ■ MaaS ■ Traffic ■ Electric Vehicles ■ Platforms ■ Forest Industry ■ Logistics

FUNDING FOR INTERNATIONAL GROWTH

Impacts for Finland

Horizon 1:
Grow current business, 1-2 years

Horizon 2:
Build emerging business, 2-4 years

Horizon 3:
Create options for the future, 5-10 years

Time

FUNDING SERVICES

FOR COMPANIES

RESEARCH, DEVELOP, RENEW, GROW

EXPLORE, TEST, GO GLOBAL



The amount of funding depends on the company's needs and resources.

FOR RESEARCH ORGANIZATIONS: CO-INNOVATION AND CO-CREATION FUNDING

**BUSINESS
FINLAND**

**PRESENTATIONS
CHALLENGE
COMPETITION IDEAS**

PRESENTATIONS

1. VTT, Drone Accelerator
2. Rumble Tools, All-Weather Multi-purpose Drones in Logistics
DroLo
3. VTT, Hot & cold last mile delivery solution
4. Kehittämisyhtiö Karstulanseutu Oy, New kind of UAS test &
research environment PDF
5. Third Space Automation ByDrone introduction

Drone Accelerator: The Challenge



Picture @ AAU

- The estimated international market for the drone area **is bigger** than any other area of autonomous systems
- **Finnish drone ecosystem is currently rather fragmented**
 - Relevant research institutes, corporations SMEs, public organisations are not very aware of each other and possible joint development interests
- At the moment, it looks like **other countries are going ahead** of Finland in drone business, research & innovation
- More **speed and collaboration is needed** with a learning-by-doing attitude!
- We need to take initiative in building a **national Drone Accelerator to Finland**

Drone Accelerator: Benefit, Market Potential and International Business



Picture @ VTT

- Markets & Markets ([2017](#)) estimate for drone market growth: **USD 18,14 Bn (2017) → USD 52.3 Bn (2025) with CAGR 14,15%**
- [EU: 150 000 new jobs around EU area by year 2050](#)
- References abroad: [UAS Denmark](#), [Robotics Place](#), [Droneport](#) and [NuAIR](#)
- The Drone Accelerator's potential international partners:
 - Belgium: [SABCA](#)
 - Denmark: [Drones@AAU](#) and [UAS Denmark](#)
 - France: [Air Space Drone](#), [ICS group](#) at Paul Sabatier University, [Thales](#)
 - Portugal: University of Madeira [M-ITI group](#), University of Porto [LSTS group](#)
 - Taiwan: Industrial Technology Research Institute ([ITRI](#))
 - USA: [NIAS](#), [RTI International](#), [Singularity University](#)
- **A Finnish Drone Accelerator can inform EU-level drone regulation**
- **The Drone Accelerator will increase international business in many areas**

Drone Accelerator: Solution



Picture @ VTT

- 1. Development of a joint learning-by-doing center**
 - Business-oriented pilot and PoC initiative development
- 2. Finding drone pilots from across relevant existing domain ecosystems**
 - E.g., [Smart Otaniemi](#), [One Sea](#), [ITS Finland](#), [Smart Tram](#), [FIMA](#) & [Living Lab Bus](#)
- 3. Innovation actions for companies facilitated by research institutes**
 - Initiative workshops, think tanks, impact assessments, service concepts, etc.
- 4. Active and continuous piloting and testing**
 - [Number 9](#), [OuluZone](#), [Redstone Aero](#), [Aviapolis](#), [Kiikala](#) & [Hiedanranta](#)
 - Research project supports piloting → "Cookbook for Doing Drone Business"
- 5. Commercialization of new innovative drone-related business models**

Drone Accelerator: Partners

- For the accelerator to be a success, **key drone stakeholders** in Finland need to be involved
- The following organisations have expressed their support to VTT for building the accelerator:
 - **ANS Finland**
 - **Arctic Drone Labs**
 - **Forum Virium Helsinki**
 - **Gaiothe** (Patrick Halford, SingularityU Nordic)
 - **Natural Resources Institute Finland (Luke)**
 - **Finnish Geospatial Research Institute**
 - **Oulu University of Applied Sciences**
 - **Robots.expert**
 - **Traficom**
- **RAAS organisations:** e.g., Aalto University, Univ. of Oulu, Tampere University, Univ. of Turku
- Other potential partners: **Finnish Environment Institute (SYKE), RumbleTools, Securitas, Vaisala, Port of Oulu, FMI, 3PL Logistics, Toybox, Posti and Third Space Auto (DroLo)**
- VTT and RAAS can ramp up the accelerator (in two years) and then a joint venture can run it
 - The accelerator contributes to **Testbed Finland** offering



Drone Accelerator: Project Scope and Timetable

- The proposal has a **collaboration connection to the DroLo project preparation**
- In the **start phase**, funding is needed for
 - 1) the definition of Drone Accelerator's **operational model & rulebook**,
 - 2) joint **preparation of the first phase of pilots**, and
 - 3) start of the **joint learning-by-doing center with a kick off event**
 - Duration of this start phase is 6 months in **10/19–03/20**
- The **ramp-up phase and first operational period** lasts 1½ years
 - Schedule: **04/20–9/21**
 - **Includes piloting and analysis of 10–15 drone business cases**
 - New accelerated piloting batch (about 5 pilots each) would start every 6 months
 - This "piloting pump" of new co-innovation projects would run as long as needed
- **Altogether 25–40 companies to be involved in the pilots**



All-Weather Multi-purpose Drones in Logistics **DroLo**

5.6.2019

Project scope

- For 2050, more than 400 000 drones for commercial and government missions are expected to operate in Europe
 - Estimating a total impact of EUR 27 bn – EUR 43 bn
 - Over 100 000 new jobs directly related to UAV production and services
 - + 250 000–400 000 additional non-direct jobs
- The project studies and develops safe and secure all-weather multi-purpose drones
 - The drones should be able to operate in the Nordic conditions or in another challenging environment year-around in order to:
 1. enable maximum utilization of each drone,
 2. optimize the performance of the logistics chain, and
 3. generate novel future multi-purpose drone operations that combine logistics, surveillance and measurement possibilities



The challenge

- Drones are not yet operating reliably enough to ensure safe and secure long-term operations and goods transportation
 - Especially automated flying above residential areas has its challenges
- Weather (wind, frost, snow, ice) and its sudden changes are a challenge
 - Problems are related to, e.g., 1) battery life in the cold conditions, 2) correct flight path in heavy wind, 3) and frosting of drone rotor blades in icy rain
 - Especially, the Nordic weather conditions are a challenge for 24/7 year-round drone operations
 - Weather challenges for drones are also seen to increase globally, because of the climate change
- Connectivity challenges related to logistics drones need to be solved



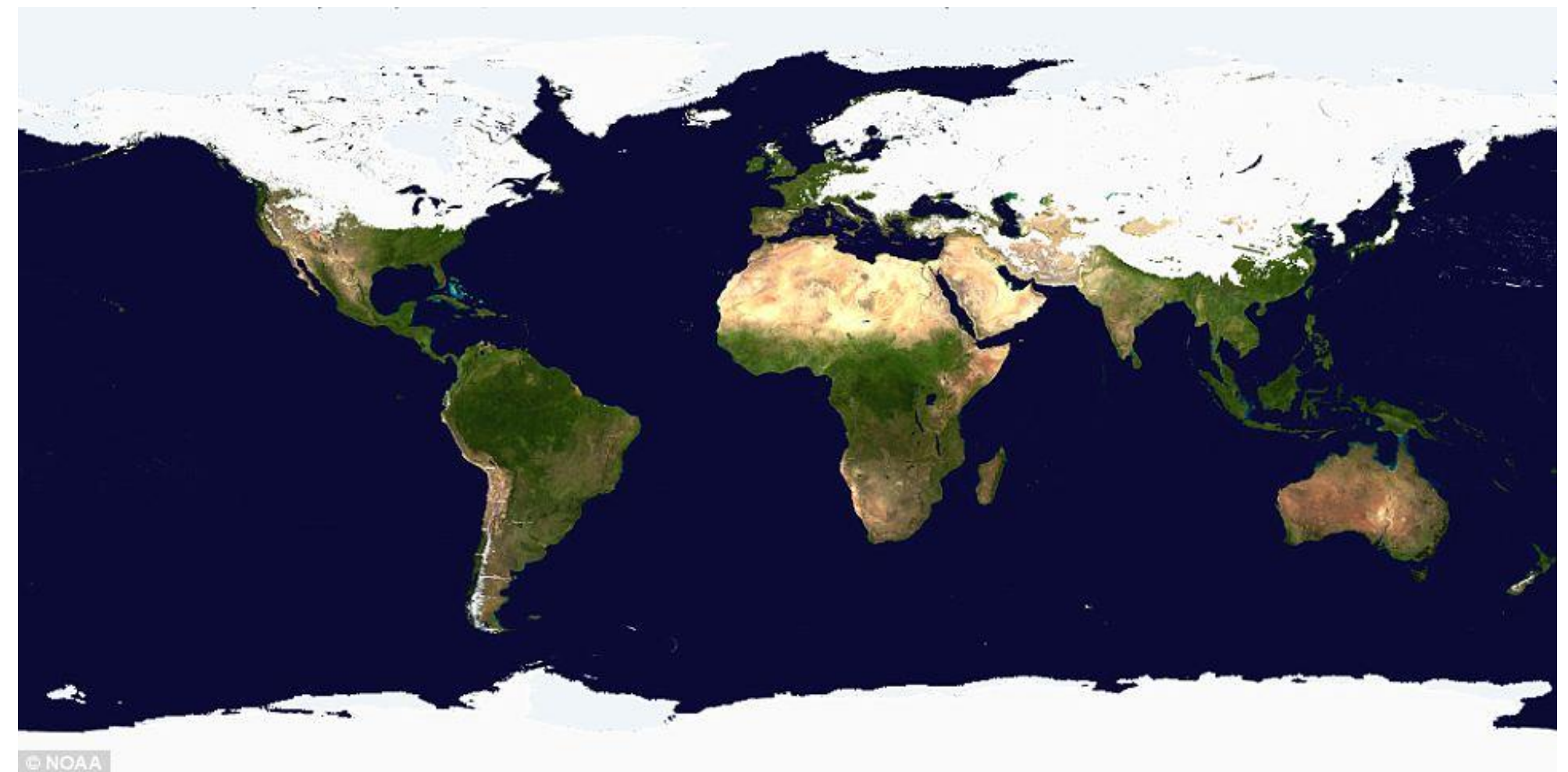
The solution

- The project provides research, piloting and case studies on:
 - Solutions to improve drone weather resistance
 - VTT's icing wind tunnel will be used for testing
 - Solutions to maximize the drone aerial time
 - For example, fuel cell solutions for drones (VTT)
 - Solutions to parcel loading, logistics and unloading
 - Definition of the optimal flight path and optimisation of flight time using weather analysis and prediction data
 - Mapping of safety-related and other critical issues of drones flying in residential areas and BVLOS
 - Assessment of public acceptance, consumer/user experience and human factors related to drone logistics
 - Development of a successful business model for all-weather multipurpose drones in logistics
 - Utilization of existing drone testbeds in Finland and contribution to building drone service ecosystems



The international market potential

- Finnish products are typically associated with good quality
 - Drone technologies validated in the challenging Nordic conditions will set an even greater safety margin when applied in the rest of world
 - Development of relevant know-how will also form the basis of a sustainable export potential from Finland
- Canada, Denmark, Iceland, Northern USA, Norway, Russia, Sweden, and some Asian countries have similar weather conditions as Finland has
 - Organisations in these countries utilise drone technologies in the same application areas as some of the Finnish drone users
- USA is one of the leading countries in the area of AI use in drones
 - AI technologies are utilised to compliment and substitute human actions in drone missions as well as process the data collected by using drones



DroLo project partners

- **The project partner network consists of different actors in the value chain:**
 - Developer organisations:
 - RumbleTools
 - Vaisala
 - Third Space Auto (& SABCA)
 - Finnish Meteorological Institute
 - End-users:
 - Securitas
 - 3PLogistiikka
 - ToyBox Finland
 - Posti Group
 - Port of Oulu
 - Research organizations:
 - VTT
 - OAMK/Arctic Drone Labs
 - University of Oulu
 - Potentially some other RAAS orgs.
 - Public orgs. (not yet deeply involved):
 - Forum Virium Helsinki
 - Business Tampere
 - Border control
 - Police
 - Cities

Key contacts of the DroLo project

- Pentti Kokki, RumbleTools
- Mika Aro & Matti Helén, Securitas
- Hannu Karvonen (RAAS Coordinator) & Virpi Oksman, VTT
- Timo Lind, Arctic Drone Labs
- Arshia Gratiot, Third Space Auto
- Anne Hirsikko, Finnish Meteorological Institute
- Mira Juola, Port of Oulu
- Vadim Kramar, Oulu University of Applied Sciences, Allied ICT Finland, Arctic Drone Labs

VTT's Drone Olympics challenge

topic supports the development of the DroLo project strongly

For inquires, please contact:

Pentti Kokki

pentti.kokki@rumbletools.fi

Virpi Oksman

virpi.oksman@vtt.fi

Additional material

Technical

- AI data post-processing
- AI operational
- Assistive and mission-specific sensors
- Battery technologies
- Body materials, main construction and moving parts
- BVLOS
- Computing capacity
- Control interfaces
- Dust and solid particles clouds
- Extreme light conditions
- Freezing rain
- Heavy and gusty wind
- Heavy clouds
- Ice fog
- Infrastructure requirements
- Just-in-time/dynamic data supply
- Low temperatures
- Low-carbon operations
- Navigation systems
- Payload
- Poor communications
- Rain and fog
- Rapid temperature changes
- Snow
- Temperature crossing 0°C
- Time constraints
- UTM
- Weight of UAV and auxiliary equipment
- Vertical Take-off and Landing (VTOL)

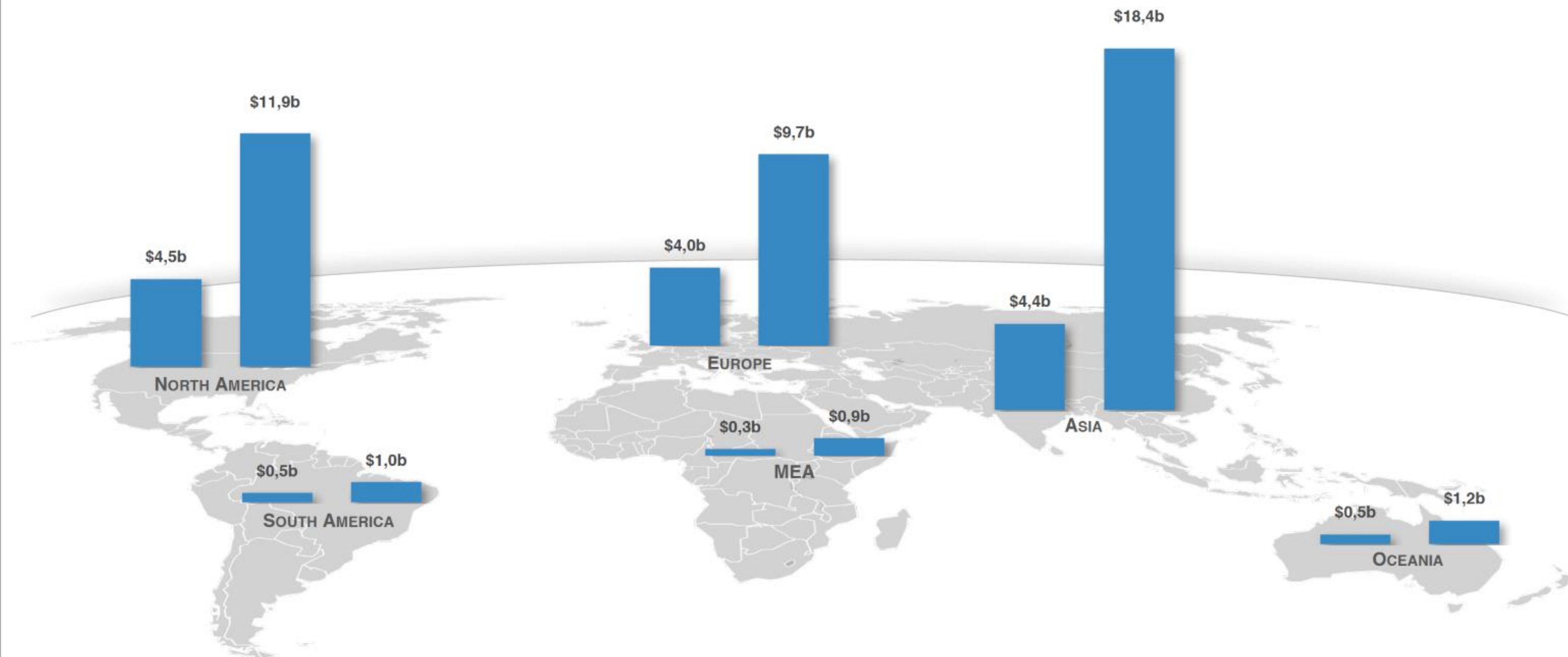
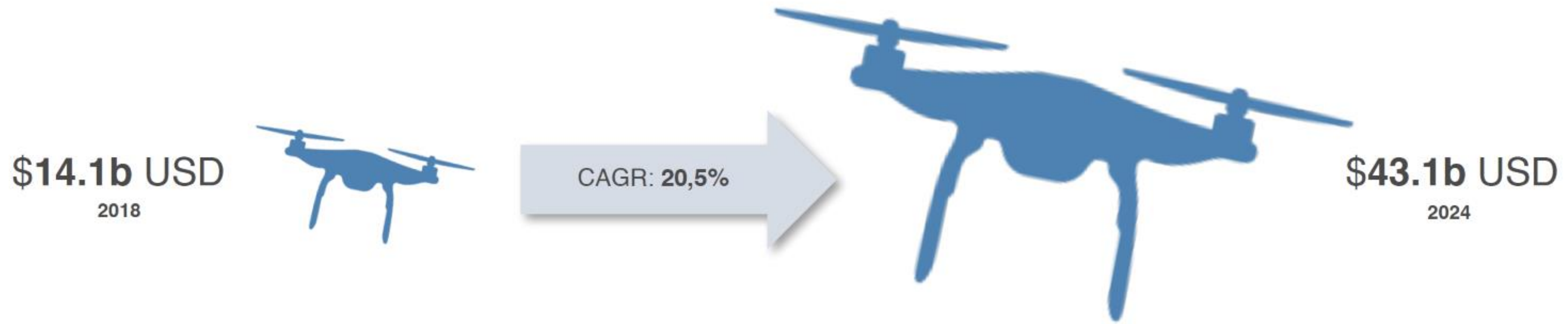
- May be addressed, or their impact reduced/eliminated with:
 - the development of technologies,
 - improved design or functionality,
 - more sophisticated construction materials,
 - application of additional technological means or artefacts.

Organisational

- AI operational
- Best practices
- BVLOS
- Control interfaces
- Coordination with professional operations
- Emotional aspects
- Ethics and privacy considerations
- Extreme light conditions
- Following guidelines and professional codes of practice
- Formal procedures
- Freezing rain
- Geographical irregularities
- Heavy and gusty wind
- Heavy clouds
- Human factors
- Human responses
- Human rights
- Ice fog
- Infrastructure requirements
- Just-in-time/dynamic data supply
- Lack of supply
- Laws, policies and regulations
- Low temperatures
- Navigation systems
- Payload
- Planning and following the plan
- Poor communications
- Processes-relevant challenges
- Rain and fog
- Rapid temperature changes
- Short flight time
- Snow
- Temperature crossing 0°C
- Time constraints
- UTM
- Weight of UAV and auxiliary equipment
- Vertical Take-off and Landing (VTOL)
- Wild animals

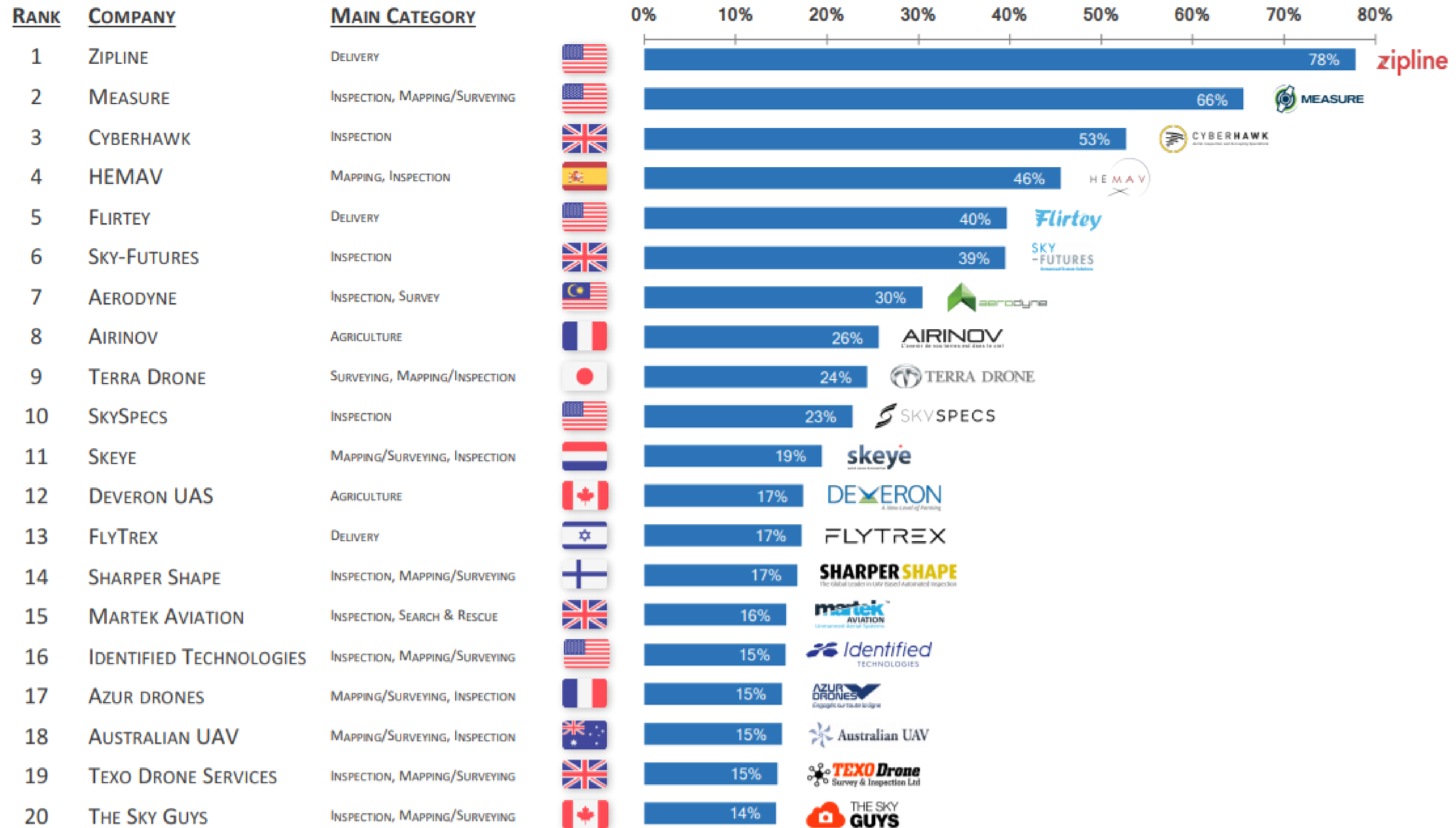
- May be addressed with human actions, predictive or corrective,
- Taken into consideration at planning and operational phases.

DRONE MARKET SIZE AND FORECAST 2018-2024



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TOP20 Drone Operator Ranking 2018



Hot & cold last mile delivery solution

Tiinamari Seppänen,
Janne Keränen

Need

Online food delivery and grocery sales market together exceeds globally soon **\$246B**

Convenience and easy accessibility
are the major market drivers

Time is critical, delivery should not take longer than 60 min





Drones for the last mile in urban solutions?

The problem

Food delivery boxes and bags requires insulating capacity and currently are often made from EPS

Non-biodegradable and non-recyclable petrochemical-based product



**Sustainable last mile package solution
keeping the temperature is missing!**

The solution

Bio-based and recyclable food delivery box



- Insulating capability both for hot and cold foods and drinks
- Lightweight, protective
- Easy and convenient to recycle (cardboard)
- Solution can be made with a minor modification to a existing technology
- Preliminary cost calculation made → low production cost!

We are open to discuss further development options



Thanks!

tiinamari.seppanen@vtt.fi

janne.keranen@vtt.fi

elina.paakkonen@vtt.fi