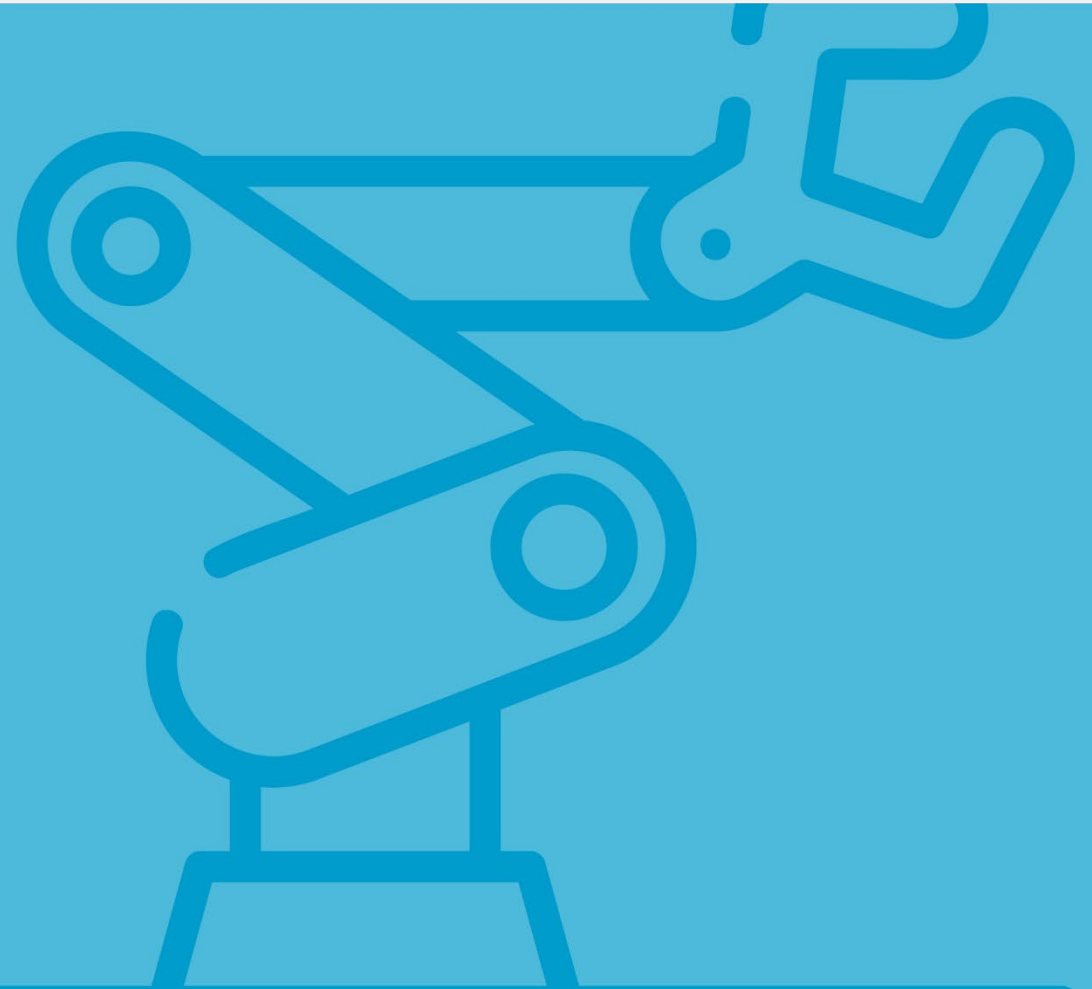


Welcome to the presentation of

# 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



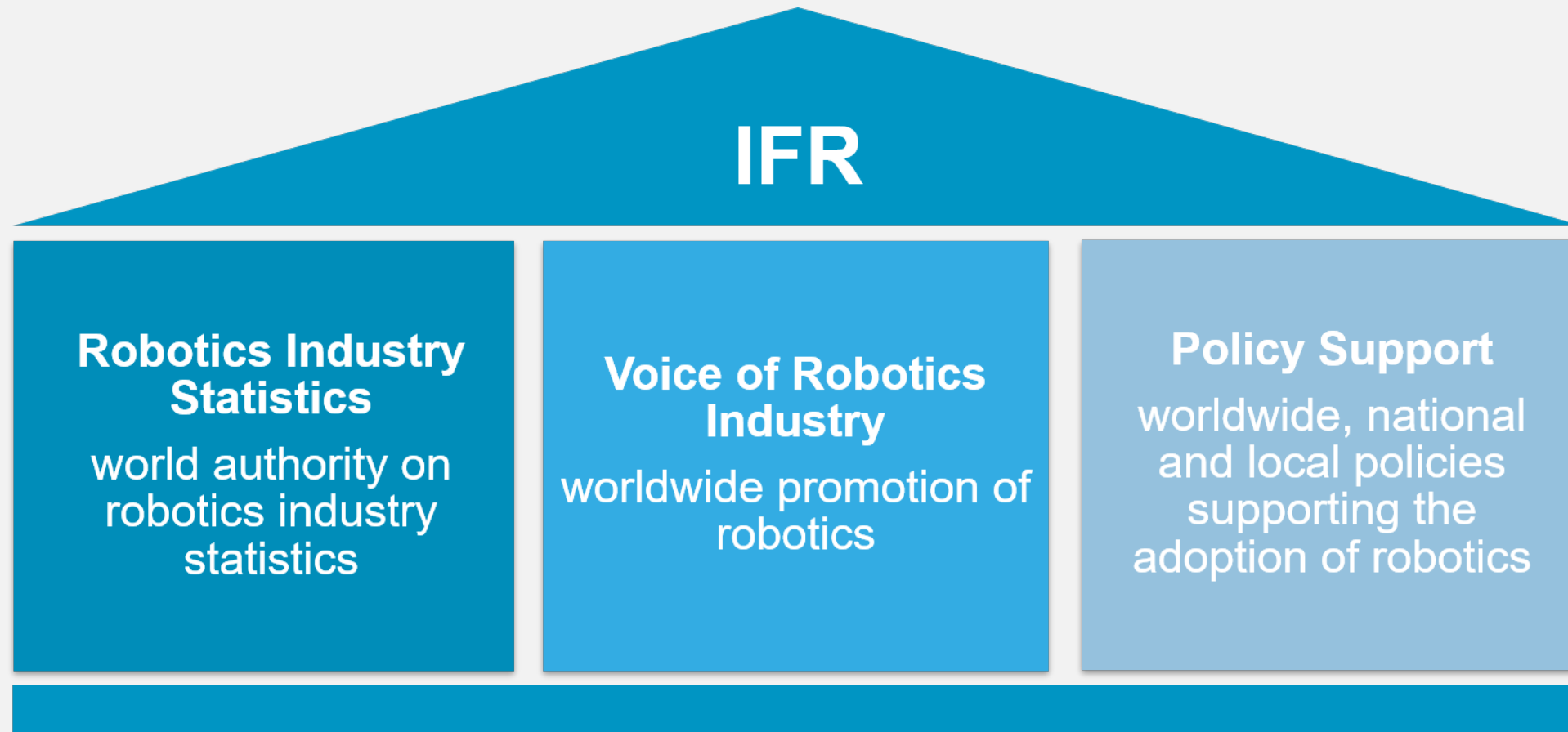
## COMPONENT SUPPLIERS & INTEGRATORS



## 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%

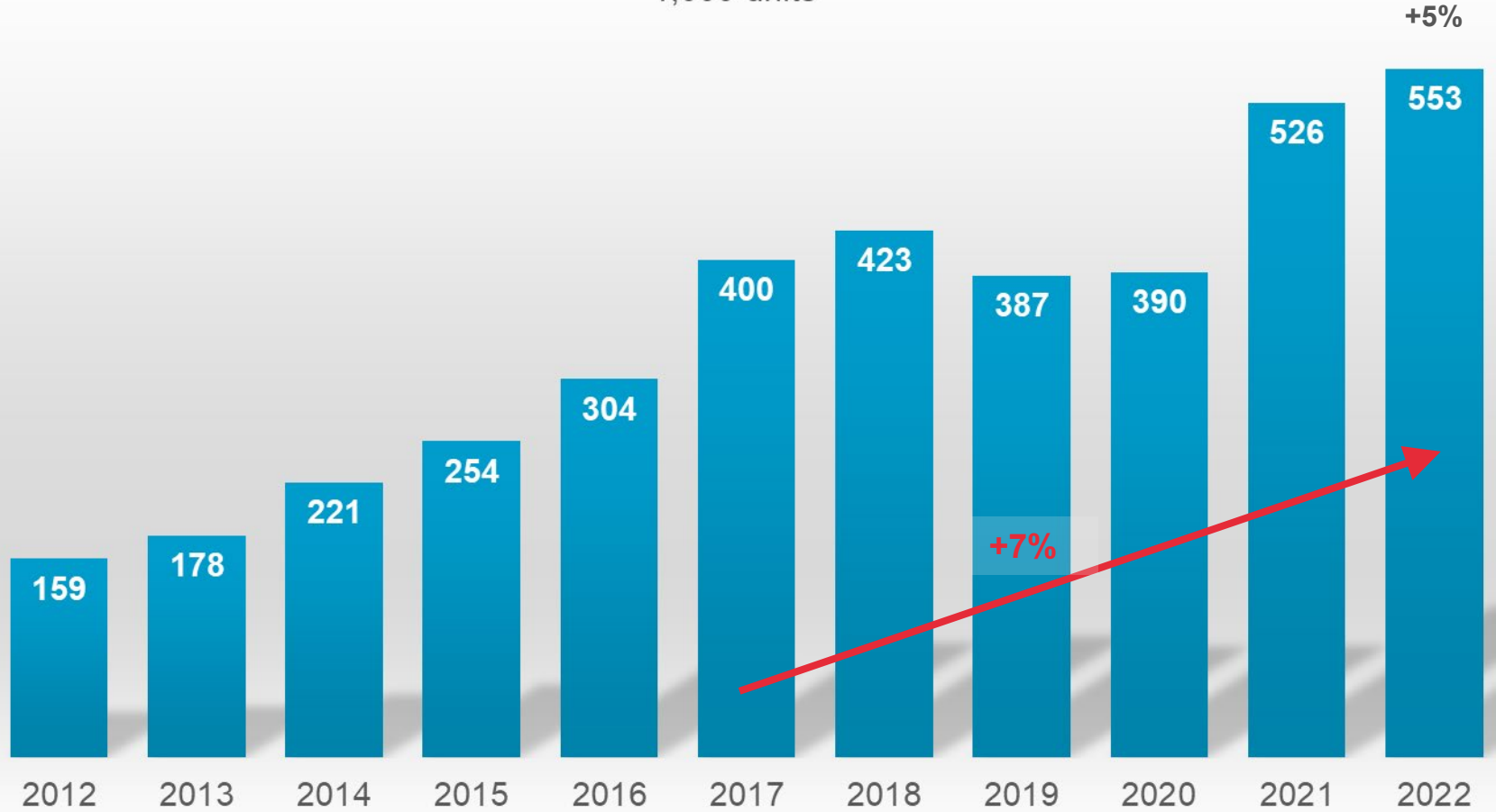
## Robot stock

- 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

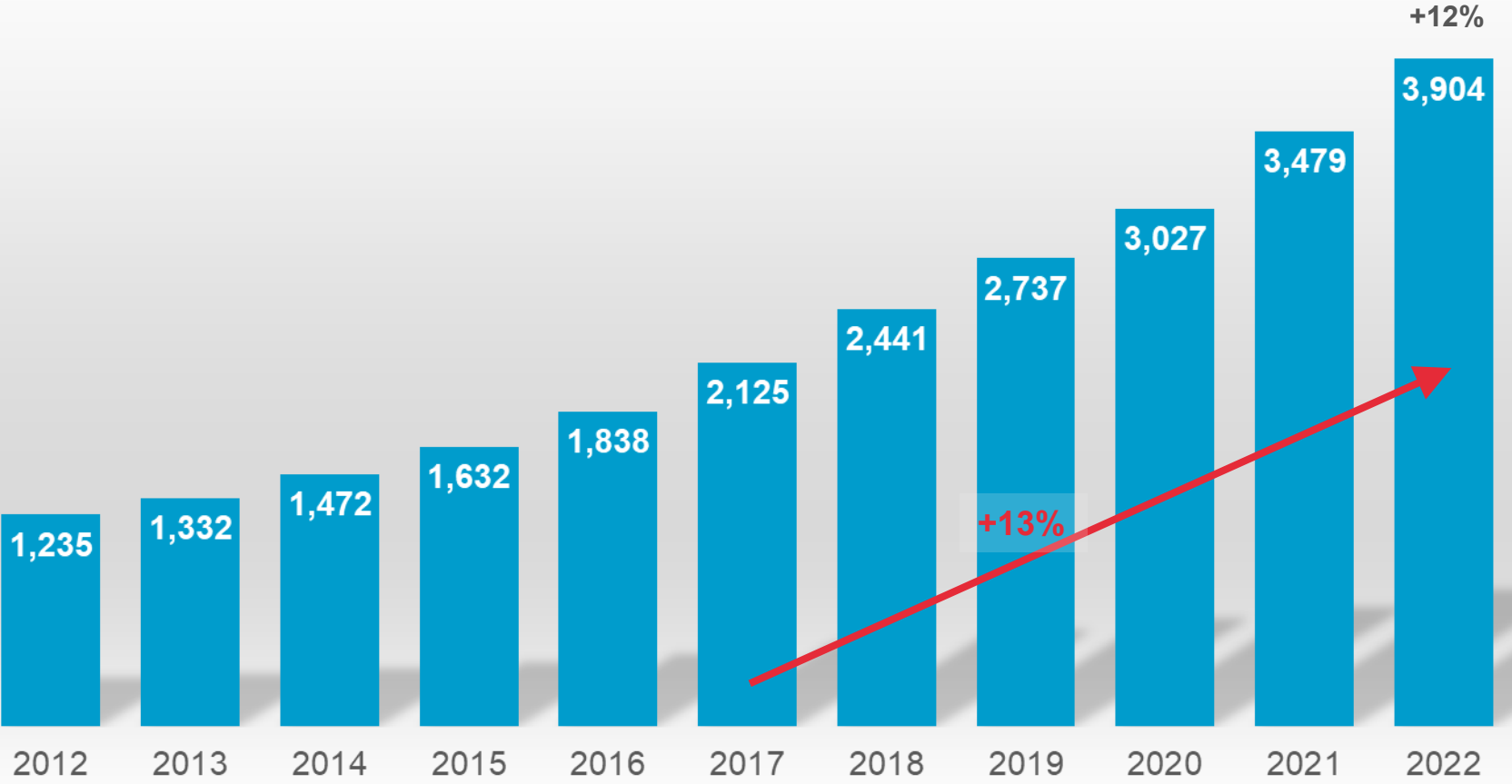


Source: World Robotics 2023

Almost 4 million industrial robots operating around the world

### Operational stock of industrial robots - World

1,000 units

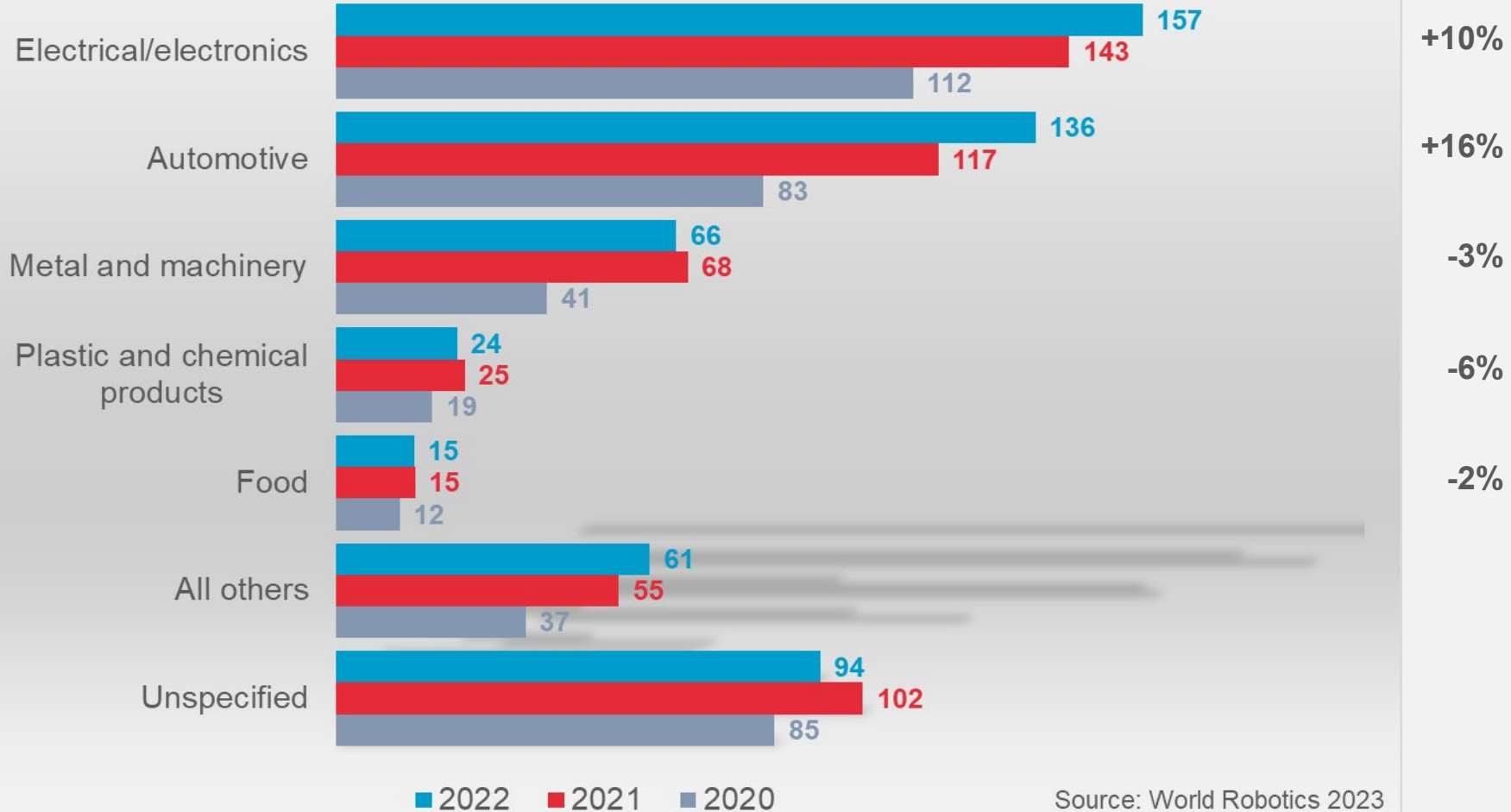


Source: World Robotics 2023

**Electronics is major customer – challenges for general industry**

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

1,000 units

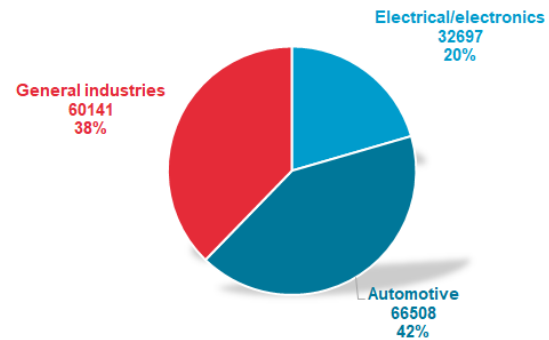


Source: World Robotics 2023

# General industry now accounts for almost half of new installations

## Shares of majors industries in 2012

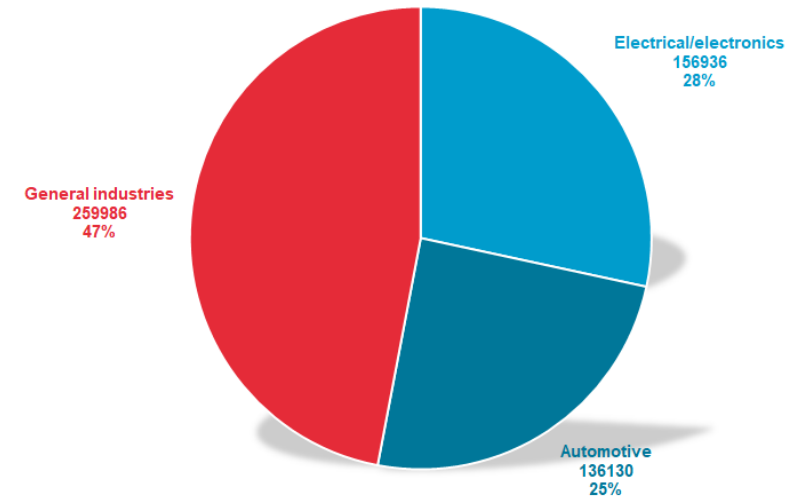
Annual installations of industrial robots: automotive and electronics vs. general industry - 2012 - World



Source: International Federation of Robotics

## Shares of majors industries in 2022

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

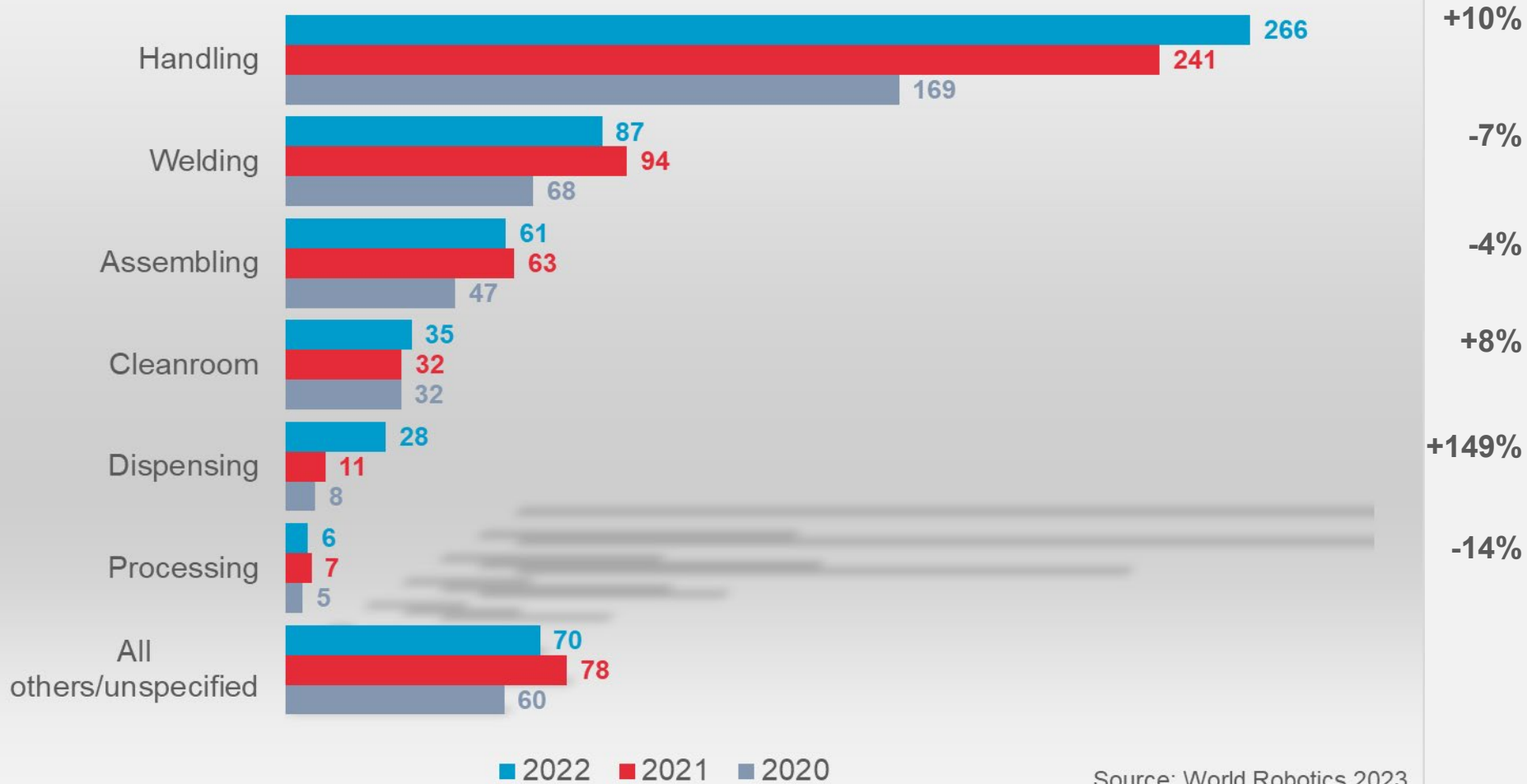


Source: International Federation of Robotics

**Handling is most important application with 48% share**

**Annual installations of industrial robots by application - World**

1,000 units

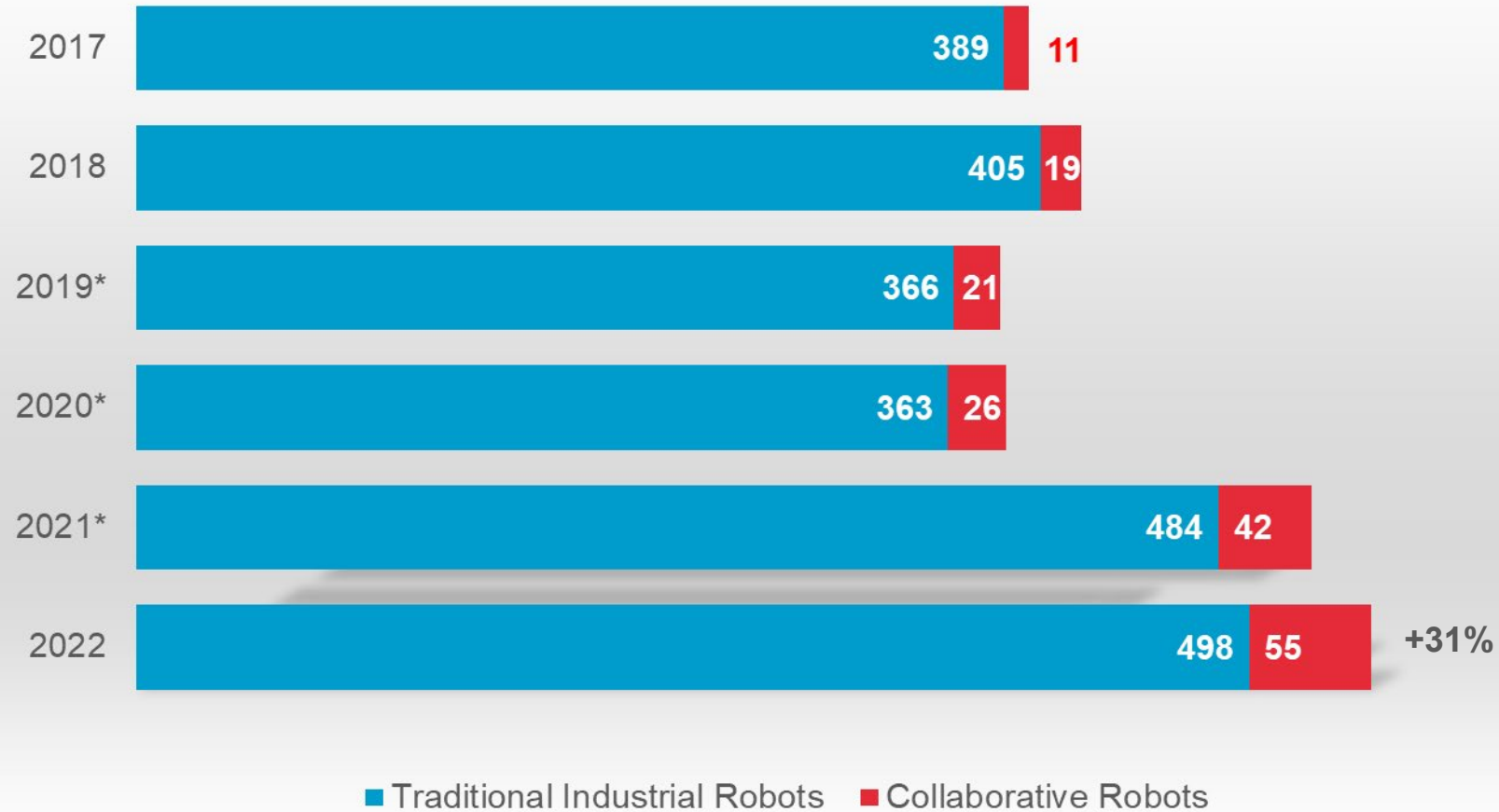


Source: World Robotics 2023

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

### Collaborative and traditional industrial robots

'000 units

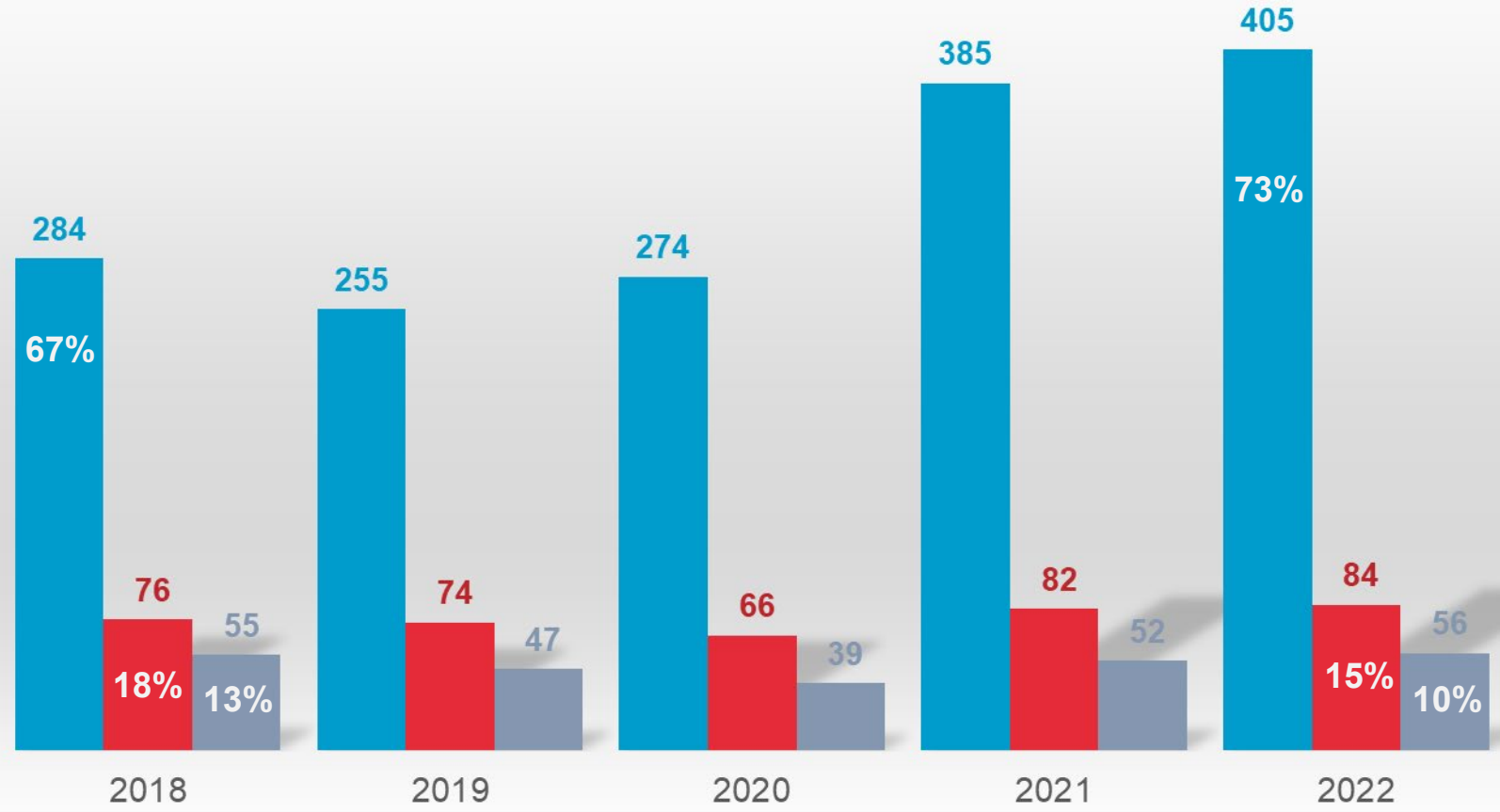


\*revised

Source: World Robotics 2023

Growth in all regions

Annual installations of industrial robots  
('000 of units)

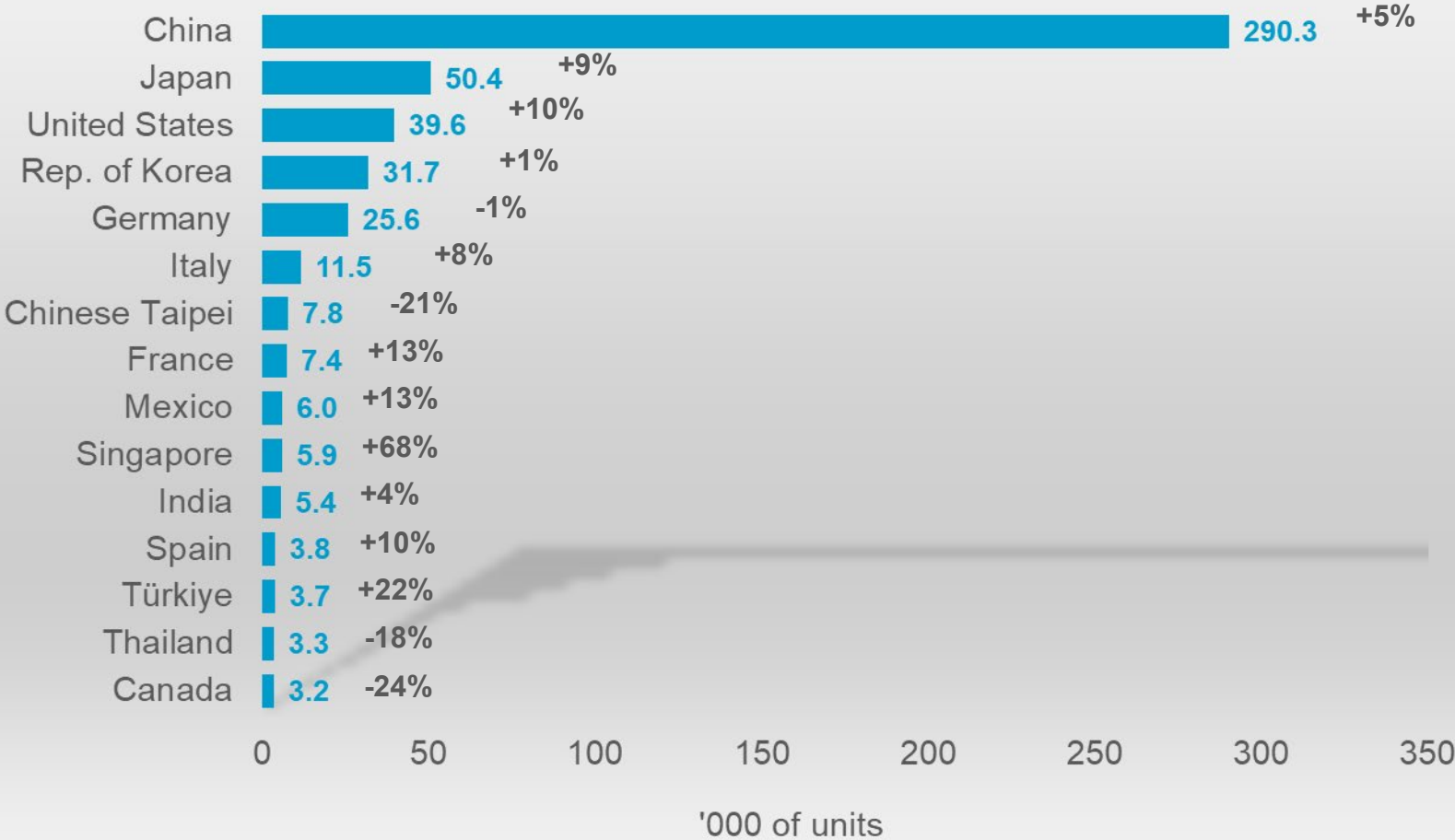


■ Asia/Australia ■ Europe ■ The Americas Source: World Robotics 2023



**China installs every other robot**

**Annual installations of industrial robots  
15 largest markets 2022**

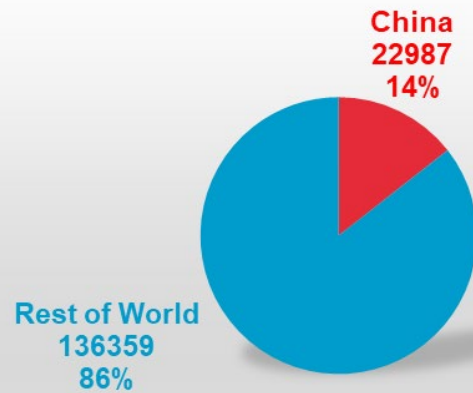


Source: World Robotics 2023

# China is growing dramatically

## China vs. Rest of World in 2012

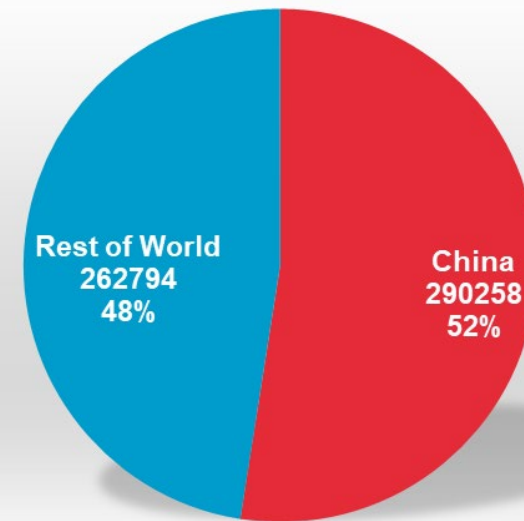
Annual installations of industrial robots in 2012



Source: International Federation of Robotics

## China vs. Rest of World in 2022

Annual installations of industrial robots in 2022

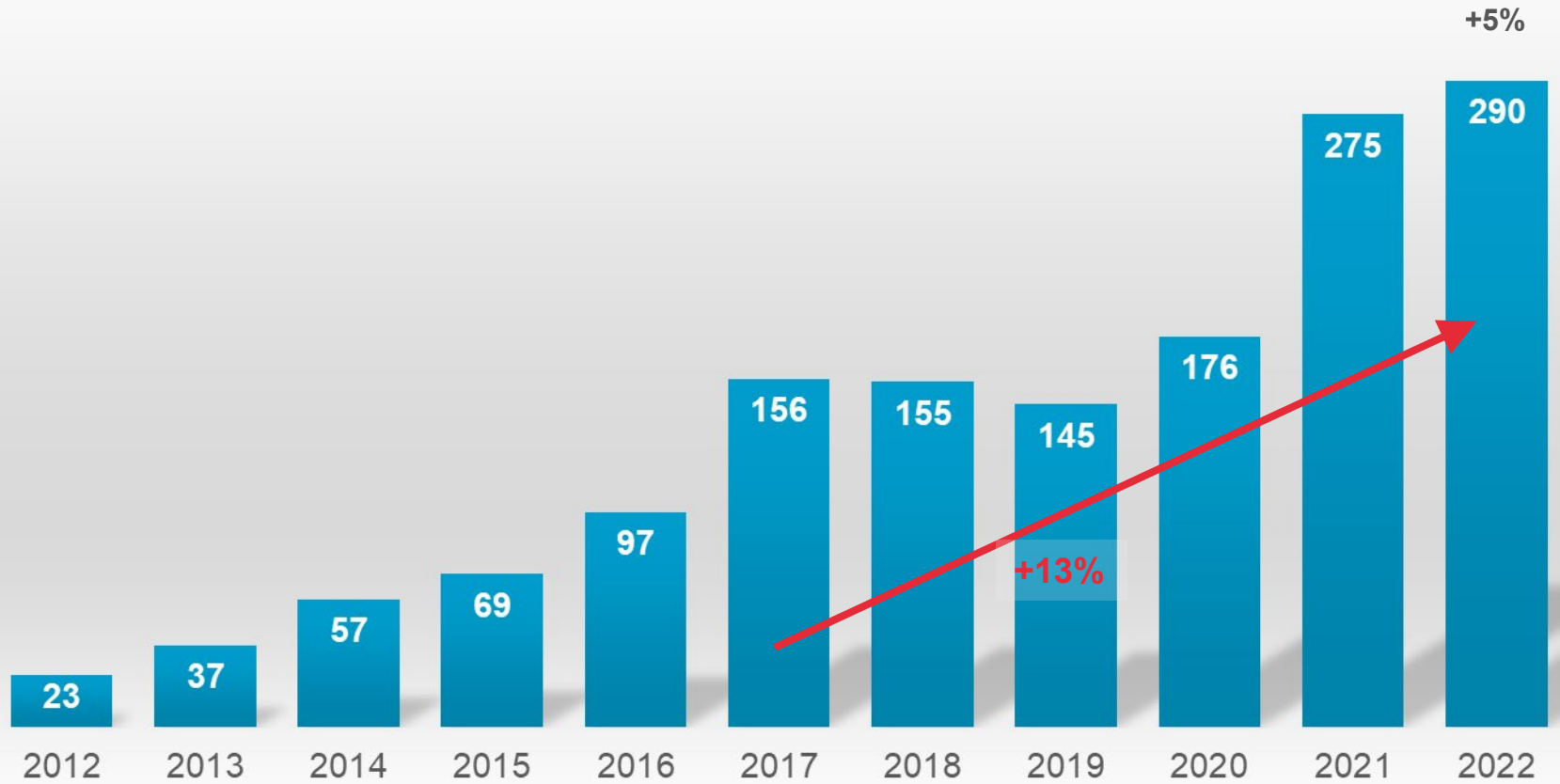


Source: International Federation of Robotics

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

Annual installations of industrial robots - China

1,000 units

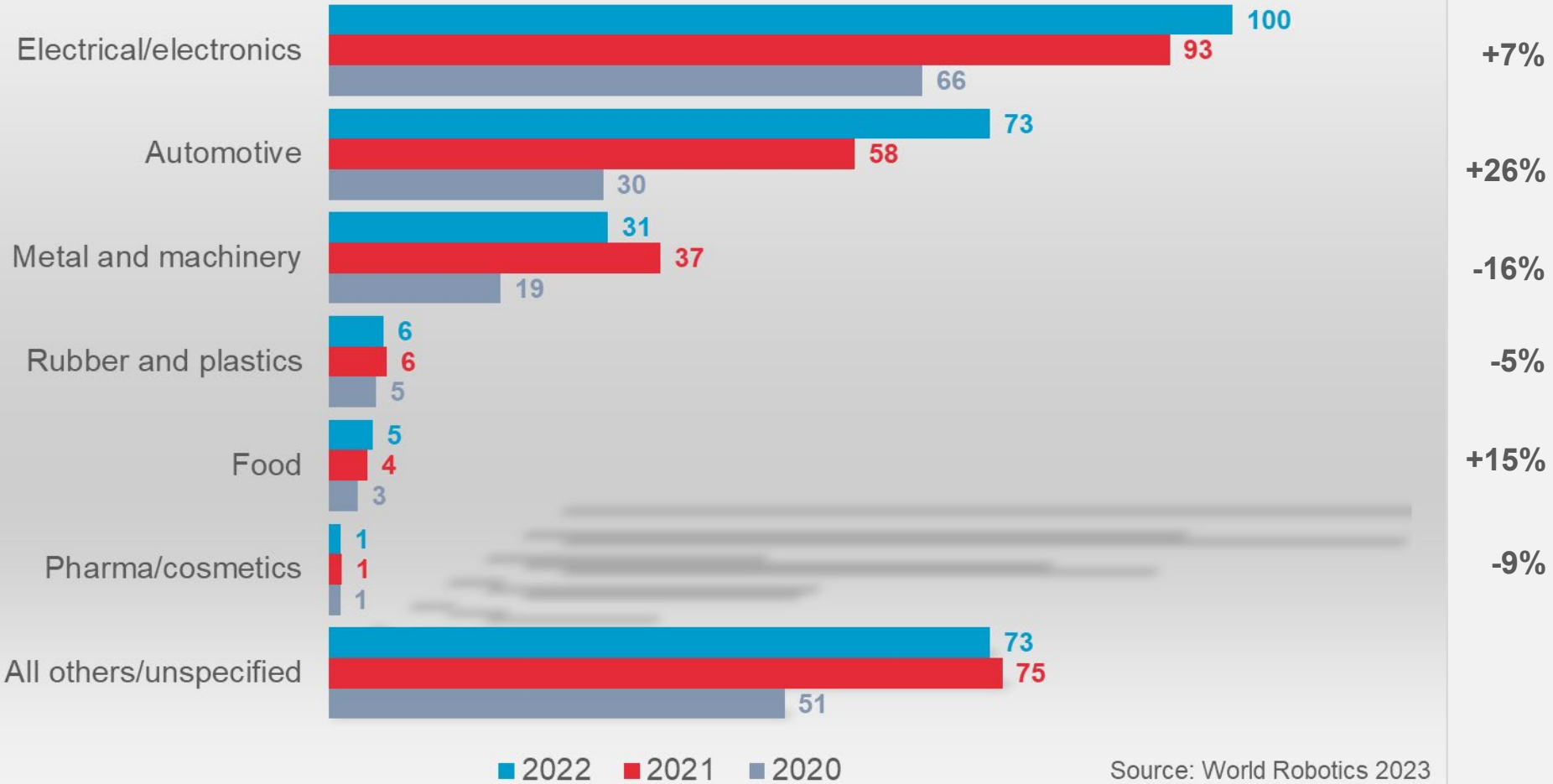


Source: World Robotics 2023

China's electronics industry is the main customer

Annual installations of industrial robots by customer industry - China

1,000 units

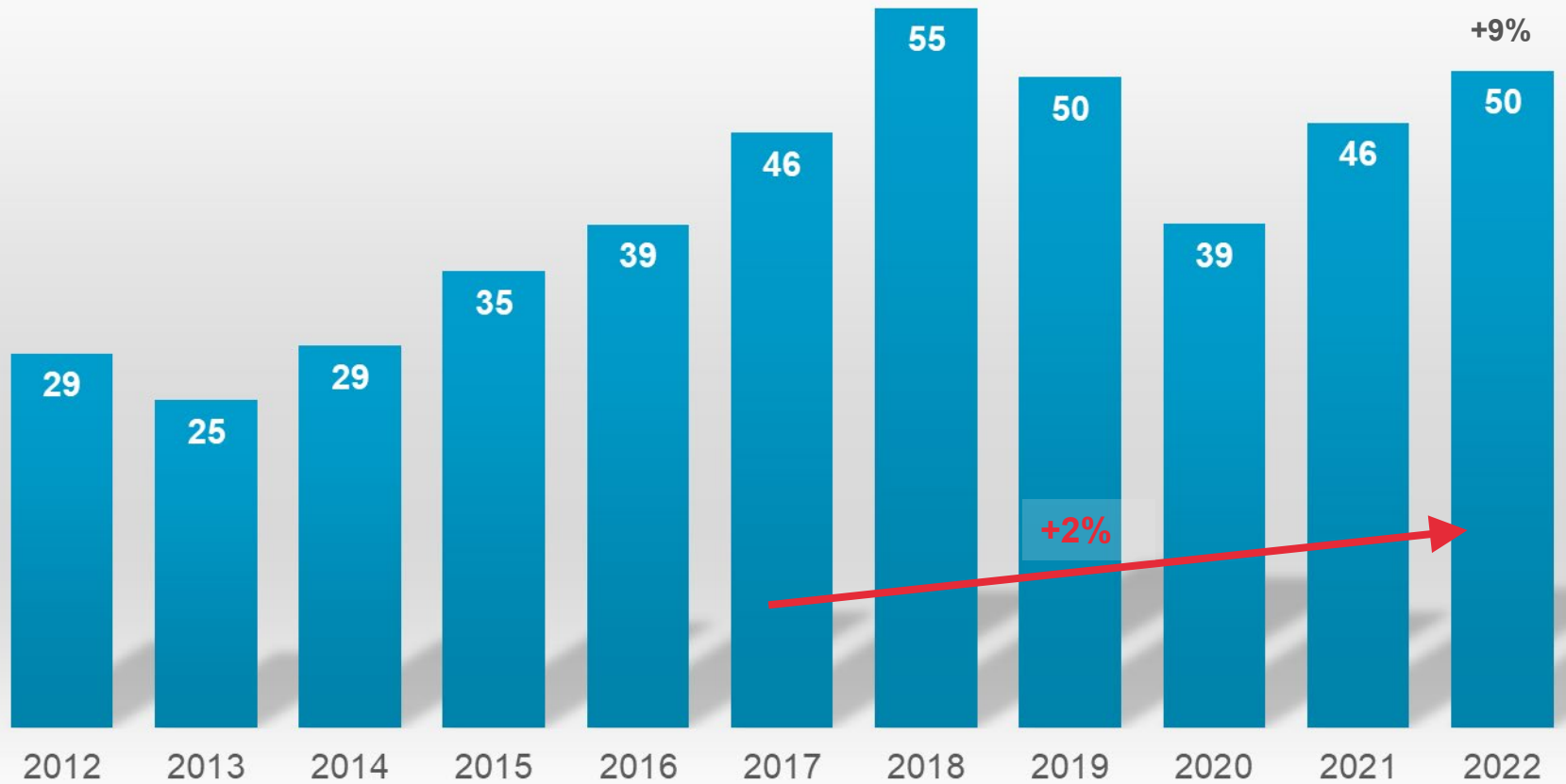


Source: World Robotics 2023

## Japan recovers strongly – second highest installation count ever

### Annual installations of industrial robots - Japan

1,000 units

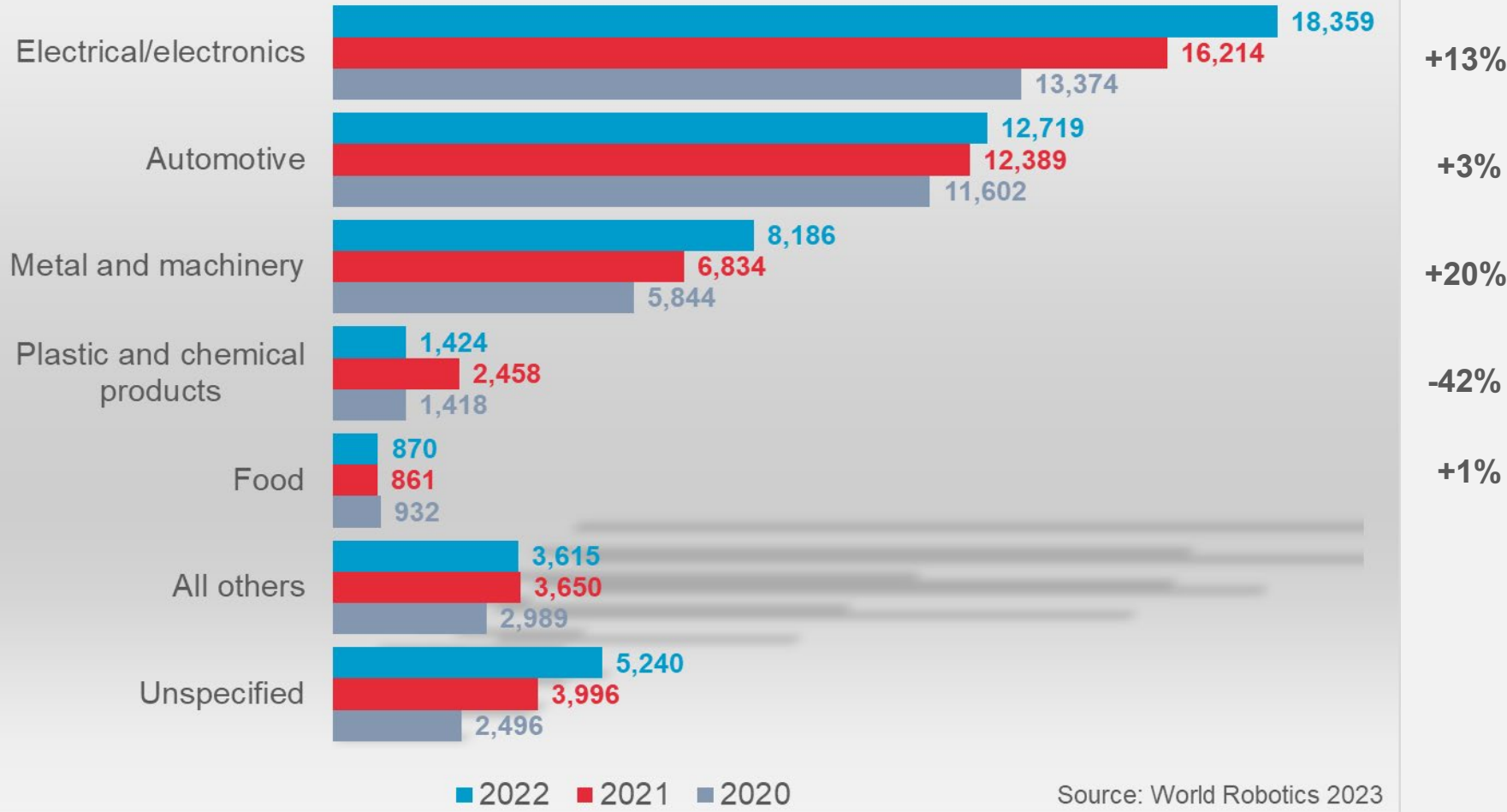


Source: World Robotics 2023

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

Annual installations of industrial robots by customer industry - Japan

units

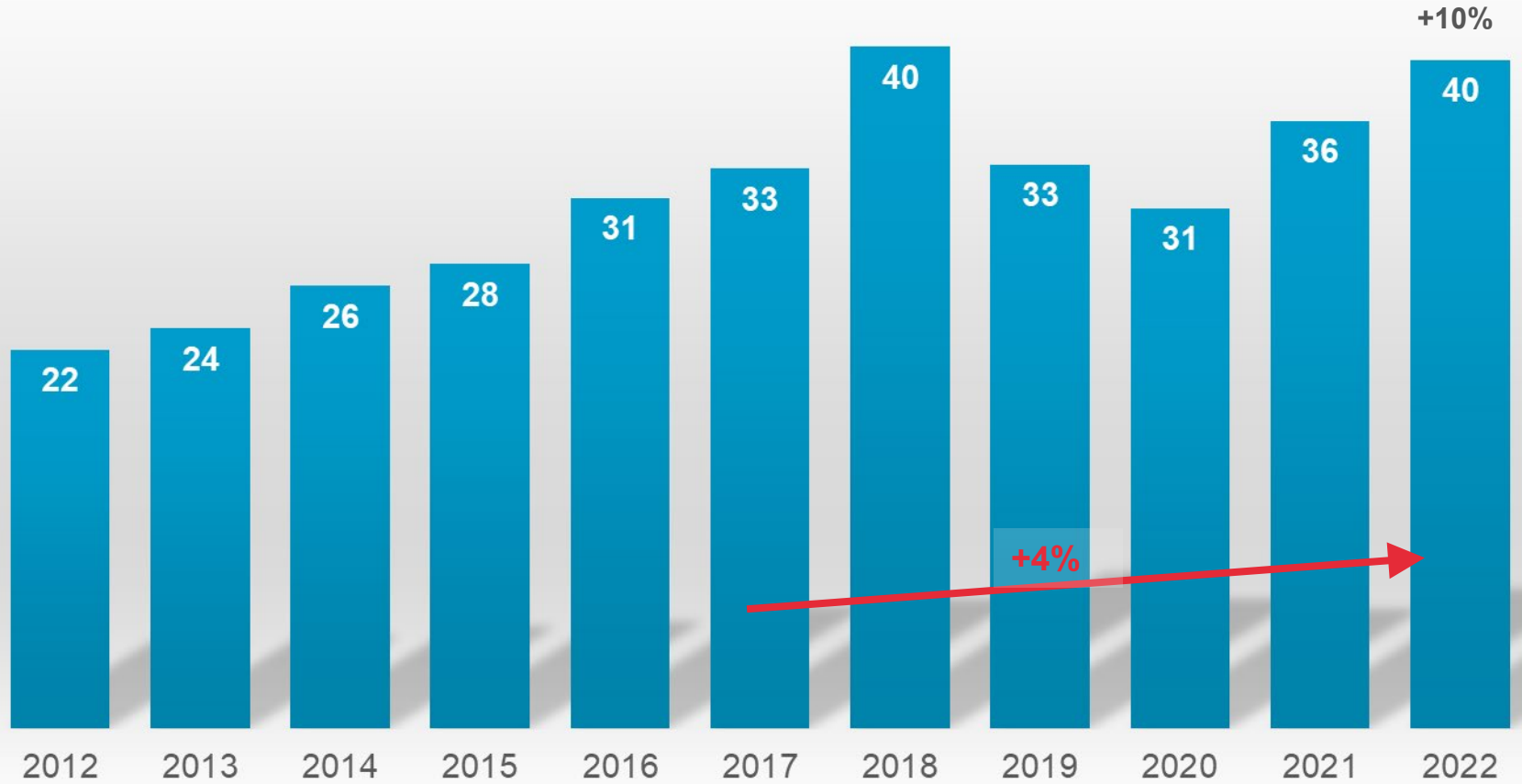


Source: World Robotics 2023

United States: **Second highest level** ever recorded

**Annual installations of industrial robots - United States**

1,000 units

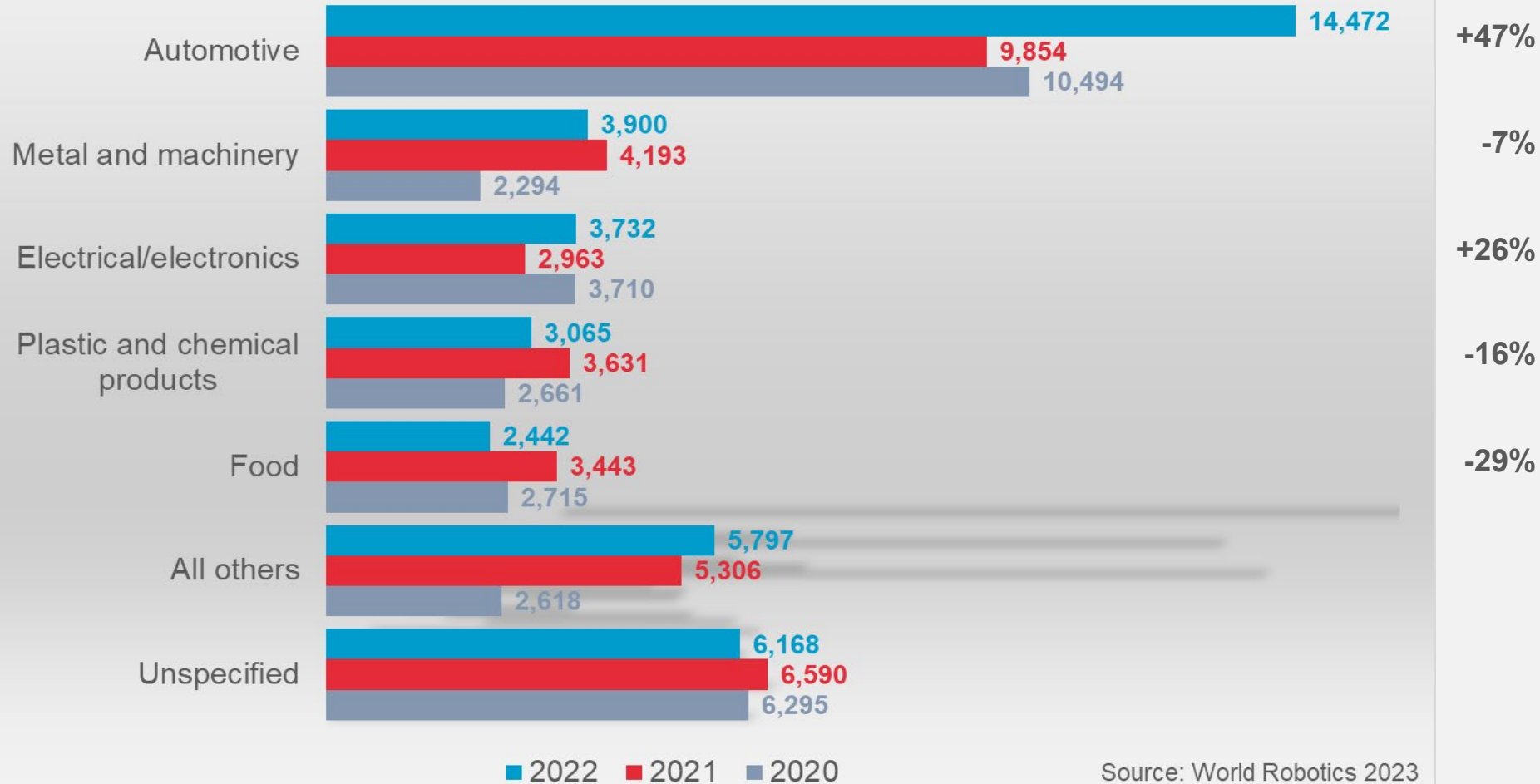


Source: World Robotics 2023

## US Automotive Industry driving growth

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

units

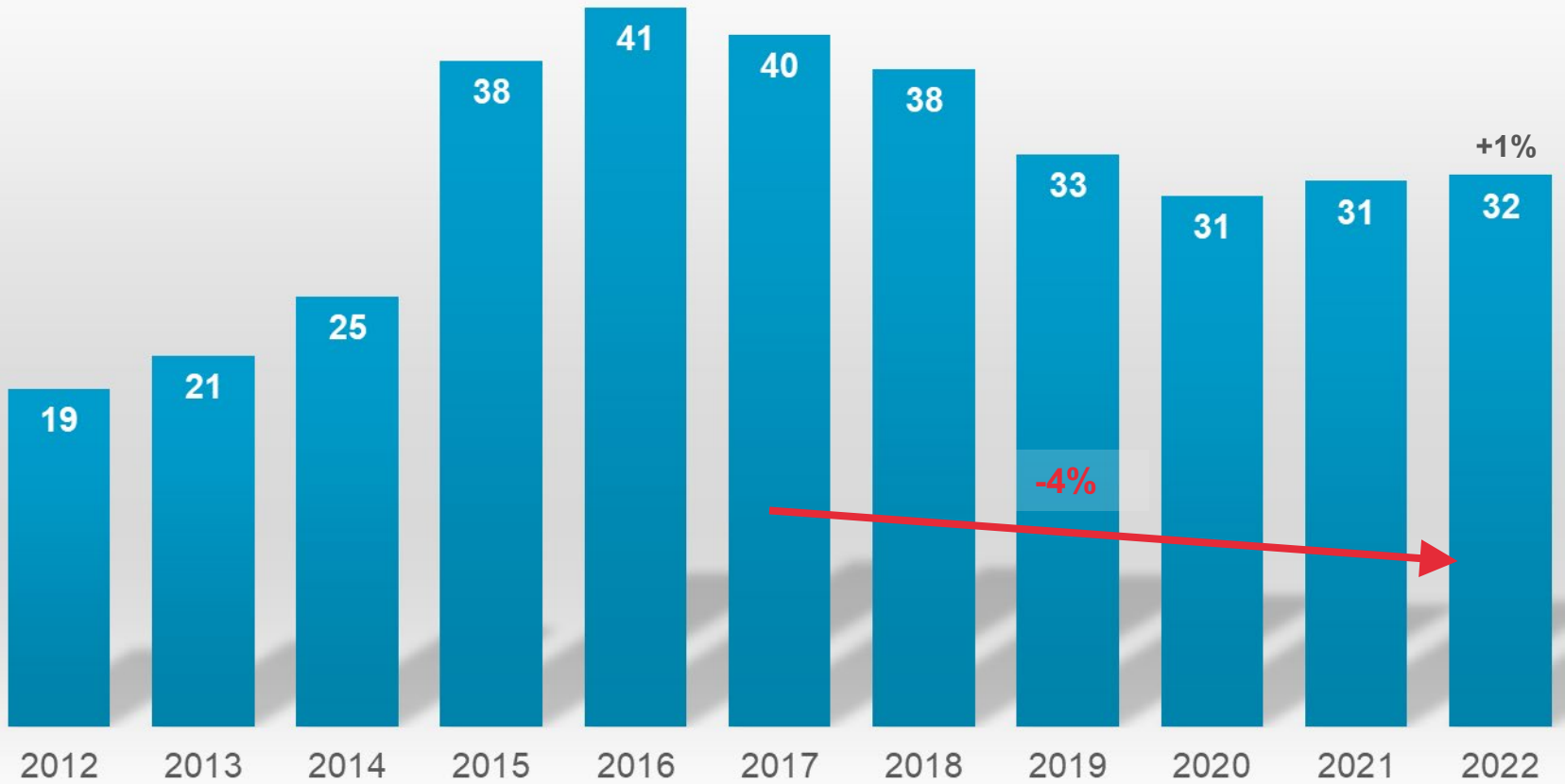




## Korean robot demand moving sideways

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

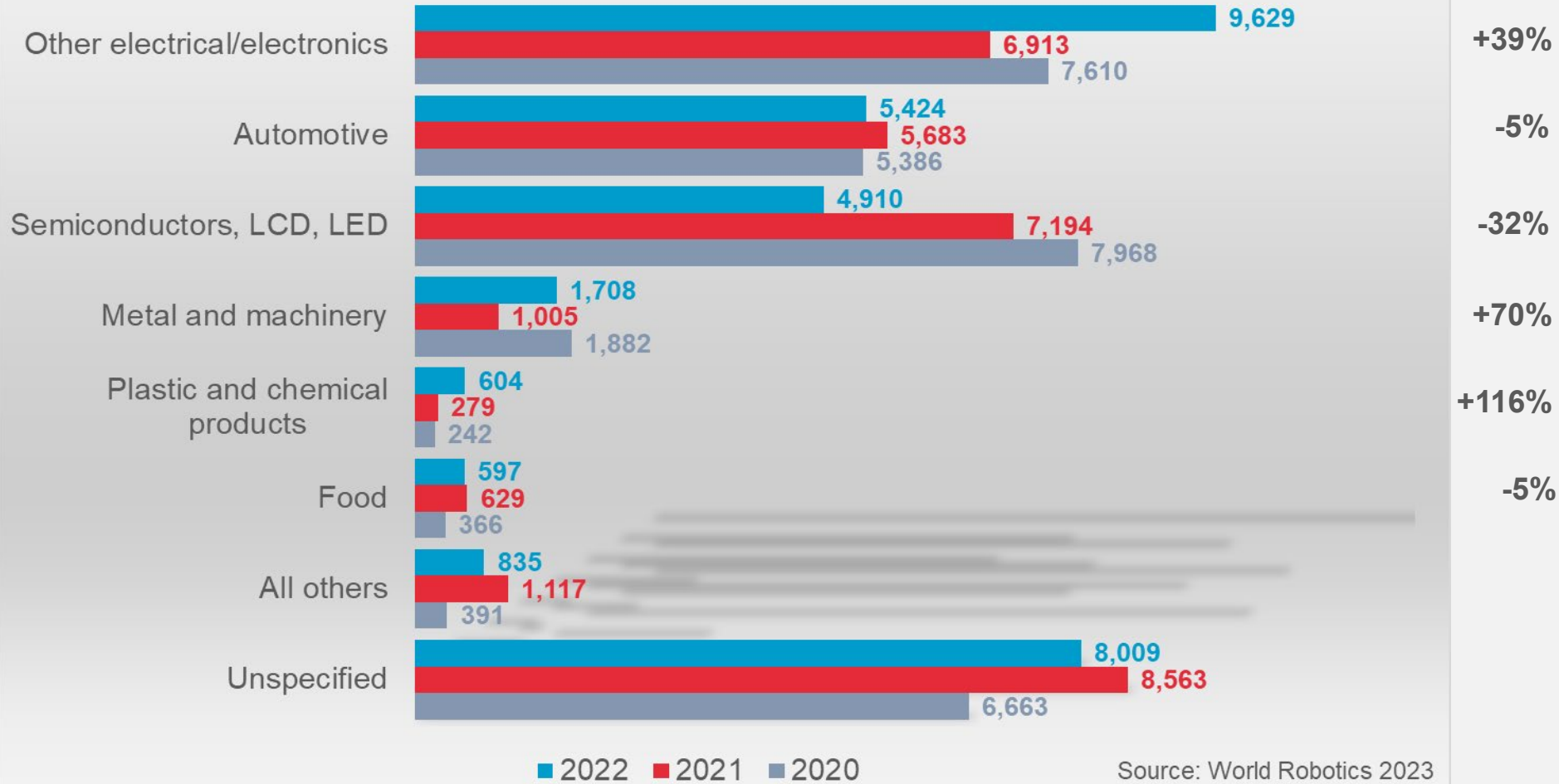
1,000 units



Source: World Robotics 2023

**Korean electronics industry up 3%**

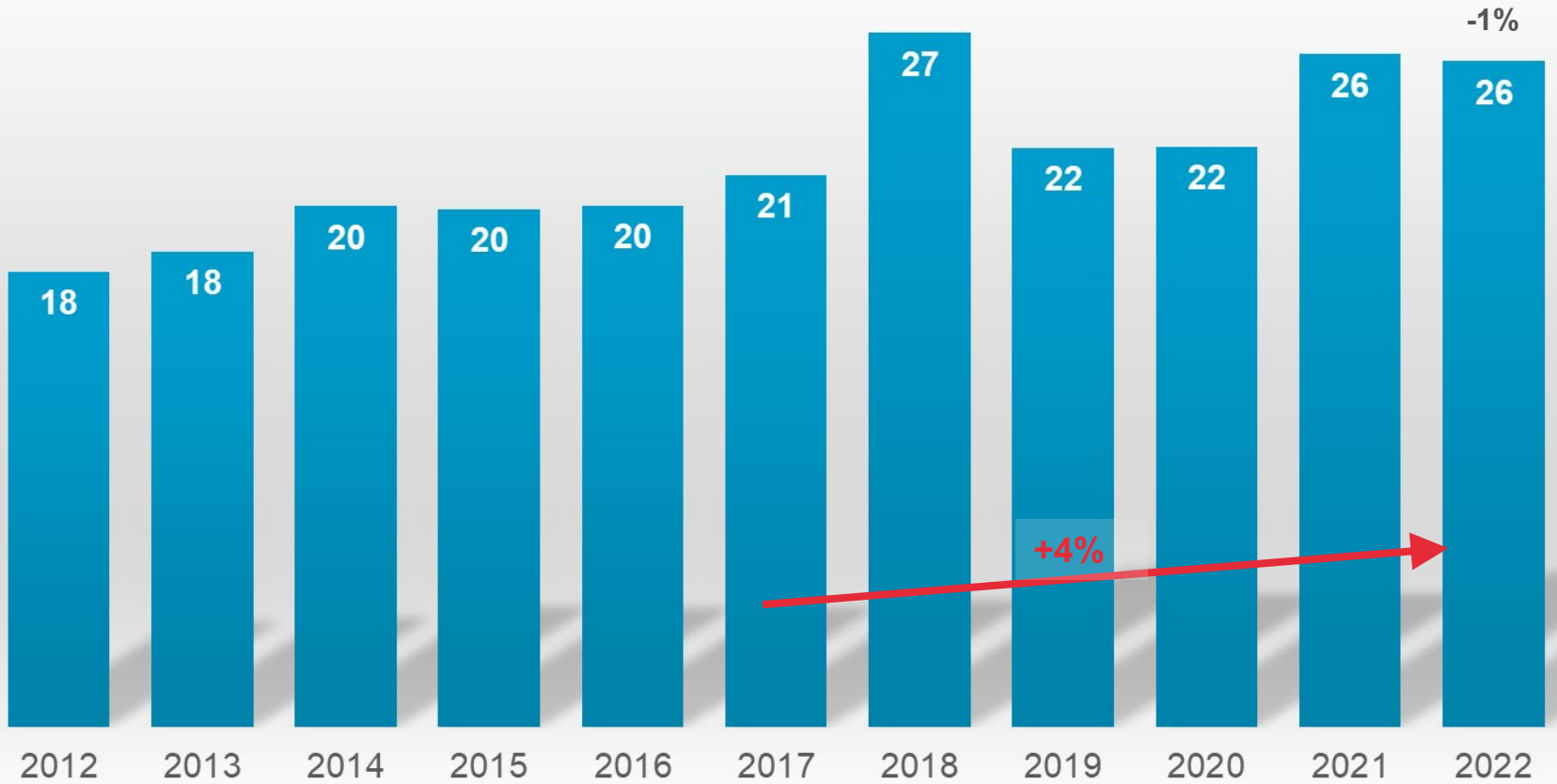
**Annual installations of industrial robots by customer industry - Rep. of Korea**  
units



## Germany slightly declining

### Annual installations of industrial robots - Germany

1,000 units

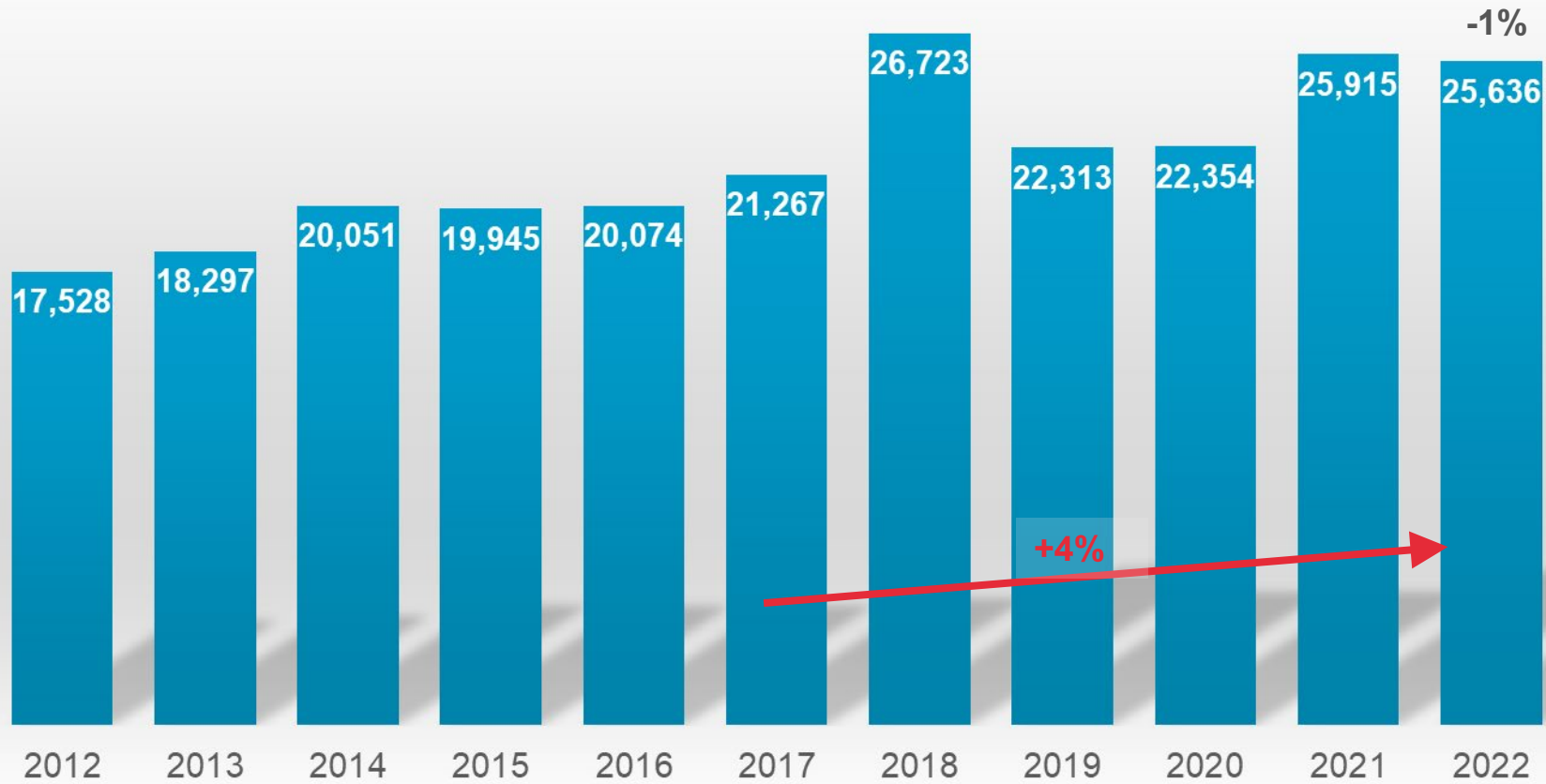


Source: World Robotics 2023

## Germany slightly declining

### Annual installations of industrial robots - Germany

units

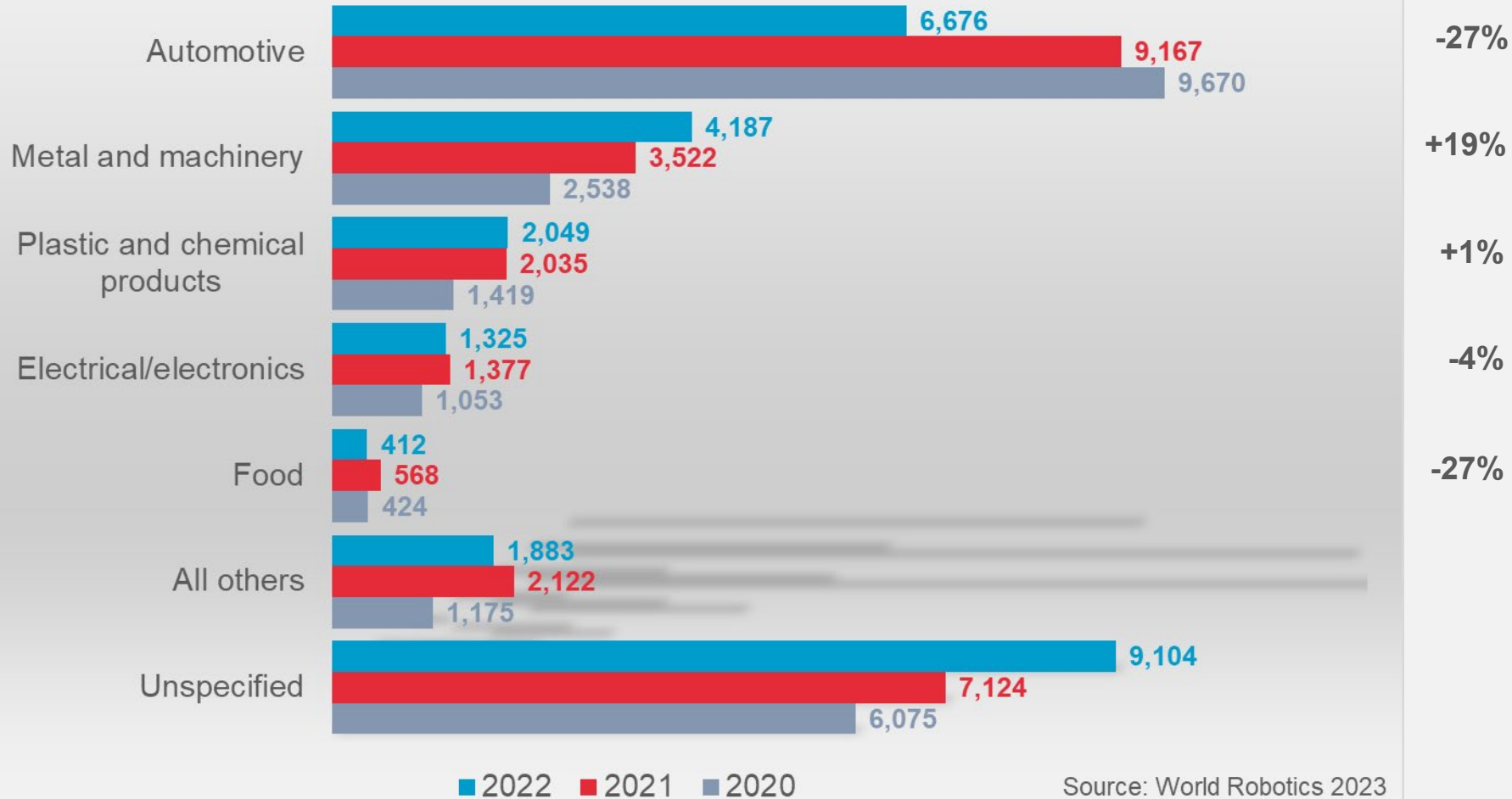


Source: World Robotics 2023

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

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

units



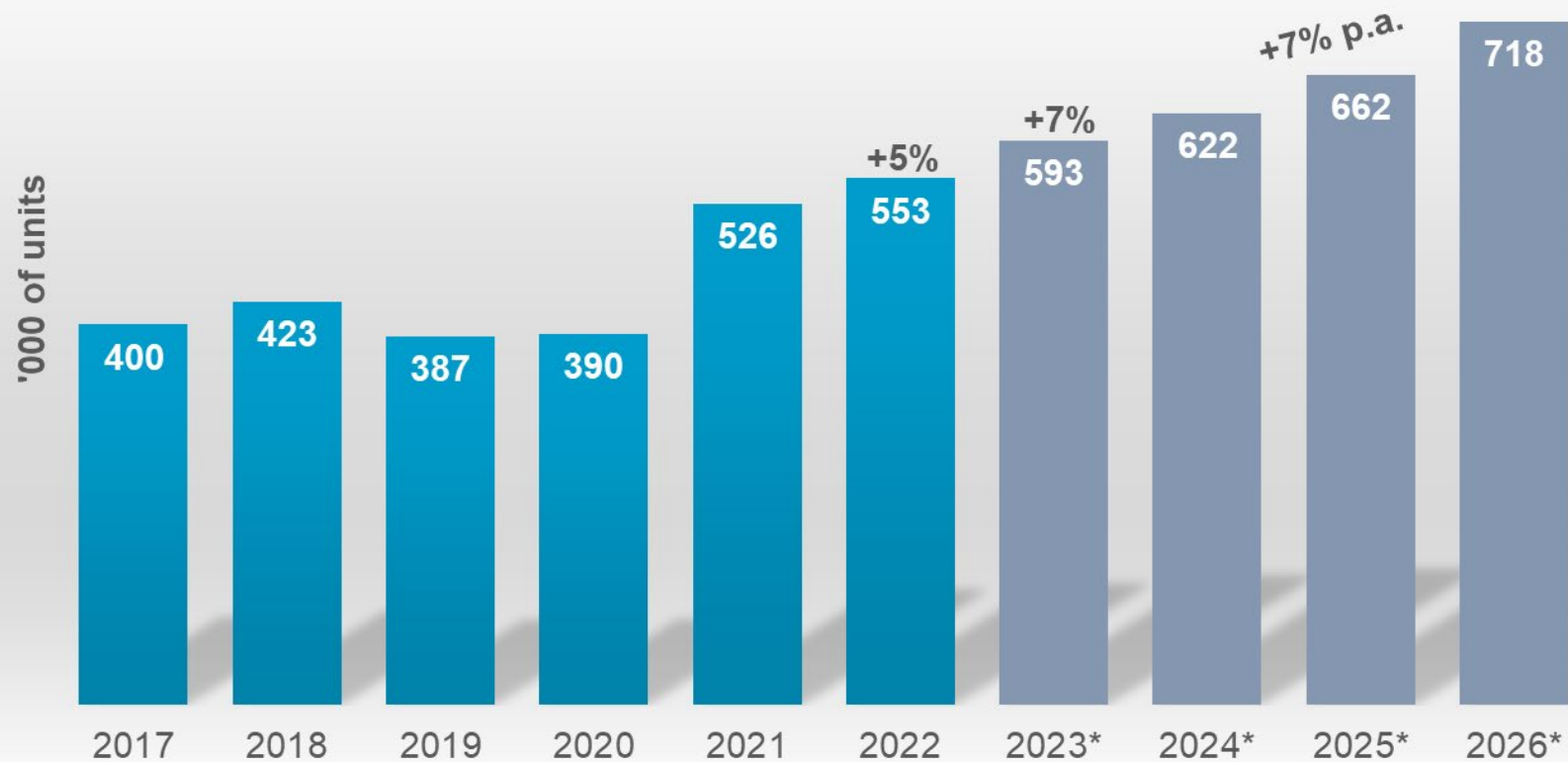
Source: World Robotics 2023

# Trends and Forecast



## Approaching the 600,000-unit mark in 2023

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

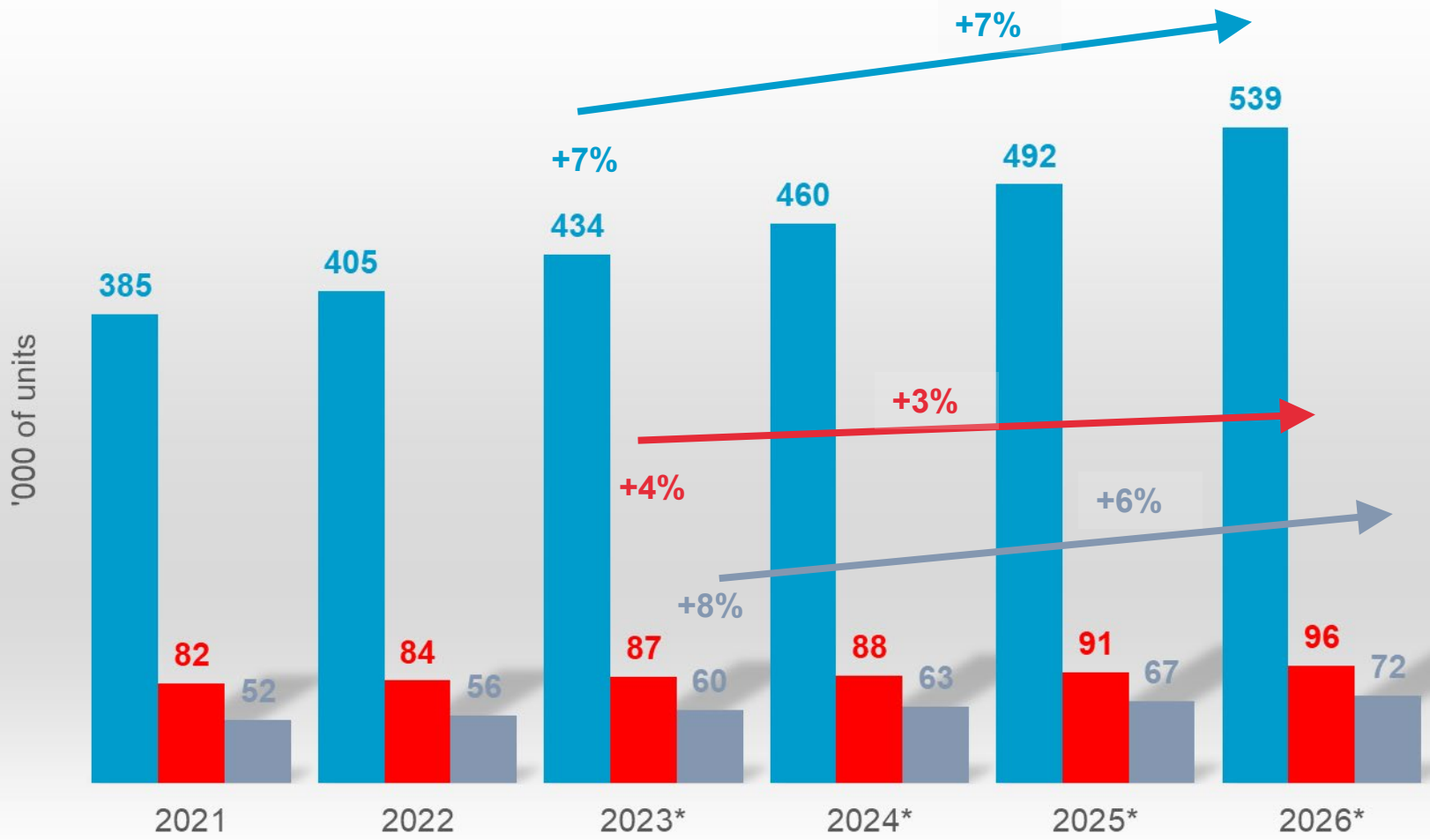


\*forecast

Source: World Robotics 2023

Forecast

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



\*forecast

■ Asia/Australia ■ Europe ■ The Americas

Source: World Robotics 2023



# 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

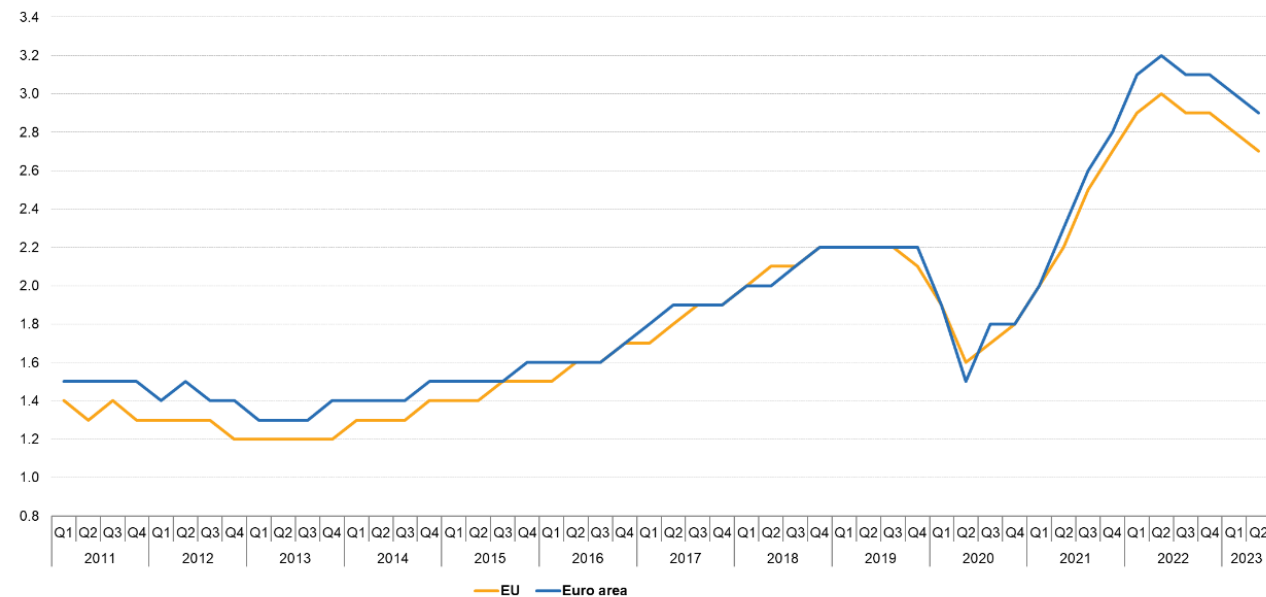
- **Labor scarcity** in many developed economies is driving the demand for automation
- **Reconsideration of supply chains and closeness to customers**
  - Re- and nearshoring of production
- **Small and medium sized enterprizes (SMEs) need easy access to automation**
  - “Democratizing” robotics
  -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



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

## Job vacancy rates in the EU and Euro Area\*

Quarterly job vacancy rates, seasonally adjusted, 2011-2023 (Q2-2023)  
(%)



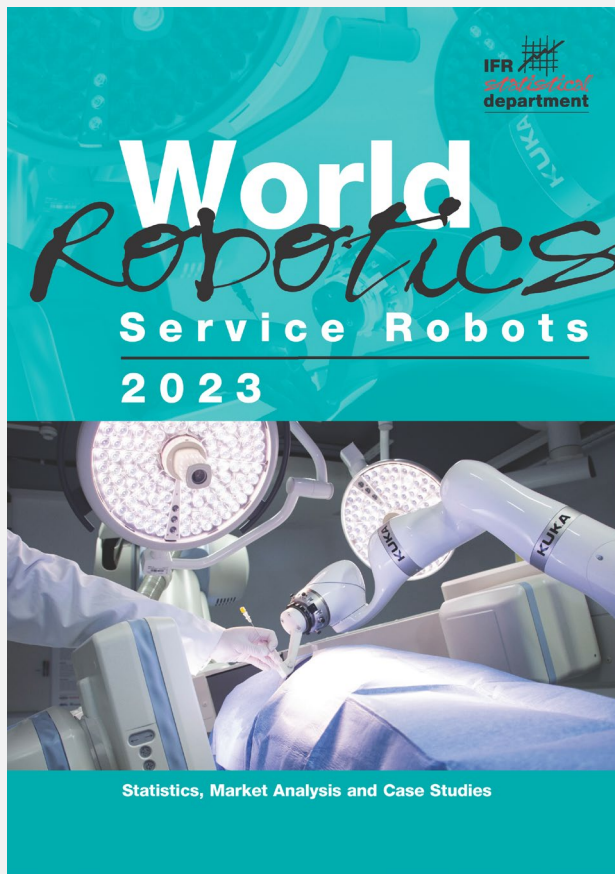
Note: data for NACE Rev. 2 Sections B to S.

eurostat

\*Source: Eurostat

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

# Service robots – top findings



## 2022: Continuous growth

### New professional service robots\*

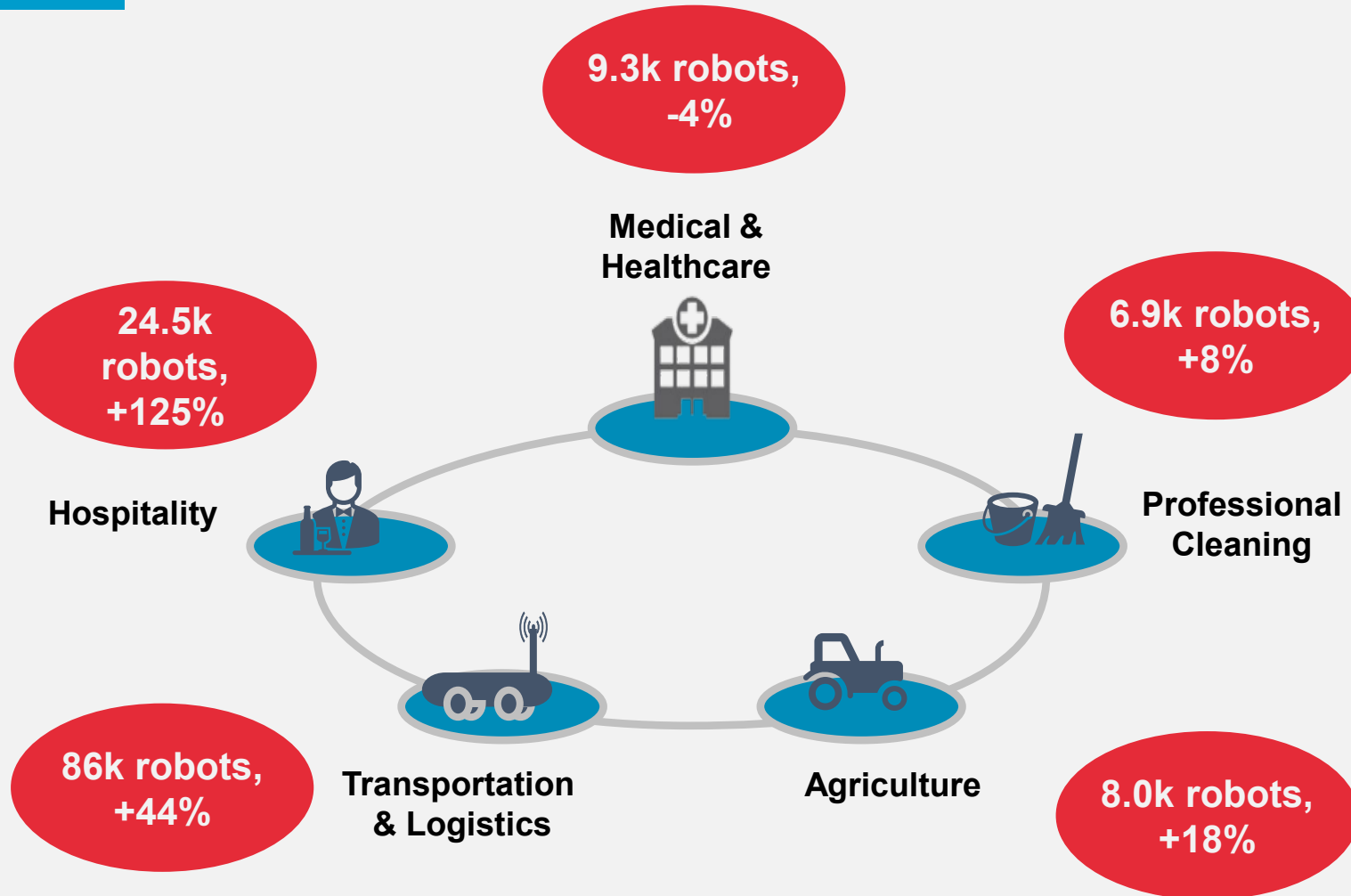
- 158,000 units (+48%)

### 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

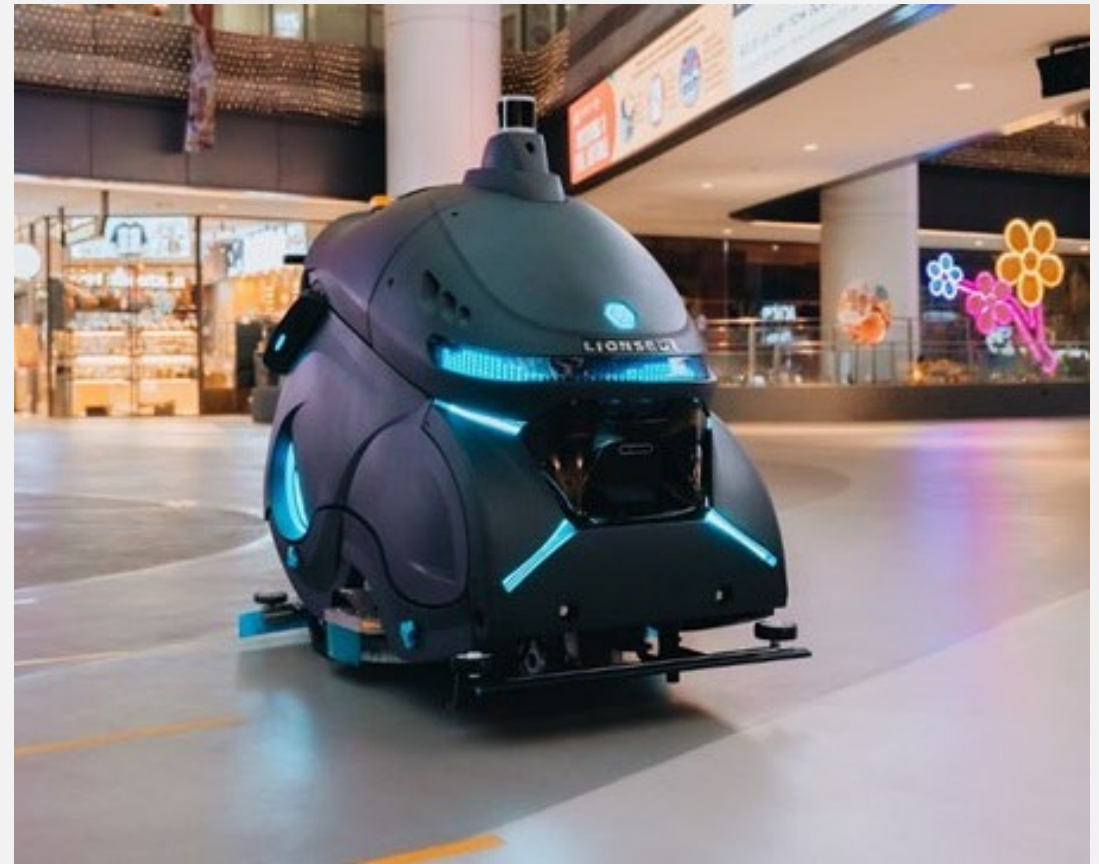
- There is a lot of interest in logistics robots because of a massive shortage of staff (Covid aftermath)
- Robot use in these changing environments, which are often full of people, is still technically challenging, also due to safety reasons, fire protection regulations etc.
- Ease of use and user-friendliness 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

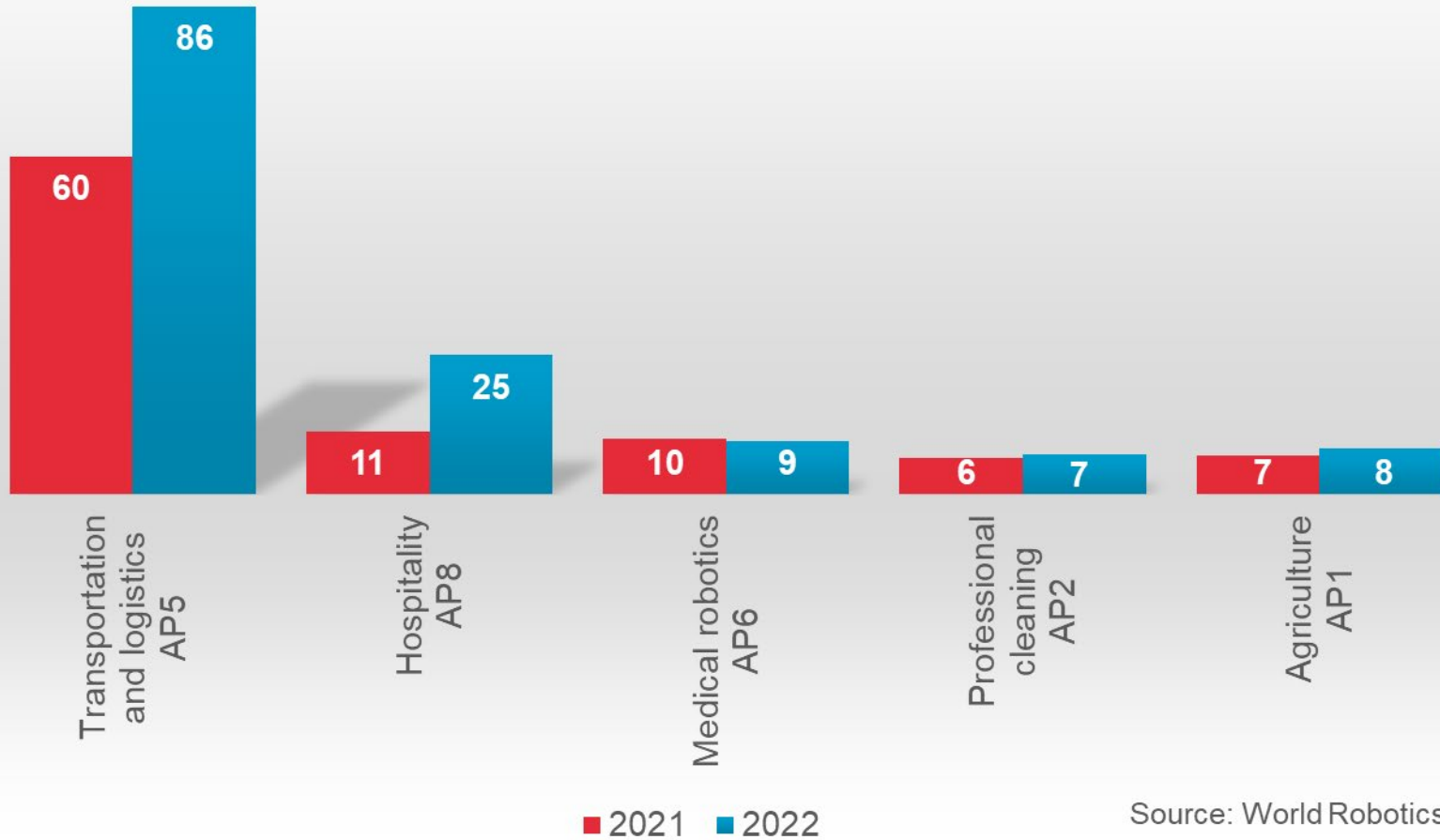
- Drivers for this development are a shortage of skilled workers and environmental problems that are increasingly coming into focus
- Safety is no longer seen as a barrier to market entry
- Prevention instead of symptom treatment in agriculture: Robots will be a key pillar in this regard by continuously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



Source: Small Robot Company

Main professional applications

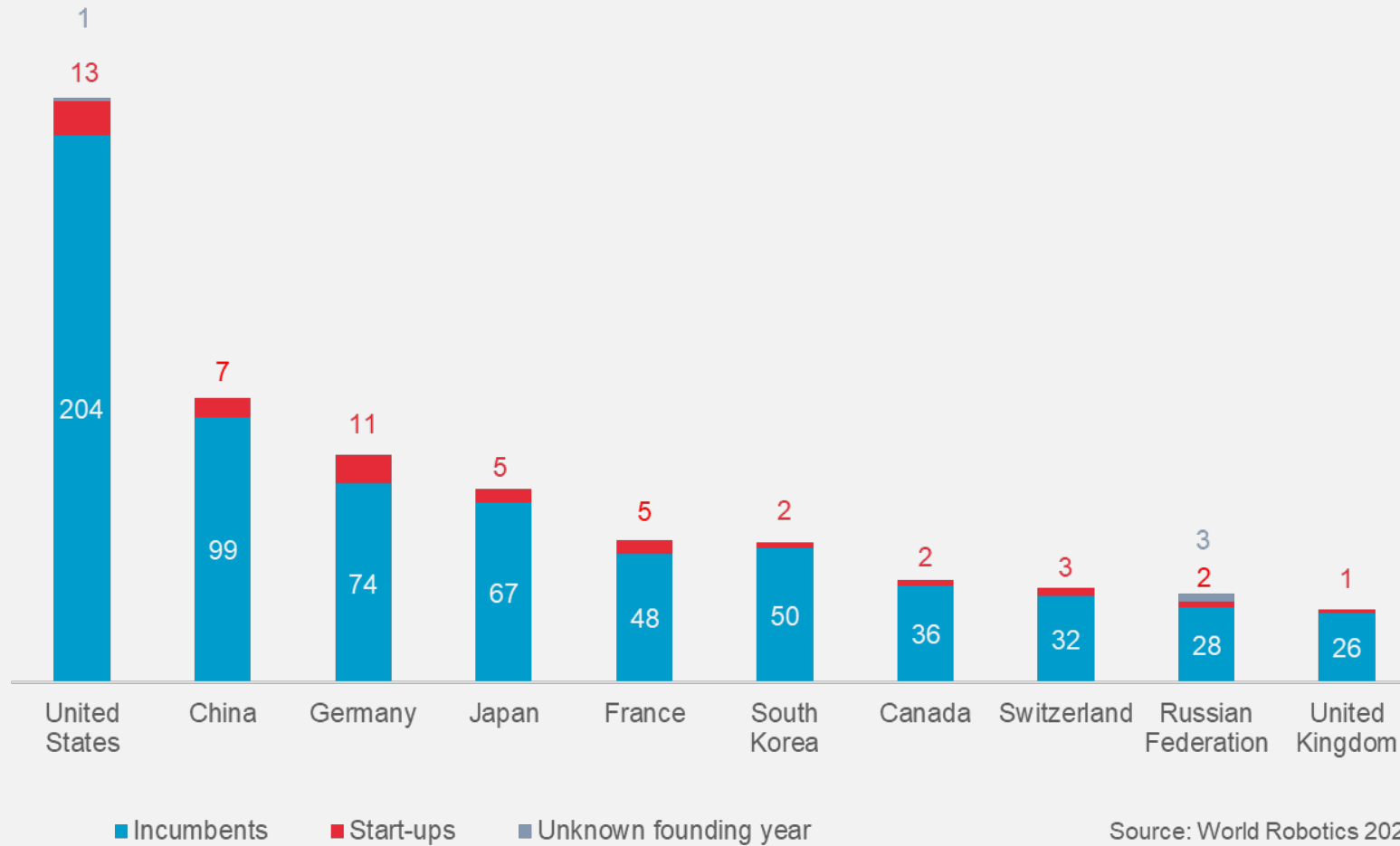
Service robots for professional use. Top 5 applications  
Unit sales 2021 and 2022  
'000 of units



Source: World Robotics 2023

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

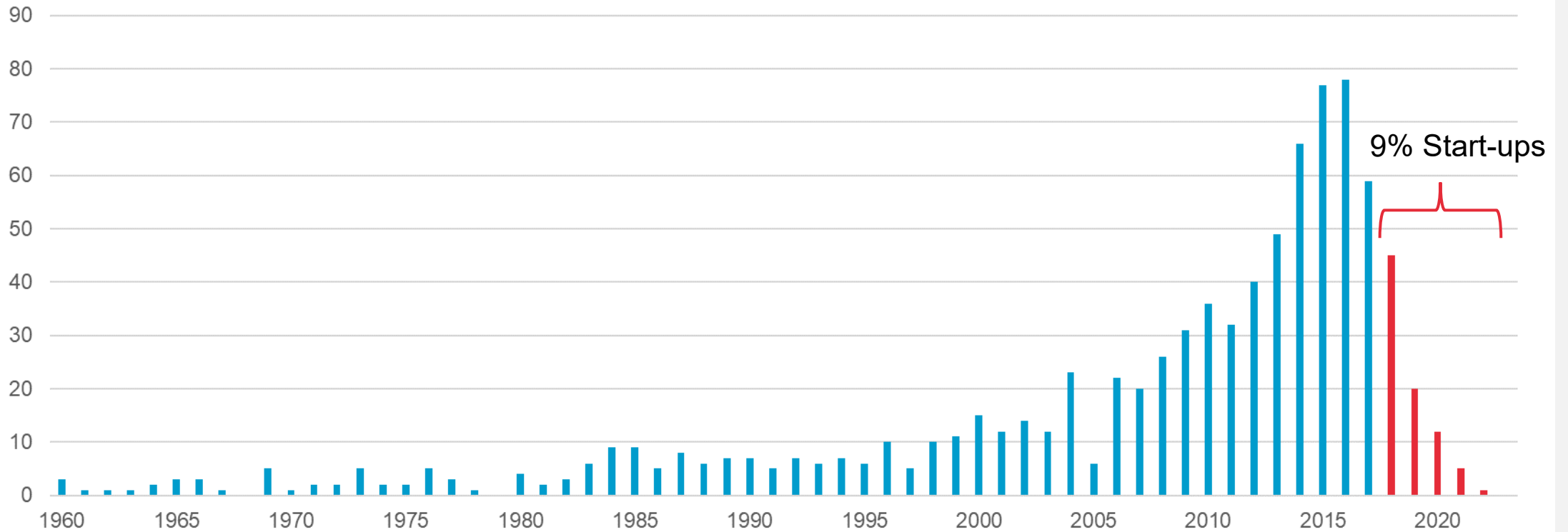
Service robot manufacturers by country (top 10)  
all applications



Source: World Robotics 2023

# Trend of declining startups continues

### Number of service robot manufacturers by year of establishment



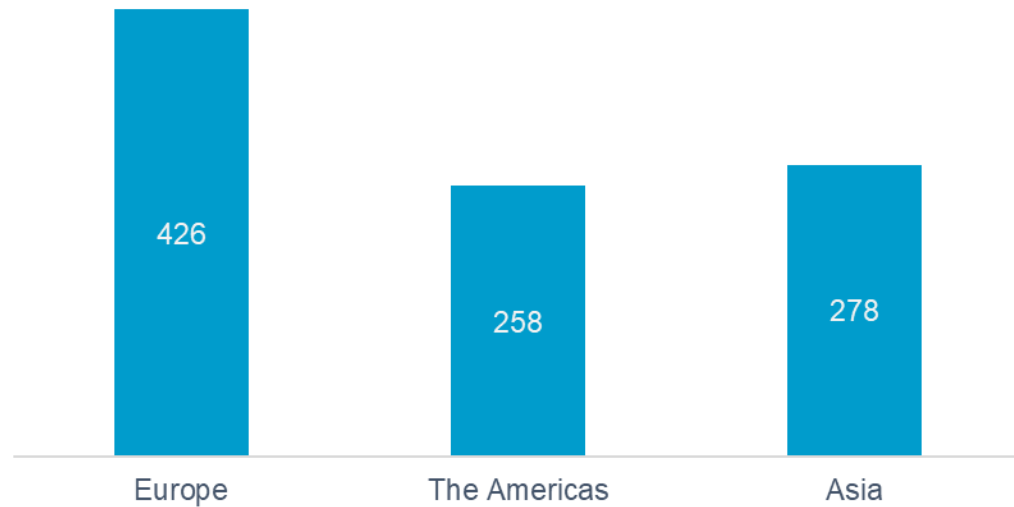
Source: World Robotics 2023

# 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

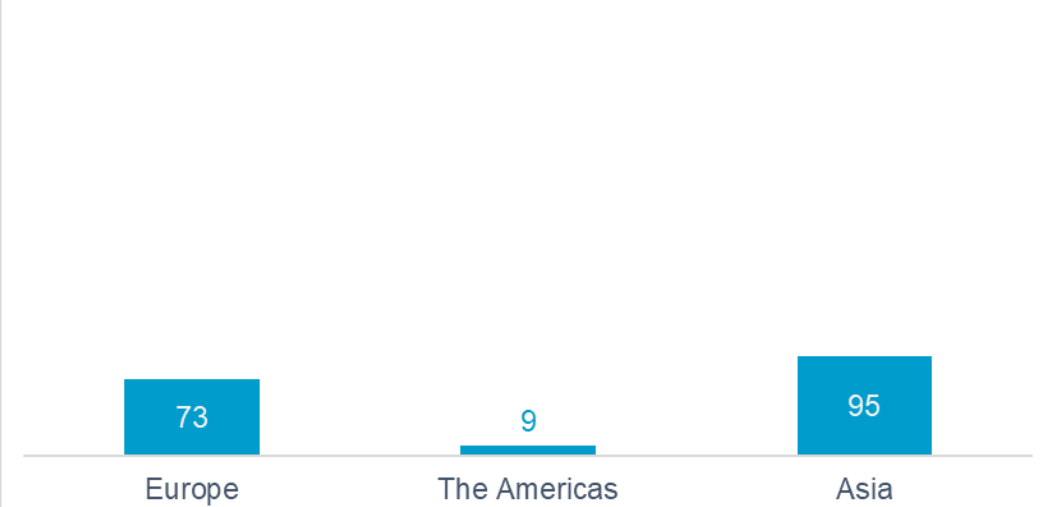


Source: International Federation of Robotics

## Less than 180 industrial robot suppliers

### Number of industrial robot suppliers by region

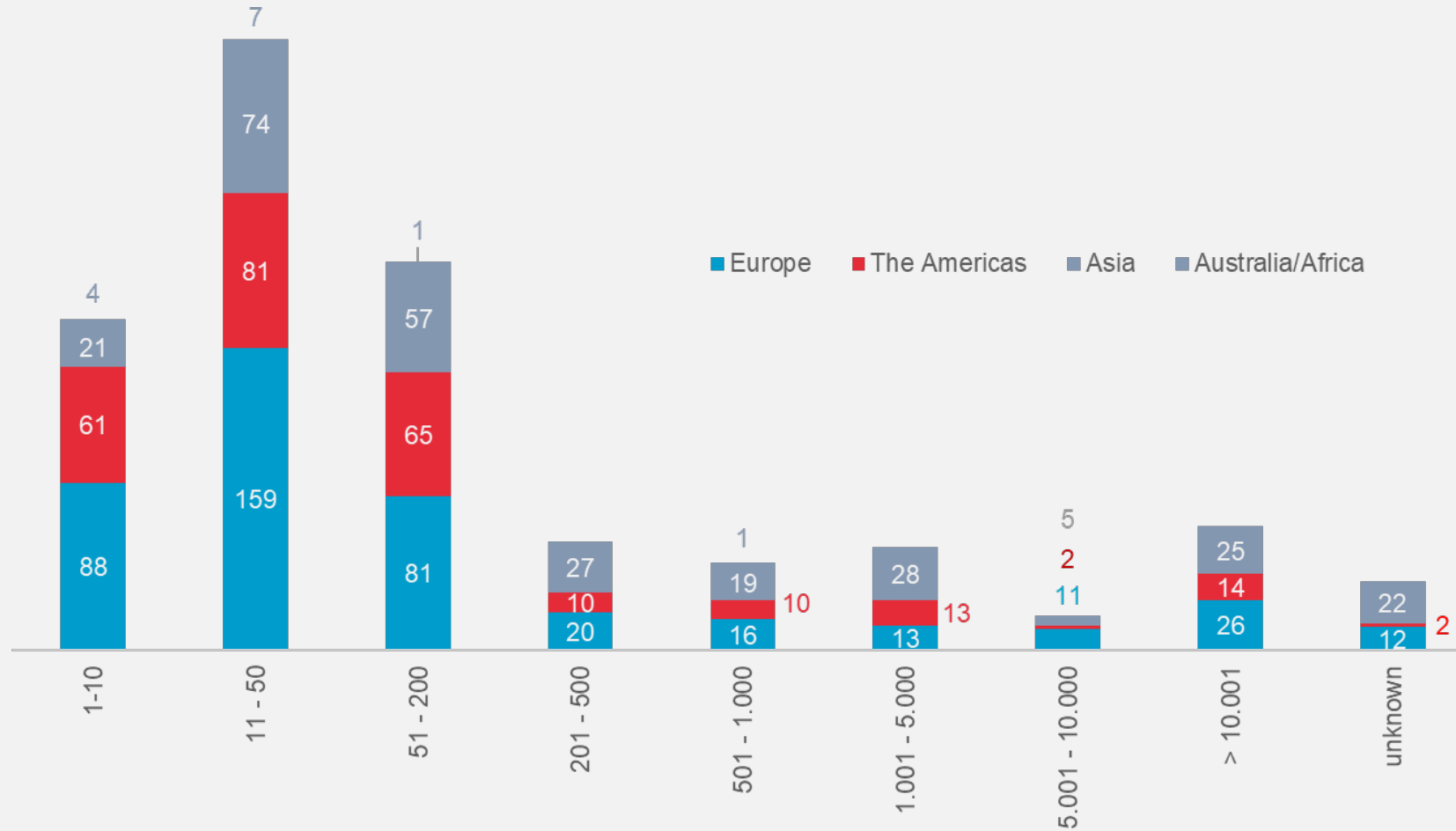
as of August 2023, main regions only



Source: International Federation of Robotics

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

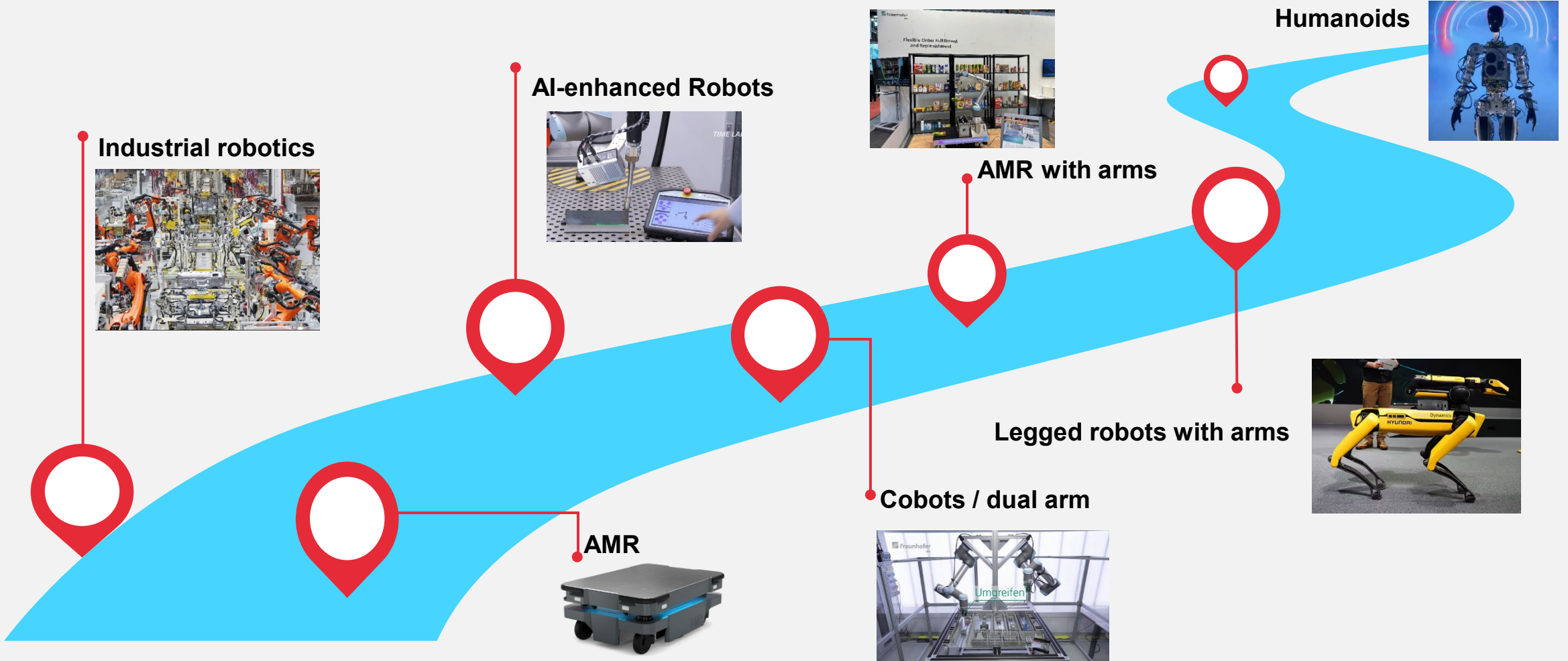
Number of service robot manufacturers by business size (number of employees)



\*(SME with <=500 employees)

Source: World Robotics 2023

# Long-term Research Trends



- **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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<https://ifr.org/>



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<https://www.youtube.com/c/IFRInternationalFederationofRobotics>



<https://www.linkedin.com/company/international-federation-of-robotics/>