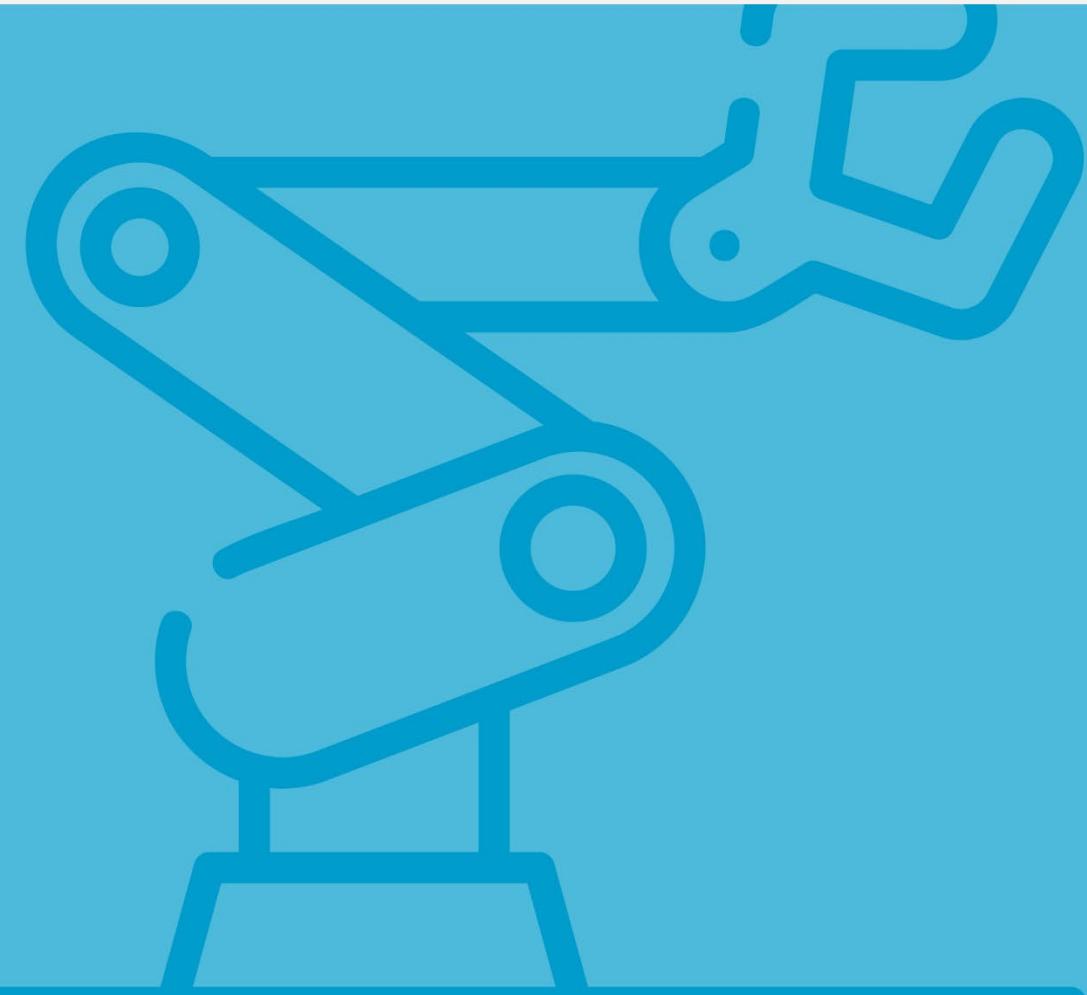


Welcome to the presentation of

# World Robotics 2023



# The Speakers



**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 3000 organizations represented indirectly

# Members

## NATIONAL ASSOCIATIONS



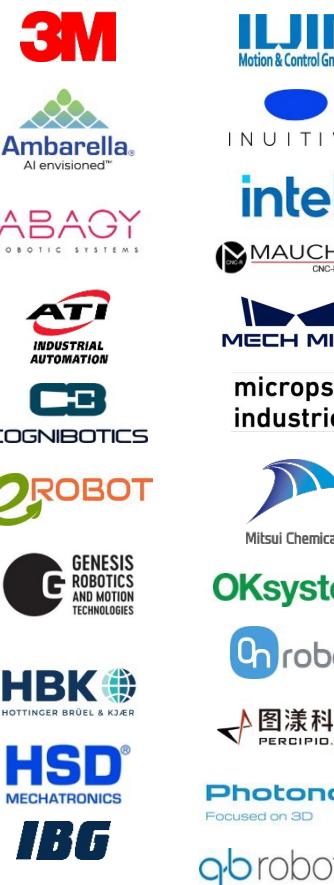
## INDUSTRIAL ROBOT MANUFACTURERS



## SERVICE ROBOT MANUFACTURERS



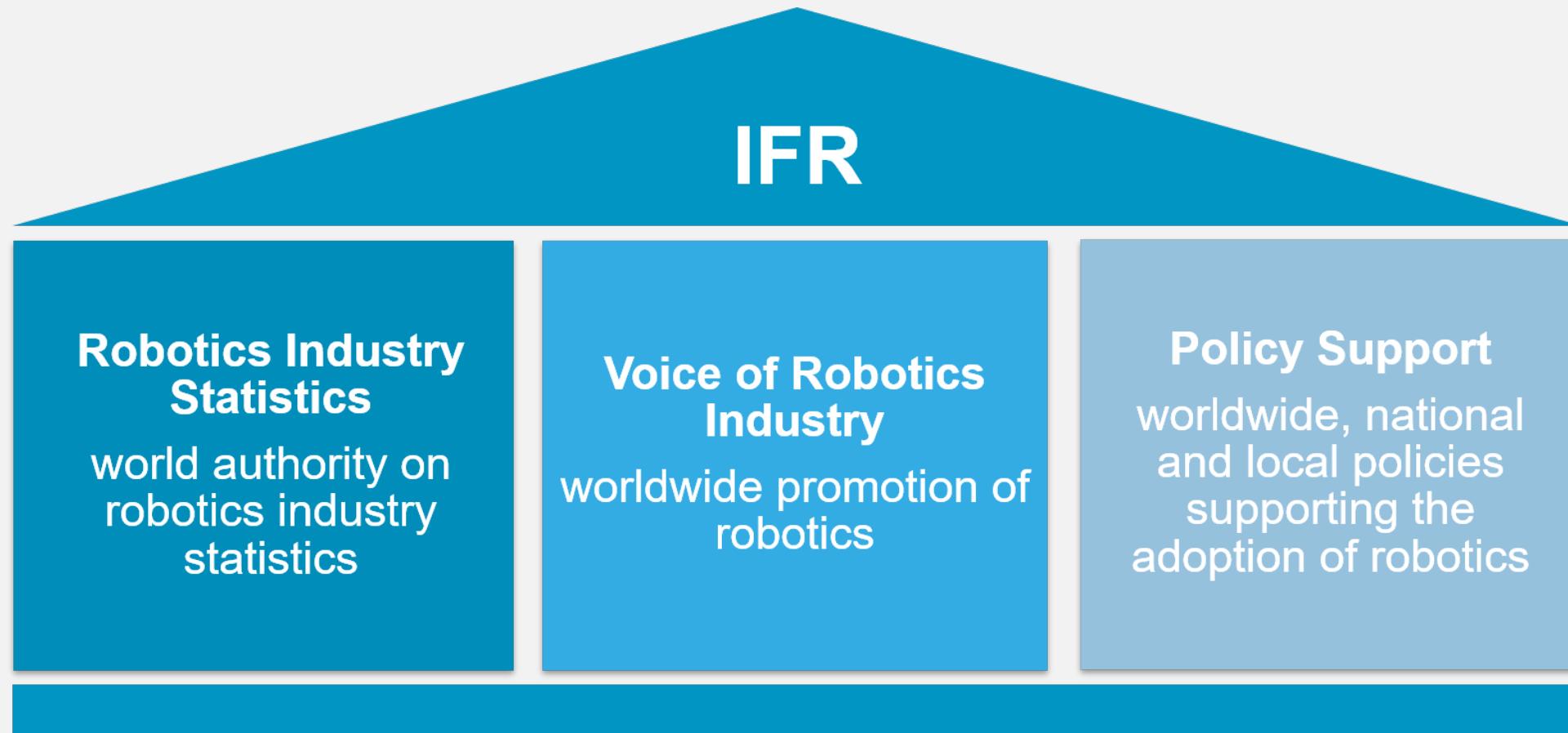
## COMPONENT SUPPLIERS & INTEGRATORS



## R&D INSTITUTES



# Three pillars of IFR activities



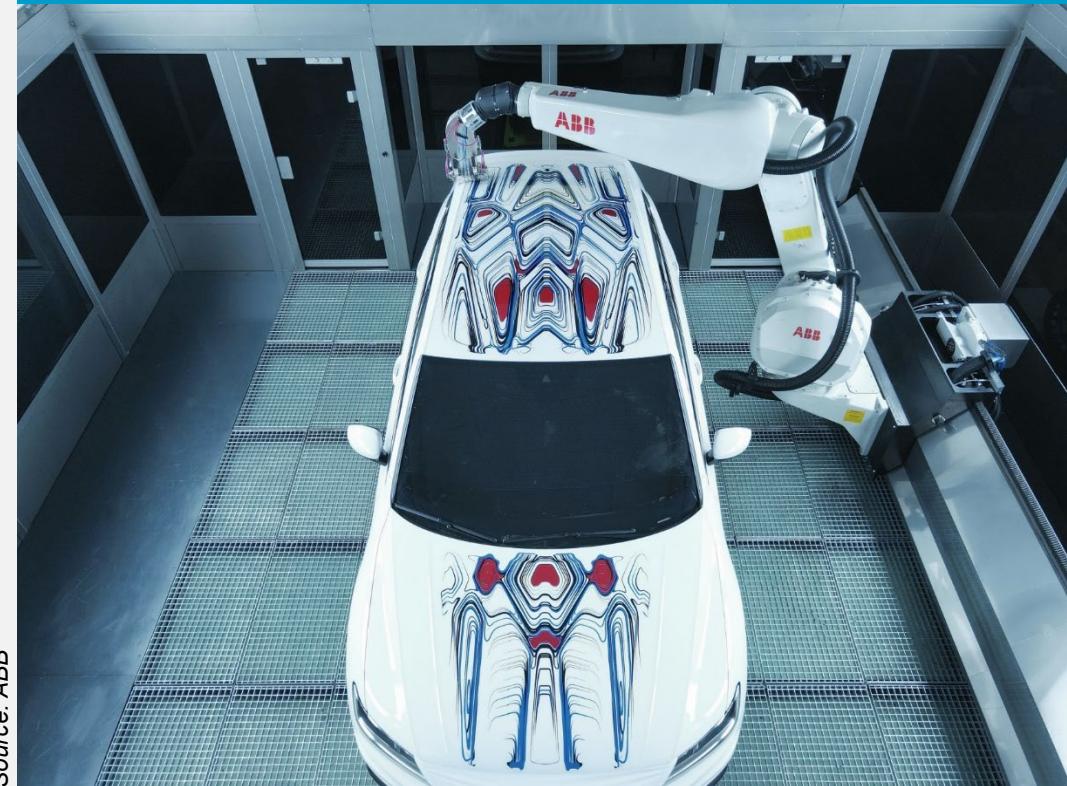
# What is a robot – and what is not?



- “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



Source: ABB

## Service robots

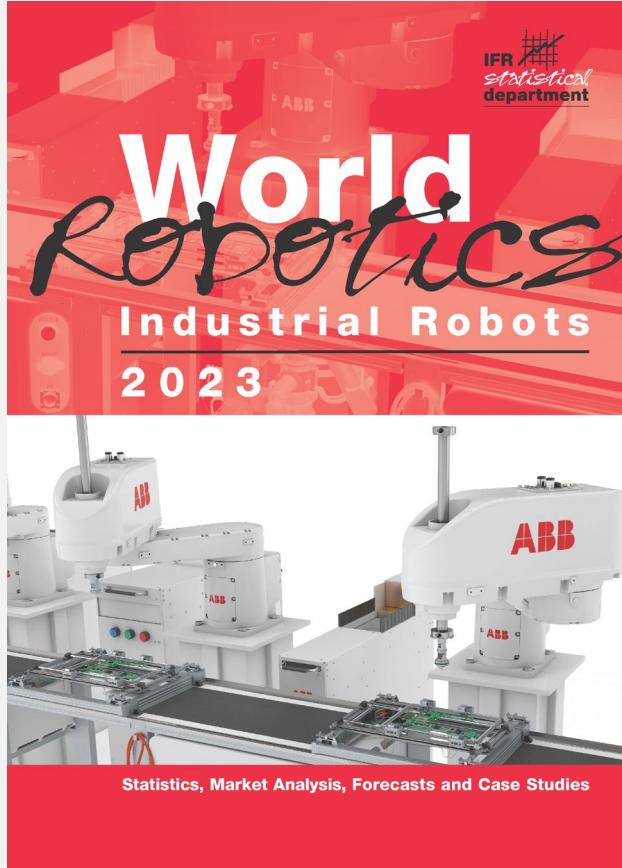


Source: KUKA

# Presentation of World Robotics 2023



# Industrial robots - top findings



## 2022: Growing from a high basis

- Second record year in a row

## New robots

- 553,000 units (+5%)
- CAGR 2017-2022: +7%

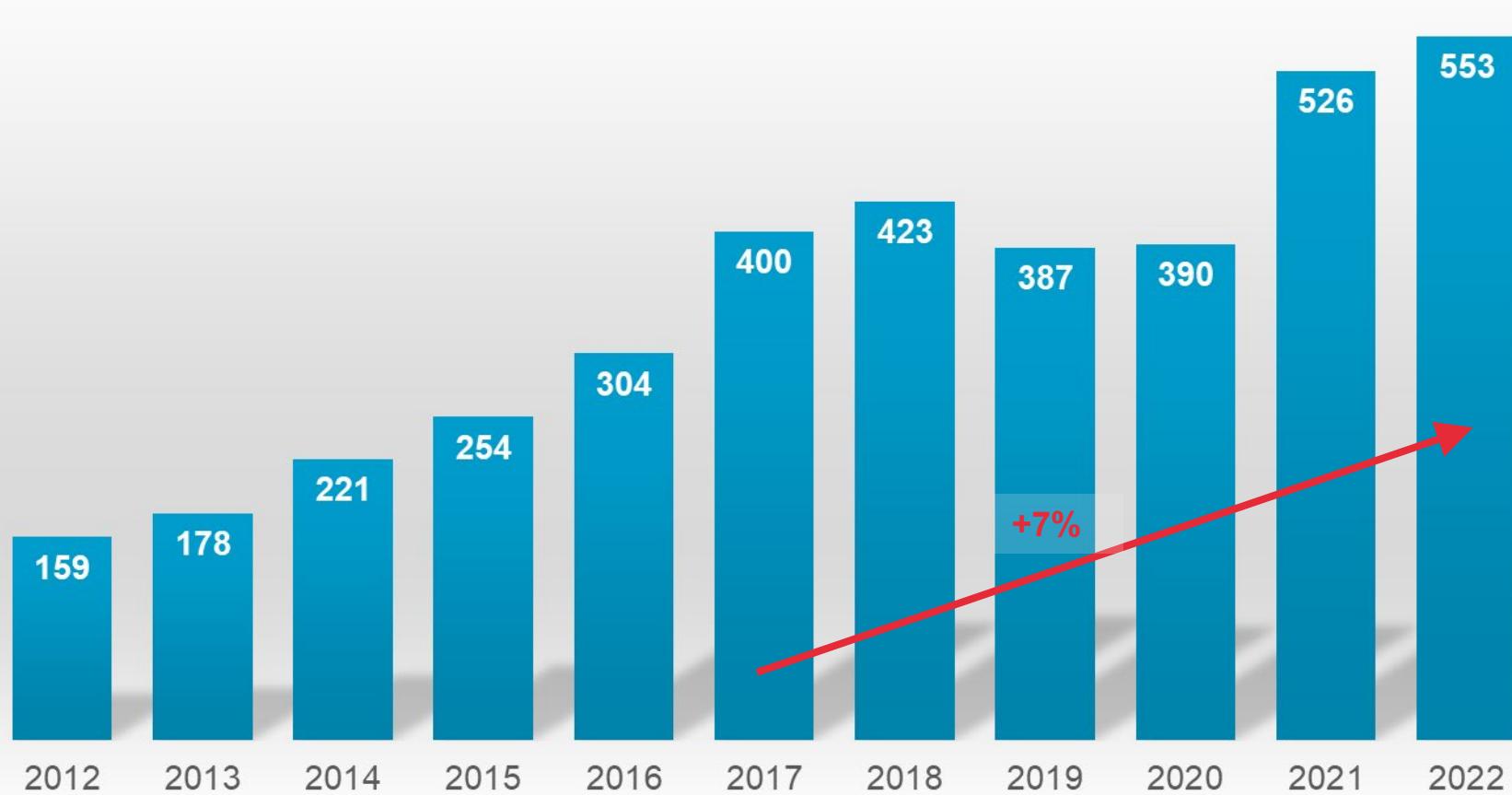
## Robot stock

- 3.9 million units (+12%)
- CAGR 2017-2022: +13%

World record of **500,000 units** exceeded

## Annual installations of industrial robots - World

1,000 units

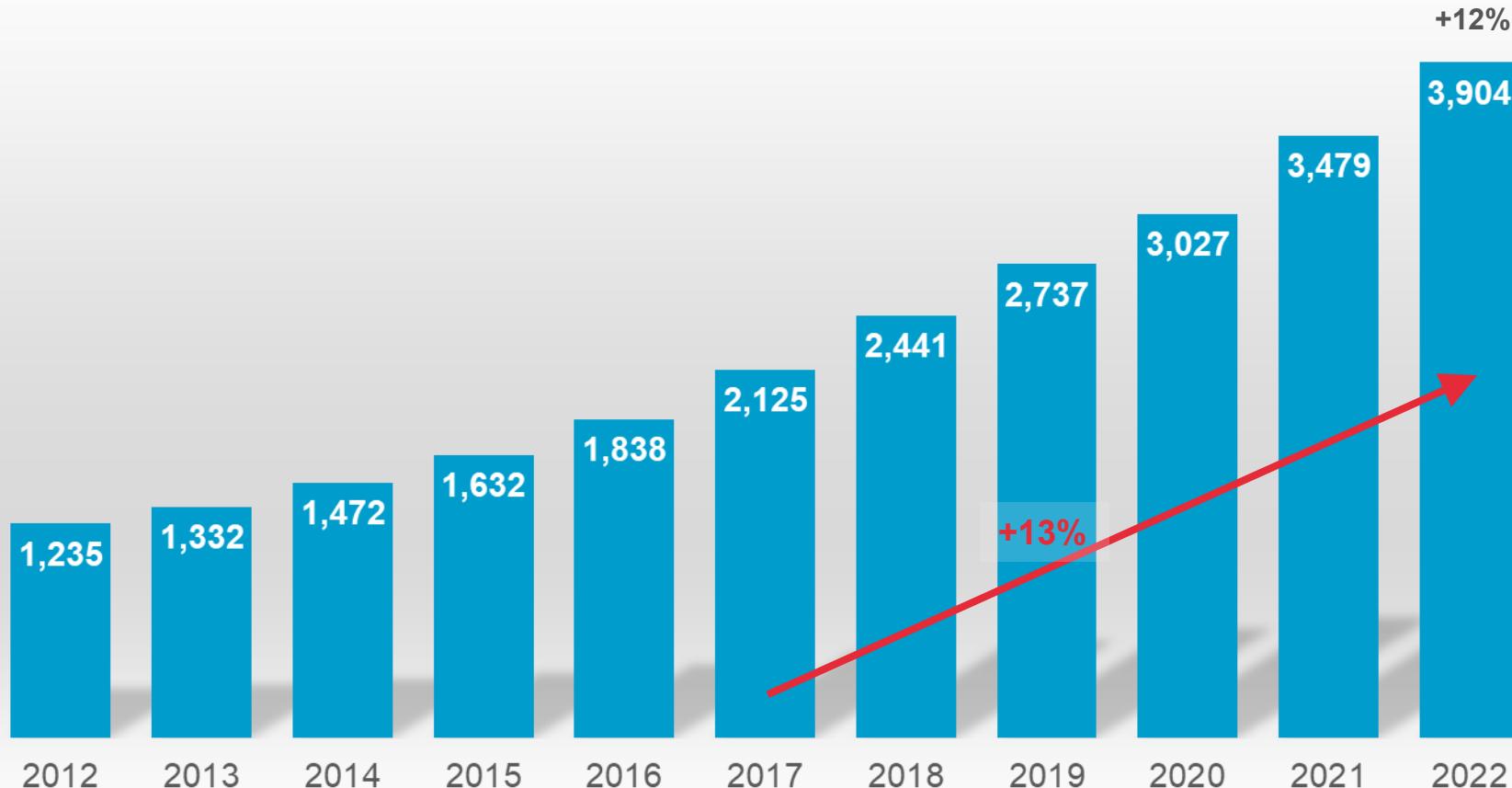


Source: World Robotics 2023

Almost 4 million industrial robots operating around the world

## Operational stock of industrial robots - World

1,000 units

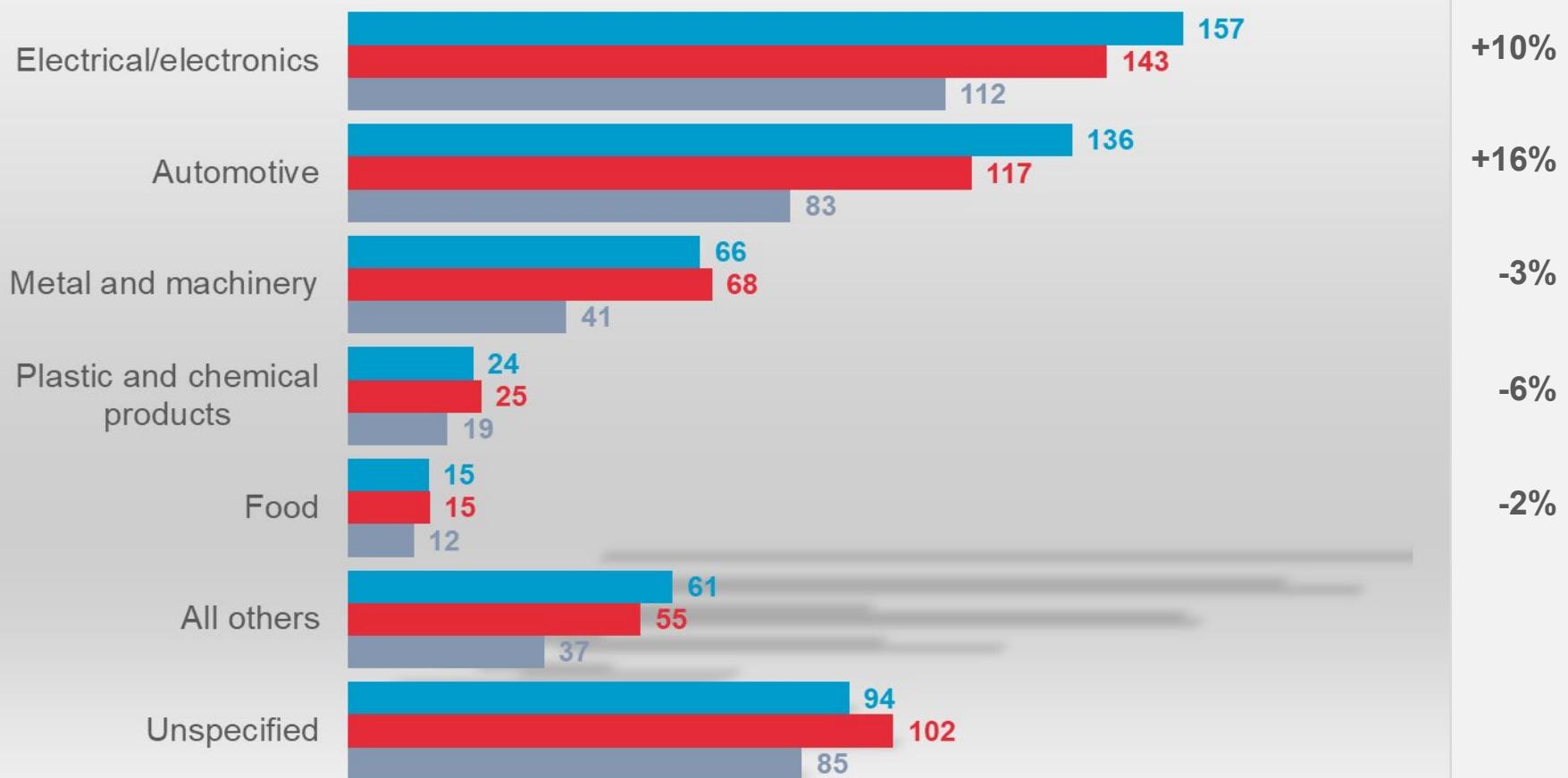


Source: World Robotics 2023

## Electronics is major customer – challenges for general industry

### Annual installations of industrial robots by customer industry - World

1,000 units

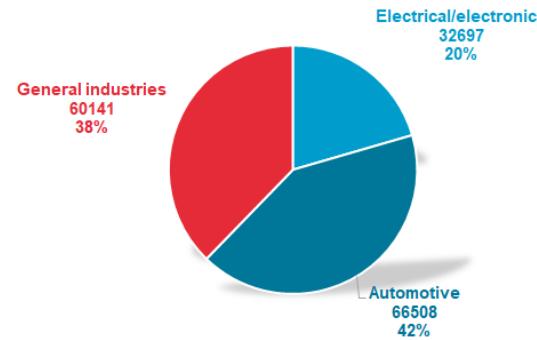


Source: World Robotics 2023

# General industry now accounts for almost half of new installations

## Shares of major industries in 2012

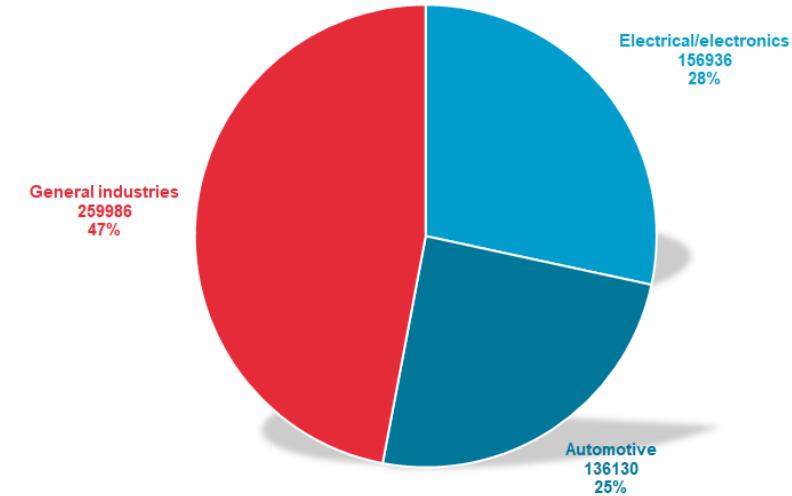
Annual installations of industrial robots: automotive and electronics vs. general industry - 2012 - World



Source: International Federation of Robotics

## Shares of major industries in 2022

Annual installations of industrial robots: automotive and electronics vs. general industry - 2022 - World

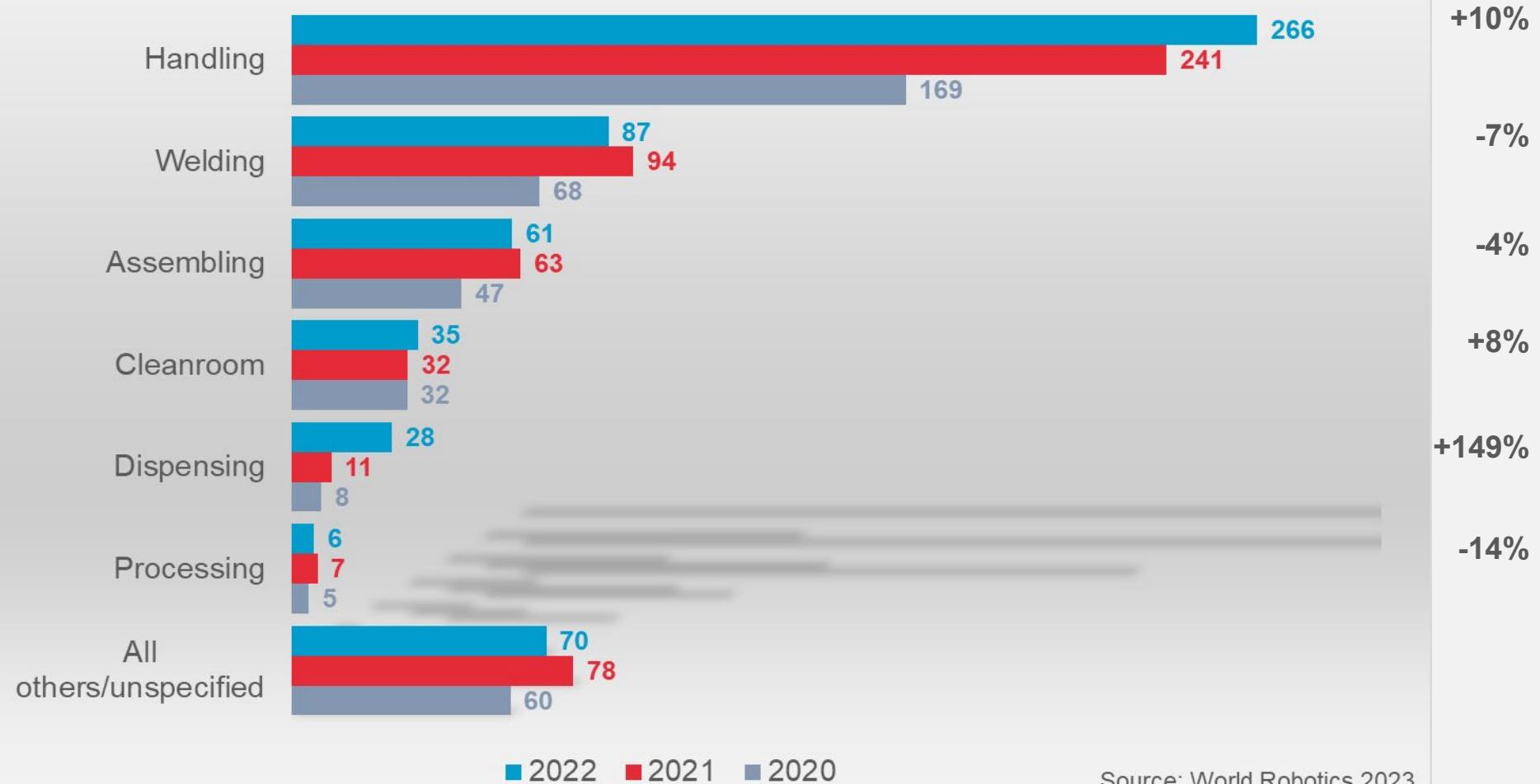


Source: International Federation of Robotics

Handling is most important application with 48% share

## Annual installations of industrial robots by application - World

1,000 units

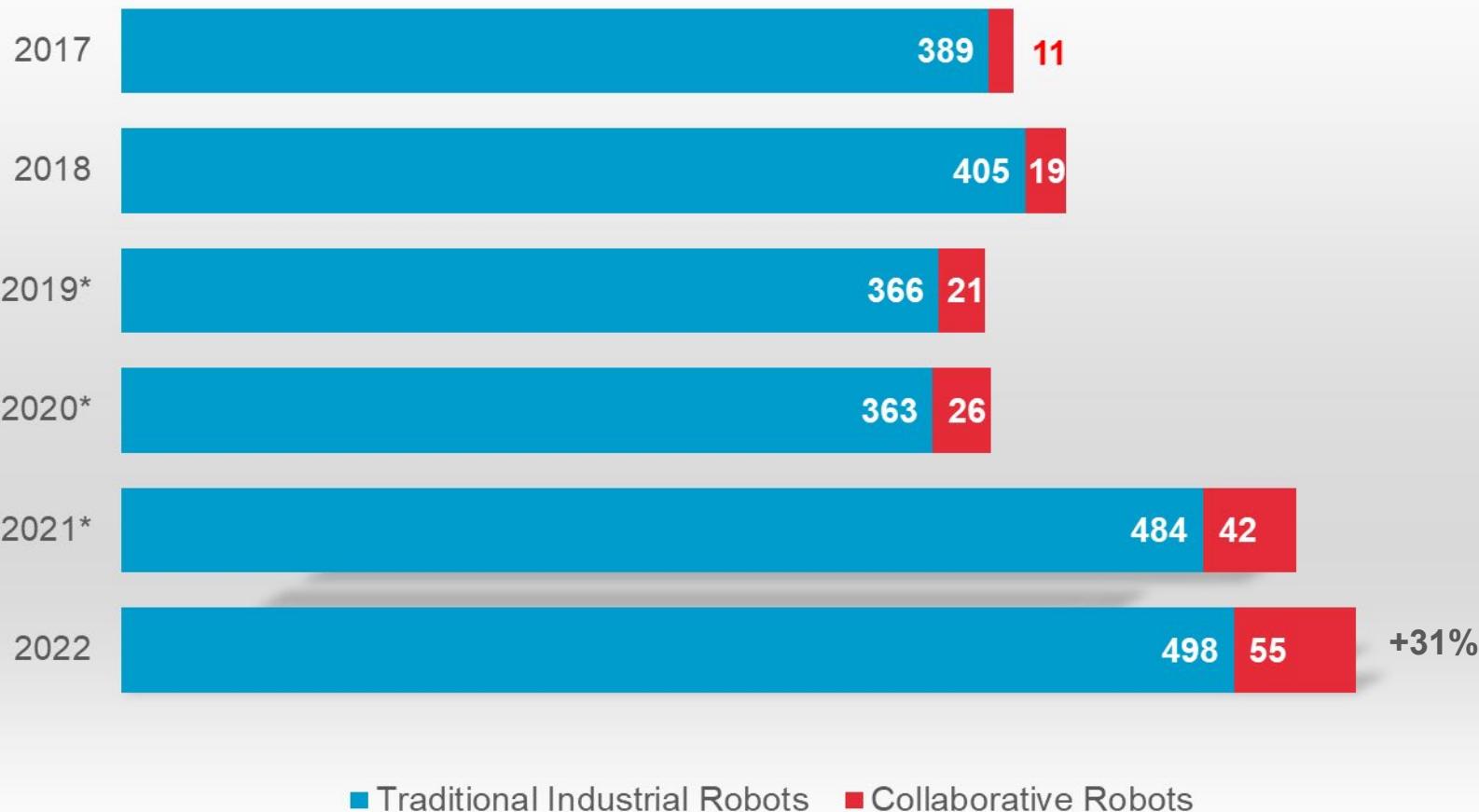


Source: World Robotics 2023

## Collaborative robots steadily growing their market share to 10%

### Collaborative and traditional industrial robots

'000 units

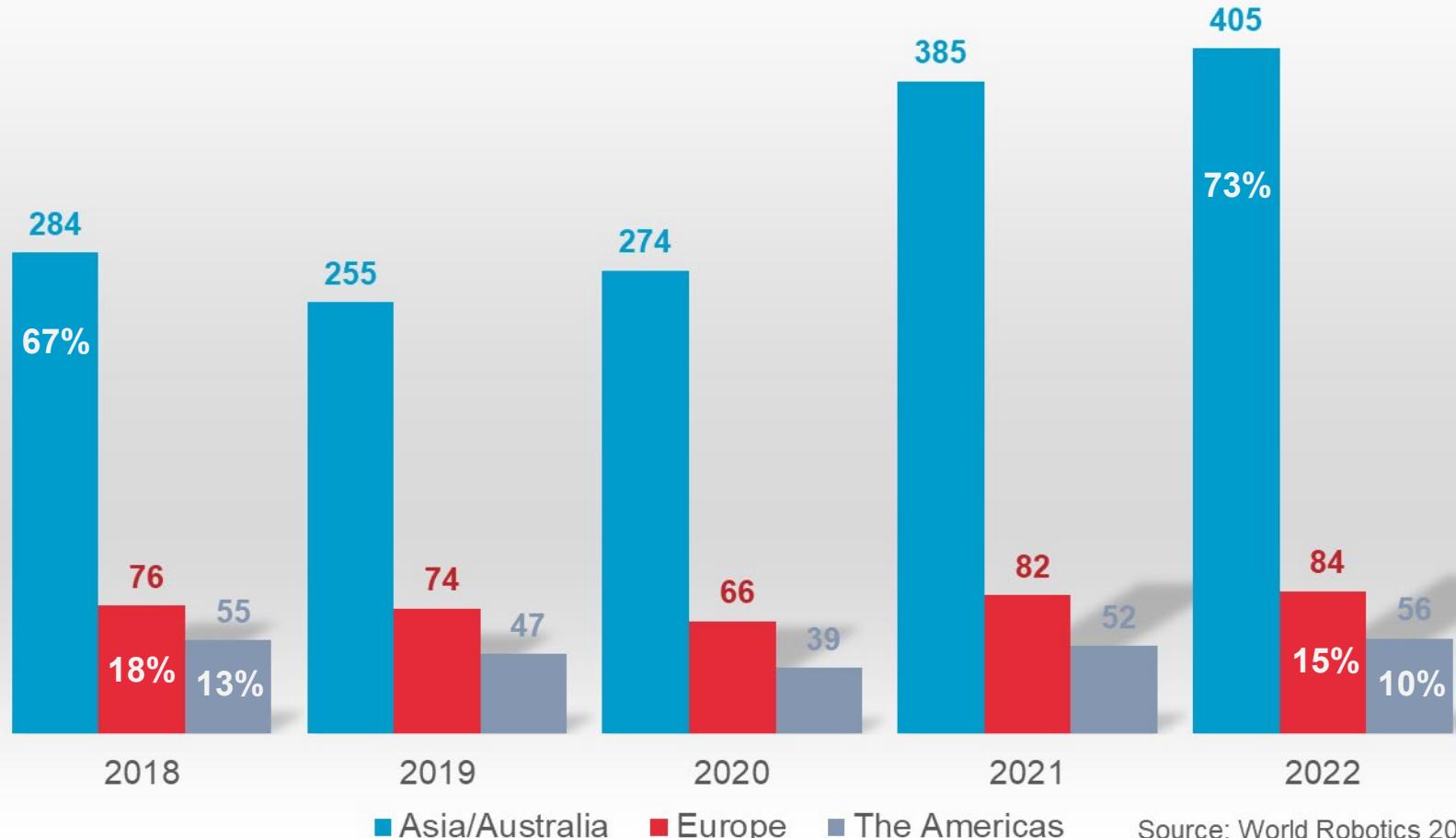


\*revised

Source: World Robotics 2023

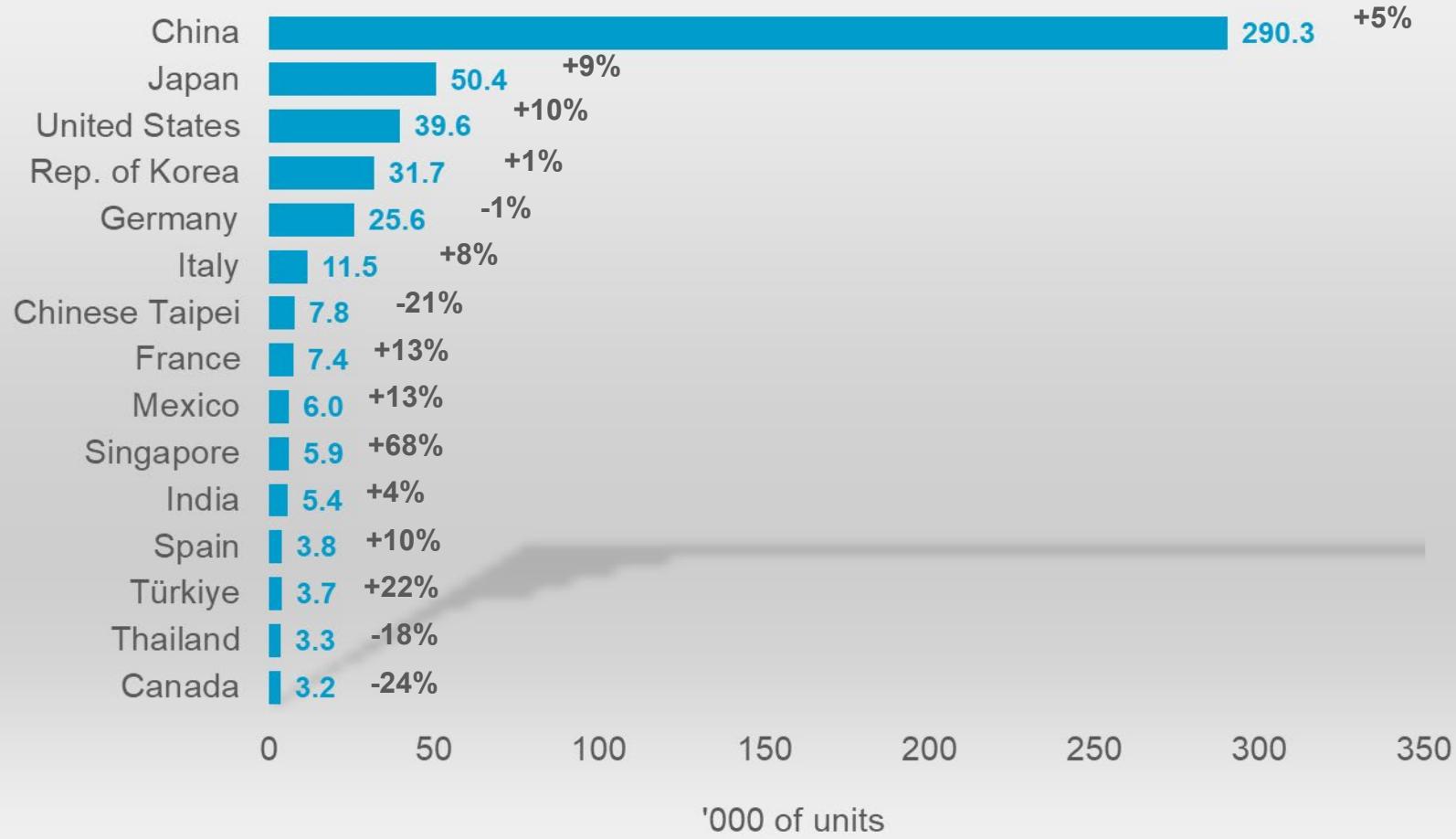
## Growth in all regions

### Annual installations of industrial robots ('000 of units)



## China installs every other robot

Annual installations of industrial robots  
15 largest markets 2022

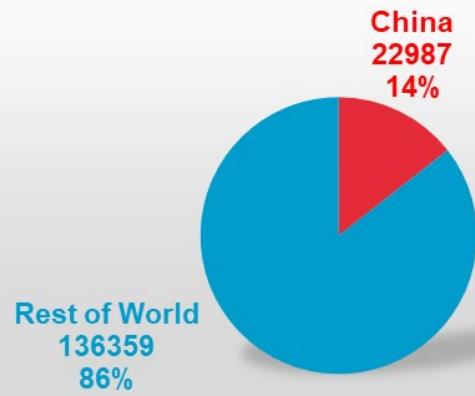


Source: World Robotics 2023

# China is growing dramatically

China vs. Rest of World in 2012

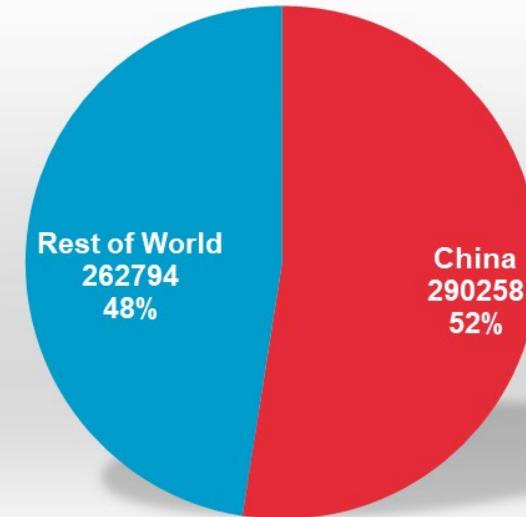
Annual installations of industrial robots in 2012



Source: International Federation of Robotics

China vs. Rest of World in 2022

Annual installations of industrial robots in 2022

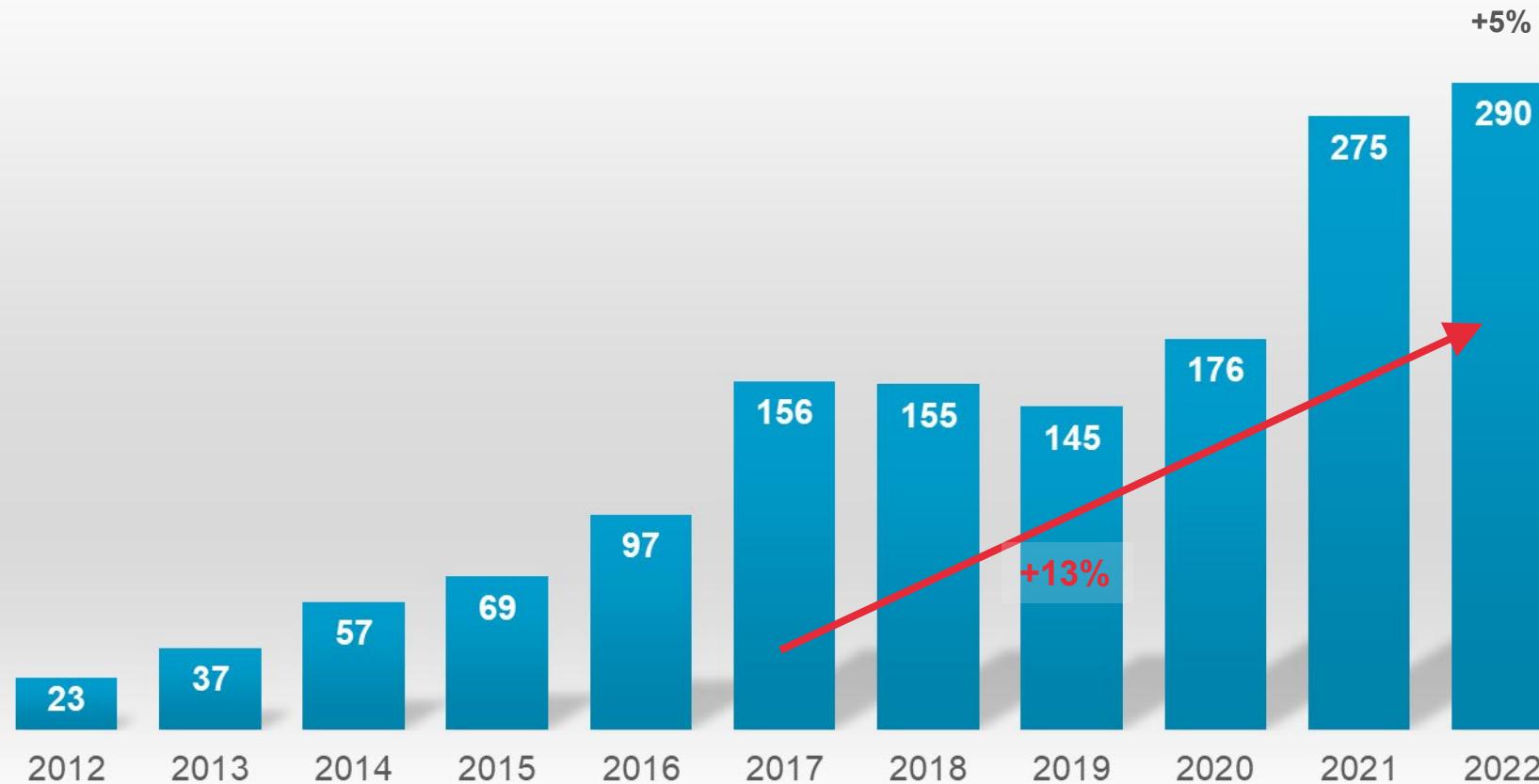


Source: International Federation of Robotics

**China multiplied its annual installations by more than factor 12 in a decade**

### Annual installations of industrial robots - China

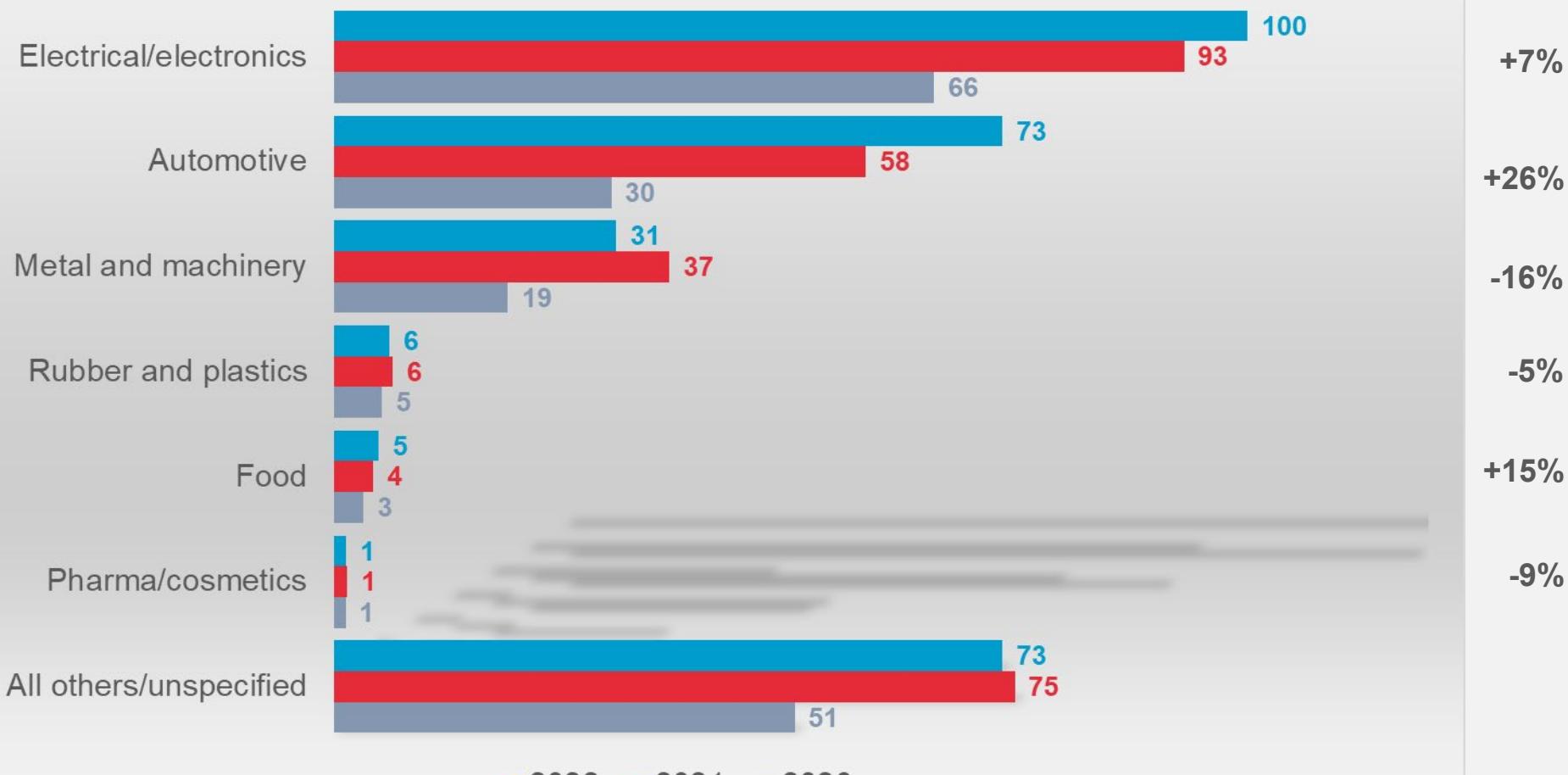
1,000 units



China's electronics industry is the main customer

## Annual installations of industrial robots by customer industry - China

1,000 units



Source: World Robotics 2023

Japan recovers strongly – second highest installation count ever

### Annual installations of industrial robots - Japan

1,000 units

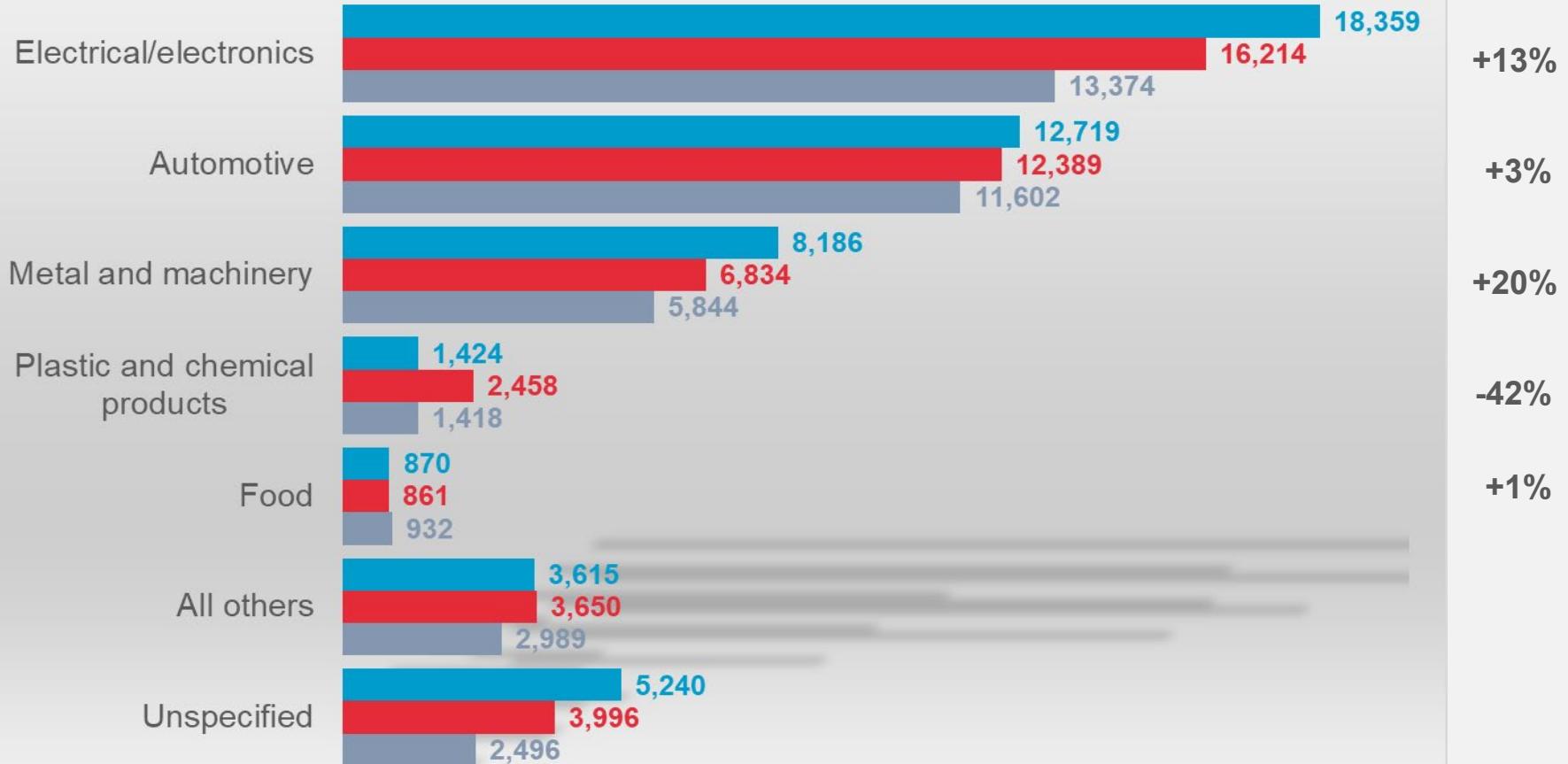


Source: World Robotics 2023

## Japan's electronics and automotive industry – strong demand

### Annual installations of industrial robots by customer industry - Japan

units



■ 2022 ■ 2021 ■ 2020

Source: World Robotics 2023

United States: Second highest level ever recorded

## Annual installations of industrial robots - United States

1,000 units

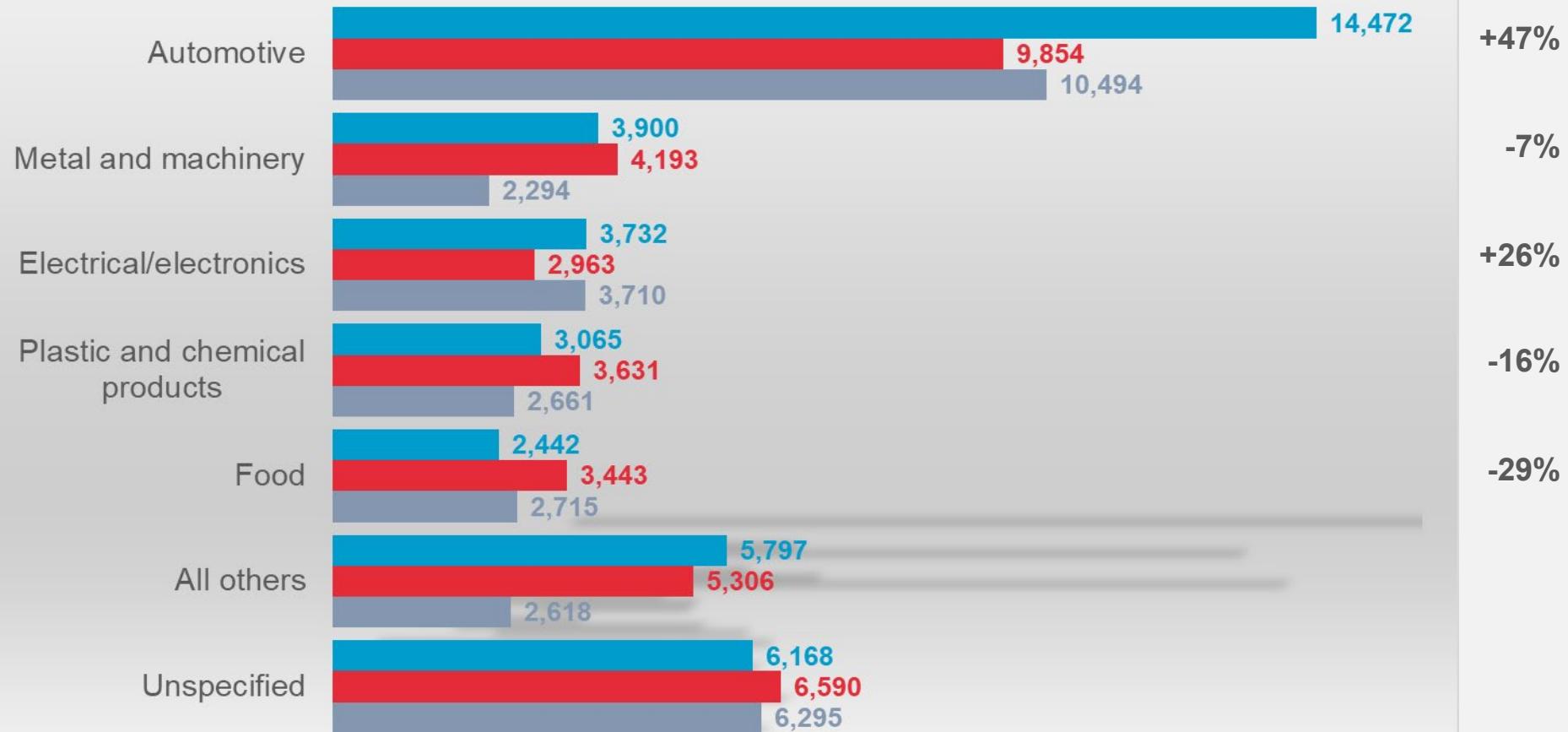


Source: World Robotics 2023

## US Automotive Industry driving growth

### Annual installations of industrial robots by customer industry - United States

units



■ 2022 ■ 2021 ■ 2020

Source: World Robotics 2023

## Korean robot demand moving sideways

### Annual installations of industrial robots - Rep. of Korea

1,000 units

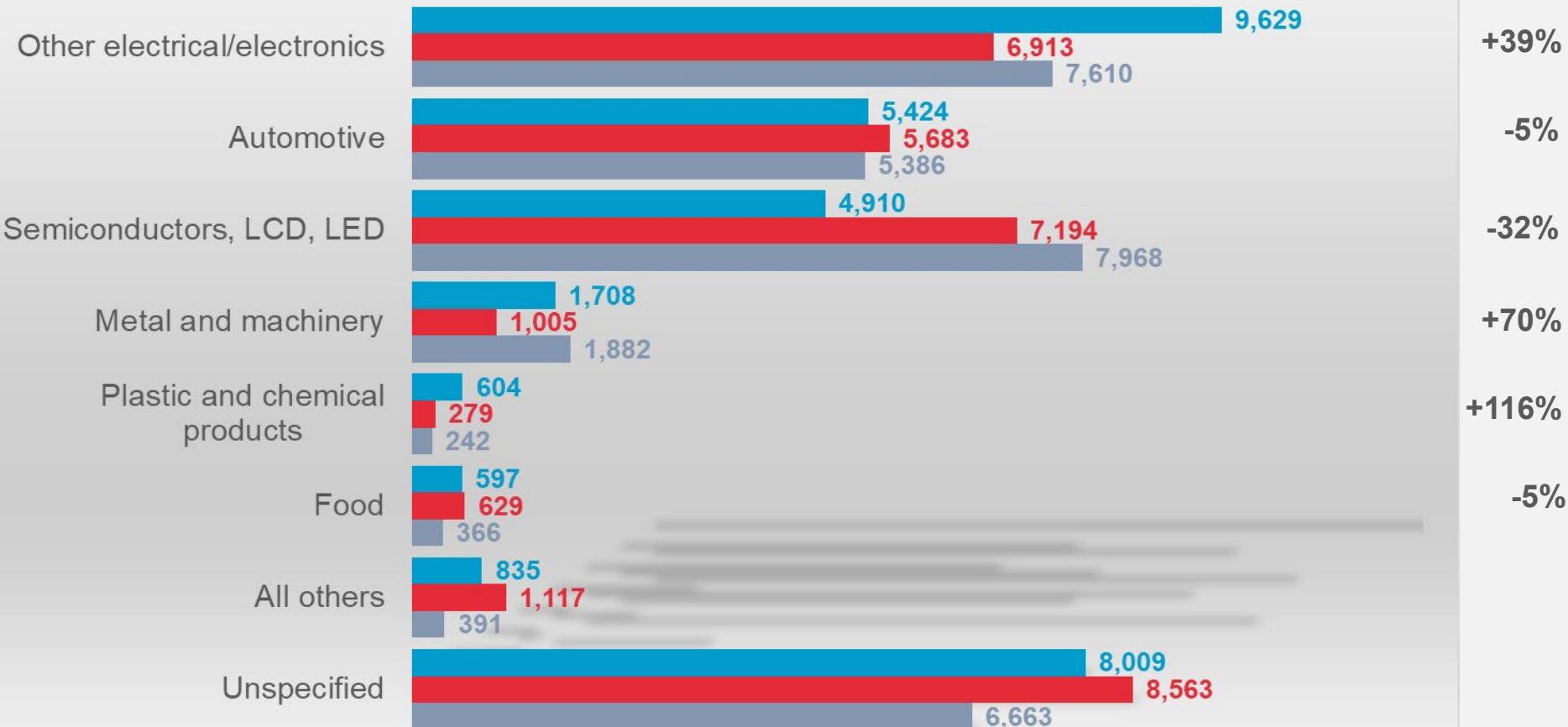


Source: World Robotics 2023

## Korean electronics industry up 3%

### Annual installations of industrial robots by customer industry - Rep. of Korea

units



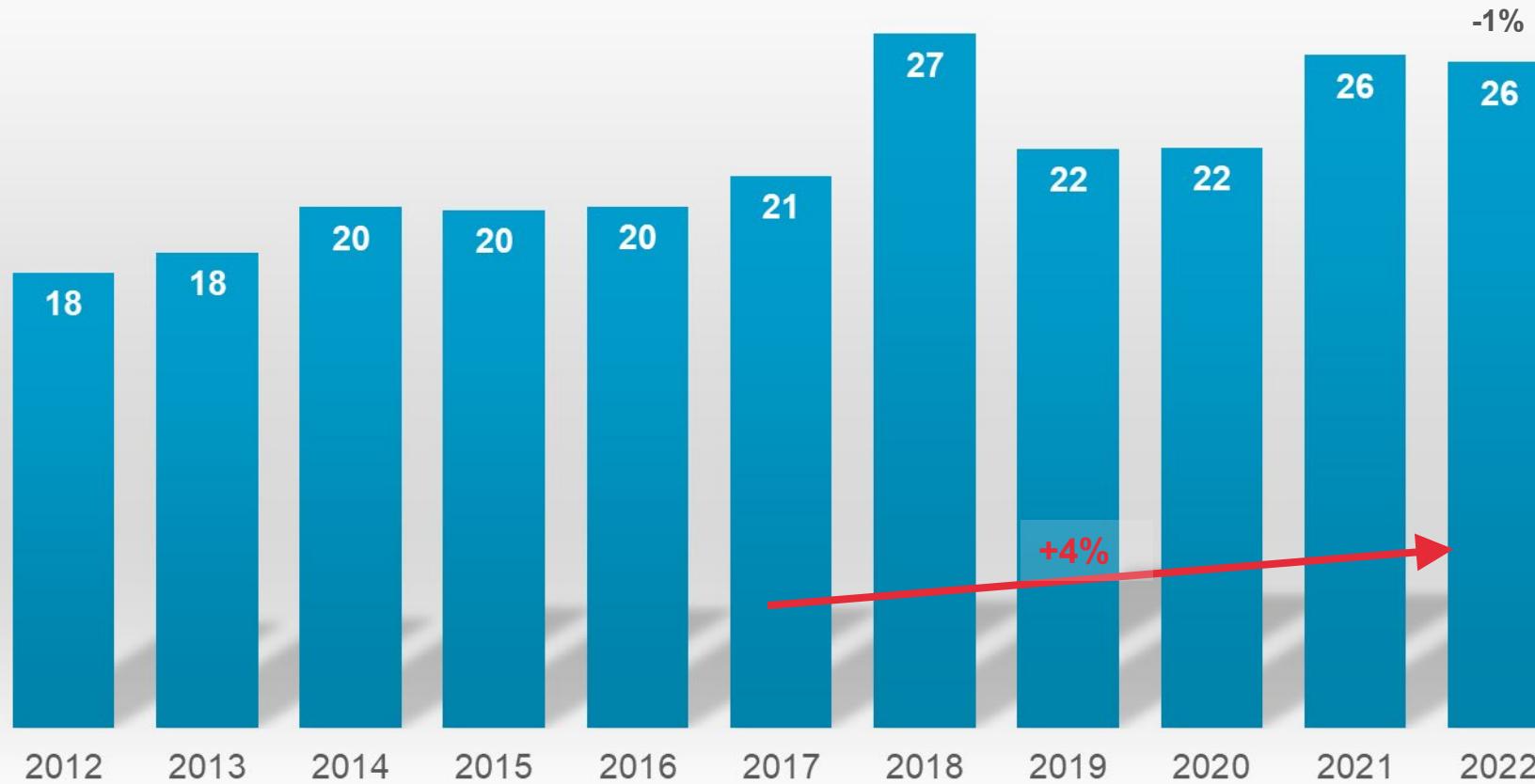
■ 2022 ■ 2021 ■ 2020

Source: World Robotics 2023

Germany slightly declining

### Annual installations of industrial robots - Germany

1,000 units

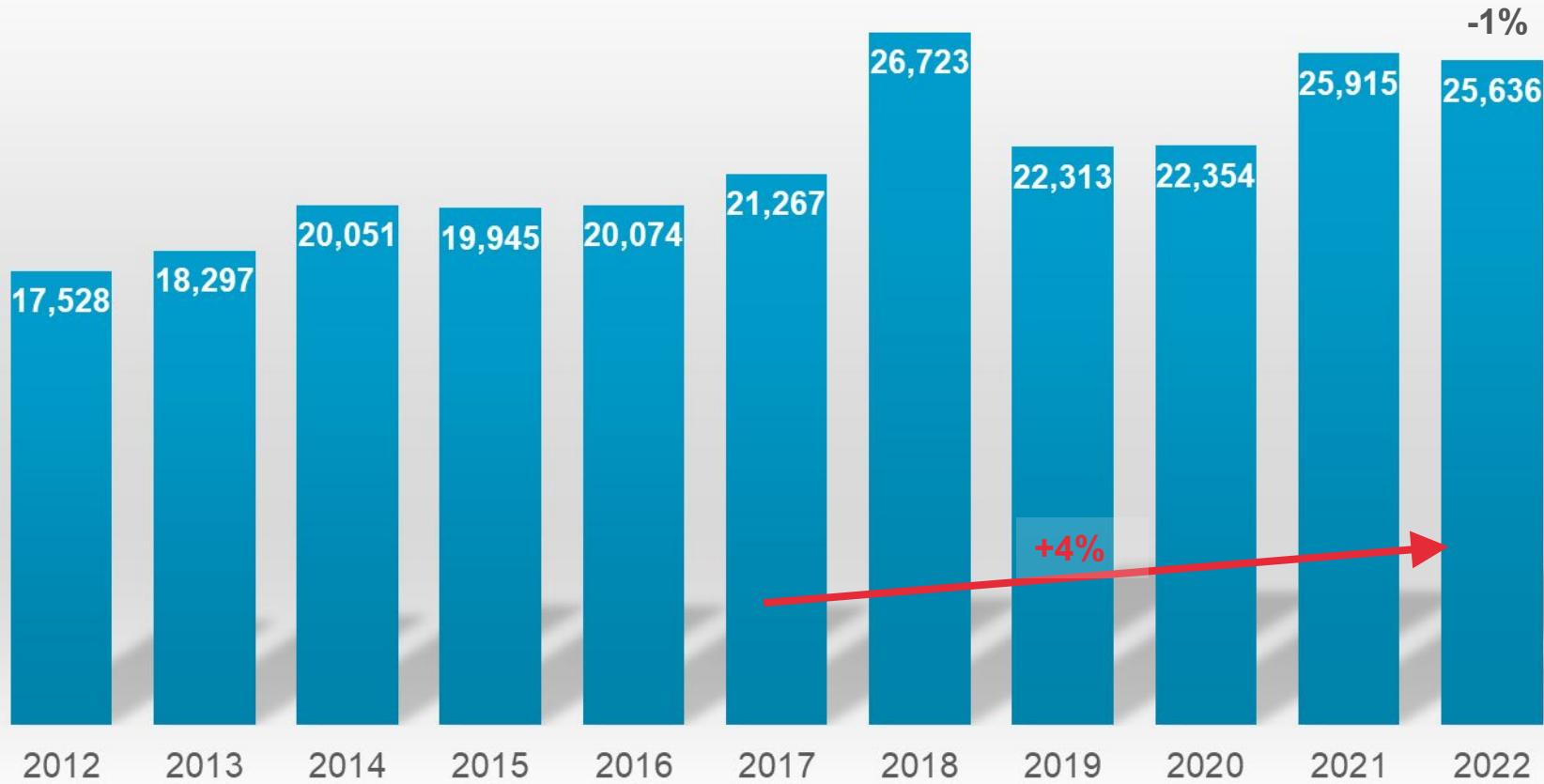


Source: World Robotics 2023

Germany slightly declining

## Annual installations of industrial robots - Germany

units

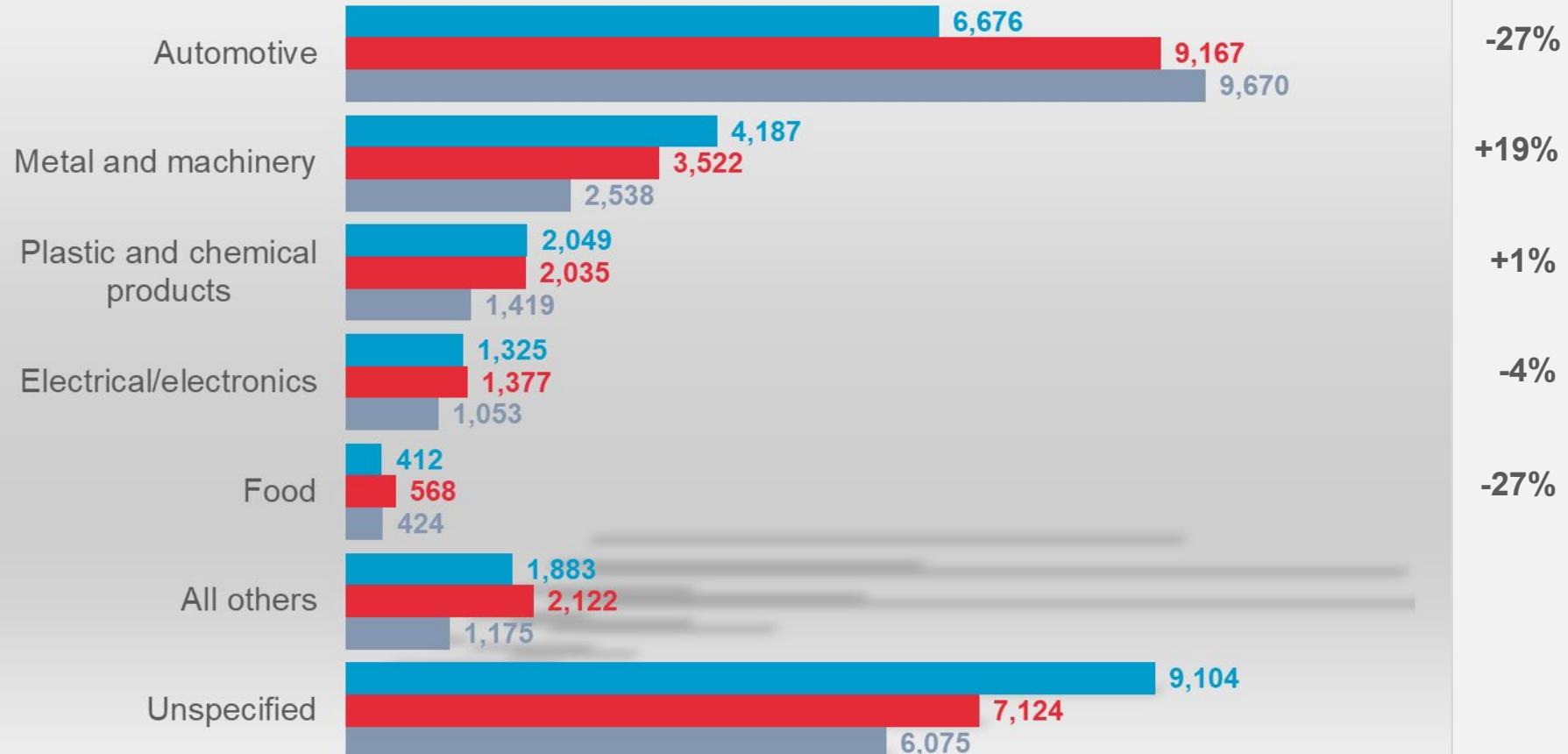


Source: World Robotics 2023

**Automotive** declining sharply, continued growth in **metal + machinery**

### Annual installations of industrial robots by customer industry - Germany

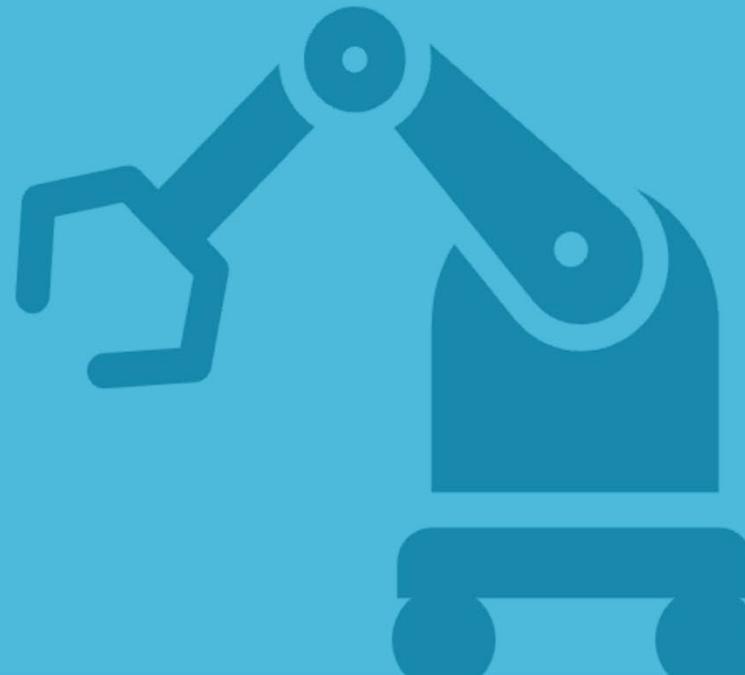
units



■ 2022 ■ 2021 ■ 2020

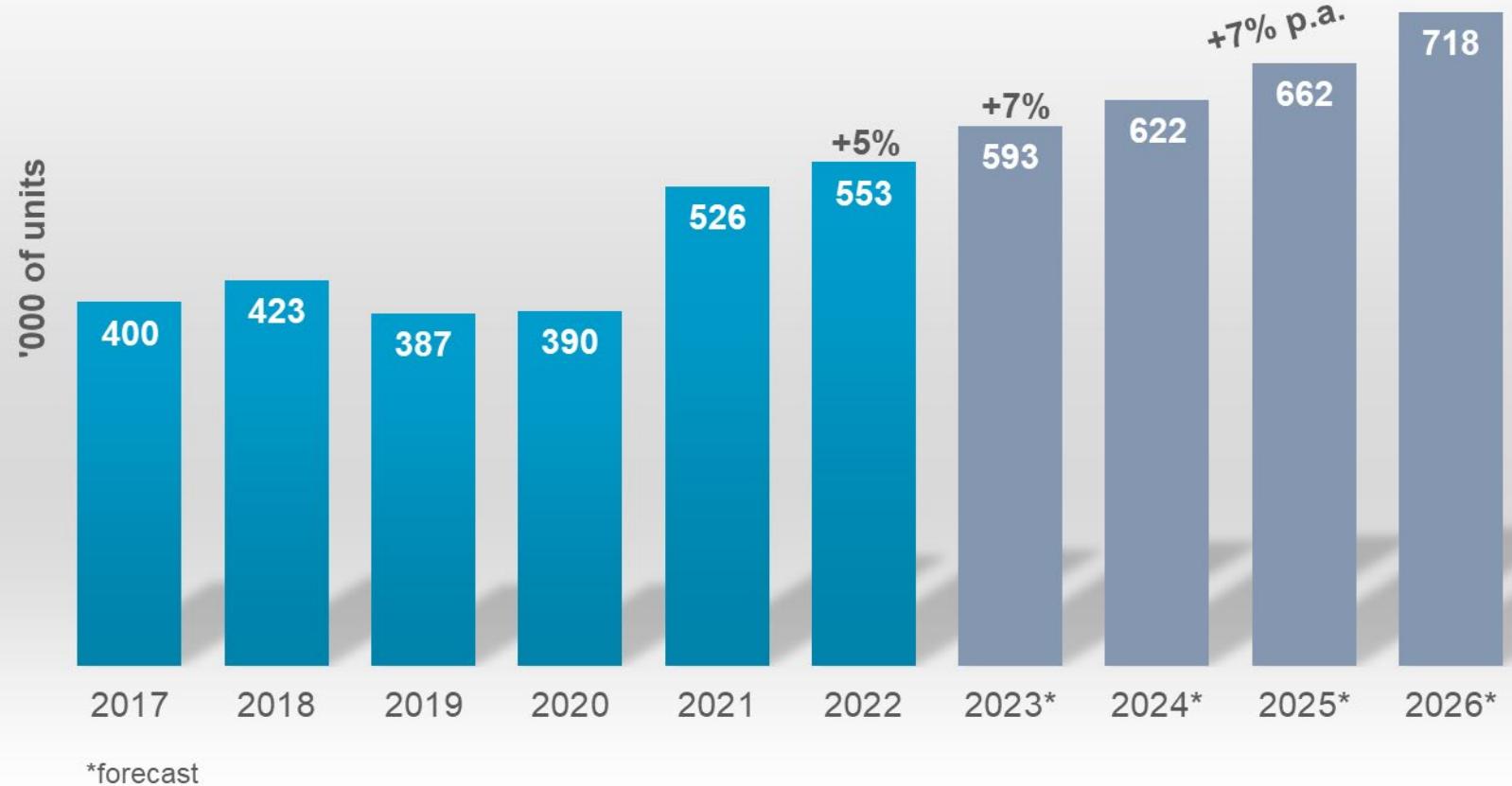
Source: World Robotics 2023

## Trends and Forecast



Approaching the 600,000-unit mark in 2023

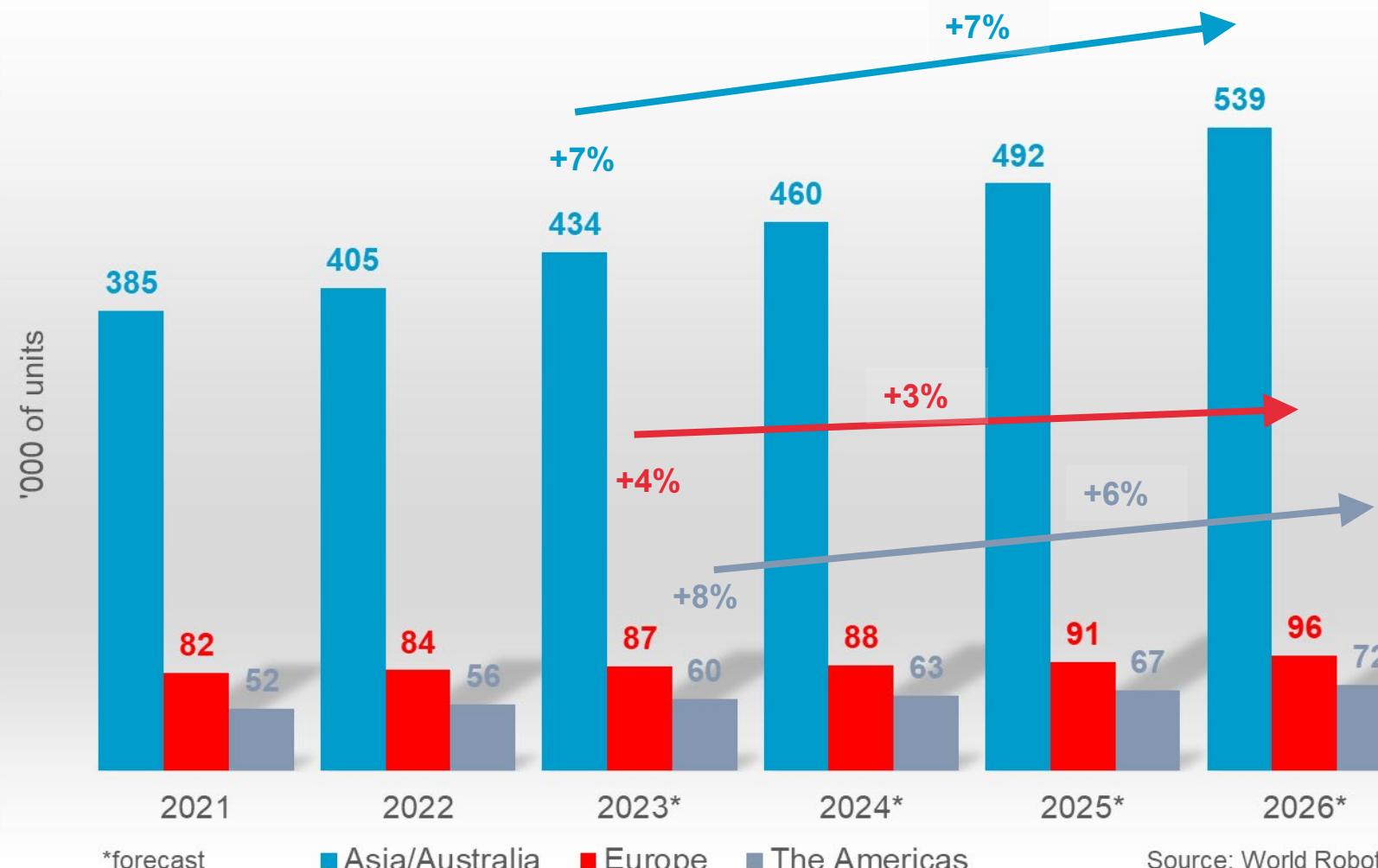
Annual installations of industrial robots 2017-2022 and 2023\*-2026\*



Source: World Robotics 2023

Forecast

Annual installations of industrial robots 2021-2022 and 2023\*-2026\*



# Short-term market determinants



- Supply chain constraints are easing
- Inflation remains high
- Slowdown of global economic growth
  - No direct correlation to robot installations
  - Development in China has strong impact on overall performance
- Orders\*: backlog from 2022 and declining intake in 2023
  - Orders from 2022 shipped in 2023
  - Base effect: strong order intake in 2022

\*IFR Quarterly Survey: Growth rate of order intake in currency units compared to same period last year.

# Technological trends

- **Cloud computing and 5G mobile networks**
  - new business models
  - optimized performance
  - fully digitalized production
- **Machine vision**
  - simplifies programming
  - detection of shapes and guide grippers in complex environments
- **Artificial intelligence** coming to market
  - smarter, faster, more efficient and more accessible automation
  - enhancing maintenance
  - faster programming, learning by experience
  - supporting sustainability



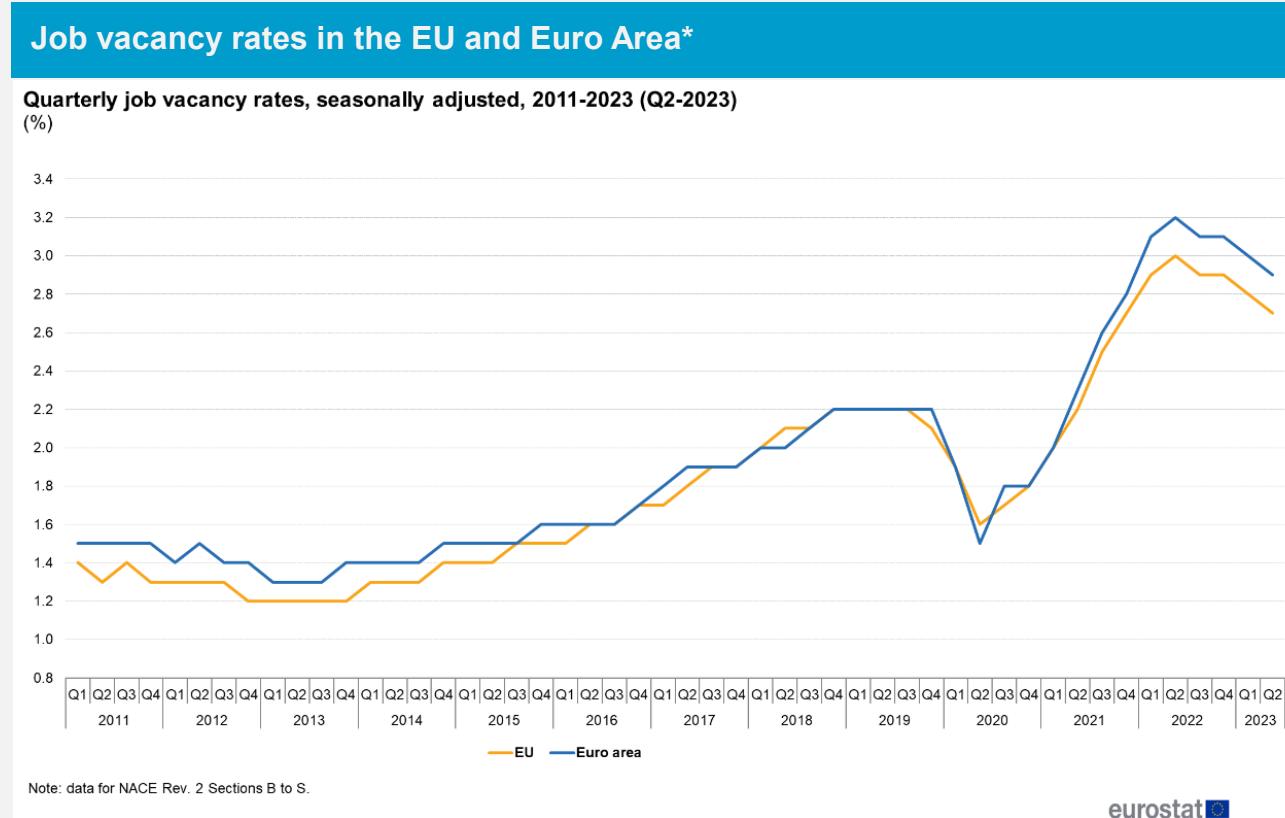
# Market trends

- **Labor scarcity** in many developed economies is driving the demand for automation
- **Reconsideration of supply chains and closeness to customers**
  - Re- and nearshoring of production
- **Small and medium sized enterprises (SMEs) need easy access to automation**
  - “Democratizing” robotics
  - Lowering the hurdles for robotization: IFR’s Go4 Robotics campaign  
<https://go4robotics.com/>



go4  
Robotics

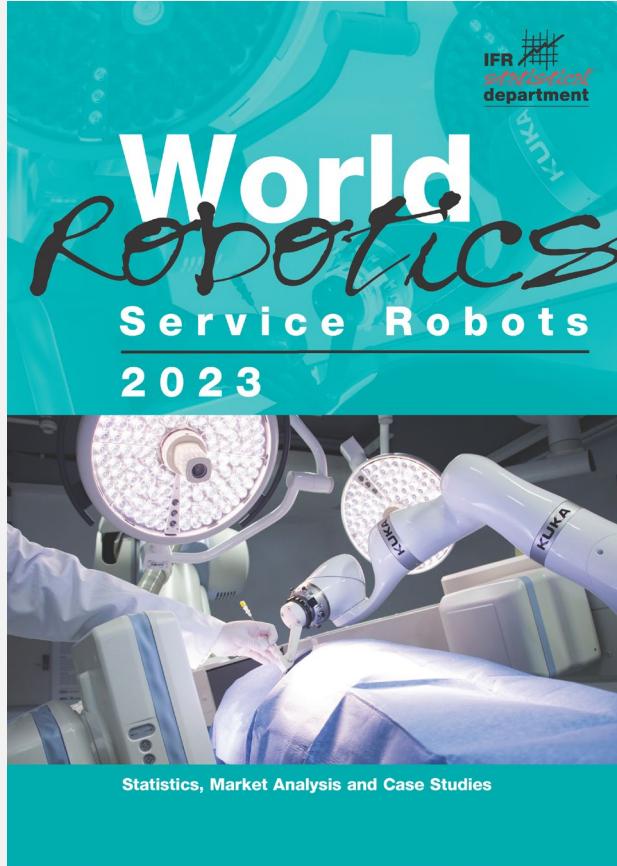
# Lack of labor creates a tremendous demand for professional service robots



\*Source: Eurostat

- **Productivity leap** needed to overcome **shortage of skilled workers**
- **Demographic change**

# Service robots – top findings



## 2022: Continuous growth

### New professional service robots\*

- 158,000 units (+48%)

### New consumer service robots

- 5 million units (-12%)

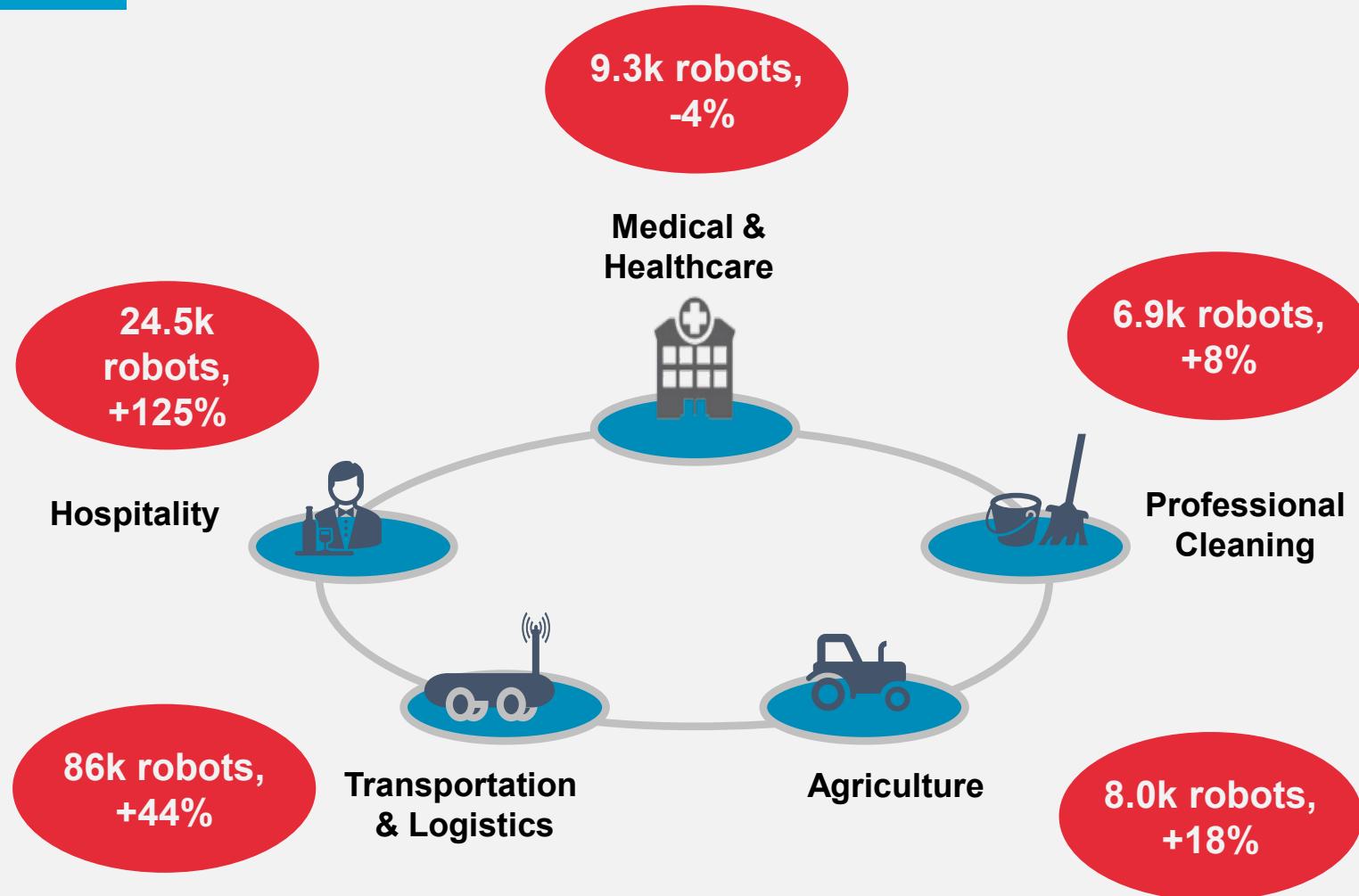
\*All numbers based on a sample of 239 companies.

Data is not projected to the whole industry.

Sample composition varies each year.

Compiling or comparing data from different survey waves is strongly discouraged.

# Top 5 application areas for professional service robots



# Focus: Mobile robots in everyday indoor environments

- There is a lot of interest in logistics robots because of a massive shortage of staff (Covid aftermath)
- Robot use in these changing environments, which are often full of people, is still technically challenging, also due to safety reasons, fire protection regulations etc.
- Ease of use and user-friendliness for non-technical staff are essential to strengthen the acceptance
- The human typically stays in the process (e.g. puts objects onto the robot or clears things away)



Source: F&P Robotics

# Focus: Floor cleaning robots

- Increasing shortage of cleaning staff is making more and more cleaning service providers consider using robots
- Very high investments in robot manufacturers in the Asia Pacific Region
- Robots are primarily used as "cobots" that support the human (the robot cleans large areas, the human cleans the edges)
- Increasing number of autonomous functions in cleaning robots, e.g. automatic fresh water refill and wastewater disposal
- First manufacturers develop robots with an arm to enable 3D cleaning



Source:Lionsbot

# Focus: Field robots

- Drivers for this development are a shortage of skilled workers and environmental problems that are increasingly coming into focus
- Safety is no longer seen as a barrier to market entry
- Prevention instead of symptom treatment in agriculture: Robots will be a key pillar in this regard by continuously providing information
- Full autonomy in pure locomotion is much more complex than expected

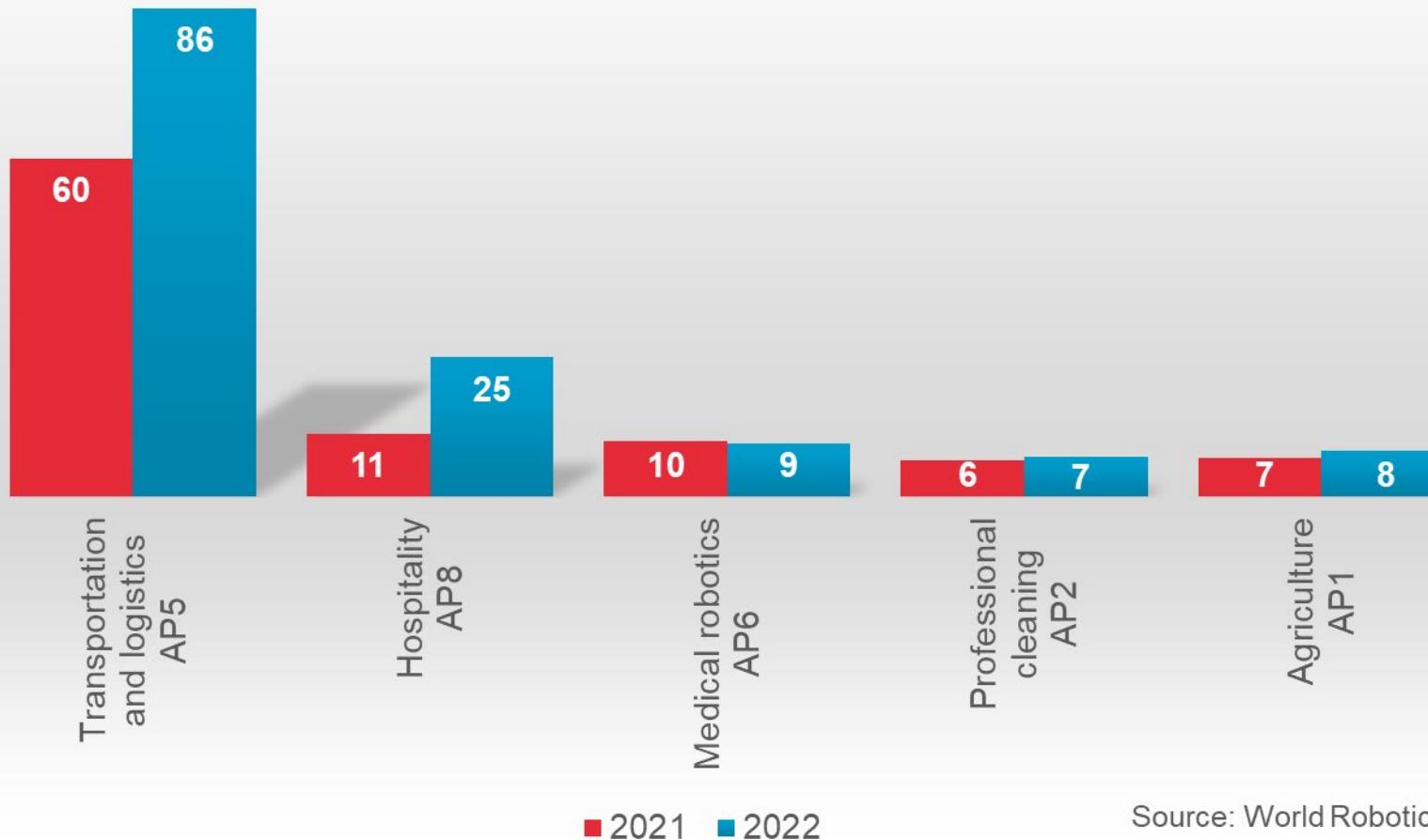


Source: Small Robot Company

## Main professional applications

### Service robots for professional use. Top 5 applications Unit sales 2021 and 2022

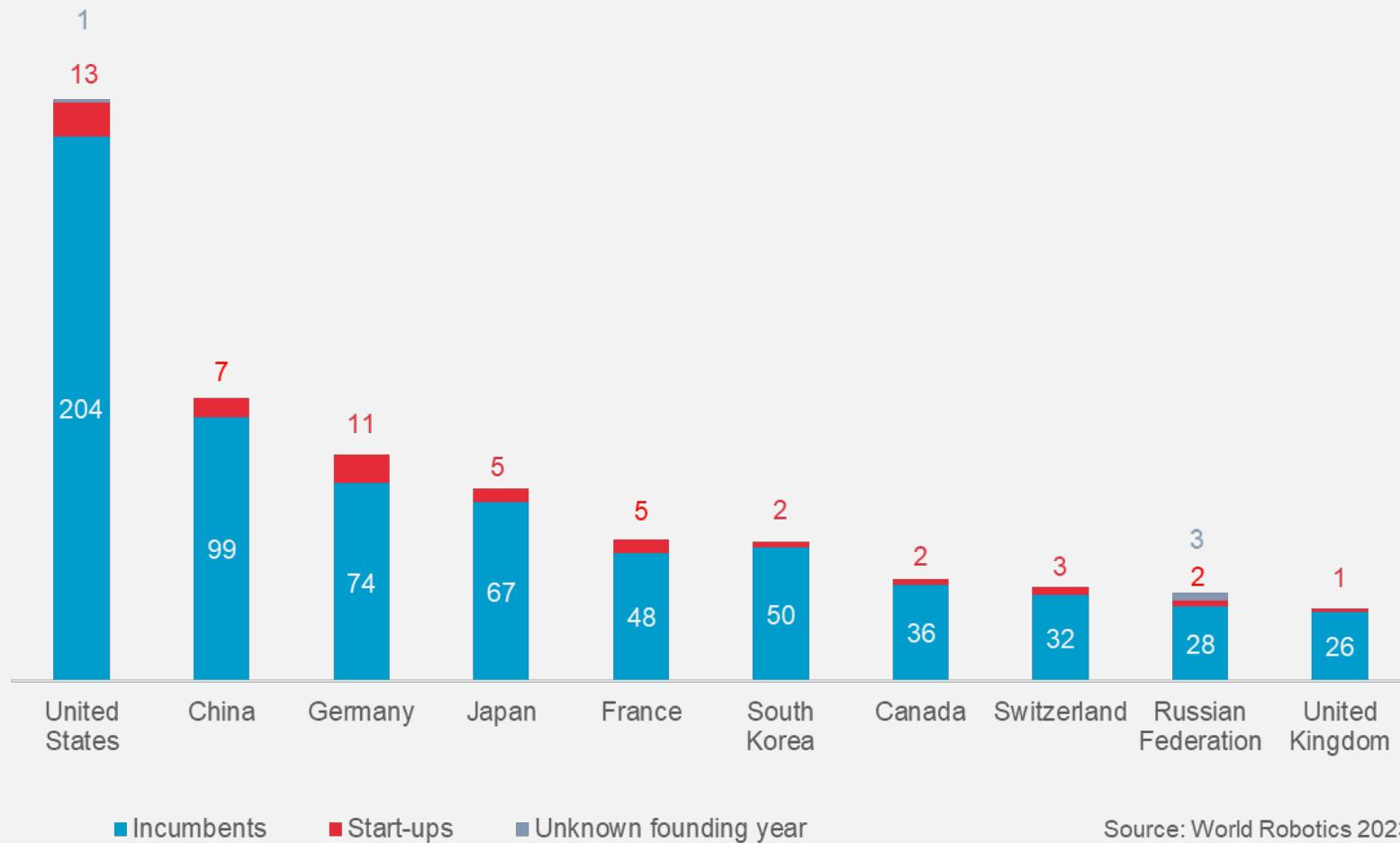
'000 of units



Source: World Robotics 2023

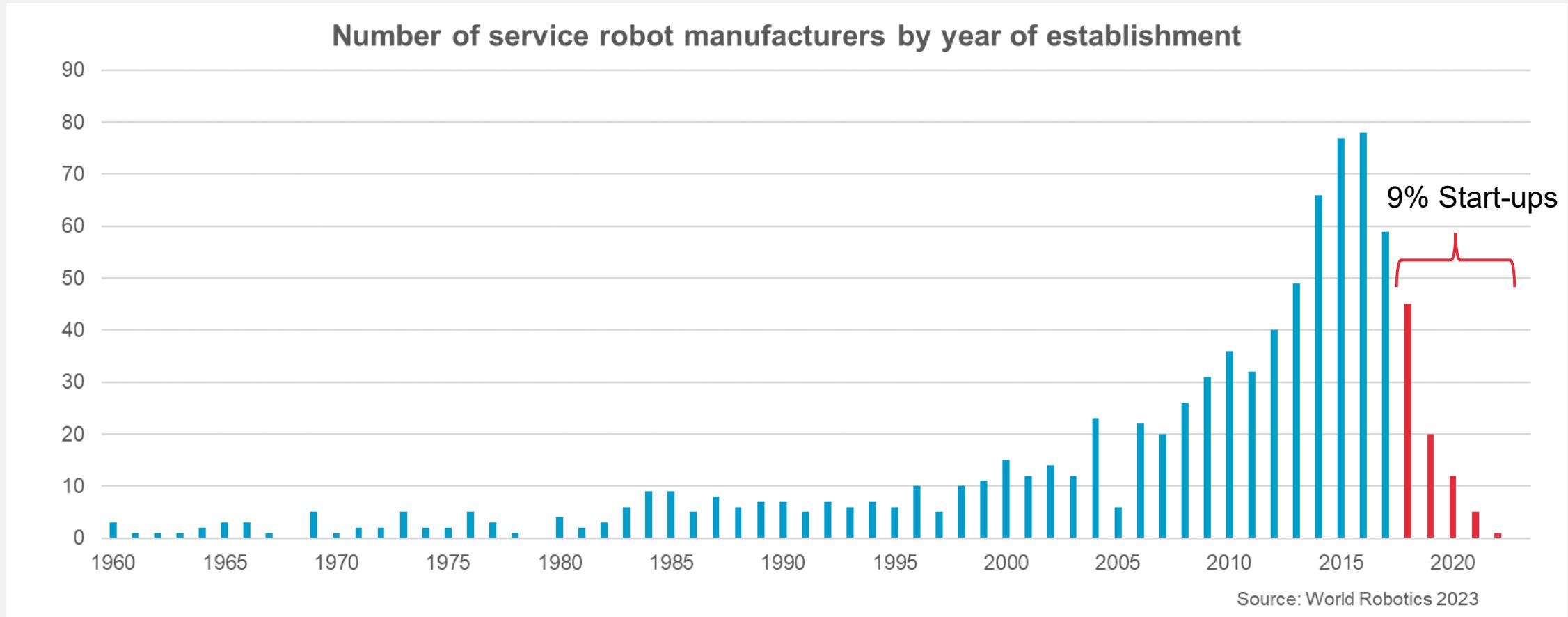
## The United States is home of most service robot suppliers

Service robot manufacturers by country (top 10)  
all applications



Source: World Robotics 2023

# Trend of declining startups continues

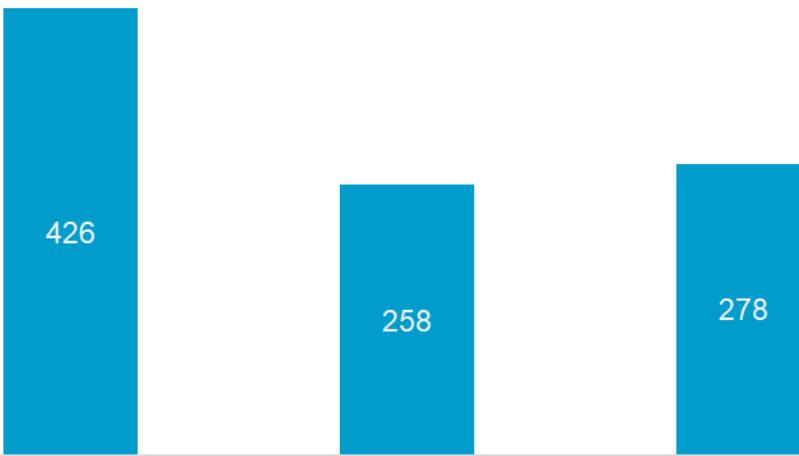


# Almost 1,000 service robot suppliers worldwide showing the wide spectrum of use

Five times more SR than IR suppliers

## Number of service robot suppliers by region

as of August 2023, main regions only



Source: International Federation of Robotics

Less than 180 industrial robot suppliers

## Number of industrial robot suppliers by region

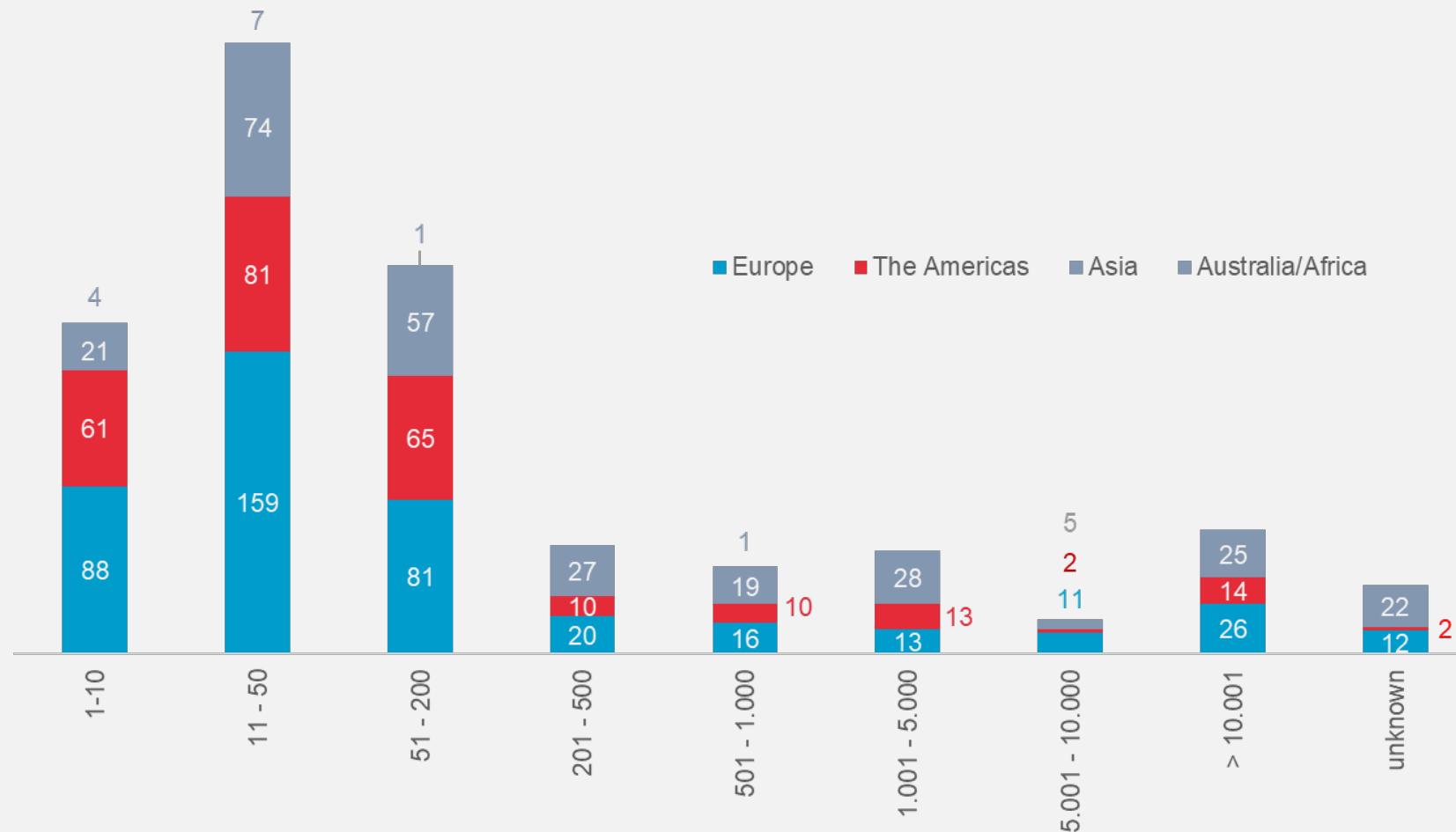
as of August 2023, main regions only



Source: International Federation of Robotics

**81% of service robot suppliers are small-medium sized enterprises\***

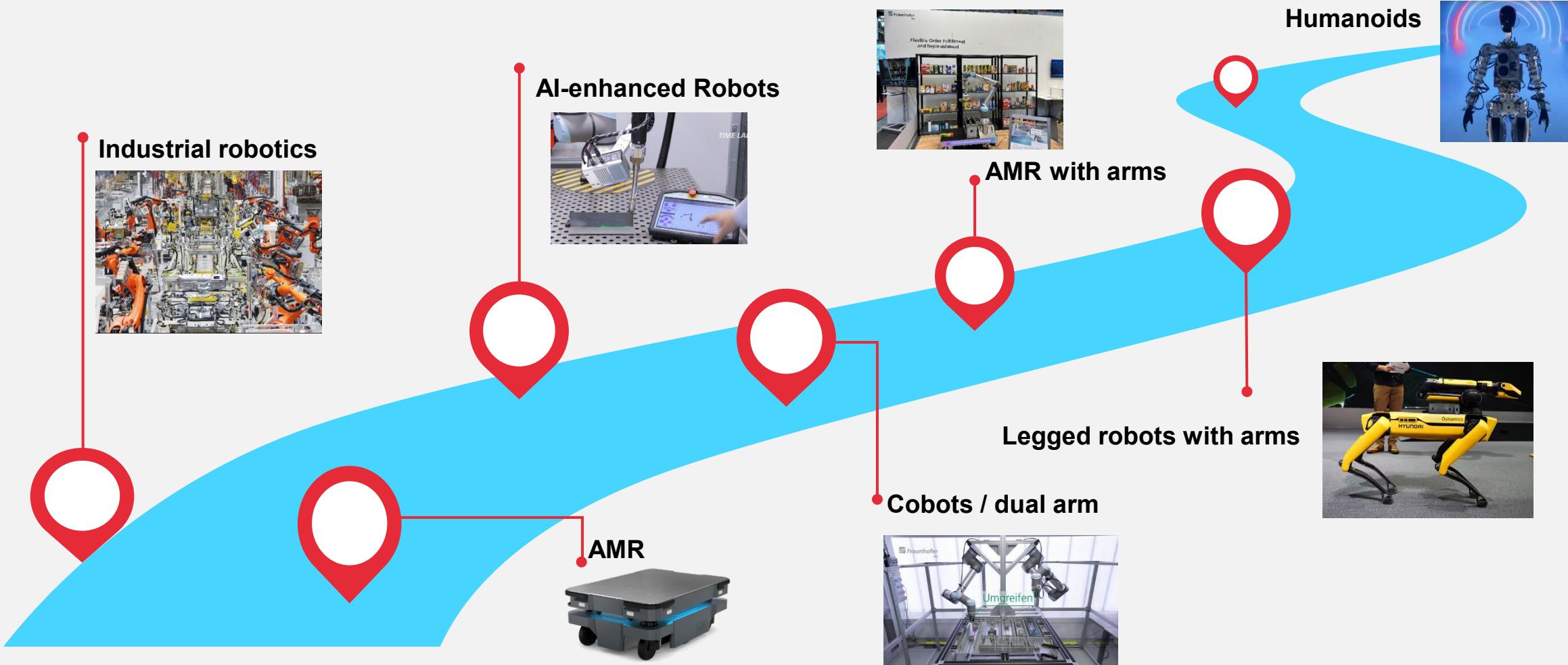
**Number of service robot manufacturers by business size  
(number of employees)**



\*(SME with <=500 employees)

Source: World Robotics 2023

# Long-term Research Trends



# Outlook

- **External and internal challenges**
  - Integration in existing infrastructure
  - Acceptance (management and staff)
  - Regulation
- **Service robots collaborate with human staff**
- **Software and use cases** driving breakthrough applications
  - Humanoids still in their early days
- **Market pull**



Source: Neura Robotics

# Thank you for your attention.

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