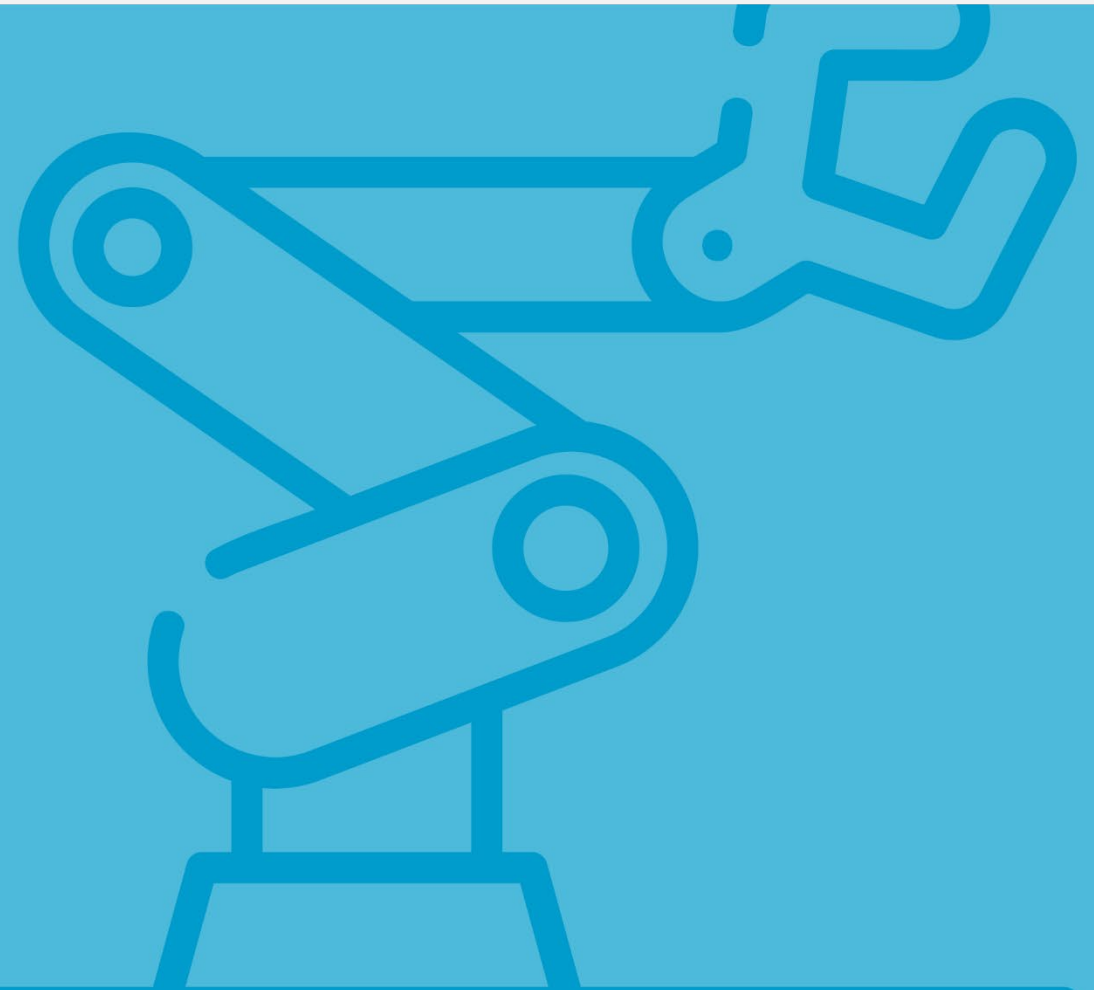


Welcome to the presentation of

World Robotics 2022



For you on the panel



Marina Bill
IFR President

Global Head Marketing
& Sales, ABB Robotics



Dr. Christopher Müller
Director Statistical Dpt.

International Federation
of Robotics



Dr. Werner Kraus
Chair IFR Service Robot
Group

Head of Dpt. Robot &
Assistive Systems,
Fraunhofer IPA



Dr. Susanne Bieller
General Secretary

International Federation
of Robotics

International Federation of Robotics

Who we are



- **Professional non-profit organization**
- **Established in 1987**
- **Communication and networking platform**
- **About 90 members**
 - National robotics associations, R&D institutes, robot suppliers, integrators
- **Over 2000 organizations represented indirectly**

Our members

NATIONAL ASSOCIATIONS



INDUSTRIAL ROBOT MANUFACTURERS



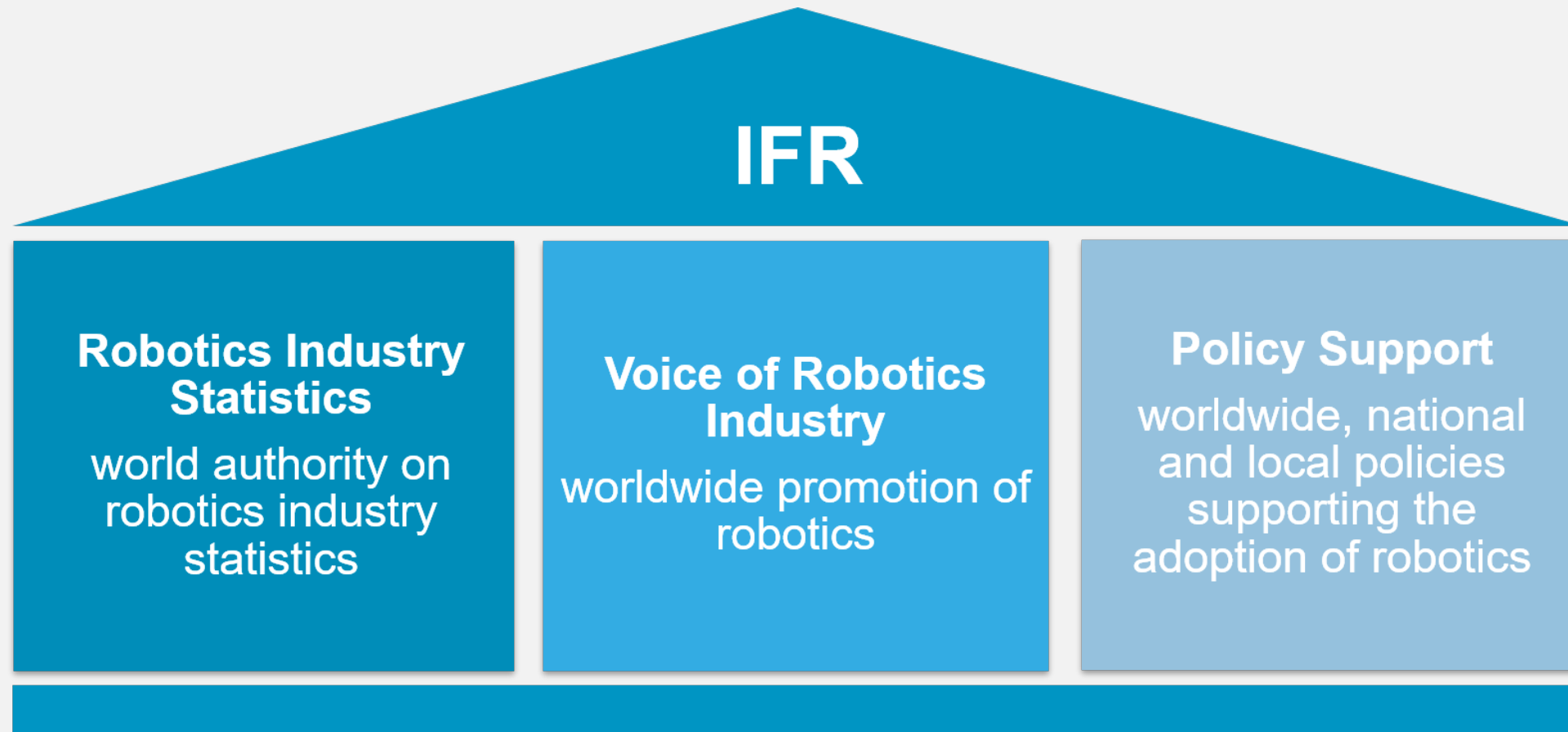
COMPONENT SUPPLIERS, INTEGRATORS, SERVICE ROBOT MANUFACTURERS



R&D INSTITUTES



Three pillars of IFR activities



What is a robot – and what is not?

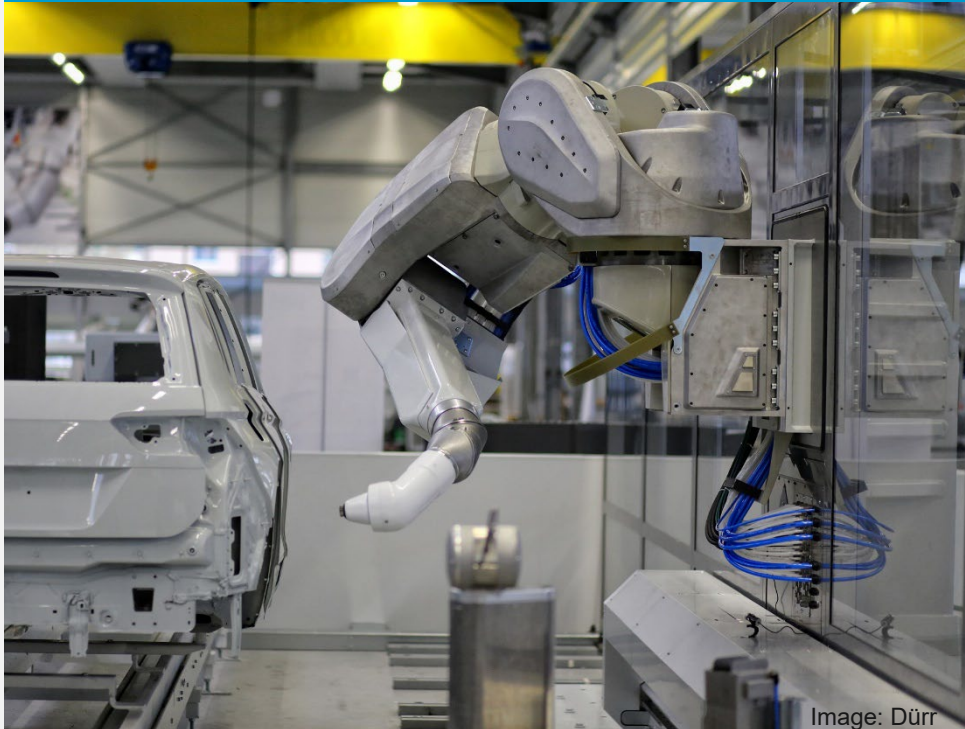


Image: Photoneo

- **“Robot”** defined by **International Standards Organization ISO**
- **No robots:**
 - ⊗ software (“bots”, AI, Robotic Process Automation -RPA)
 - ⊗ remote-controlled drones, UAV, UGV, UUV
 - ⊗ voice assistants
 - ⊗ autonomous cars
 - ⊗ ATMs, smart washing machines, etc.

Two types of robots

Industrial robots



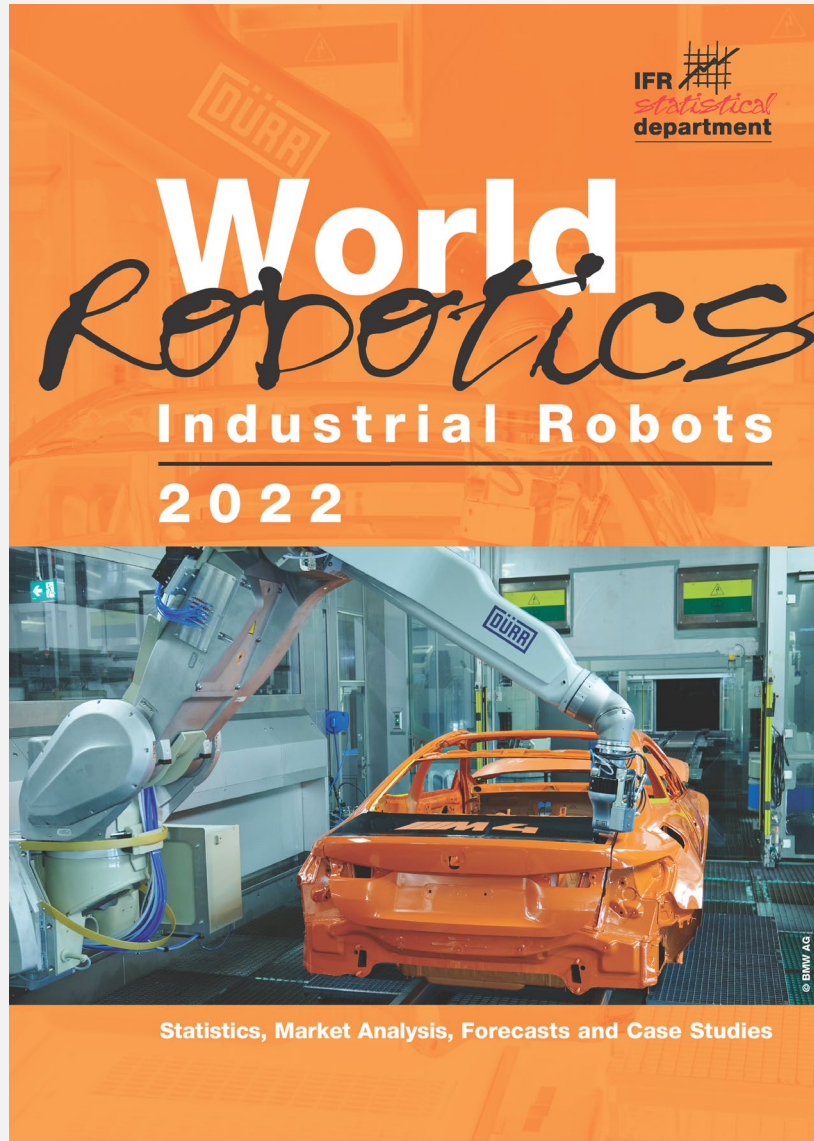
Service robots



Presentation of World Robotics 2022



Industrial robots - top findings



2021: Robot installations hit new record level

“The automation booster ignited”

Strong recovery from the pandemic year

New robots

- 517,000 units (+31%)
- highest number in history
- CAGR 2016-2021: +11%

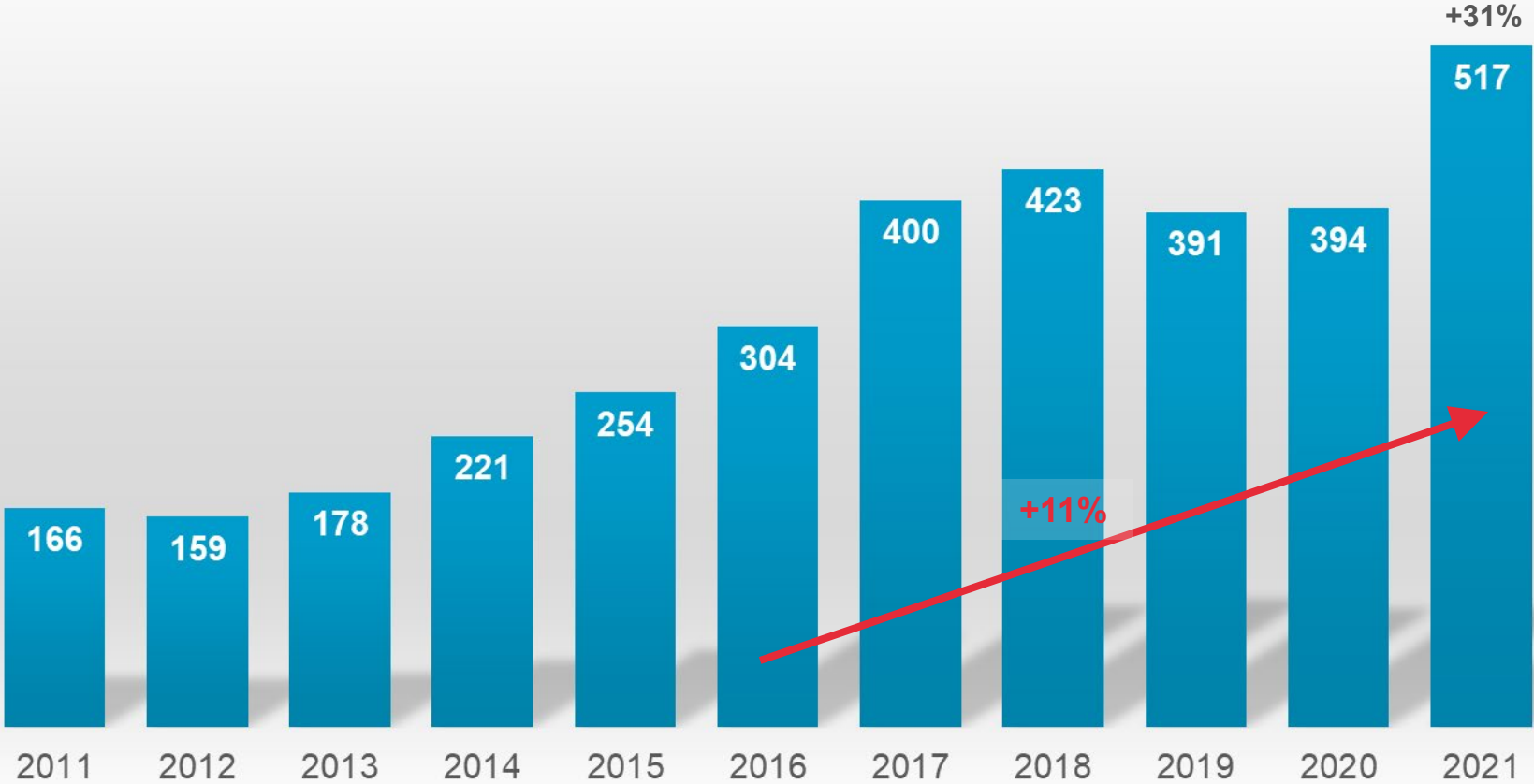
Robot stock

- 3.5 million units (+15%)
- CAGR 2016-2021: +14%

Half a million limit broken in 2021

Annual installations of industrial robots - World

1,000 units

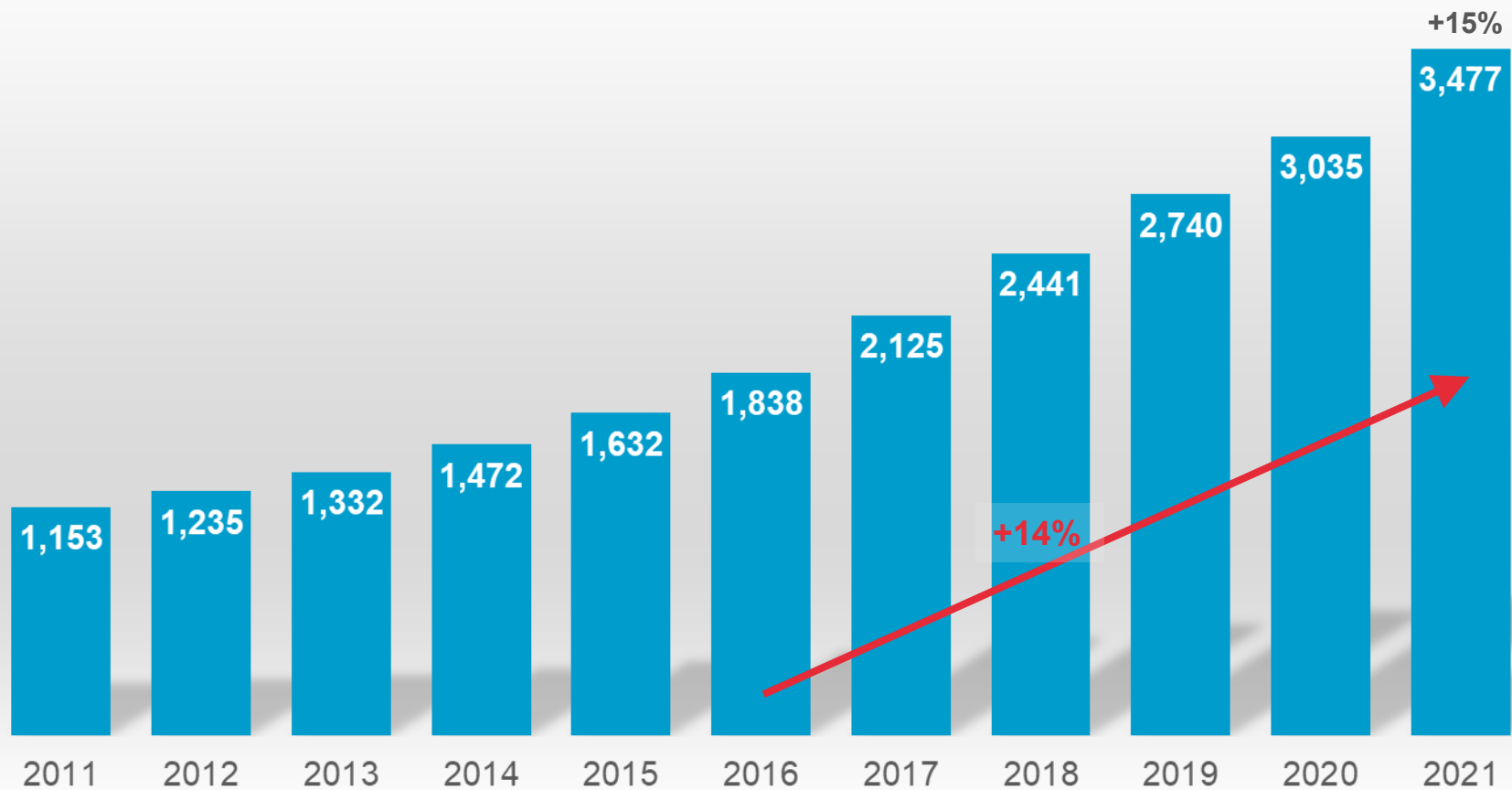


Source: World Robotics 2022

3 million industrial robots operating in factories around the world

Operational stock of industrial robots - World

1,000 units

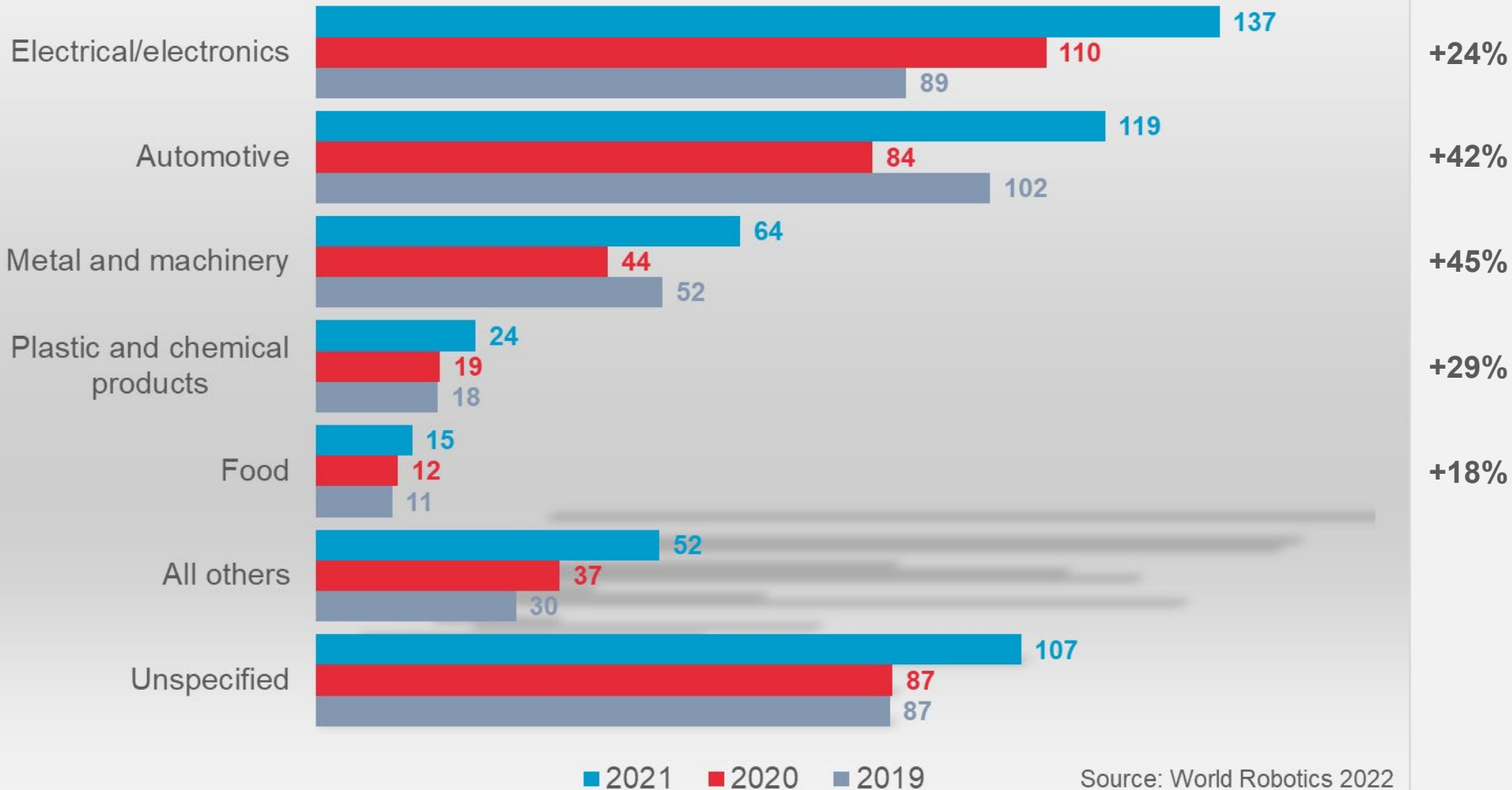


Source: World Robotics 2022

Electronics is major customer of industrial robots

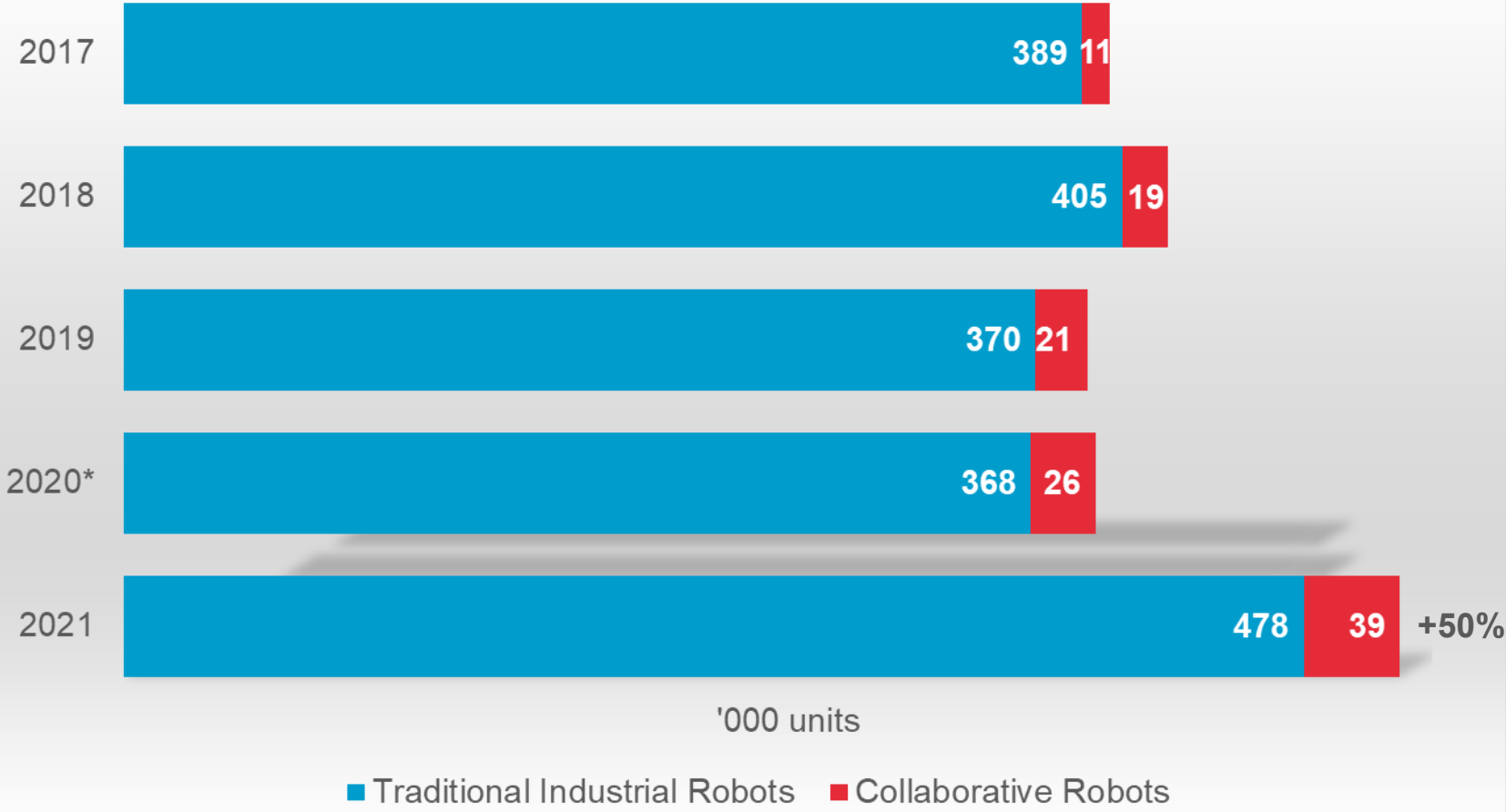
Annual installations of industrial robots by customer industry - World

1,000 units



Collaborative robots steadily growing their market share

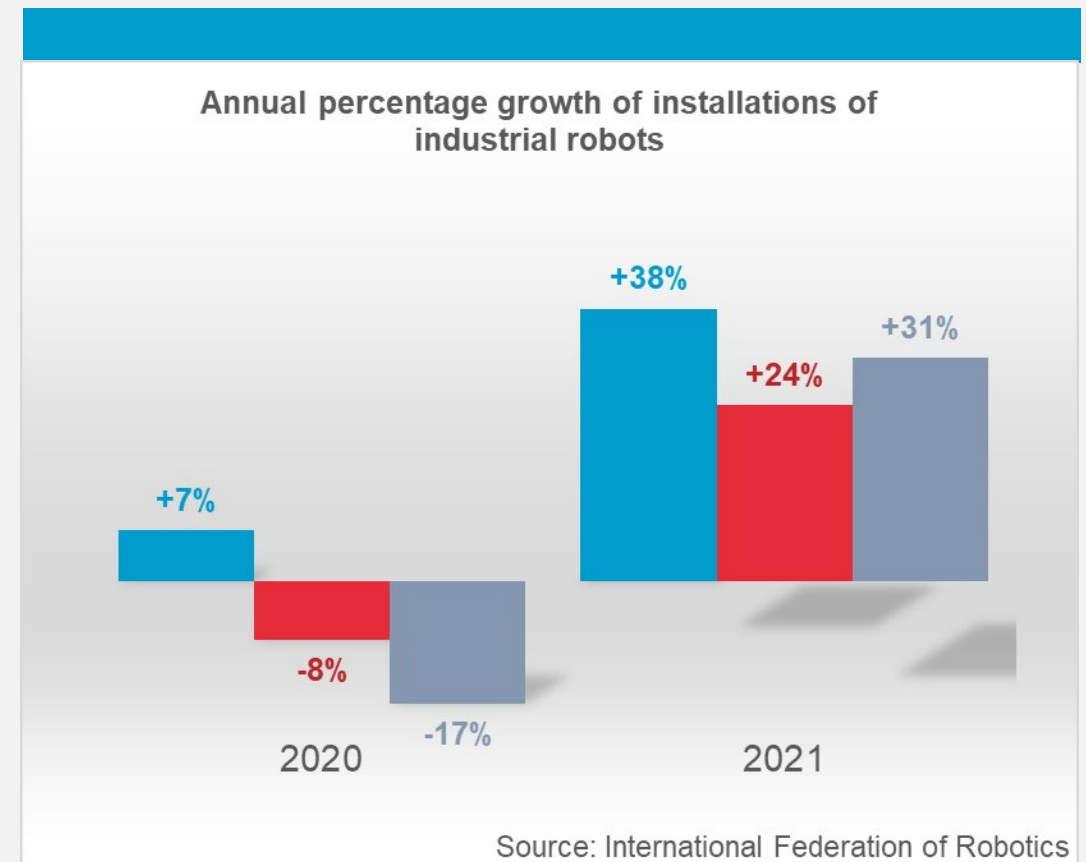
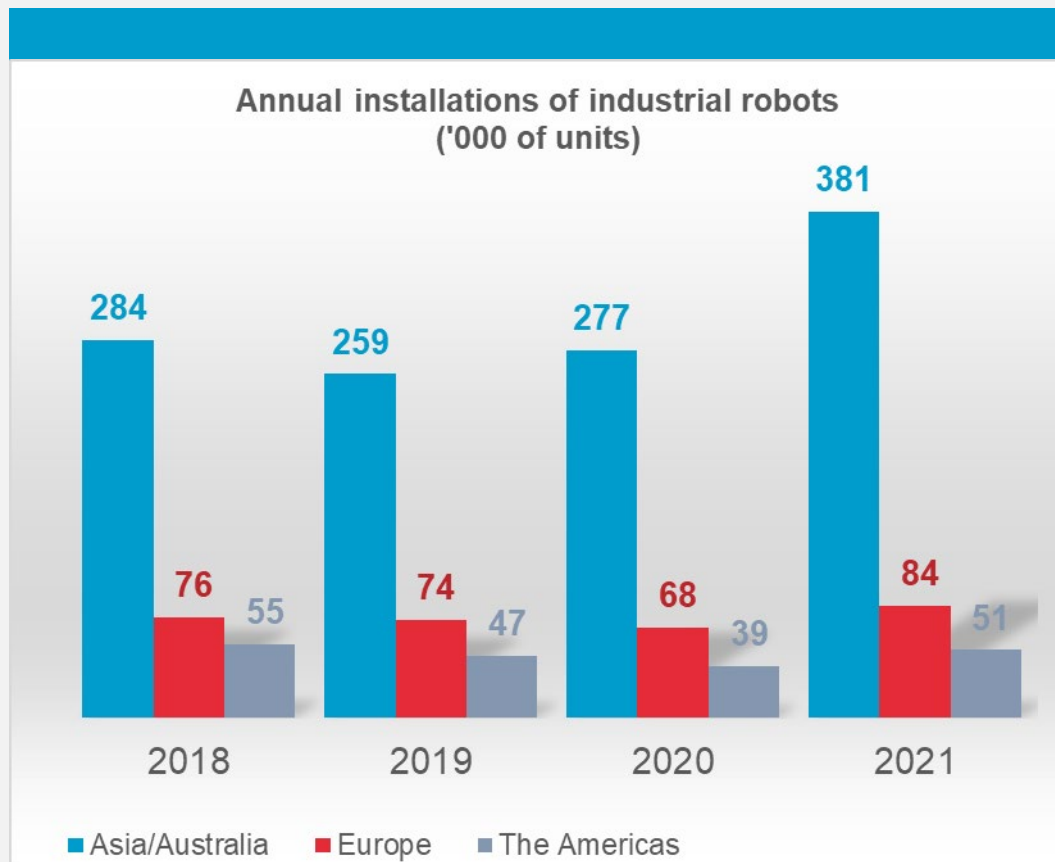
Collaborative and traditional industrial robots



*revised

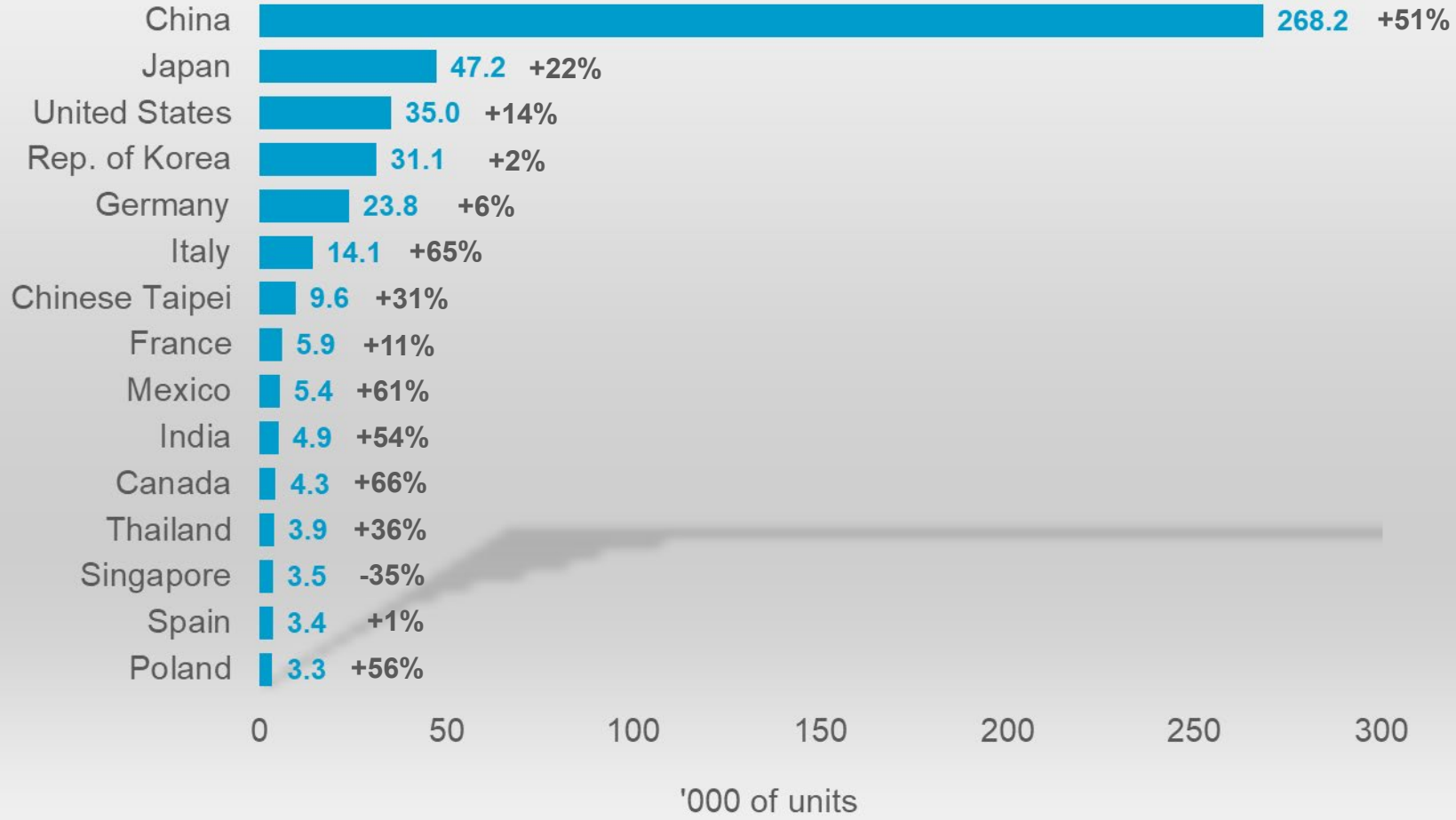
Source: World Robotics 2022

Strong growth in all regions



China increases its lead

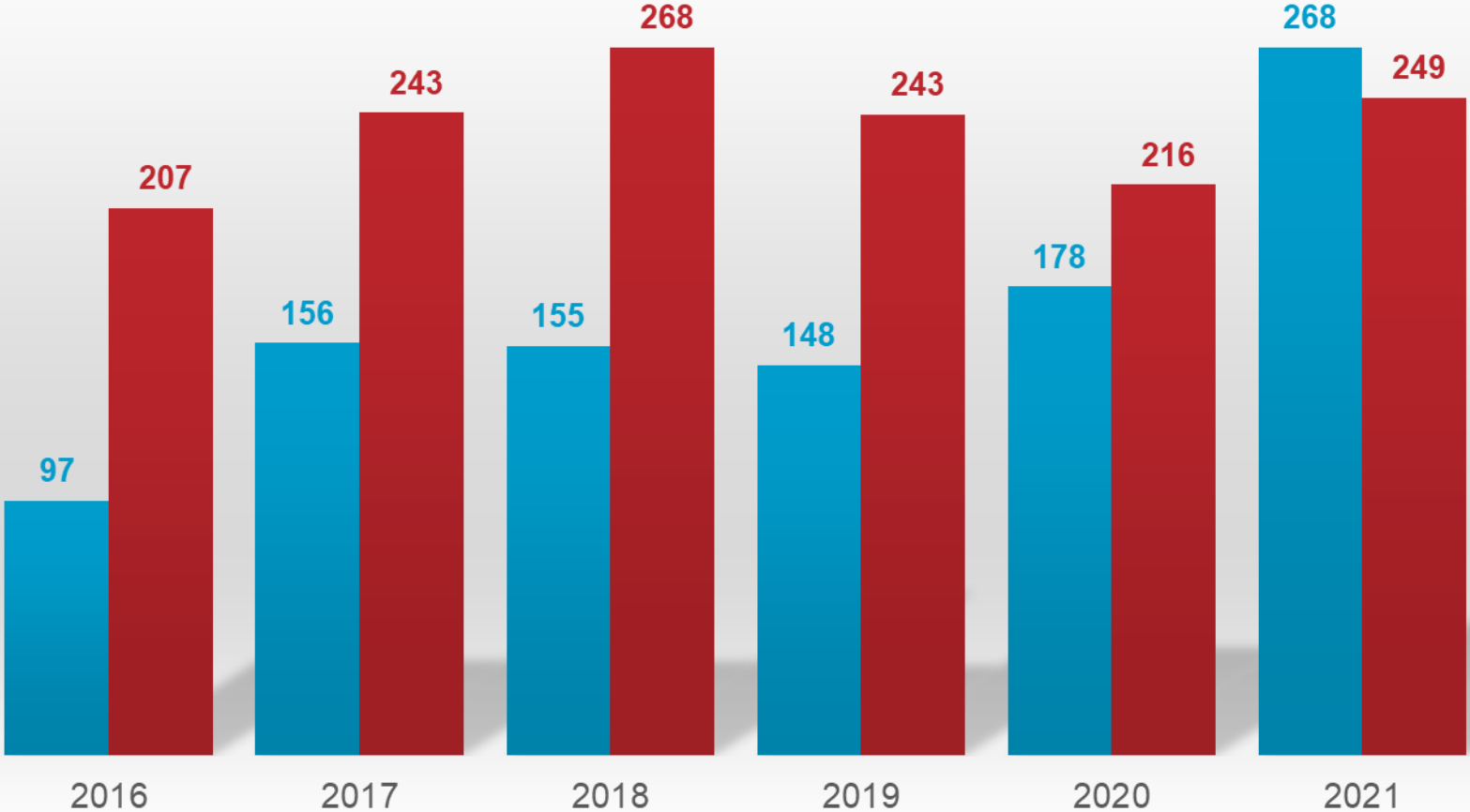
Annual installations of industrial robots
15 largest markets 2021



Source: World Robotics 2022

China now installs more industrial robots per year than the rest of the world taken together

Annual installations of industrial robots
('000 of units)



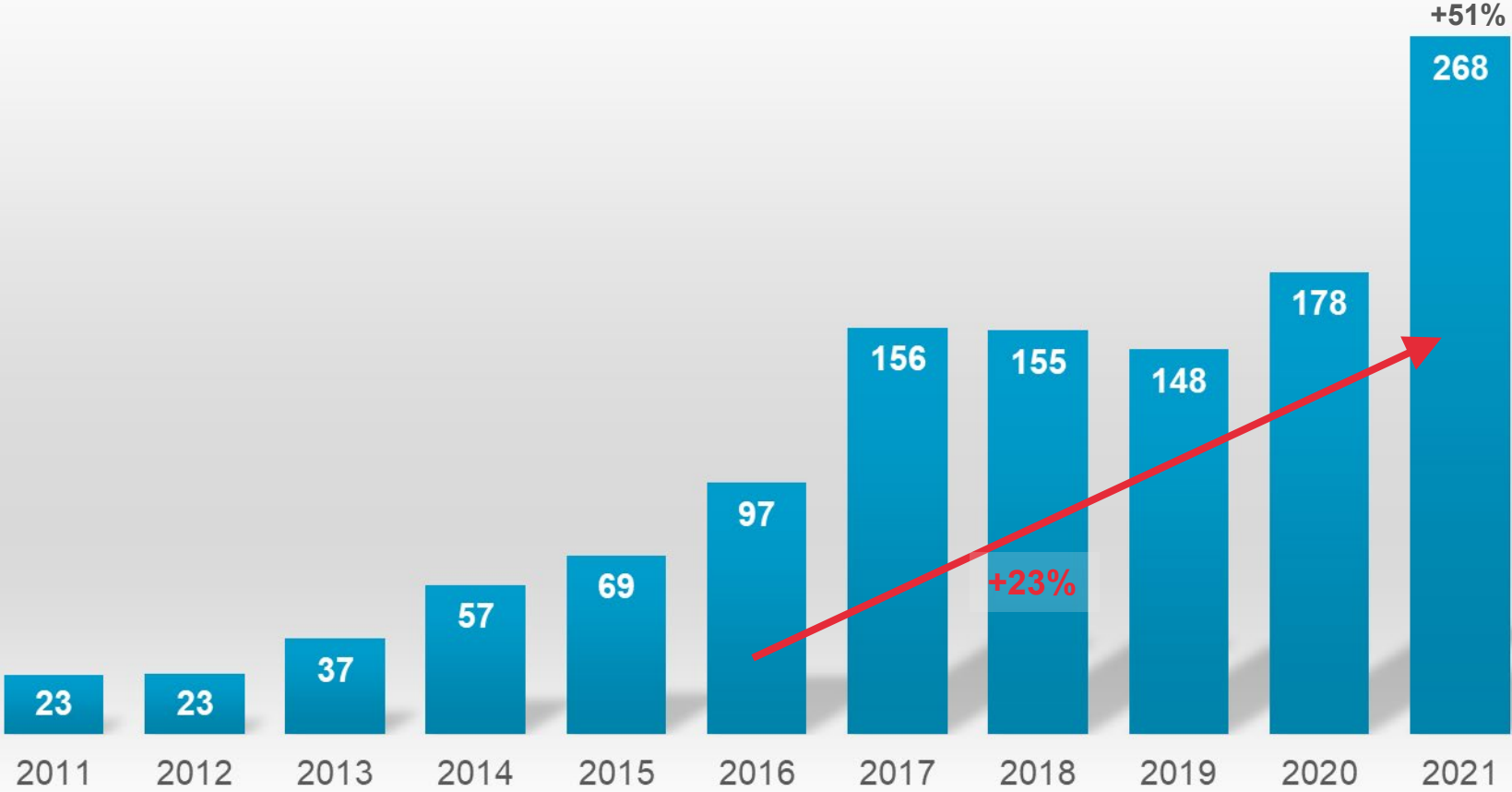
■ China ■ Rest of World

Source: International Federation of Robotics

China multiplied its annual installations by more than factor 11 in a decade

Annual installations of industrial robots - China

1,000 units

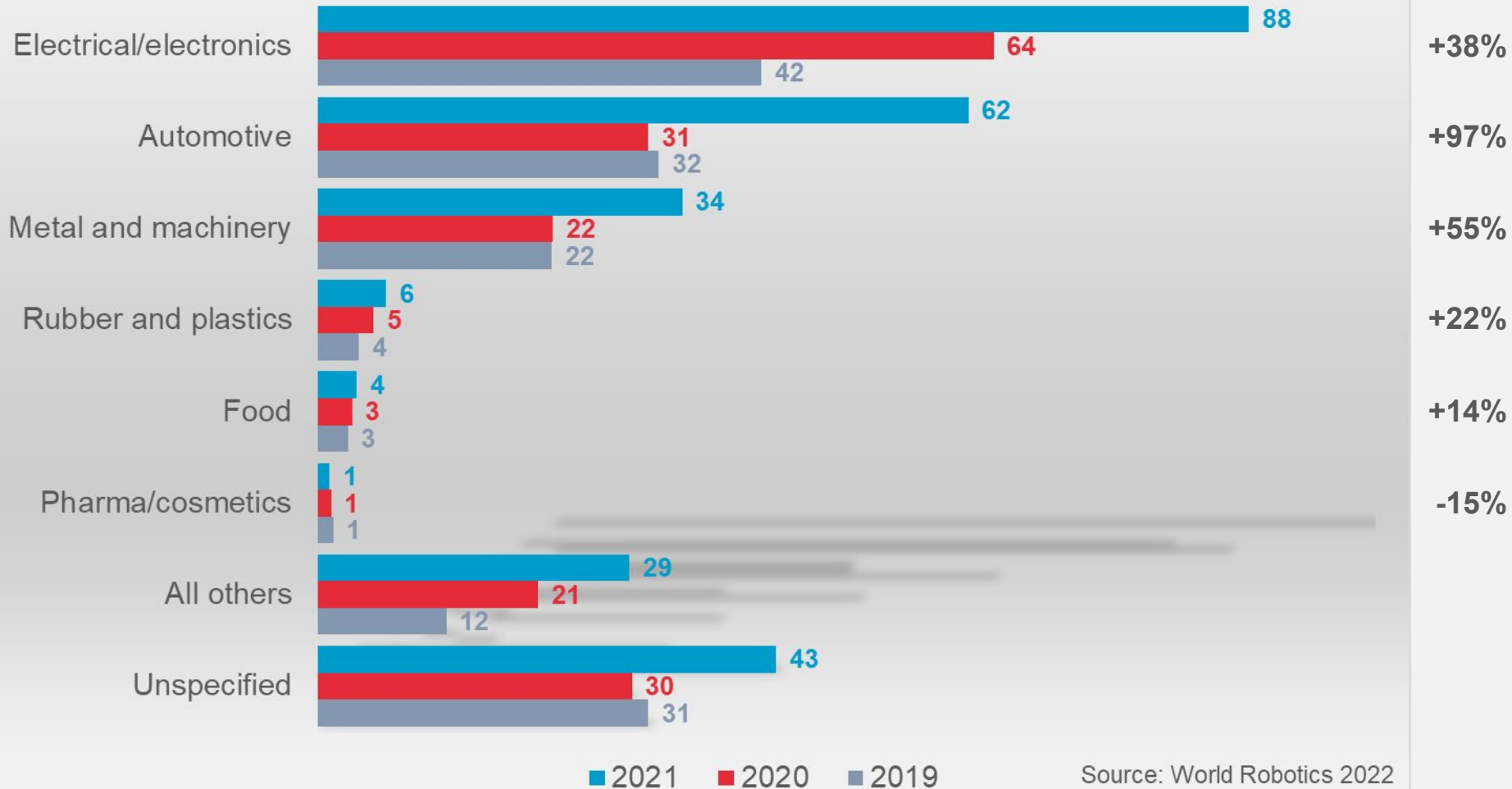


Source: World Robotics 2022

China's electronics industry is the main customer

Annual installations of industrial robots by customer industry - China

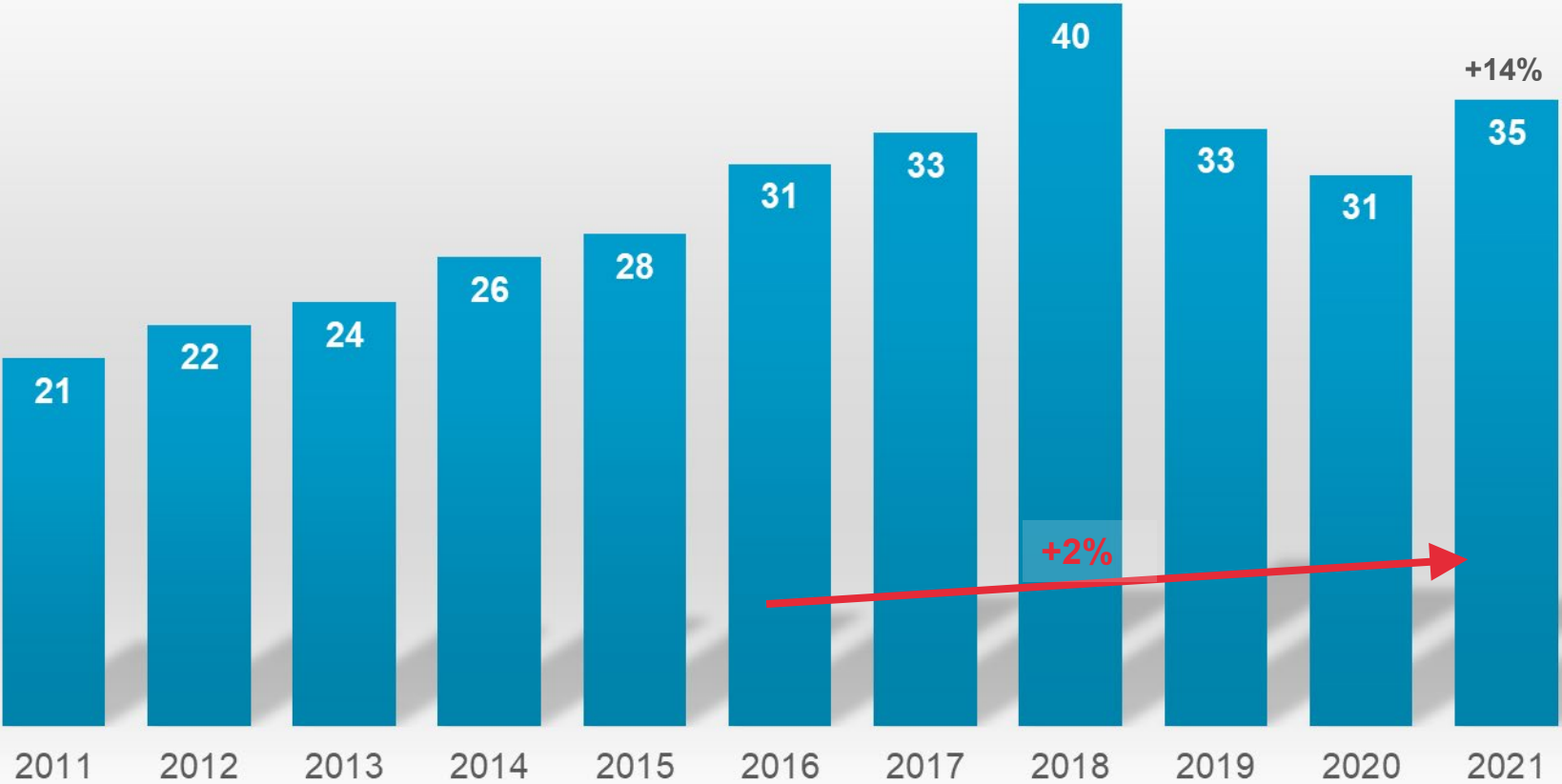
1,000 units



Second highest level ever recorded in the United States

Annual installations of industrial robots - United States

1,000 units

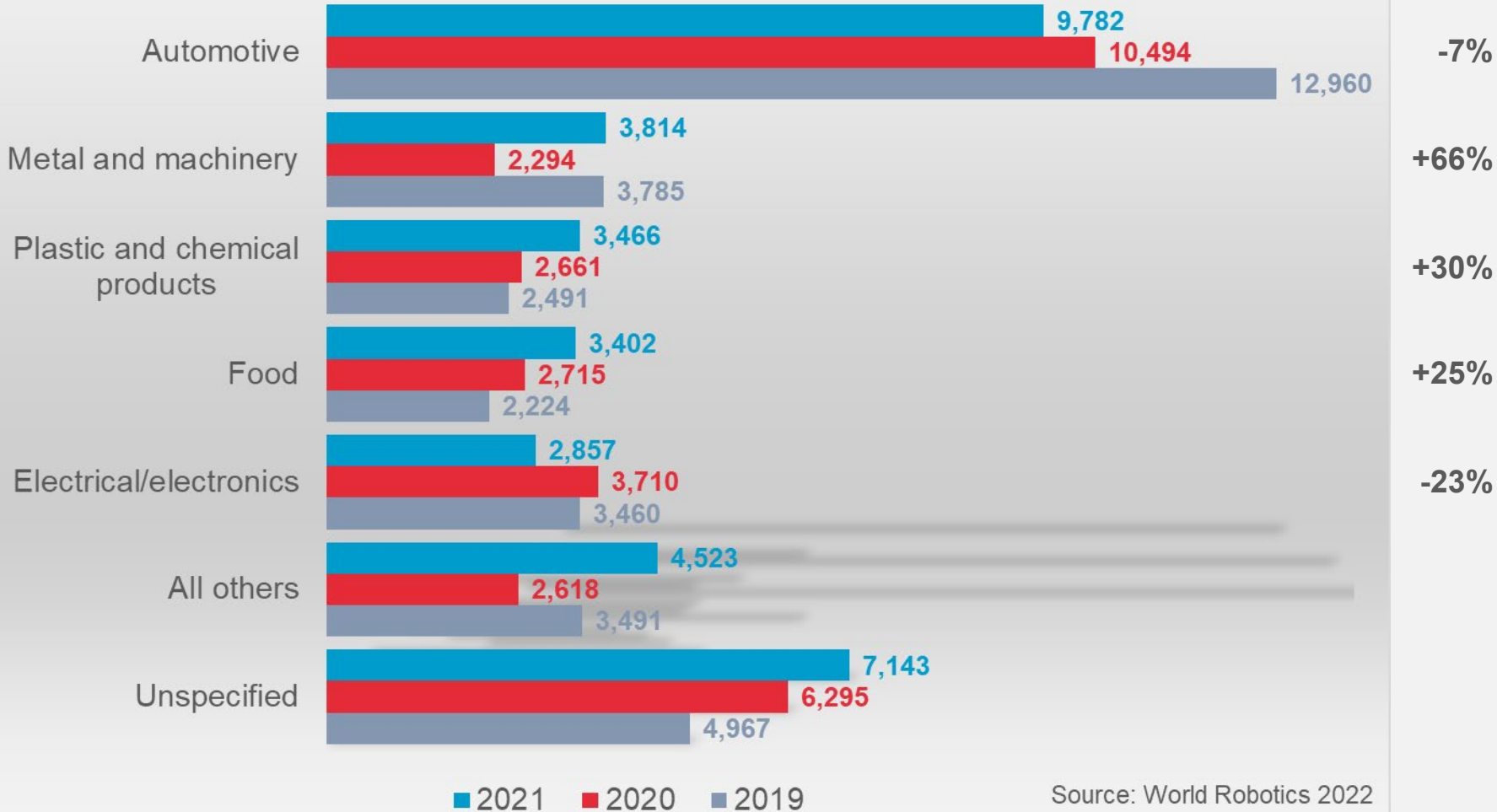


Source: World Robotics 2022

US General Industry driving growth

Annual installations of industrial robots by customer industry - United States

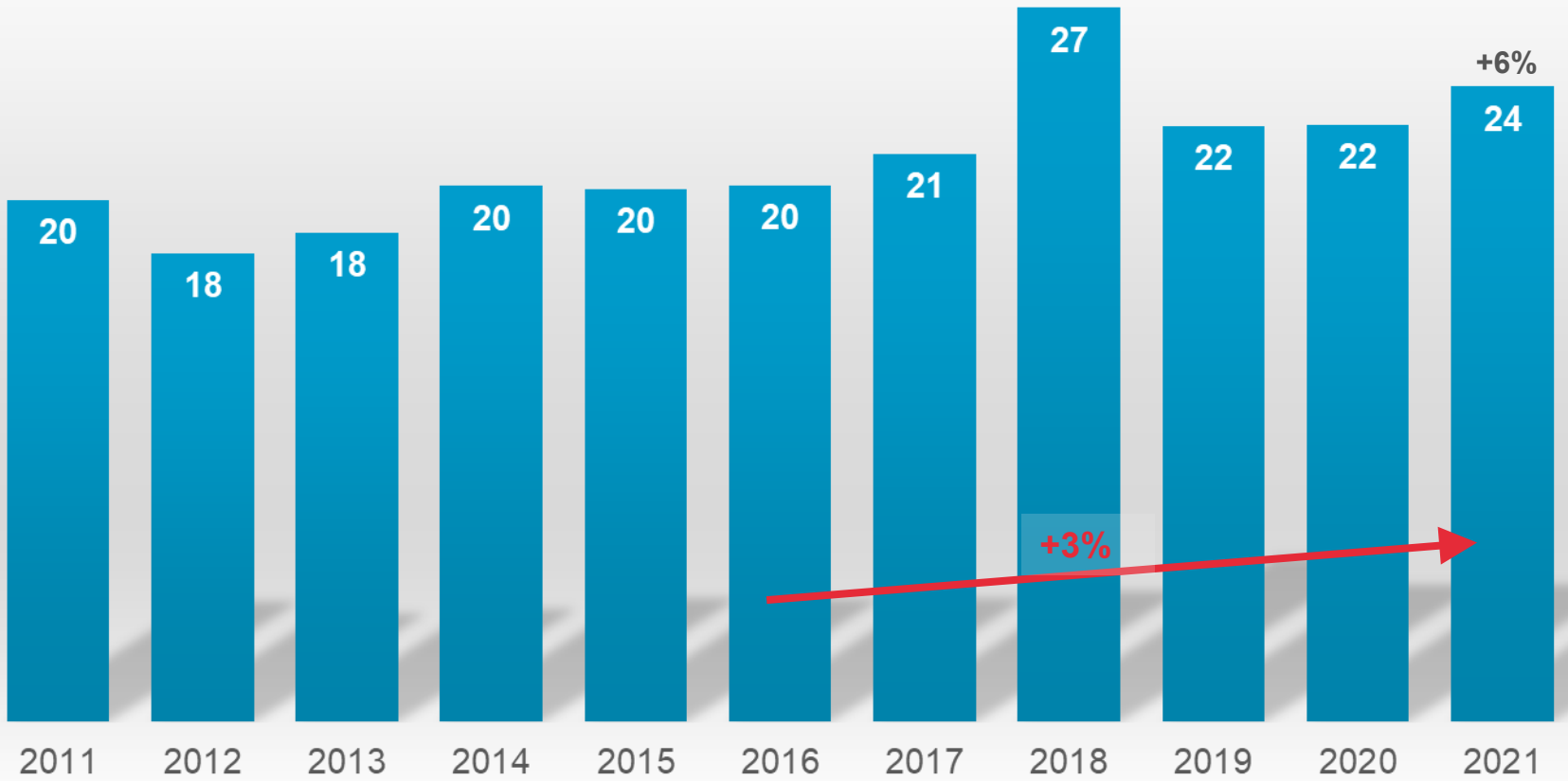
units



Demand for industrial robots in Germany growing slowly

Annual installations of industrial robots - Germany

1,000 units

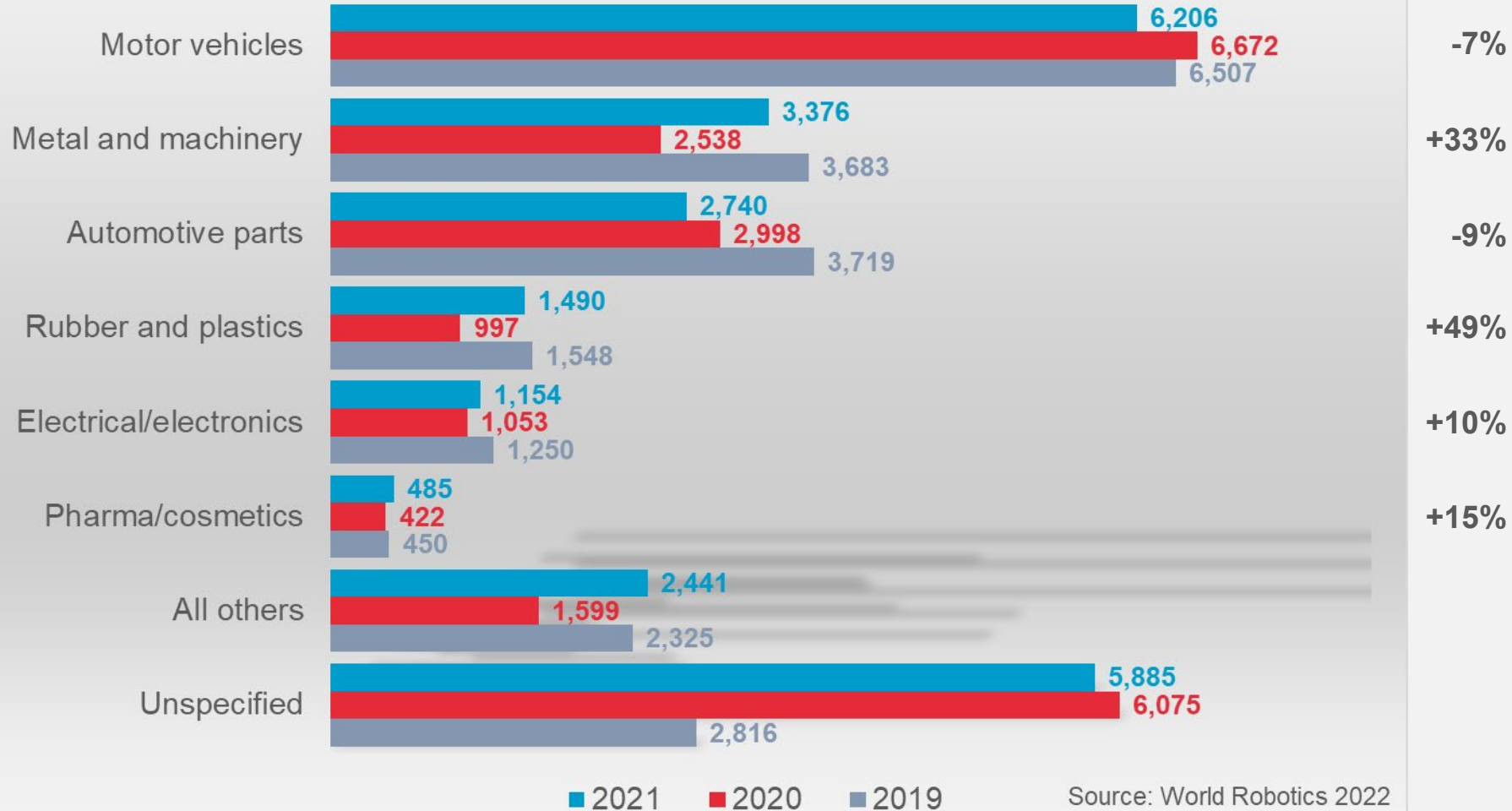


Source: World Robotics 2022

Automotive is still the major customer in Germany

Annual installations of industrial robots by customer industry - Germany

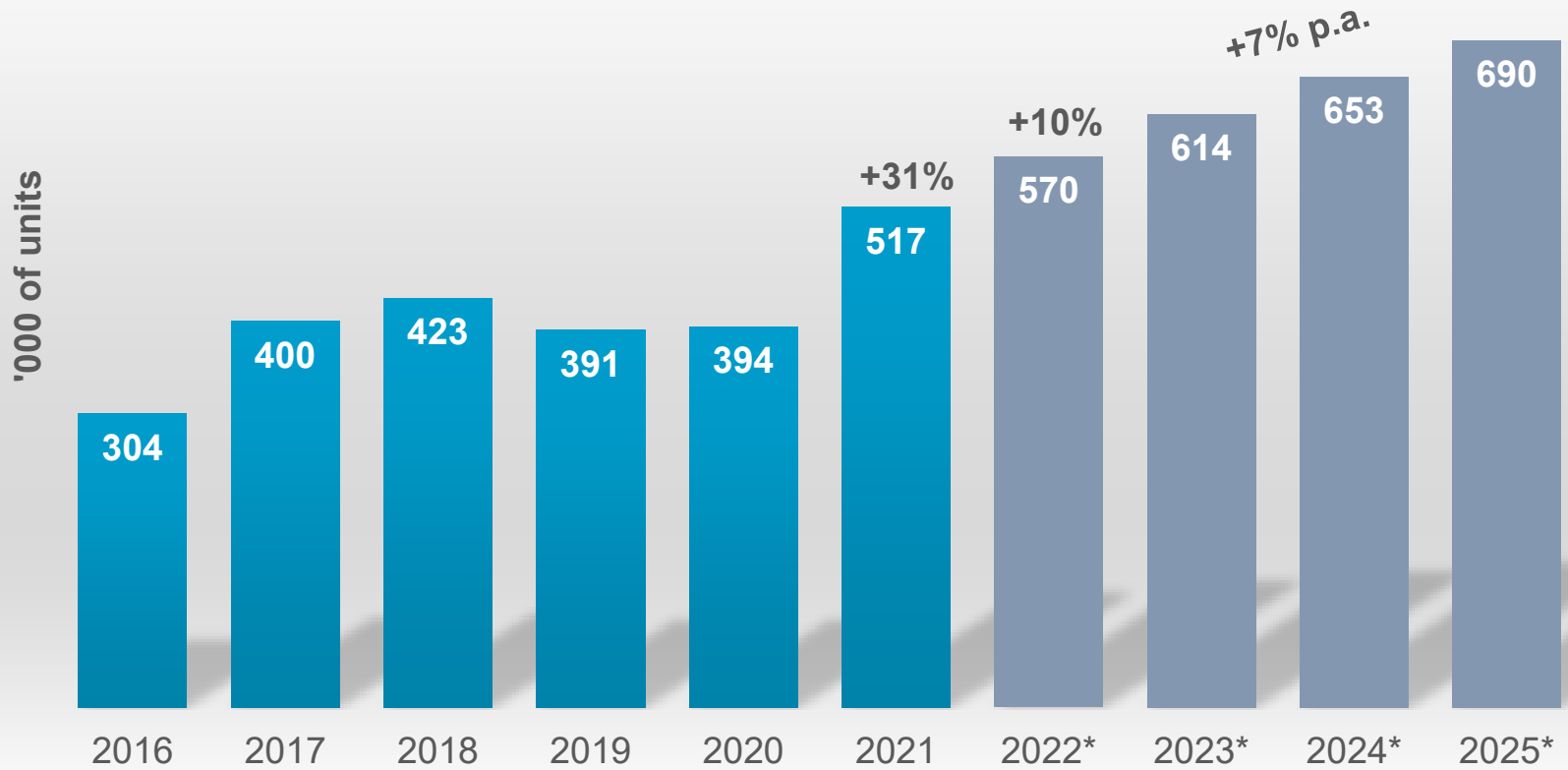
units



Trends and Forecast



Annual installations of industrial robots 2016-2021 and 2022*-2025*



*forecast

Source: World Robotics 2022

Short-term market determinants

- **Macroeconomic headwinds**
- **Geopolitical tensions leading to uncertainty**
- **Covid-19 restrictions still hamper business activities**



Short-term market determinants

- Full order books
- Scarcity of raw materials and intermediate products
- Continued demand from electronics industry
- Political support
- Labor scarcity in many developed economies



Market trends

- Re- and nearshoring of production
- “Democratizing” robotics
- Ongoing trend to high mix-low volume production



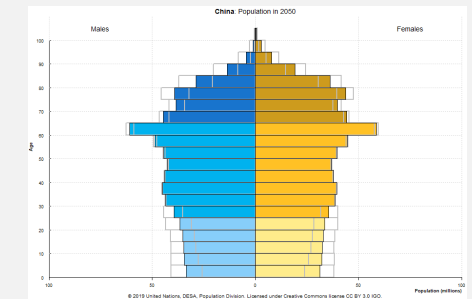
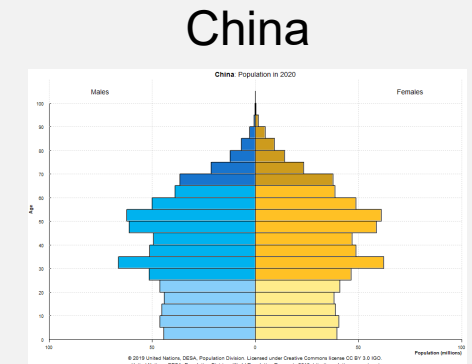
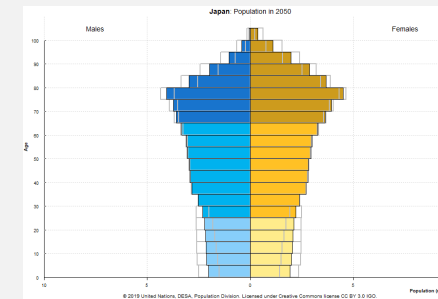
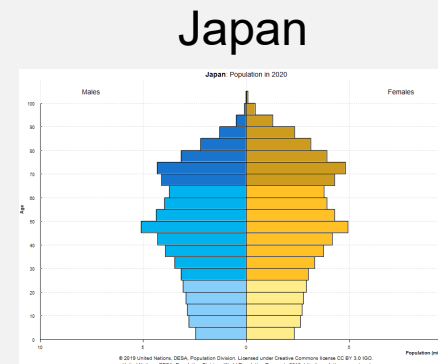
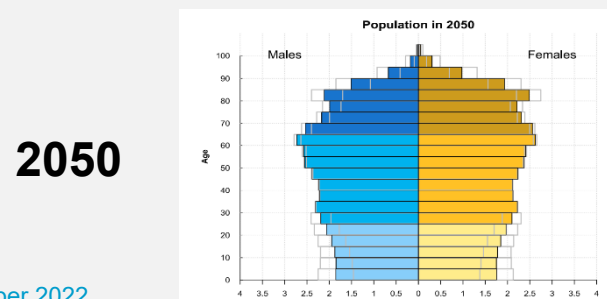
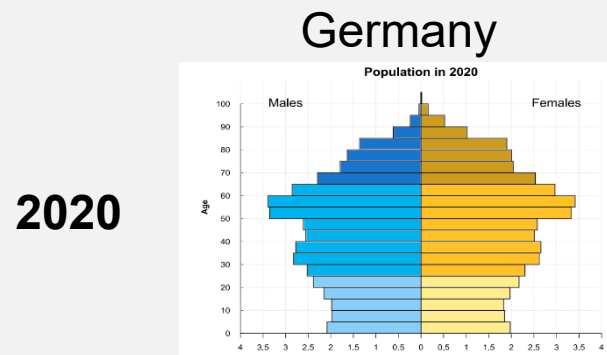
Technological trends

- **Sustainable development**
- **Advancements in adjacent technologies**
- **Human-robot collaboration steadily developing**

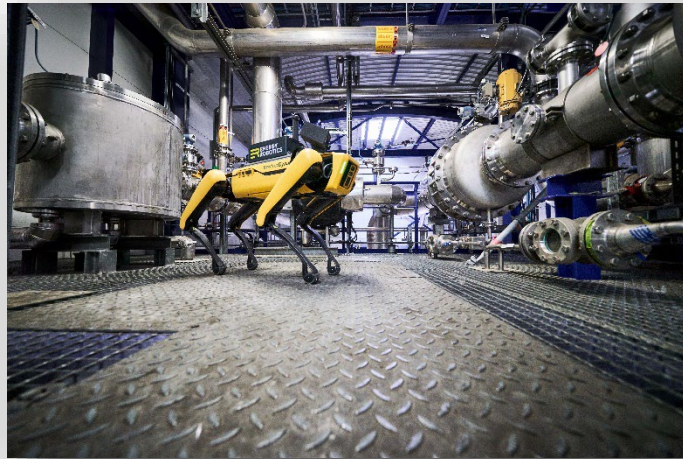


Long-term Growth Driver: Demographic change

- Low birth rates (< 2.1 children per woman) and babyboom generation going to retire
- Growing need for elderly care
- Situation similar in major economies
- **Massive labor shortage to be expected**



Labor Shortage beyond the Manufacturing Industry



- Intralogistics
 - in factories and e-commerce
- Professional Cleaning
- Inspection and Maintenance
- Hospitality
- Agriculture

Source: Energy Robotics, PAL Robotics

Source: FarmDroid, DeLaval

Megatrends

**24% of global retail sales
online by 2026**



**15 mn health care
workers missing
worldwide by 2030**



**Building square
footage +39% by 2050
in the US**



What's next?

**Worldwide housing crisis -
impacting 1.6 billion people
by 2025**



**Glyphosat ban
worldwide**



Service robots – top findings



2021: Continuous growth

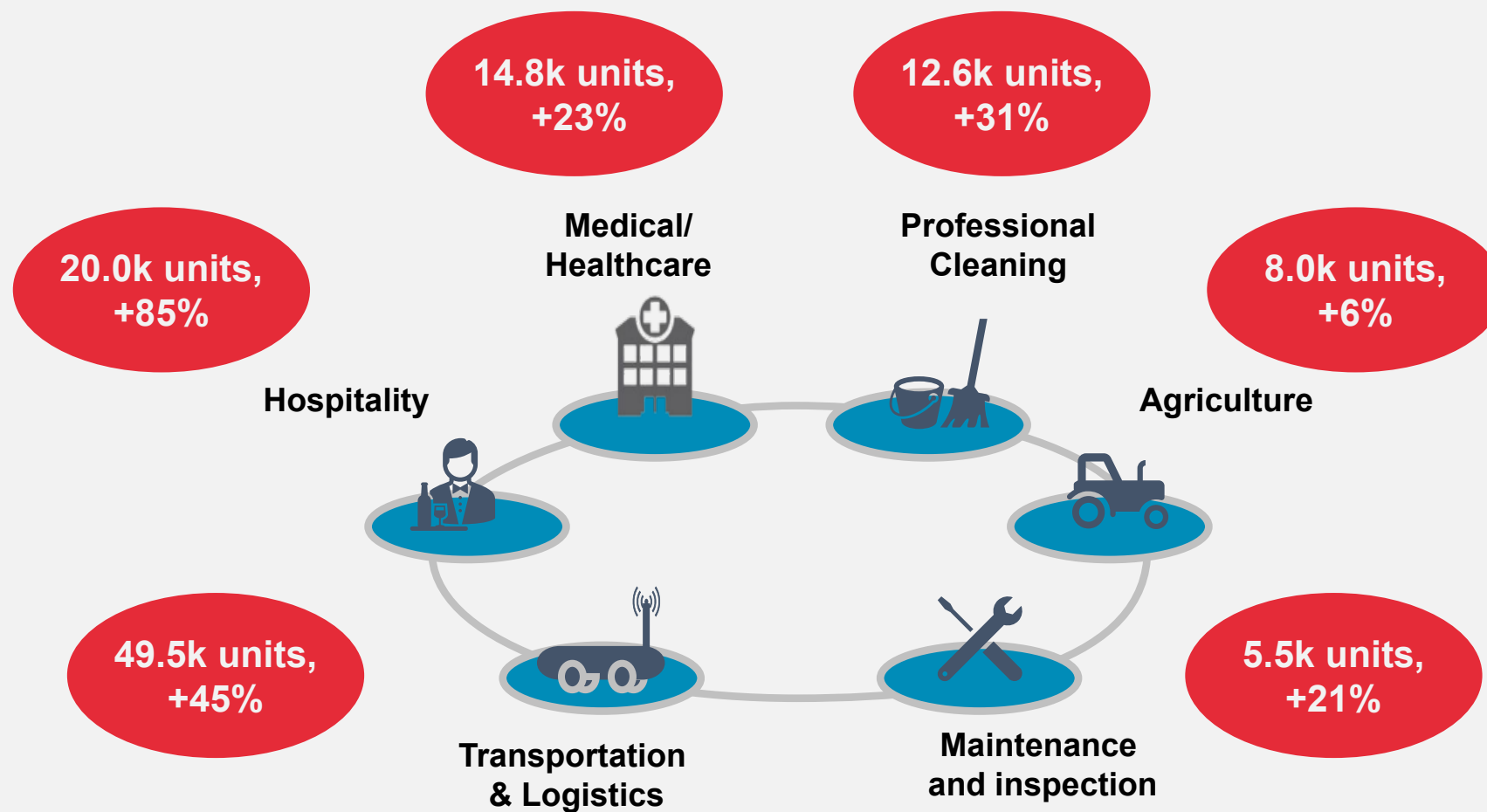
New professional service robots*

- 121,000 units (+37%)

New consumer service robots

- 19 million units (+9%)

Top 6 application areas for professional service robots



Transportation & Logistics

49.5k units,
+45%



State of the art



Future trend



Hospitality

20.0k units,
+85%



State of the art



Future trend

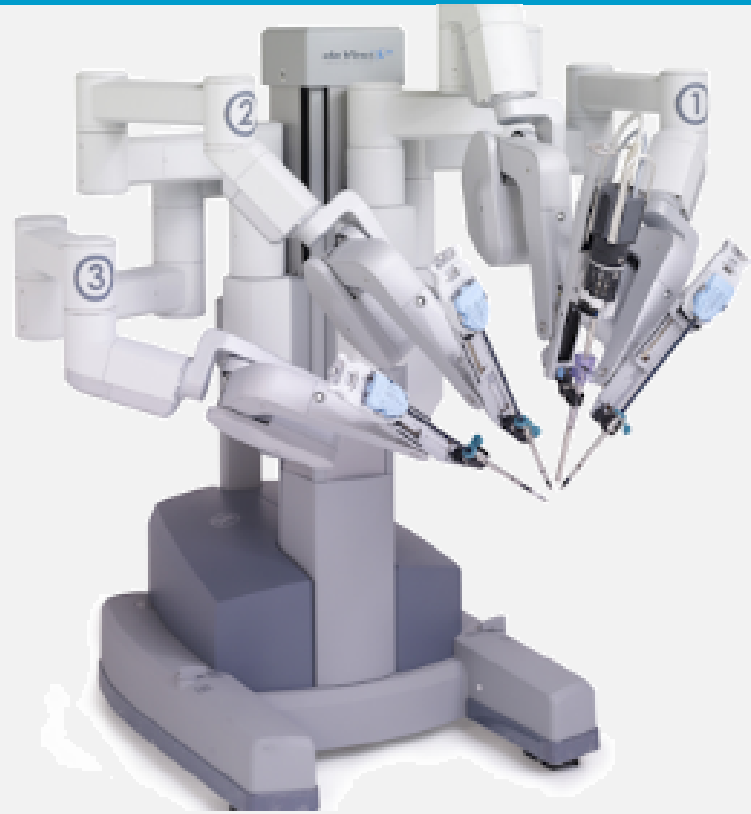


Medical/Healthcare

14.8k units,
+23%



State of the art



Future trend



Professional Cleaning

12.6k units,
+31%



State of the art



Future trend



Agriculture

8.0k units,
+6%



State of the art

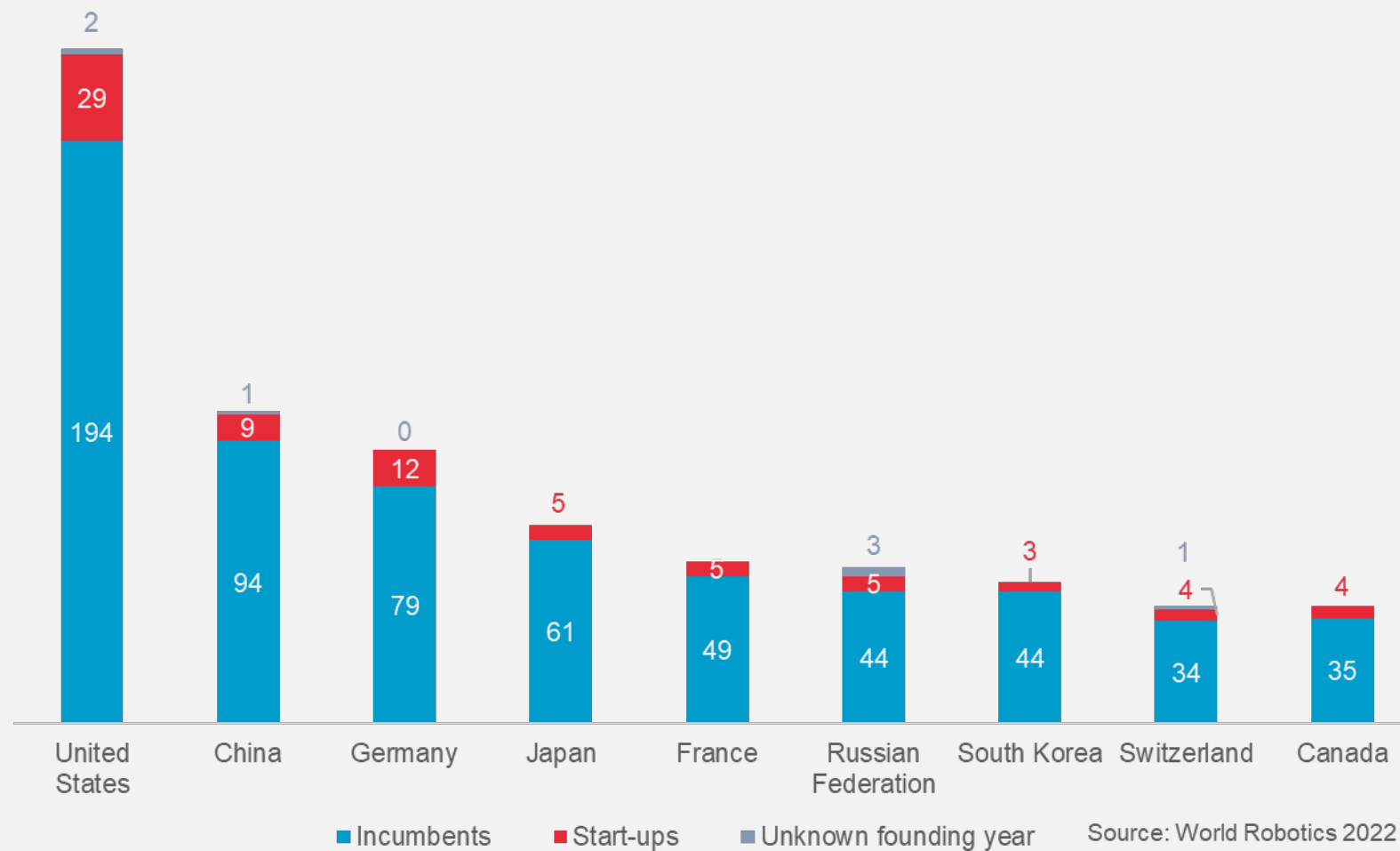


Future trend

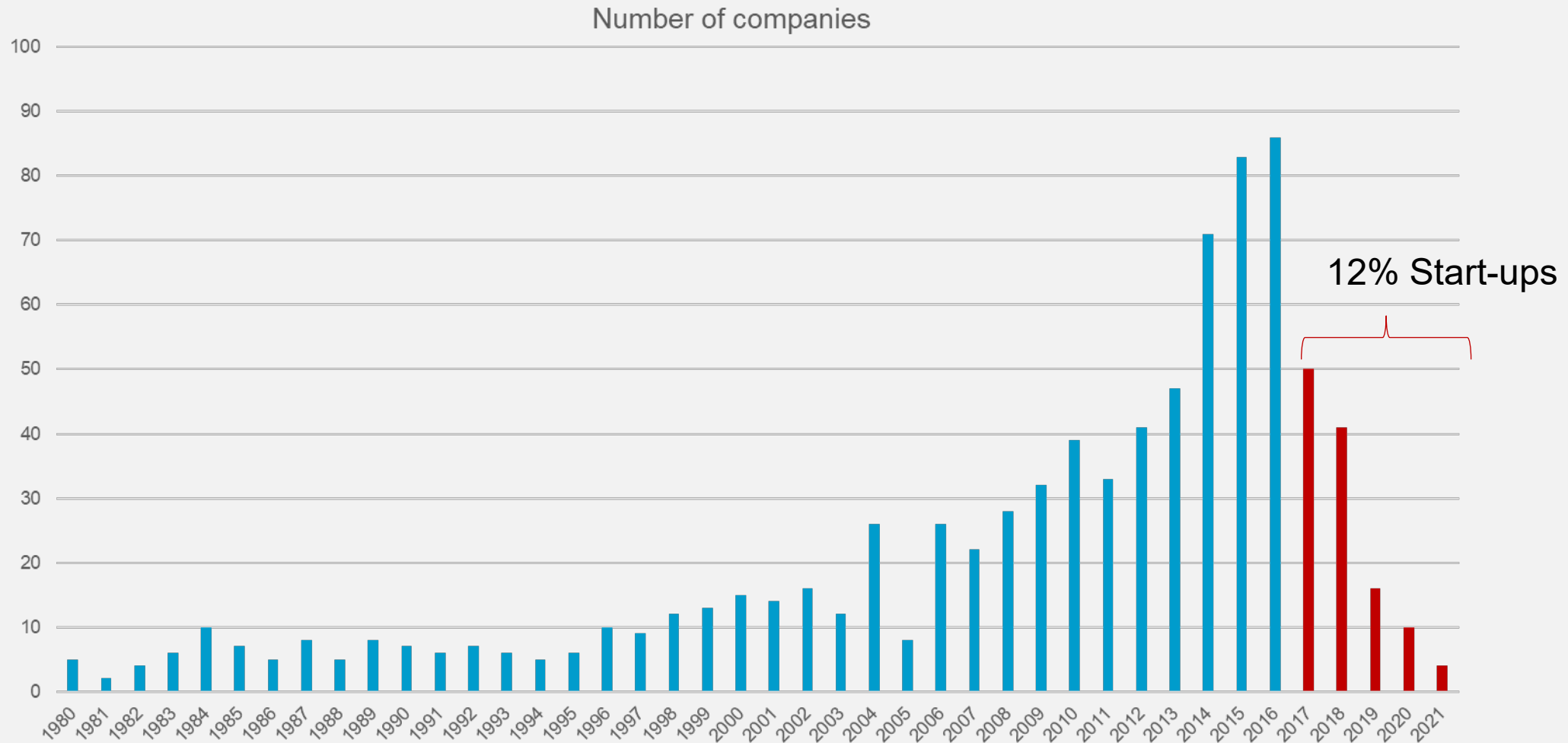


The United States is home of most service robot suppliers

Service robot manufacturers by country (top 10) all applications



2013-2016: baby boom years for service robotics



- **Lack of skilled staff/
Demographic change**
- **New business models:
Robots-as-a-Service**
- **Technology advances and AI are opening up new use cases and improves performance in existing ones**



Thank you for your attention.

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