



# **Data Science and Aviation Research & Innovation**

## **Opening**

**OPTICS2 Workshop  
EASA  
12 October 2018**

European Commission  
DG Research & Innovation  
Aviation unit



- **WHAT** is Data Science ?
- **WHY** is needed?
  - Aviation
  - Safety
- **WHAT** is on ?
  - EU Data-related actions
  - Research & Innovation (Horizon 2020)
  - Infrastructure (CEF)
- **WHAT** is next ?

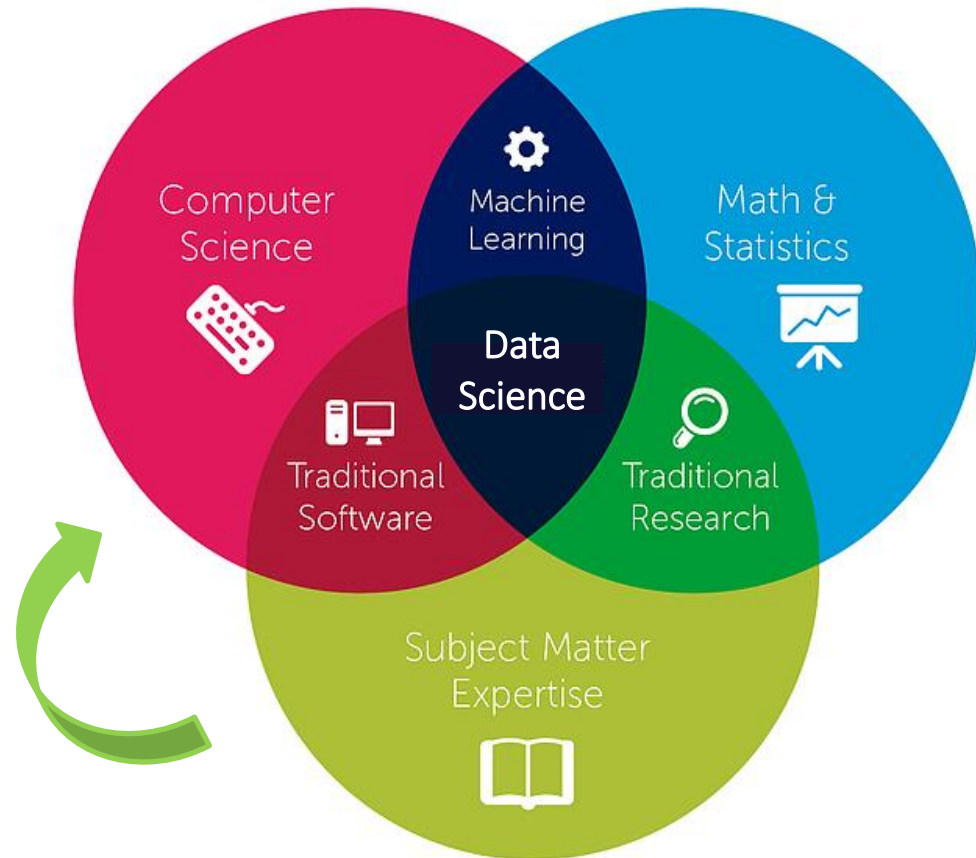


### 3Vs

- Volume
- Velocity
- Variety

### Aviation

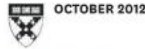
- Pace of progress ?  
(safety, certification, ...)
- Leader or follower ?
- Own resources or synergies with others sectors ?





## Harvard Business Review

HBR.ORG



OCTOBER 2012

46 The Big Idea  
The True Measures  
Of Success  
Michael J. Mauboussin

84 International Business  
10 Rules for Managing  
Global Innovation  
Keeley Wilson and Yves L. Doz

93 Leadership  
What Ever Happened  
To Accountability?  
Thomas E. Ricks



*“You can’t manage what you don’t measure.”*

Data-driven decisions are better decisions—it’s as simple as that. Using big data enables managers to decide on the basis of evidence rather than intuition. For that reason it has the potential to revolutionize management.



## HOW CAN BIG DATA MAKE A DIFFERENCE?

### DO YOU KNOW?

Decoding the human genome took

in 2003

today

near  
future



**10 Years**  
**less than**  
**a WEEK**  
**a few**  
**HOURS**

ALL OF THIS IS POSSIBLE BECAUSE OF



High speed  
broadband

Cloud  
services



High-performance  
computing



Data analytics  
tools and methods

### REAL LIFE APPLICATIONS



#### ON THE FARM

More efficient use  
of natural resources

#### IN SHOPS & FACTORIES

Improve efficiency and  
productivity



#### IN THE HOSPITAL

Better diagnosis  
& clinical decision

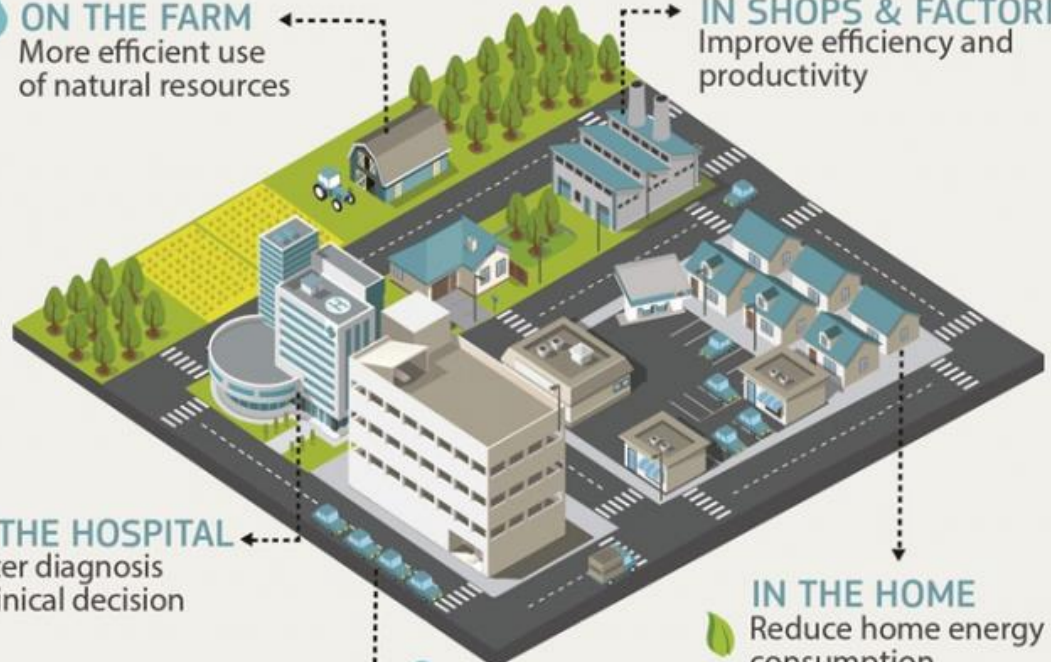
#### IN THE HOME

Reduce home energy  
consumption



#### ON THE MOVE

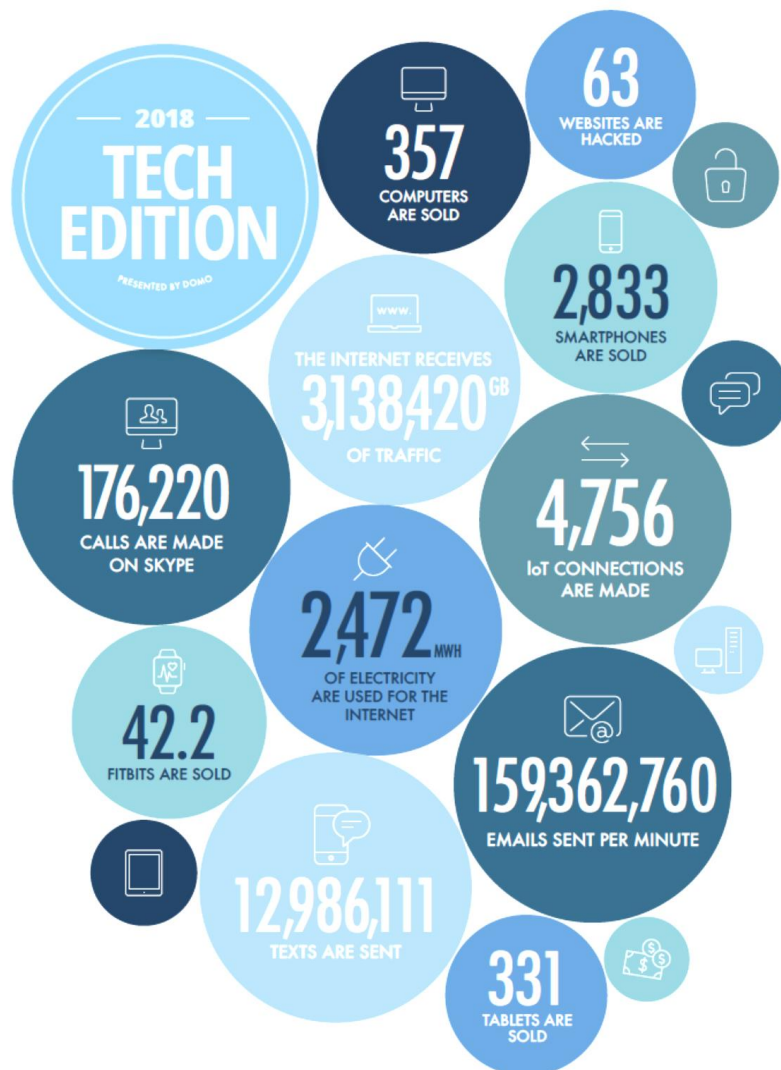
Management of  
traffic flows





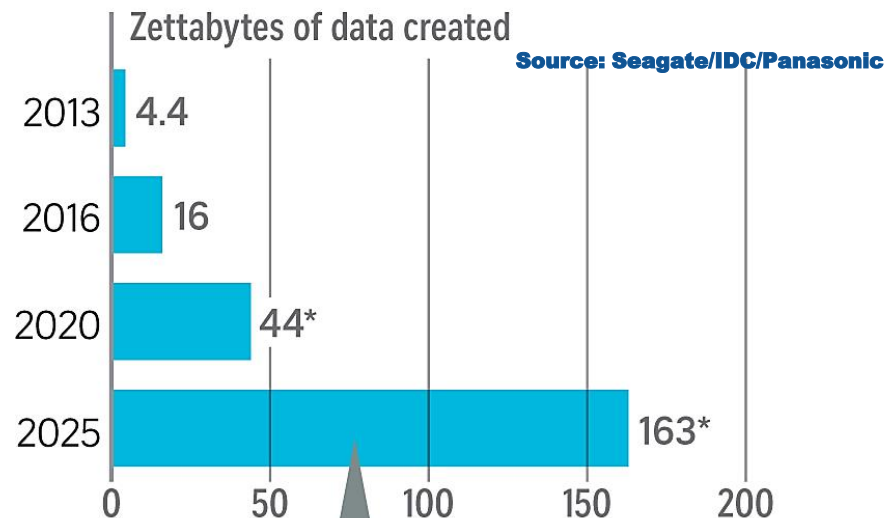


## Every minute (2018)

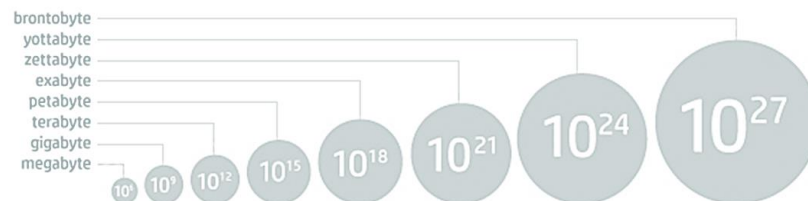


Source: DOMO - Data Never Sleeps 6.0 (2018)

## Data, the new fuel for society?



Nearly 20 per cent (about 32ZB) of the data created will be critical to daily life and the smooth running of government and businesses.



"We are at the start of the **fly-by-data** revolution"

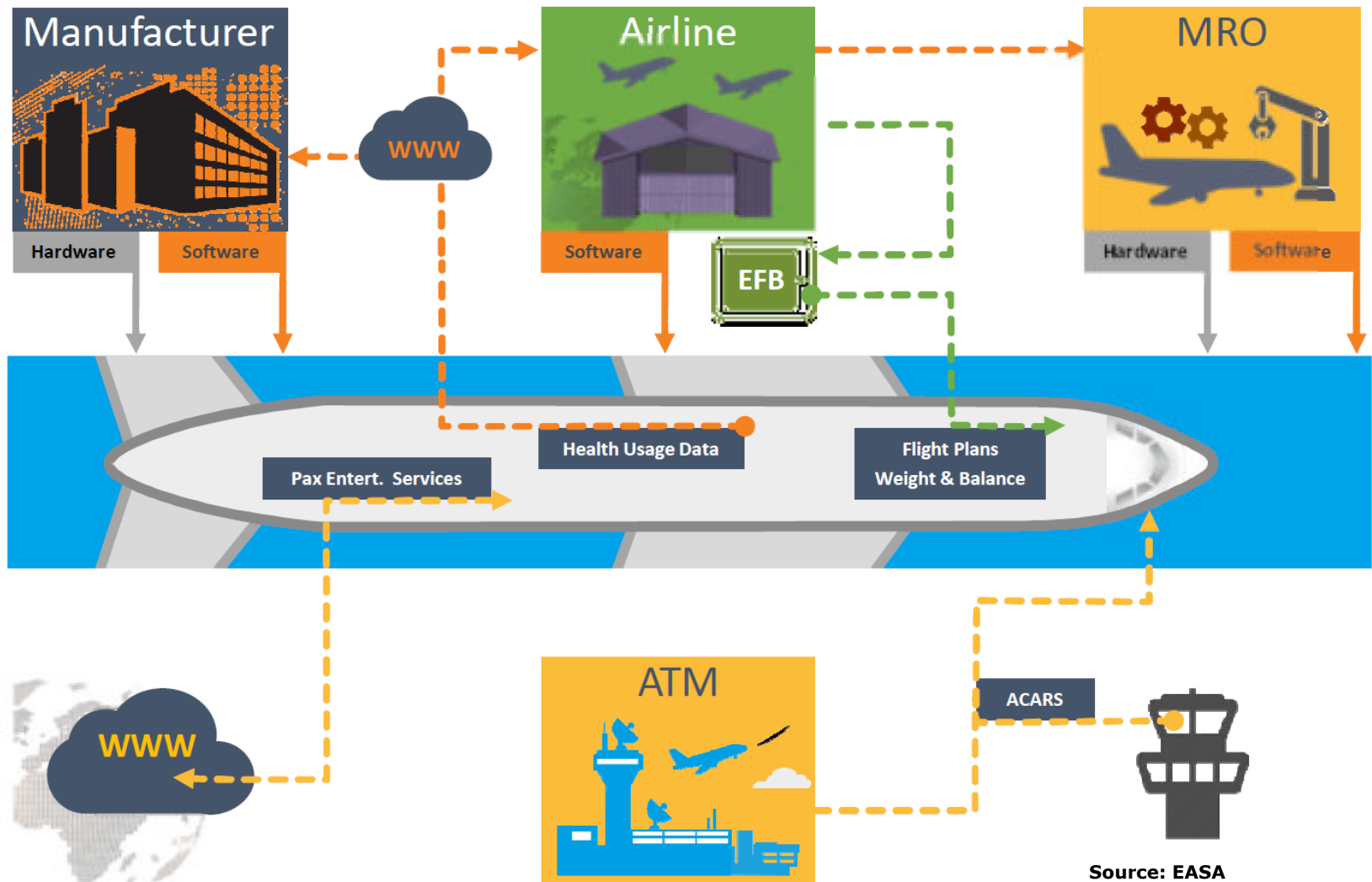
Laurent Martinez (Airbus)



# Data Science and Aviation



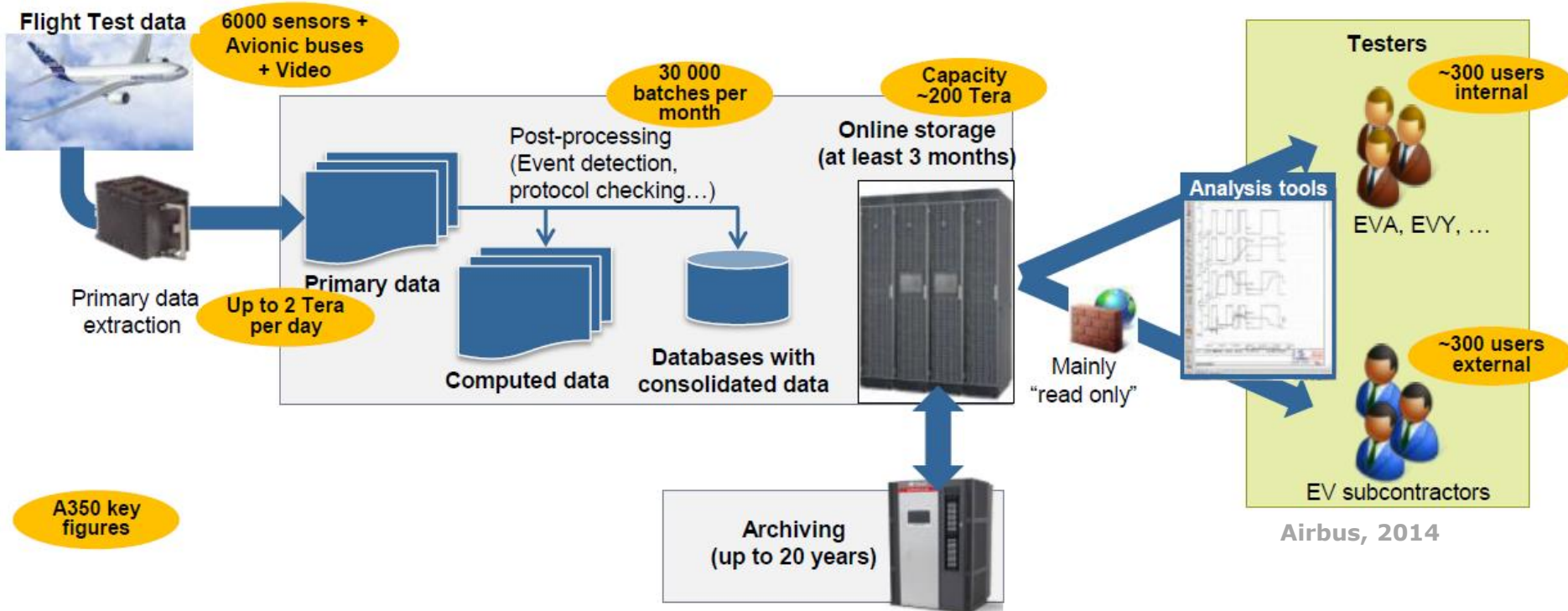
## WHY ?





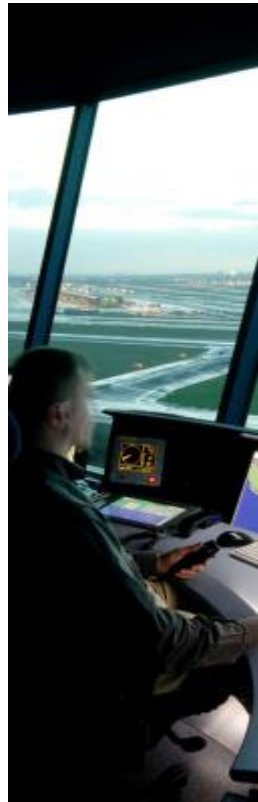
## “Talkative aircraft”

## Loop for design, manufacturing & operations



For comparison: hundreds Tera are created in seconds in internet (2018)

- Overall European air transport system: < **1 accident per ten million** commercial aircraft flights. For specific operations, such as **search and rescue**, the aim is to **reduce** the number of accidents **by 80%** (ref.2000)
- **Weather** & env. hazards precisely evaluated & risks properly mitigated.
- The European air transport system operates seamlessly through fully interoperable and networked systems allowing **manned and unmanned air vehicles** to safely operate in the same airspace.
- - -
- Efficient boarding and **security checks allow seamless security** for global travel, with min. passenger & cargo impact. **Passengers & cargo** through security screening without intrusion or disruption.
- Air vehicles **resilient by design** to on-board and on-the-ground safety **and security threat evolution, internally and externally to aircraft.**
- The air transport system has a fully **secured global high bandwidth** data network, hardened and resilient by design to cyber attacks.



# Projects for Policy recommendations



# Aviation Safety



Safety culture across the industry

**SHARING SAFETY DATA & SAFETY INTELLIGENCE**

Harnessing Human Factors

Towards a risk-based research strategy.

Reducing the operational risk portfolio

- Sharper focus
- More industrial participation
- More effective research
- Less accidents

Improving post-accident survivability

Safety management for new aviation players.

Collaborative safety & security

New technologies and safety solutions

Europe as a global aviation safety research player

## Recommendation 2: SHARING SAFETY DATA AND SAFETY INTELLIGENCE

Safety Data should to be **shared** and **collectively analysed** in order to yield and disseminate **actionable safety intelligence** and not compete where safety is concerned.

This will lead to **smarter use of data** for increased safety in aviation, and generate the economies of scale needed for big-data and other data-mining approaches.



## 4 STEPS TO LEVERAGE THE POTENTIAL OF BIG DATA



### 1. INVESTING IN IDEAS

Search for **game-shifting** ideas

**Public Private Partnership**

[www.bdva.eu](http://www.bdva.eu)

Research in **Horizon2020**

**NEW PPP (28 Sep 2018): [EuroHPC JU](#)**



### 2. INFRASTRUCTURE FOR A DATA-DRIVEN ECONOMY

**Network** of data processing facilities

Invest in the **GÉANT** network

Supercomputing **centres of excellence**

Build big data mobile internet through **5G PPP**

**Telecoms Single Market** for broadband investment



### 3. DEVELOP BUILDING BLOCKS

**Guidelines** on standard licences, datasets & charging

**One-stop-shop** to open data across the EU

**Mapping** big data standards

Open data **incubator for SMEs**

**Training** for data professionals

Data market **monitoring** tool



### 4. TRUST AND SECURITY

EU **Data protection** rules

**Guidelines** on secure data storage

**Consultations** on :

- Policy options after **Trusted Cloud** Europe report
- Data ownership & liability of data provision
- User-controlled cloud-based technologies



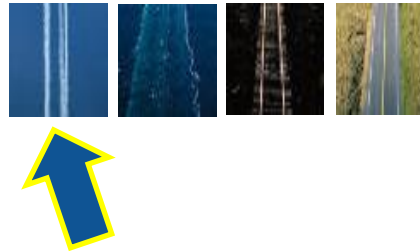
## I. Excellent science

- **European Research Council** (13 095)
- **Future Emerging Technologies** (2 696)  
1B € for Brain;
- **Marie Skłodowska-Curie fellowships** (6 162)
- **Research infrastructures** (2 488) (incl. **e-facilities**)

## II. Industrial technologies

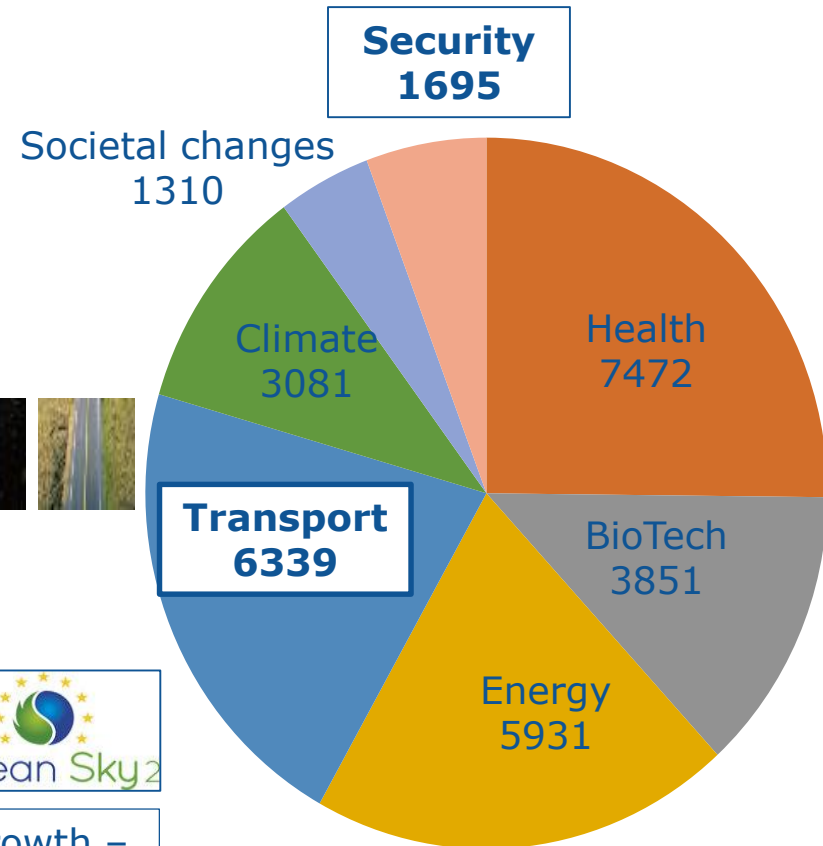
(13 557)

- **Information and Communication Technologies (ICT)**
- Adv. Materials, nano, manufacturing, ...
- **Space**
- Risk finance
- Innovation in **SMEs**



Mobility for Growth – collaborative research

## III. Societal challenges



(Figures: EU funding in € million)



<https://ec.europa.eu/digital-single-market/en/eu-funded-projects-data>

## LEIT - Information and Communication Technologies

### Information and Communication Technologies

#### A new generation of components and systems

ICT-01-2016	Smart Cyber-Physical Systems	20.0	20/10/15	12/04/16	
ICT-02-2016	Thin, Organic and Large Area Electronics	20.0	20/10/15	12/04/16	
ICT-03-2016	SSI - Smart System Integration	18.5	20/10/15	12/04/16	
ICT-04-2017	Smart Anything Everywhere Initiative	26.5	10/05/16	08/11/16	

#### Advanced Computing and Cloud Computing

ICT-05-2017	Customised and low energy computing	32.0	08/12/16		25/04/17
ICT-06-2016	Cloud Computing	45.0	20/10/15	12/04/16	
ICT-14-2016-2017	Big Data PPP: cross-sectorial and cross-lingual data integration and experimentation	27.0	20/10/15	12/04/16	25/04/17
		27.0	08/12/16		
ICT-15-2016-2017	Big Data PPP: Large Scale Pilot actions in sectors best benefitting from data-driven innovation	25.0	20/10/15	12/04/16	25/04/17
		25.0	08/12/16		
ICT-16-2017	Big data PPP: research addressing main technology challenges of the data economy	33.0	08/12/16		25/04/17
ICT-17-2016-2017	Big data PPP: Support, industrial skills, benchmarking and evaluation	5.0	20/10/15	12/04/16	25/04/17
		2.0	08/12/16		
ICT-18-2016	Big data PPP: privacy-preserving big data technologies	9.0	20/10/15	12/04/16	
ICT-19-2017	Media and content convergence	39.0	10/05/16	08/11/16	
ICT-20-2017	Tools for smart digital content in the creative industries	17.0	08/12/16		25/04/17
ICT-21-2016	Support technology transfer to the creative industries	14.0	20/10/15	12/04/16	
ICT-22-2016	Technologies for Learning and Skills	31.0	20/10/15	12/04/16	
ICT-23-2017	Interfaces for accessibility	14.0	08/12/16		25/04/17
ICT-24-2016	Gaming and gamification	12.0	20/10/15	12/04/16	



- **Horizon 2020 SafeClouds.eu**

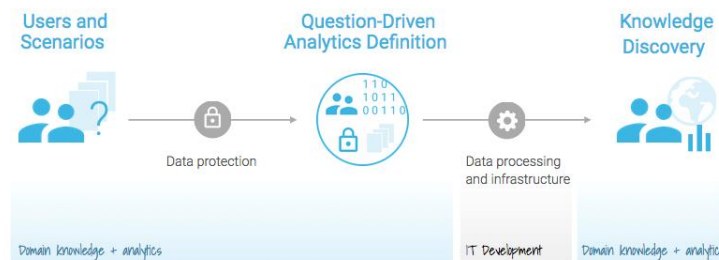
[www.innaxis.org/safecLOUDS](http://www.innaxis.org/safecLOUDS)



Input from SafeClouds partners



Summary: the big data process



**DATA  
PROTECTION:**

A necessary enabler.

A result of SafeClouds.

A combination of technical  
infrastructure & procedures.

- **CEF / EASA D4S tenders (platform, analytics provider)**



[www.easa.europa.eu/the-agency/procurement/calls-for-tender](http://www.easa.europa.eu/the-agency/procurement/calls-for-tender)



- Aviation can benefit from **EU Data Science** initiatives.
- Aviation can exploit **synergies** with **other advanced sectors** to **accelerate** smart use of data.
- Opportunities for Data Science R&I (also for aviation!) include:
  - **Horizon 2020** (e.g. ICT )
  - **Connecting Europe Facility** (CEF) e.g. EASA D4S

We remain open to **suggestions** for Aviation and Data Science R&I - also for **Horizon Europe, CEF-Digital and Digital Europe** and for **policy at large**.

Data science is great but let's keep wise ...

*"Where is the wisdom we have lost in knowledge?  
Where is the knowledge we have lost in information?"  
T. S. Eliot (1888-1965)*

... and conscious.

*(Data)"Science without conscience is but the ruin of the soul"  
"Science sans conscience n'est que ruine de l'âme"  
F. Rabelais (1483 - 1553)*

Have a good workshop !