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Into the Fourth Industrial Revolution – Patents and Self-Driving Vehicles

The Way Towards the Internet of Things. Open Standards vs Silos

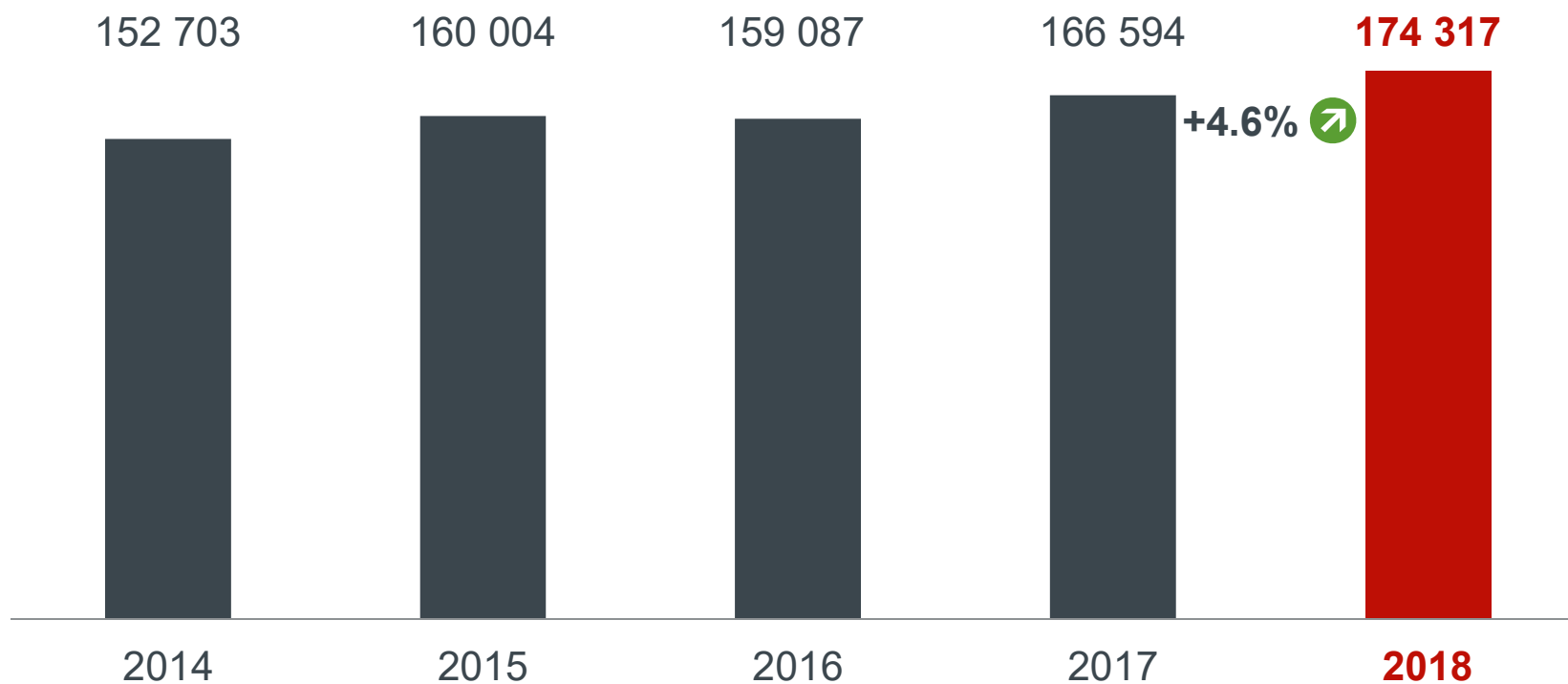


Ilja Rudyk

Senior Economist, EPO

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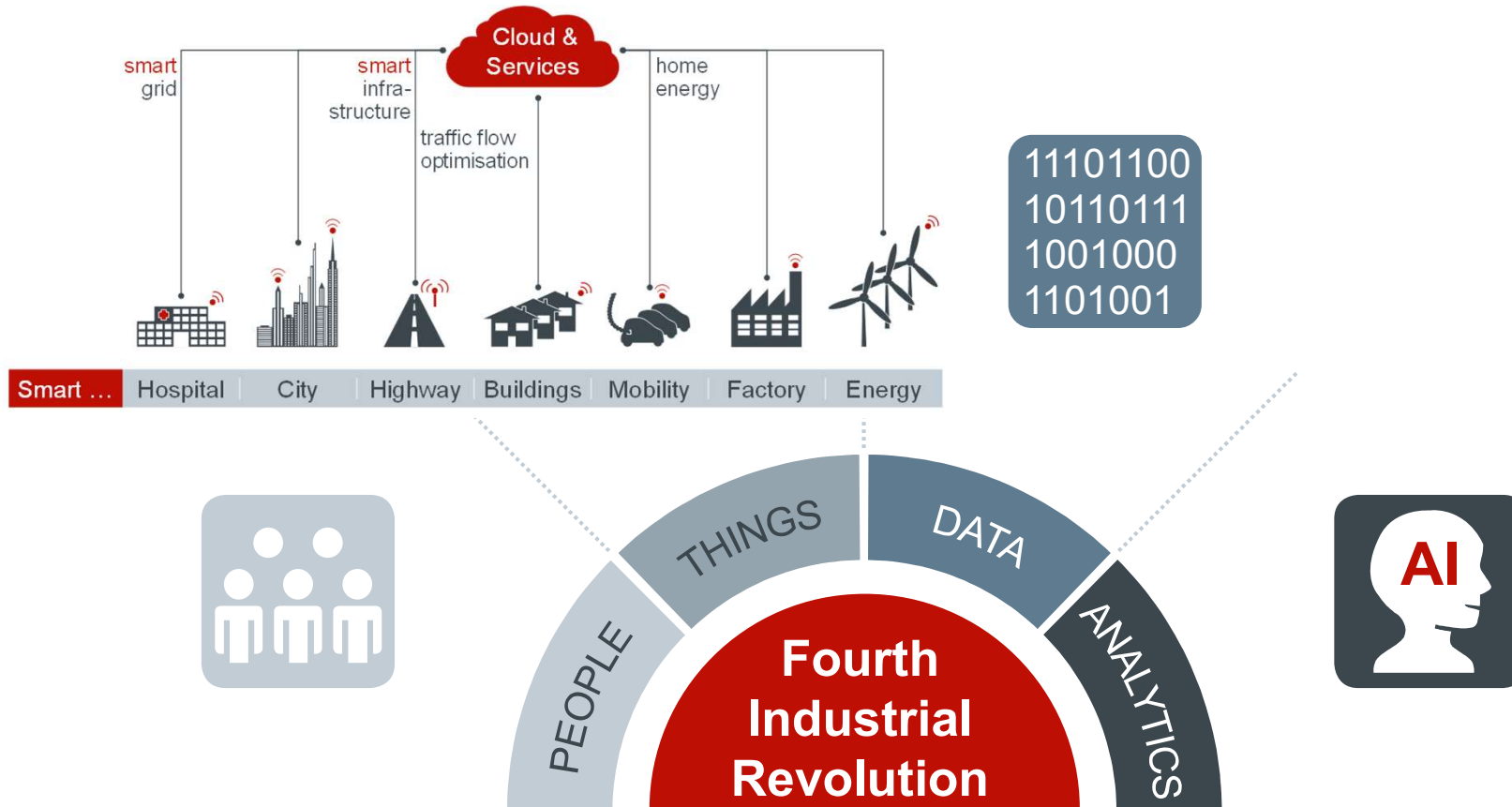
European patent applications: increasing demand



Source: EPO. Status: 21.1.2019.

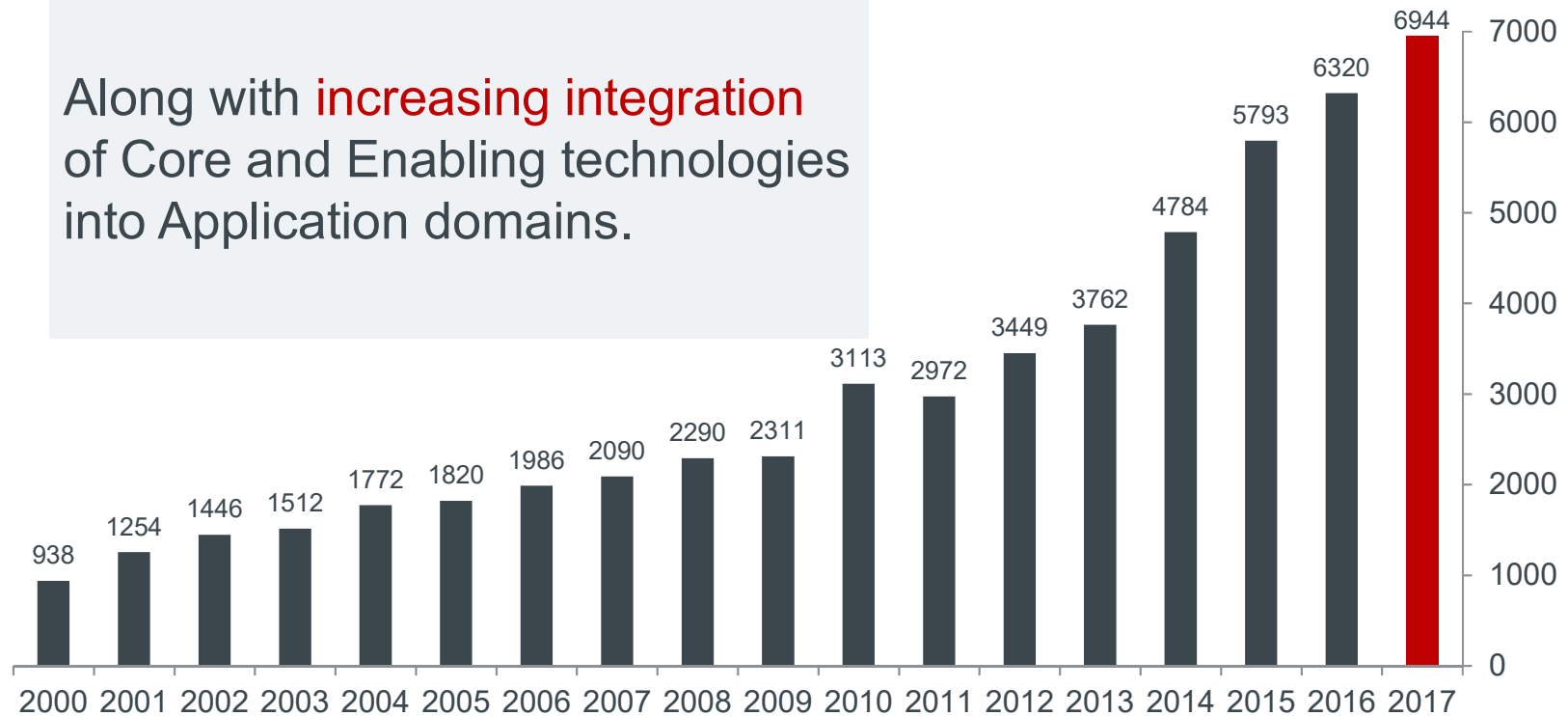
European patent applications include direct European applications and international (PCT) applications that entered the European phase during the reporting period.

The value chain of the Fourth Industrial Revolution



Steep rise of 4IR applications at the EPO

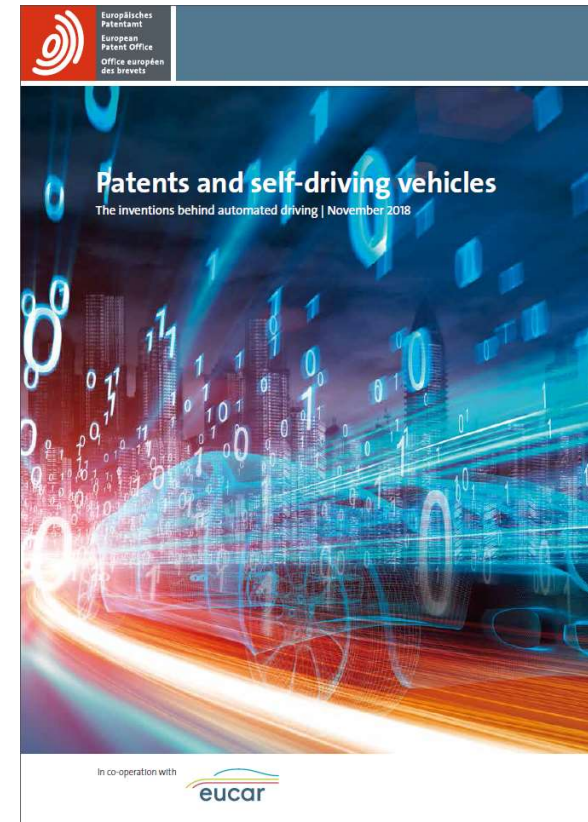
Along with **increasing integration** of Core and Enabling technologies into Application domains.



Source: EPO. The number of European patent applications in 4IR technologies. The results are presented by application date.

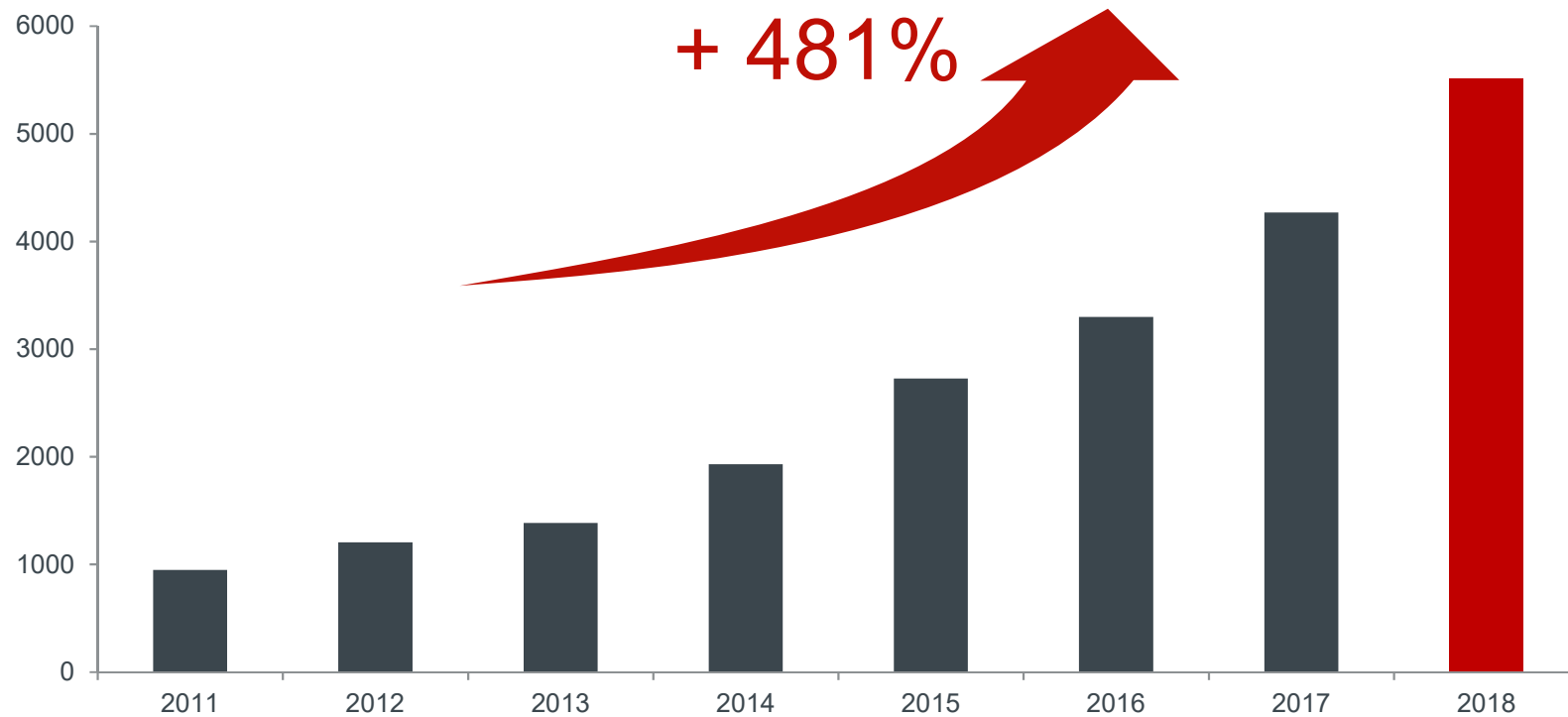
Towards self-driving vehicles (SDV)

- Innovation towards **high (SAE level 4¹) and full (SAE level 5¹) vehicle automation**, covering
- **General technologies**, such as 5G networks and cloud computing, as well as
- **Application-specific automotive technologies**, e.g. vehicle electrification and powertrains,
- As far as they are **relevant for vehicle automation**.



1. SAE, stands for the Society of Automotive Engineers, determines the intelligence level and automation capabilities of vehicles, ranking through 0 to 5.

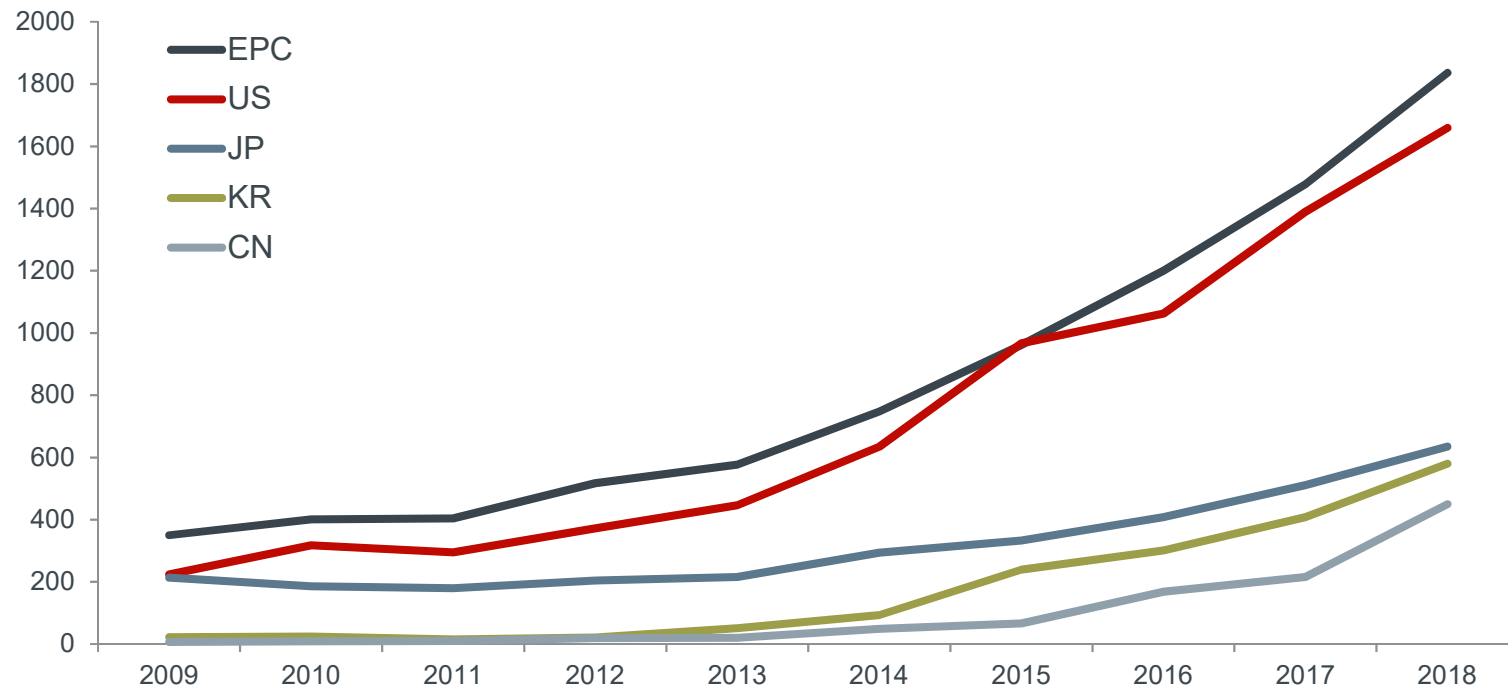
Patent applications on self-driving vehicles at the EPO



Source: EPO. The Patent statistics in this table are based on patent applications filed at the EPO in SDV technologies. They do not include patent applications filed with the national offices of the EPO member states, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

Europe and the USA are leading the race

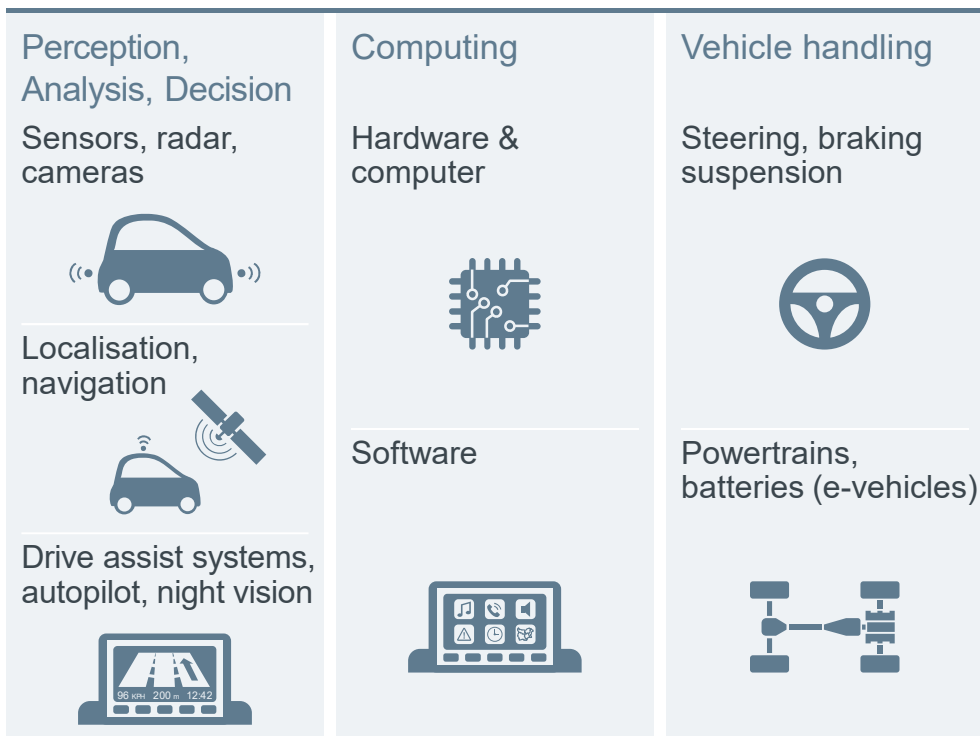
Origin of European patent applications in SDV technologies



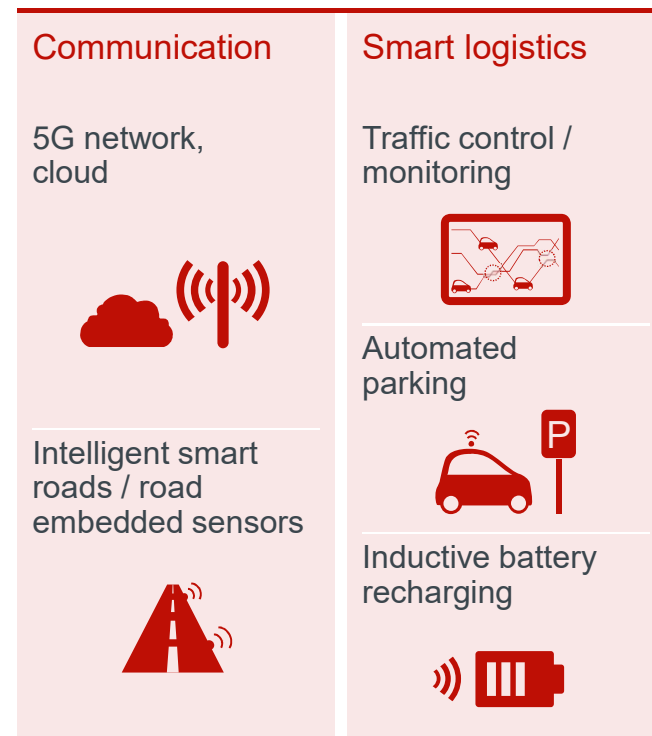
Source: EPO. The Patent statistics in this table are based on patent applications filed at the EPO in SDV technologies. They do not include patent applications filed with the national offices of the EPC contracting states, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

Cartography of SDV technologies

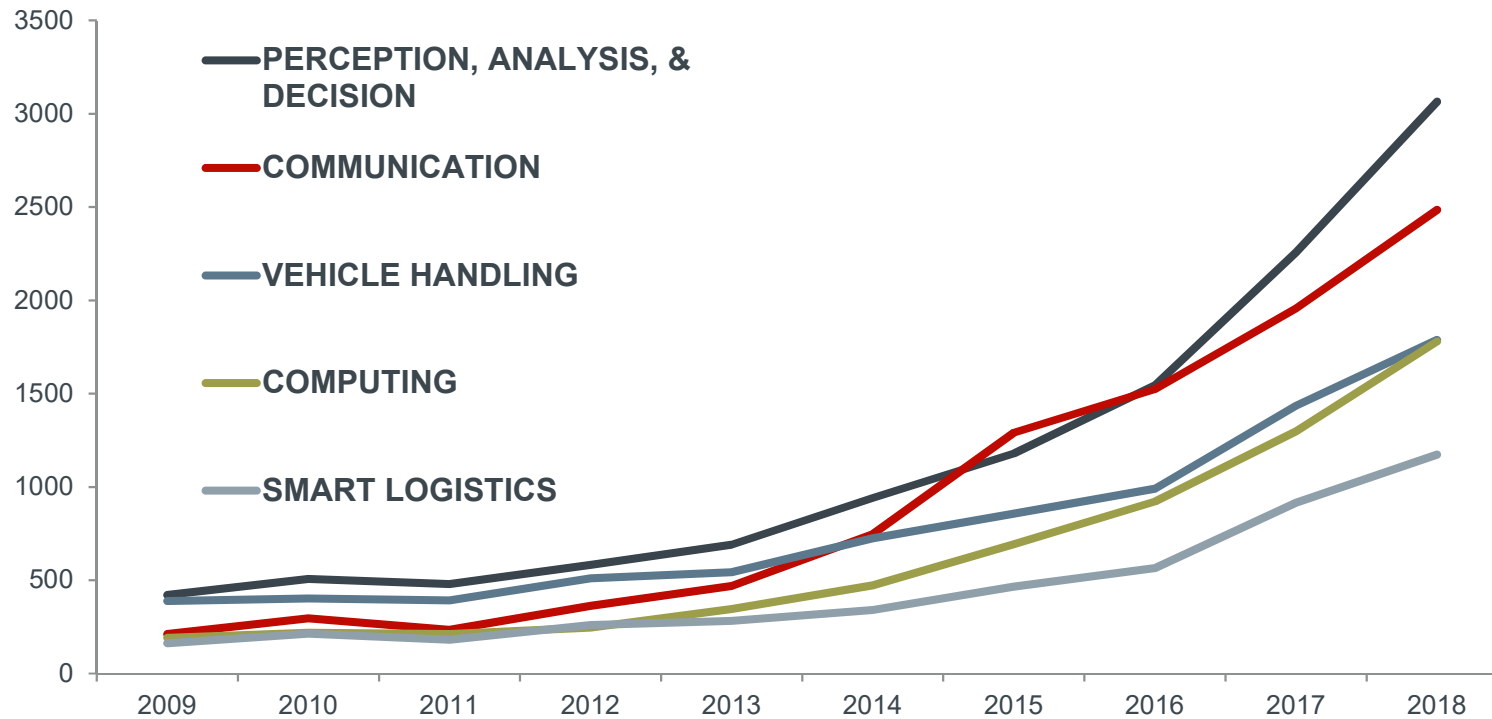
Vehicle platform



Smart environment



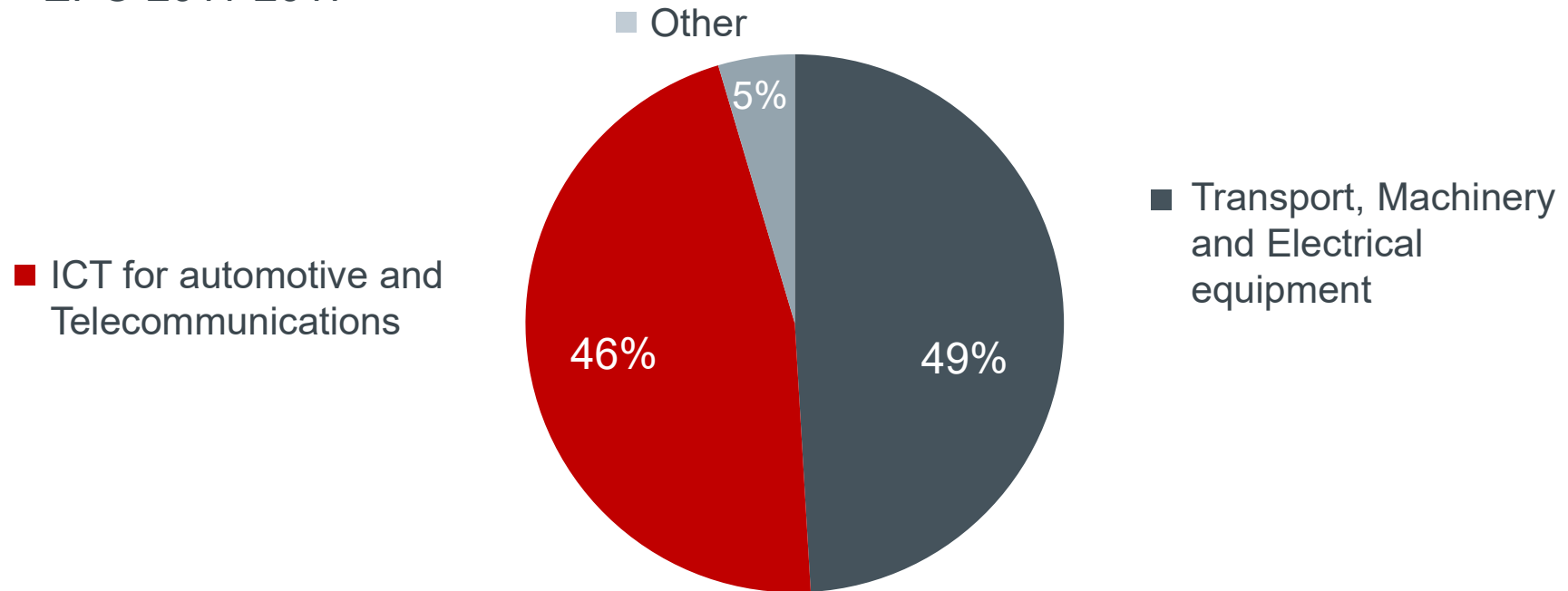
Growth of European applications by SDV field



Source: EPO. The Patent statistics in this table are based on patent applications filed at the EPO in SDV technologies. They do not include patent applications filed with the national offices of the EPC contracting states, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

Transforming industry structure

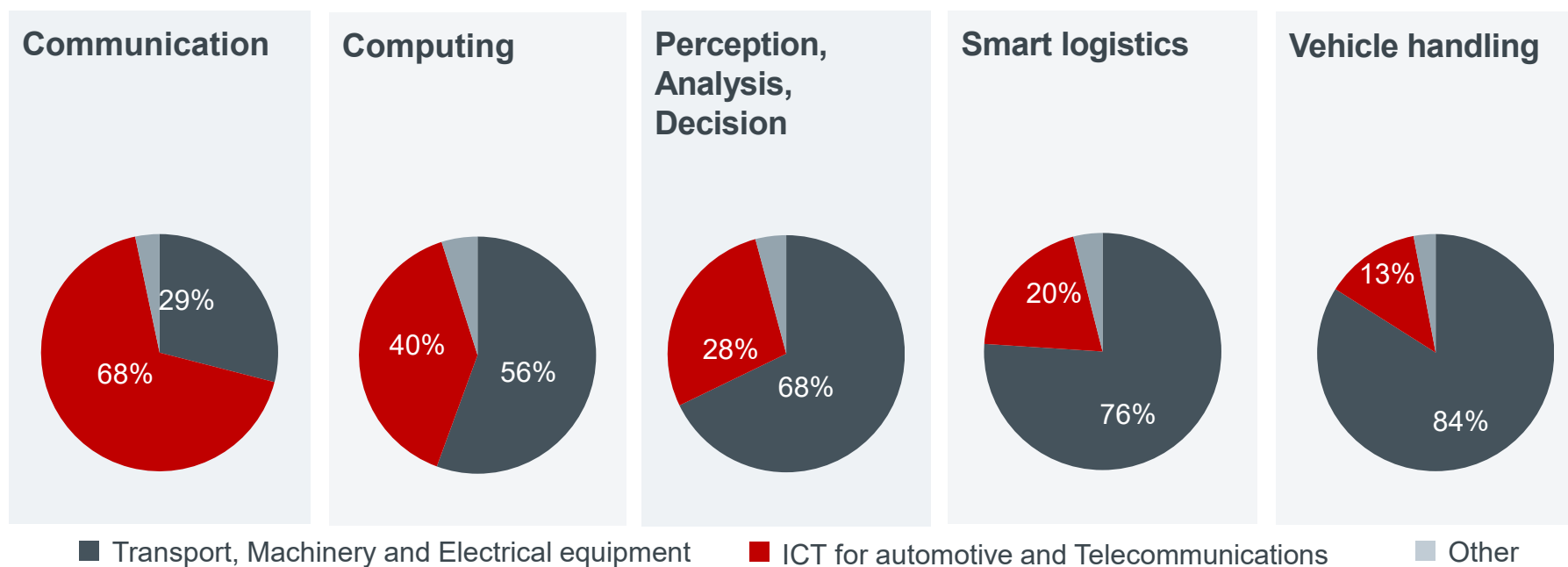
Categories of the top 500 companies filing SDV patent applications with the EPO 2011-2017



Source: EPO. The Patent statistics in this table are based on patent applications filed at the EPO in SDV technologies. They do not include patent applications filed with the national offices of the EPC contracting states, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

ICT industries and self-driving vehicles







Applications filed at the EPO between 2011 and 2017 per selected SDV field



Source: EPO. The Patent statistics in this table are based on patent applications filed at the EPO in SDV technologies. They do not include patent applications filed with the national offices of the EPC contracting states, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

Patent applications in SDV aim at broad international protection

Average patent family size in SDV technologies, 2011-2015

Smart logistics		4.1
Communication		5.3
Vehicle handling		4.2
Computing		4.7
Perception, analysis & decision		4.2
Established automotive		3.2

76.7%
of SDV families
include an EP or
PCT application
(51.3% in
established
technology fields)

Source: EPO. The patent statistics in this figure are based on all inventions, i.e. patent families, in established automotive technologies or SDV technologies for which a patent application has been filed in one of the official languages of the EPO, and with at least one patent application at the EPO or a patent office of a contracting state to the EPC. The reference date for each patent family is the date of the earliest patent filing at the EPO or one of the national offices of the EPC contracting states.

Challenges ahead?

EPO has an established approach to **Computer Implemented Inventions (CII)**

- Common understanding of CII procedures **in all sectors**
- Annual improvement of CII content of the **Guidelines** for Examination

The challenge of **industry convergence**

- Growing **complexity** of the patent landscape
- A challenge for established practices in **IP management and strategy**



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Thank you for your attention!

Ilja Rudyk
Senior Economist
irudyk@epo.org