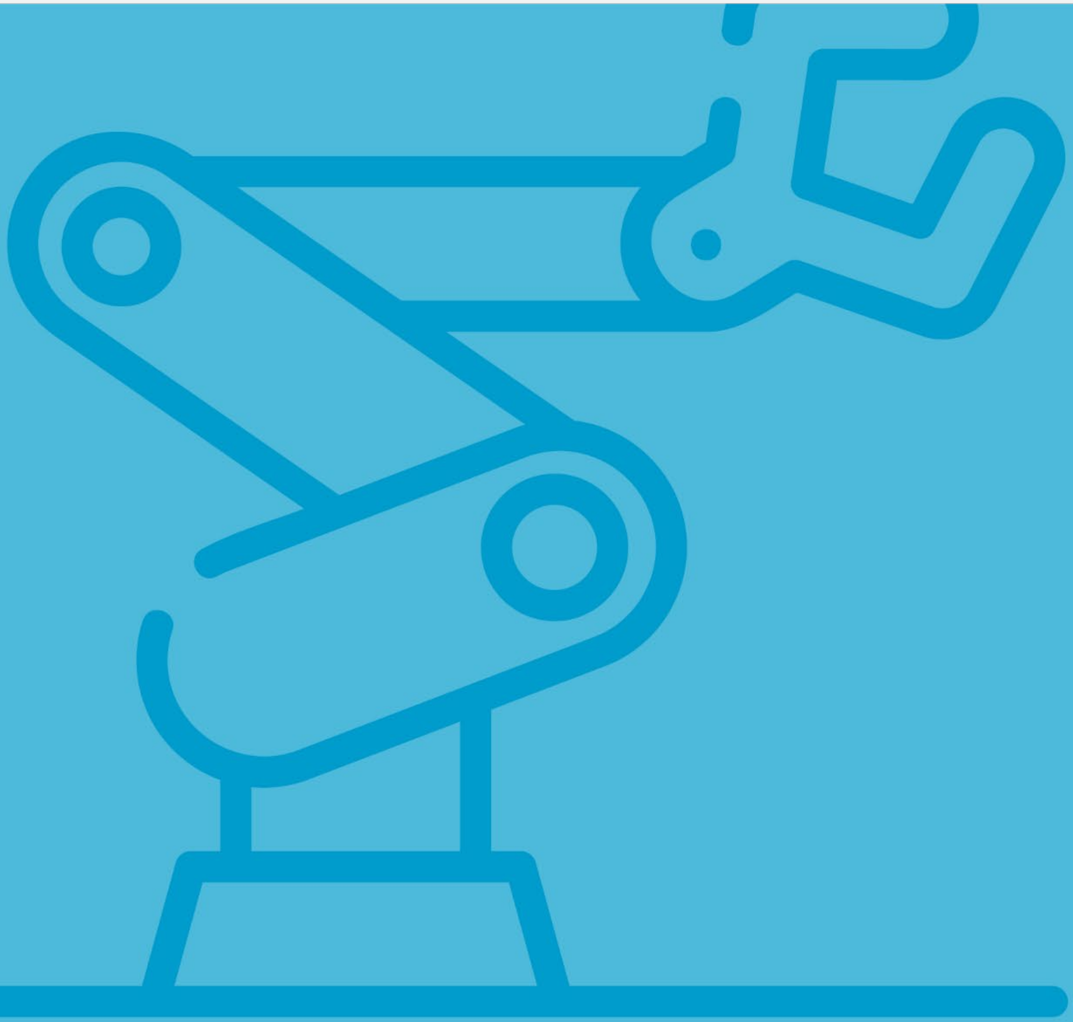
IFR International Federation of Robotics

Welcome to the presentation of

World Robotics 2023



#WorldRobotics

The Speakers

IFR International Federation of Robotics

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

IFR International Federation of Robotics

- **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

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National Associations

- A3 Association for Advancing Automation
- KAR Korea Association of Robot industry
- AER automation
- LRA Lithuanian Robotics Association
- nfea
- BARA British Automation & Robot Association
- SIRI
- CRIA China Robot Industry Alliance
- swissRobotics.net competence in industrial handling and robotics
- DIRA Danish Industrial Robot Association
- SWIRA
- enosad
- TAIROA
- EVOLIS CISMA + PROFLUID + SYMOP
- VDMA
- FAIRP

Industrial Robot Manufacturers

- ABB
- Kawasaki
- CLOOS Weld your way.
- KUKA
- COMAU
- NACHi
- NEURA Robotics
- DAIHEN
- omron
- DÜRR
- Panasonic
- EPSON Exceed your vision
- RISONG
- ESTUN Robotics
- STÄUBLI
- FANUC
- Universal Robots
- GÜDEL
- Wittmann world of innovation
- JAKA
- YASKAWA

Service Robot Manufacturers

- BlueBotics
- Fourier Intelligence
- Geek+
- IPLUSMOBOT
- LIONSBOT
- MiR
- PAL Robotics
- Standard Robots
- TARQAN
- YOUIBOT
- ZEBRA
- fetch robotics

Component Suppliers & Integrators

- 3M
- ILJIN Motion & Control GmbH
- SCHAEFFLER
- Ambarella AI envisioned
- INUITIVE
- ROBOTECO ITALARGON Panasonic
- ABAGY Robotic Systems
- intel
- SCHUNK
- MAUCHER CNC-Robotic
- SMC
- ATI Industrial Automation
- MECH MIND
- SPINEA Excellence in Motion
- micropsi industries
- COGNIBOTICS
- TOUCHE Solutions
- eROBOT
- Mitsui Chemicals
- valk welding
- Genesis Robotics and Motion Technologies
- OKsystem
- VEPRO Group
- HBK Hottinger Brüel & Kjær
- OnRobot
- Visioners Concepts
- HSD Mechatronics
- 图漾科技 PERCIPIO.XYZ
- wipro
- IBG
- Photoneo Focused on 3D
- qbrobotics

R&D Institutes

- The University of Sheffield AMRC
- RRI Robot Research Initiative
- Fraunhofer IPA
- ICROS Institute of Control, Robotics and Systems
- ISW
- MHI
- NTNU – Trondheim Norwegian University of Science and Technology
- SwRI Southwest Research Institute
- SUPSI
- Robotics Society of Romania
- Universidad Andrés Bello

Three pillars of IFR activities

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IFR

Robotics Industry Statistics

world authority on robotics industry statistics

Voice of Robotics Industry

worldwide promotion of robotics

Policy Support

worldwide, national and local policies supporting the adoption of robotics

What is a robot – and what is not?

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Image: Daihen

- “**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

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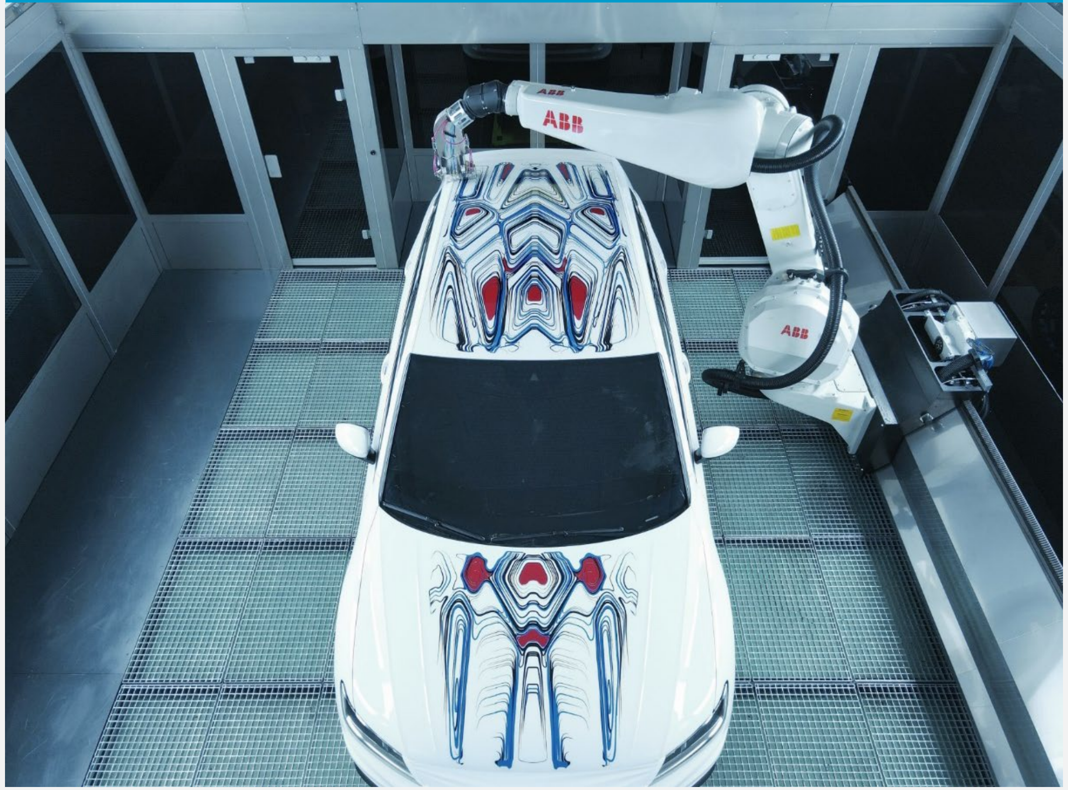
Industrial robots



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

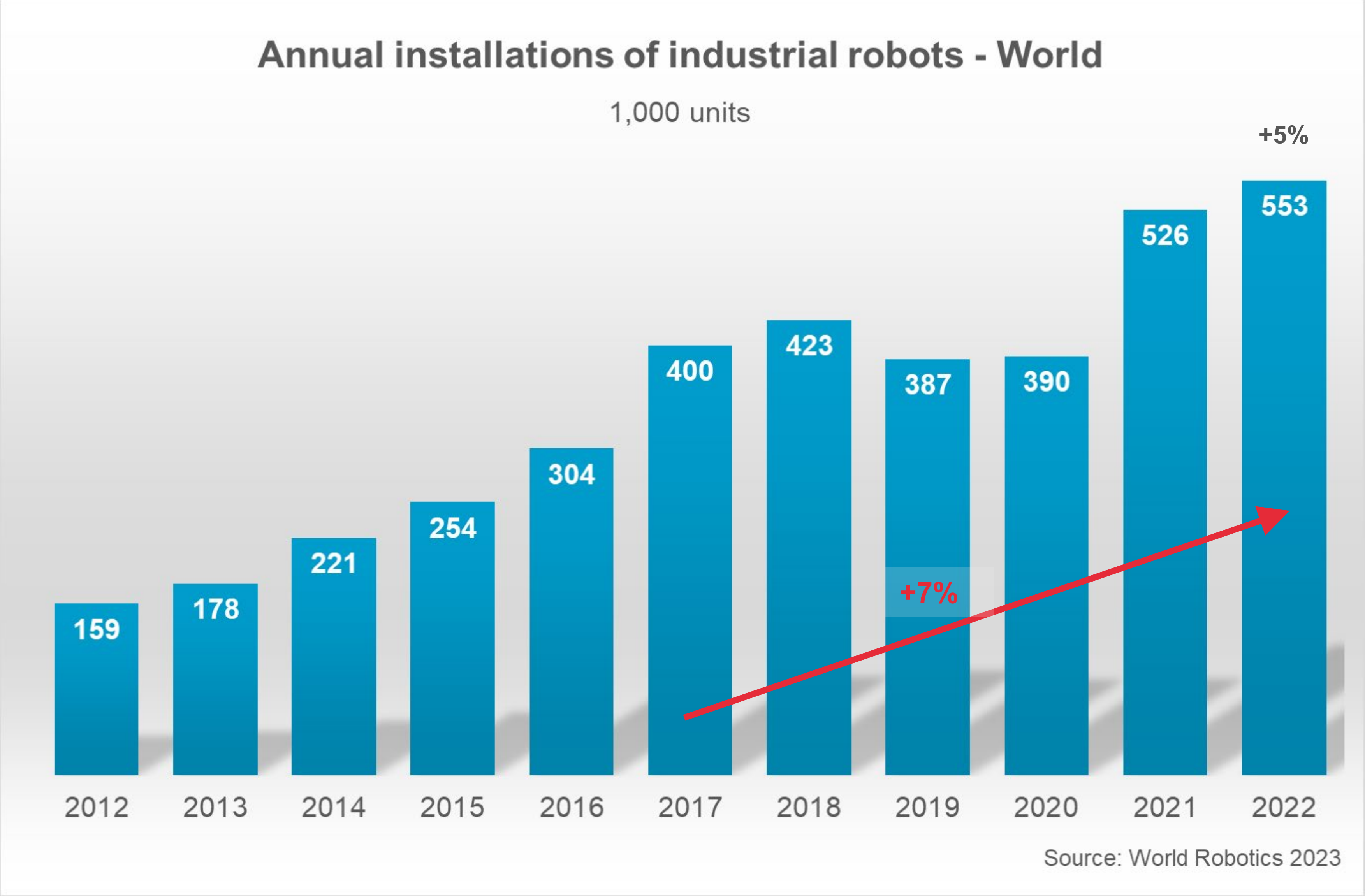
New robots

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

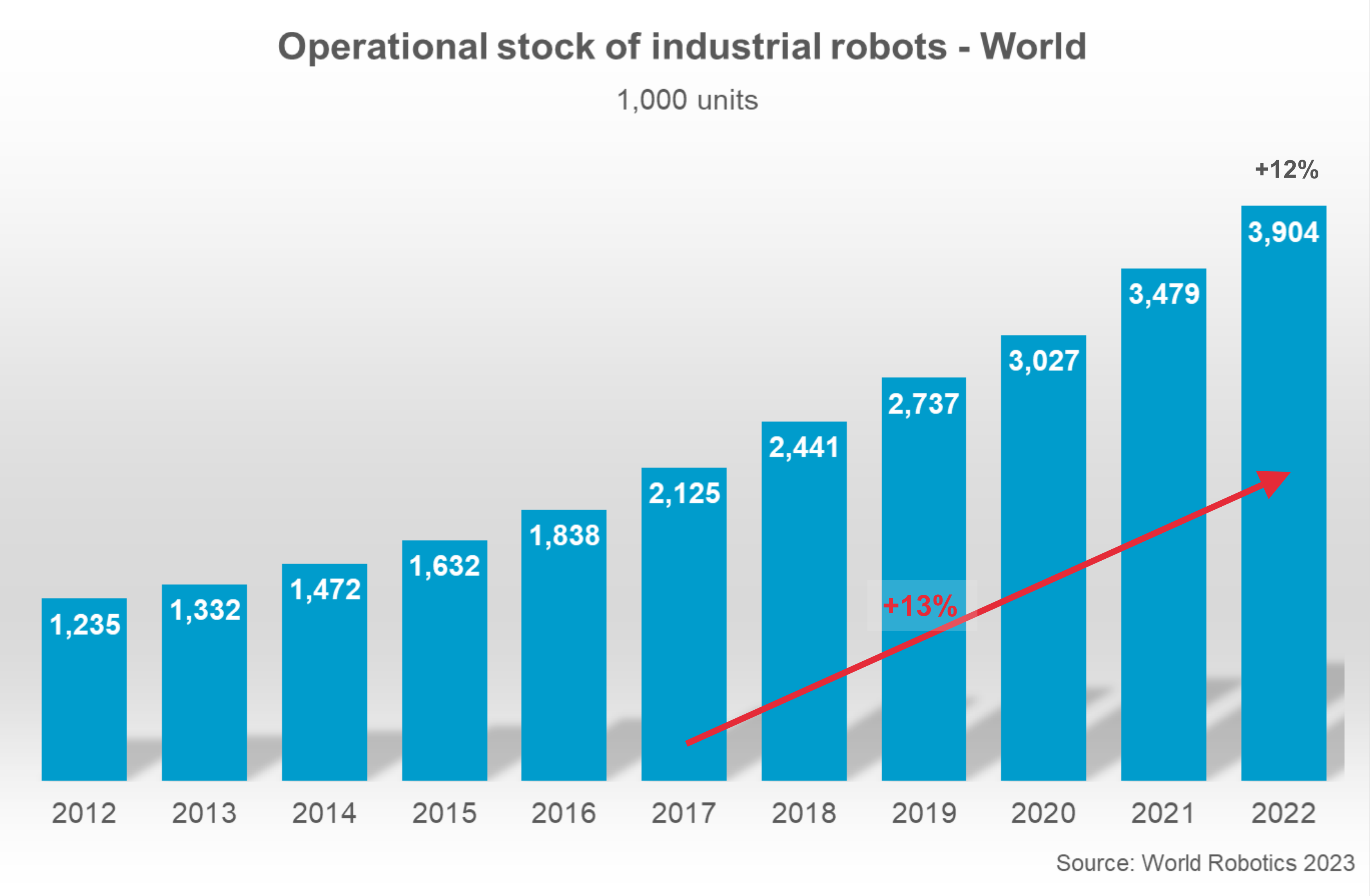
Robot stock

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

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



Almost **4 million** industrial robots **operating** around the world



Electronics is major customer – challenges for general industry

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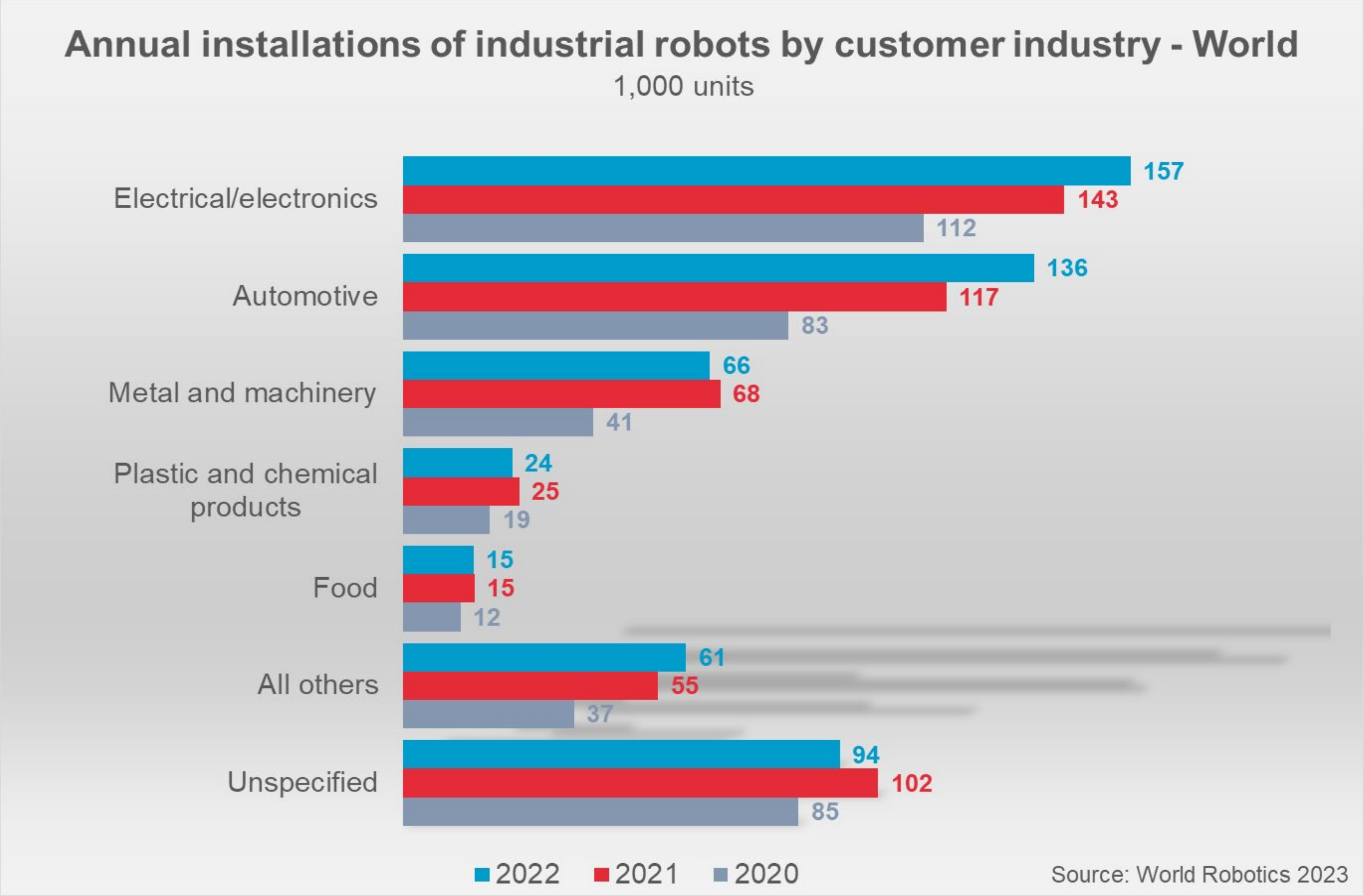


+10%

+16%

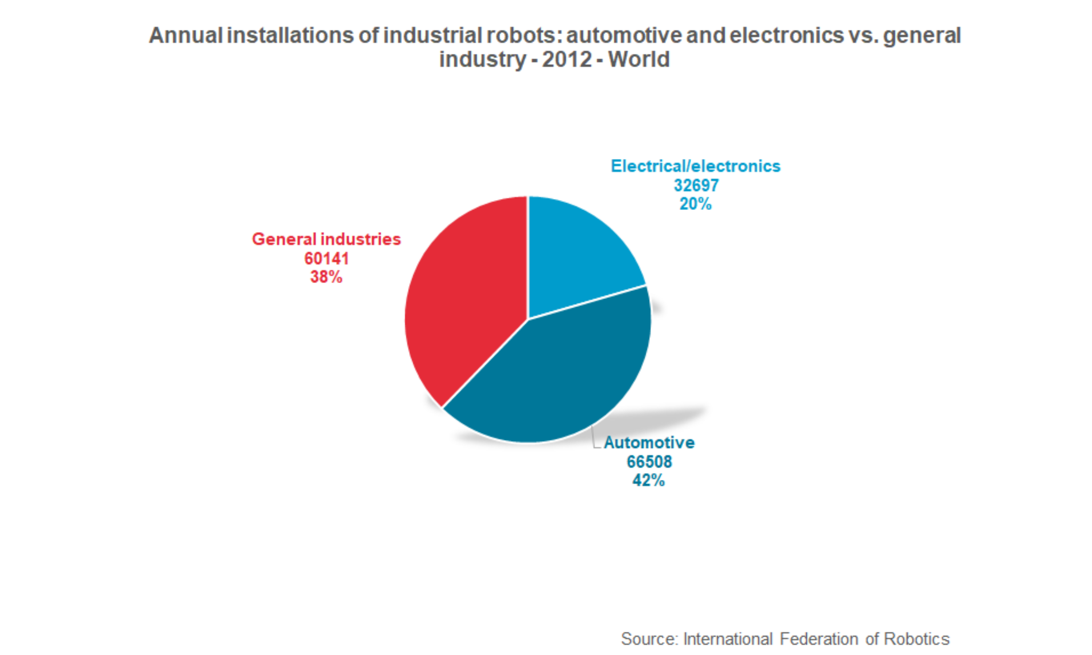
-3%

-6%

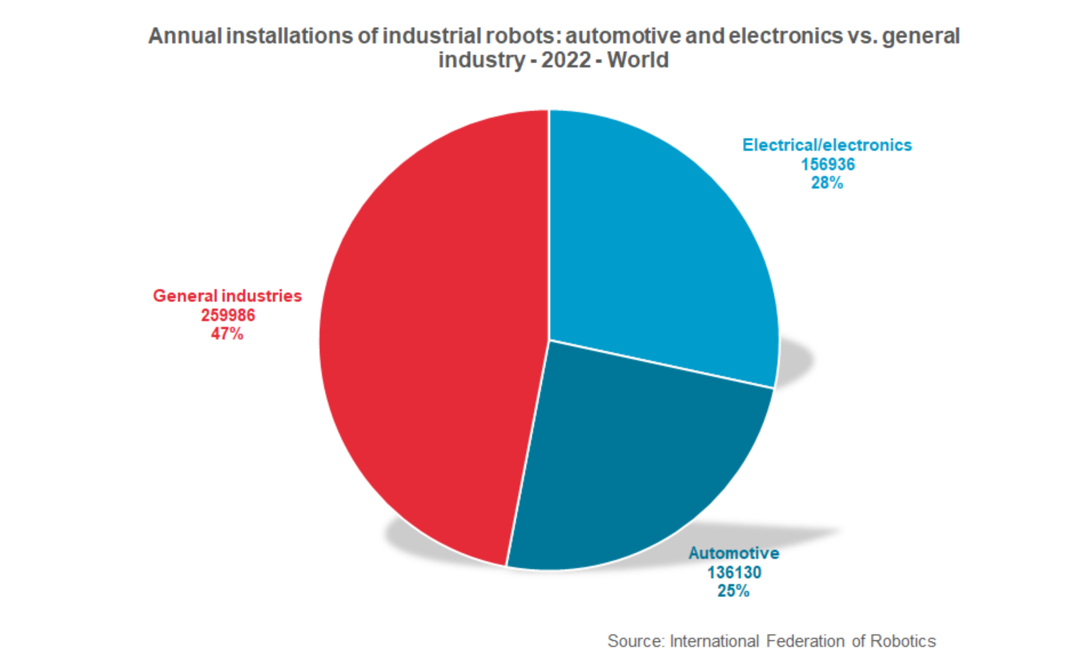
-2%

General industry now accounts for almost half of new installations

Shares of majors industries in 2012



Shares of majors industries in 2022



Handling is most important application with 48% share

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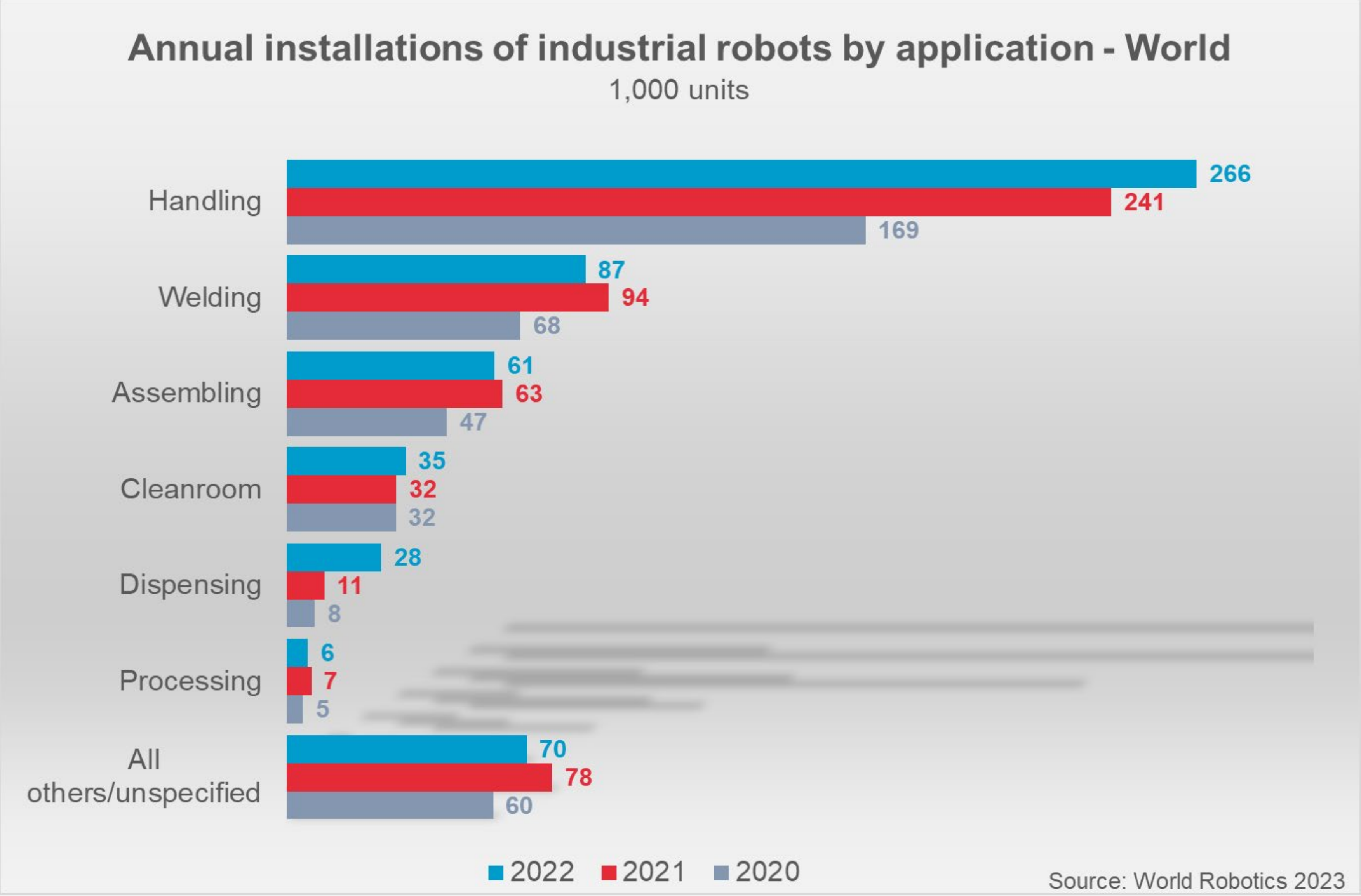


+10%

-7%

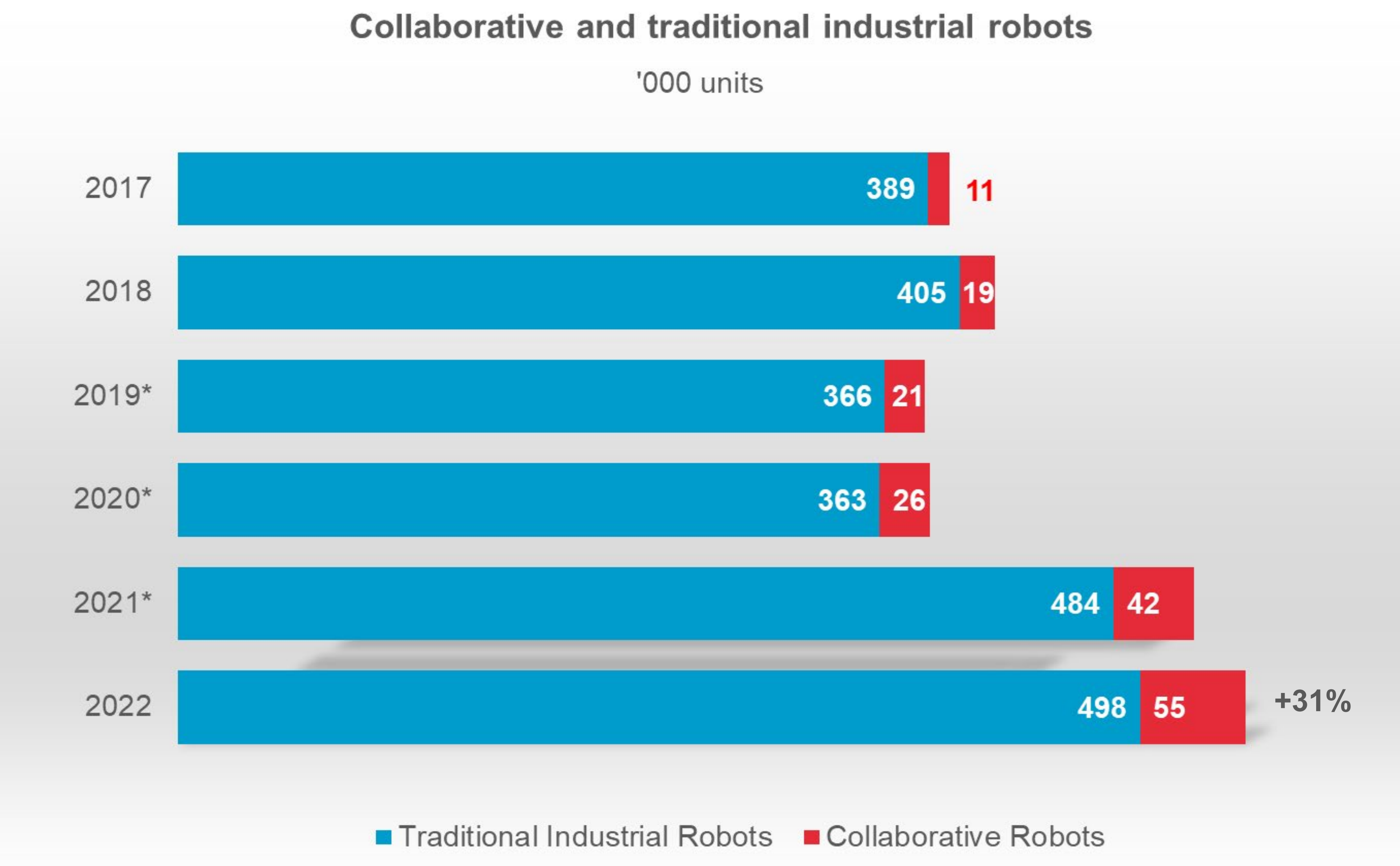
-4%

+8%

+149%

-14%

Collaborative robots steadily growing their market share to 10%



*revised

Source: World Robotics 2023

Growth in all regions

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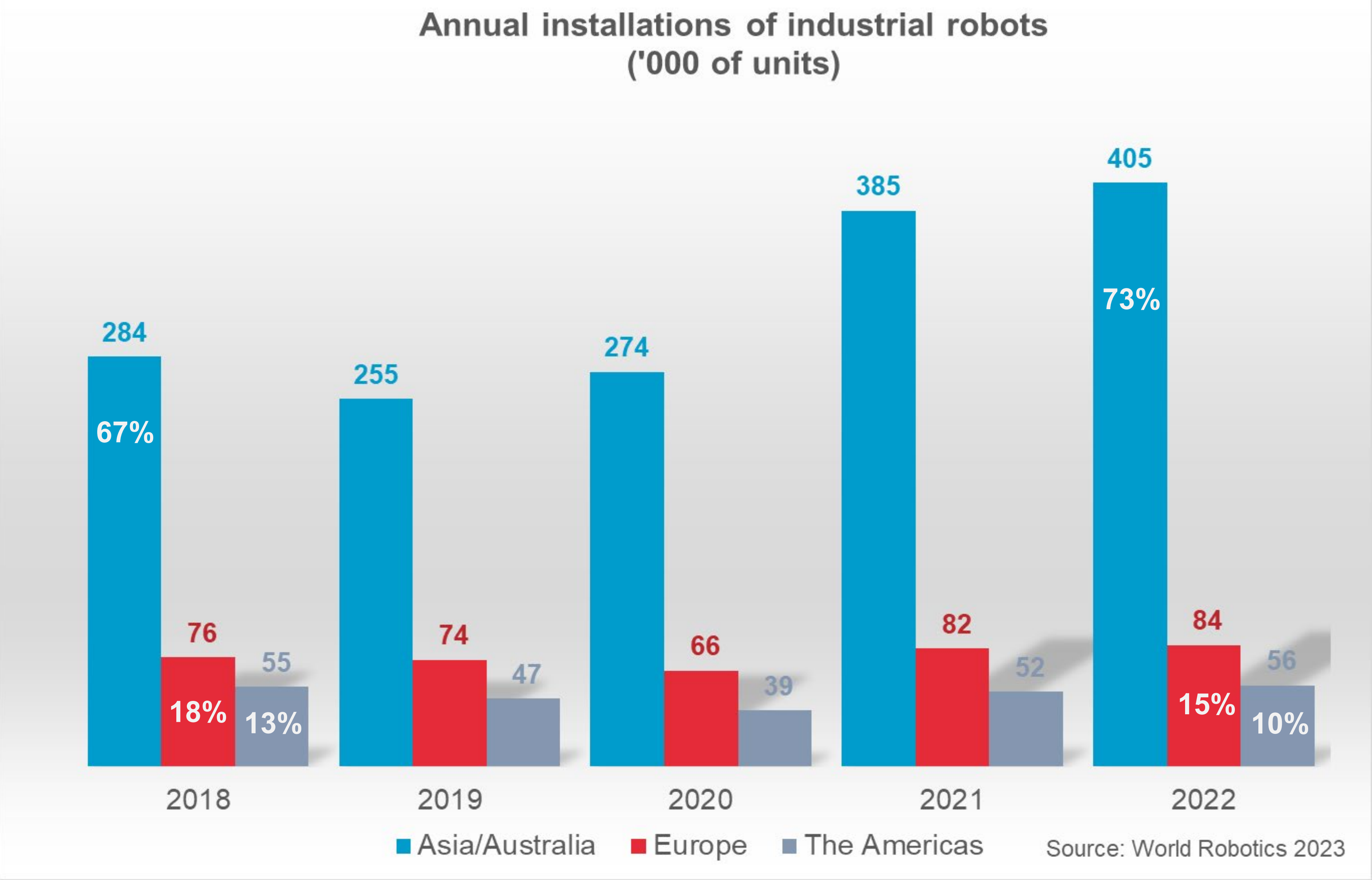

China installs every other robot

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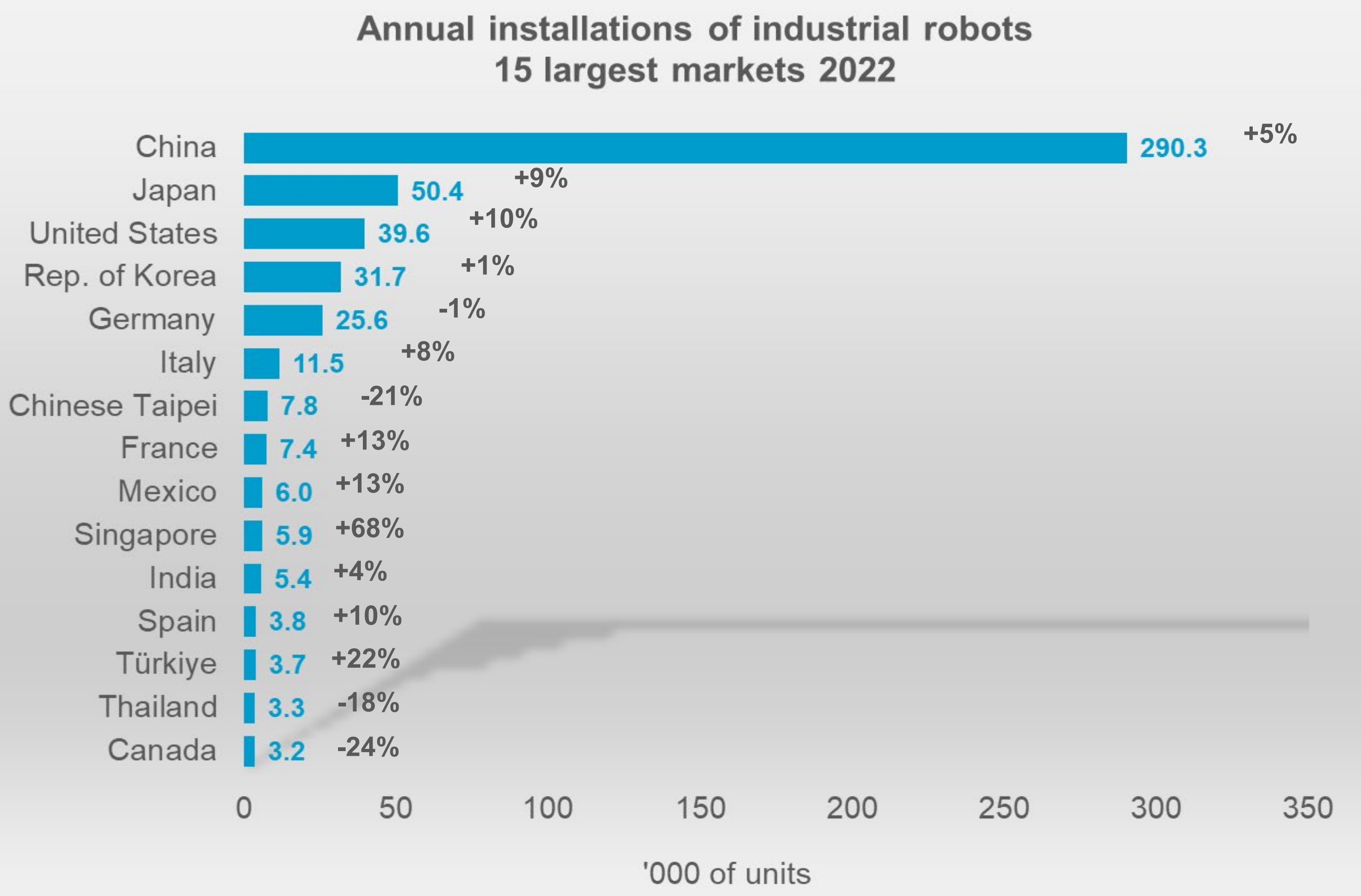

Source: World Robotics 2023

China is growing dramatically

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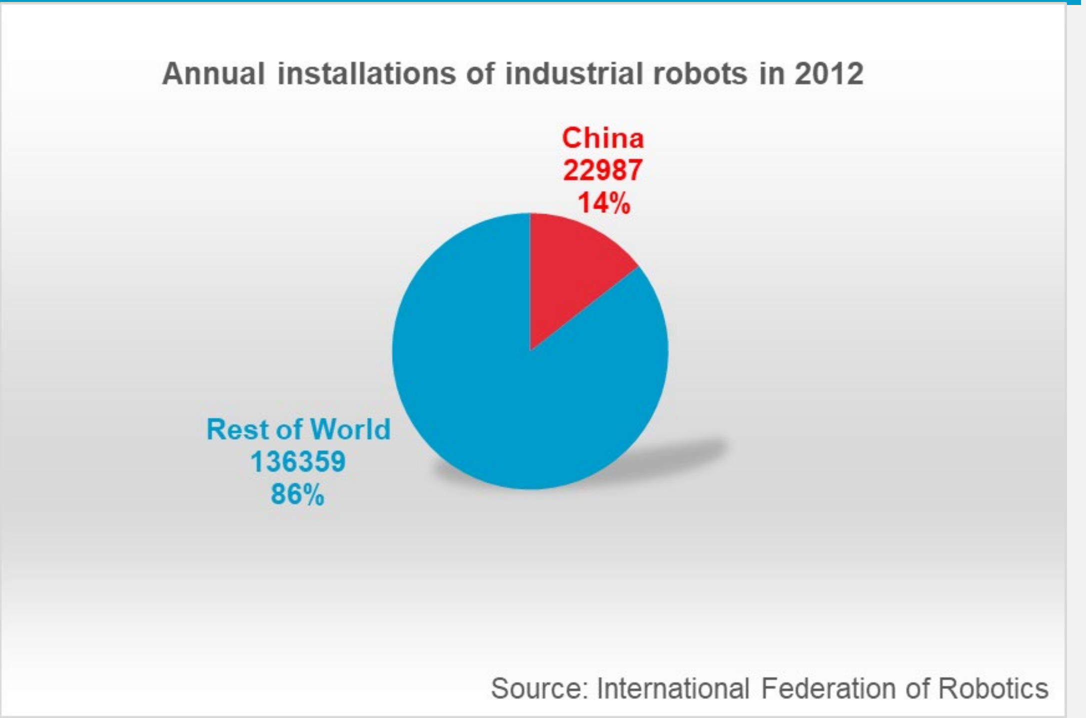
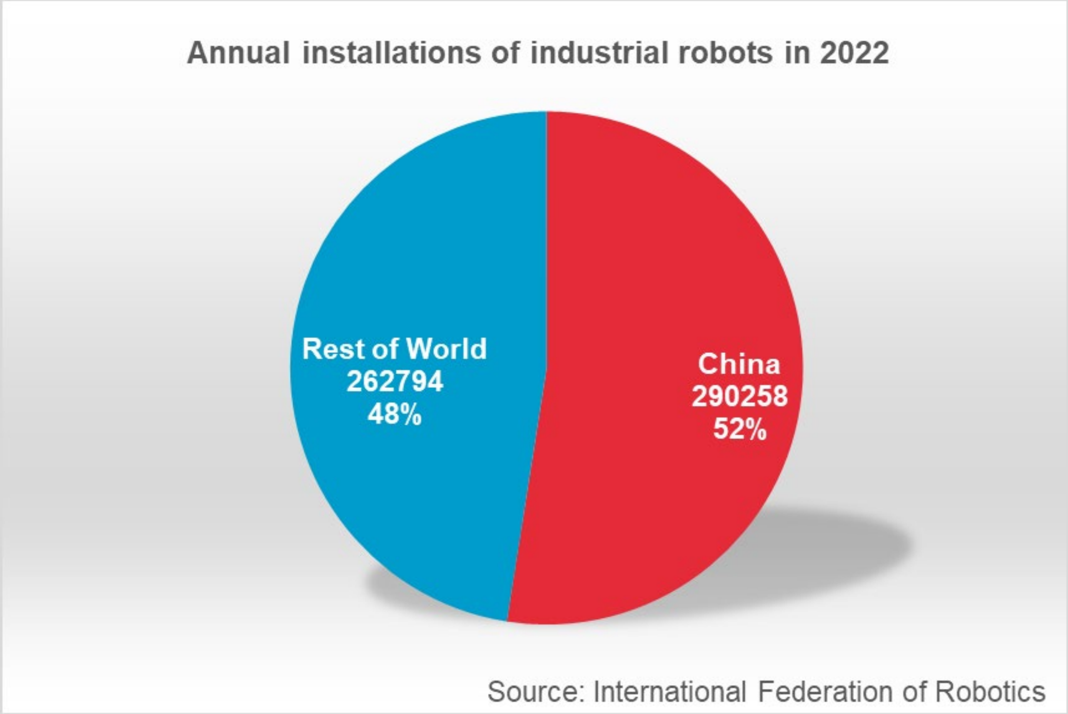
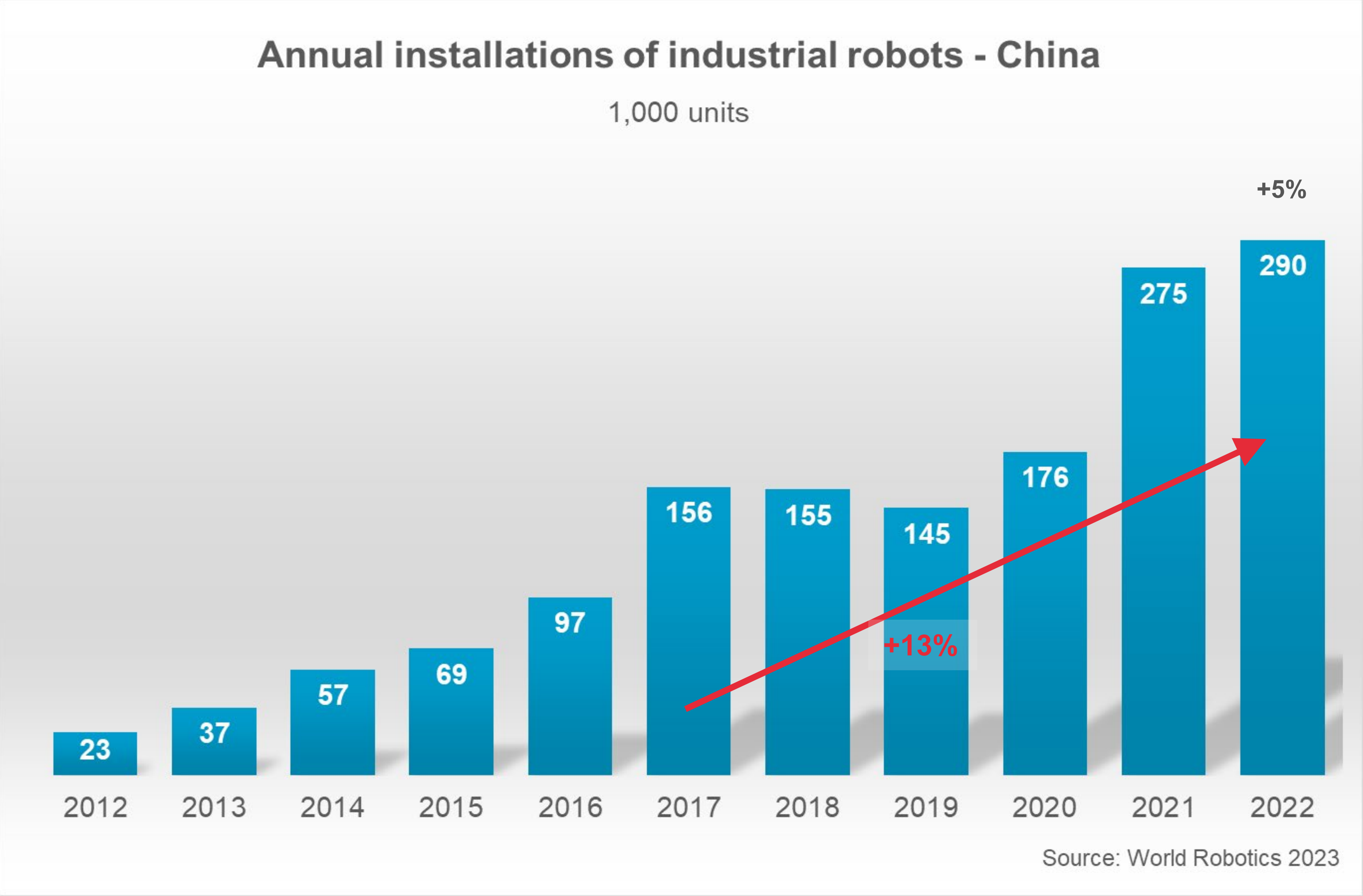
China vs. Rest of World in 2012



China vs. Rest of World in 2022



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



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China's **electronics industry** is the **main customer**

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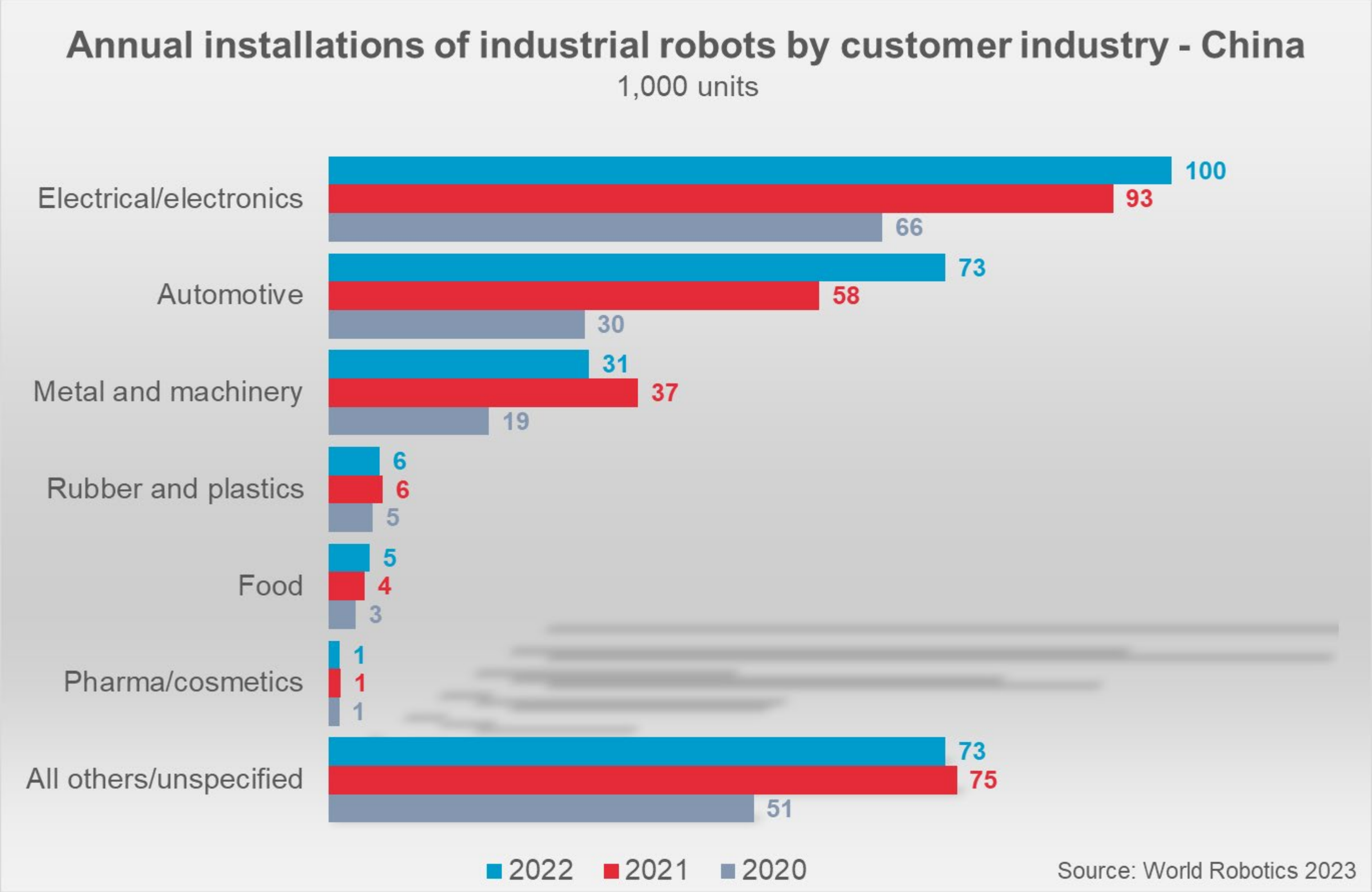
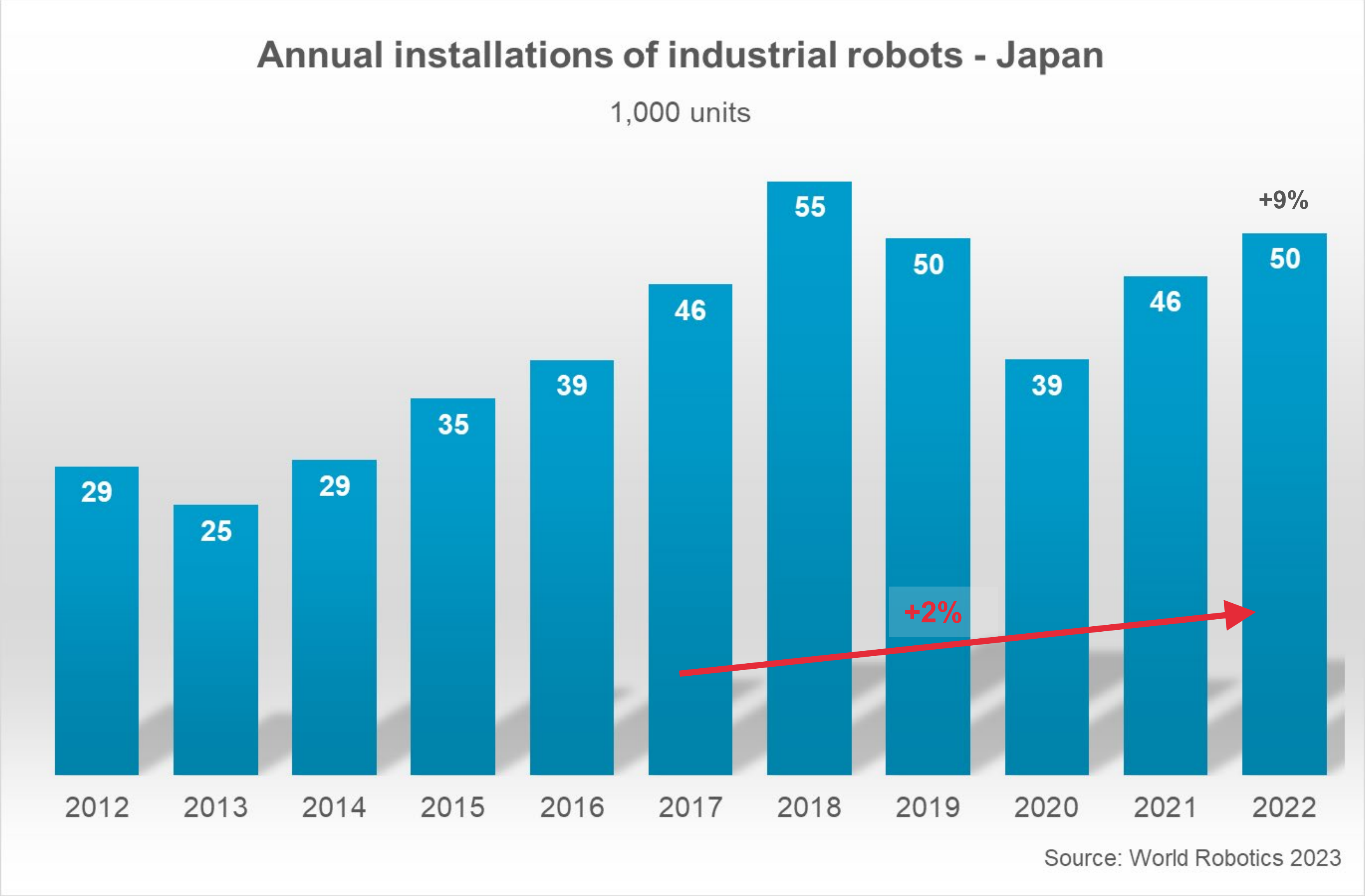
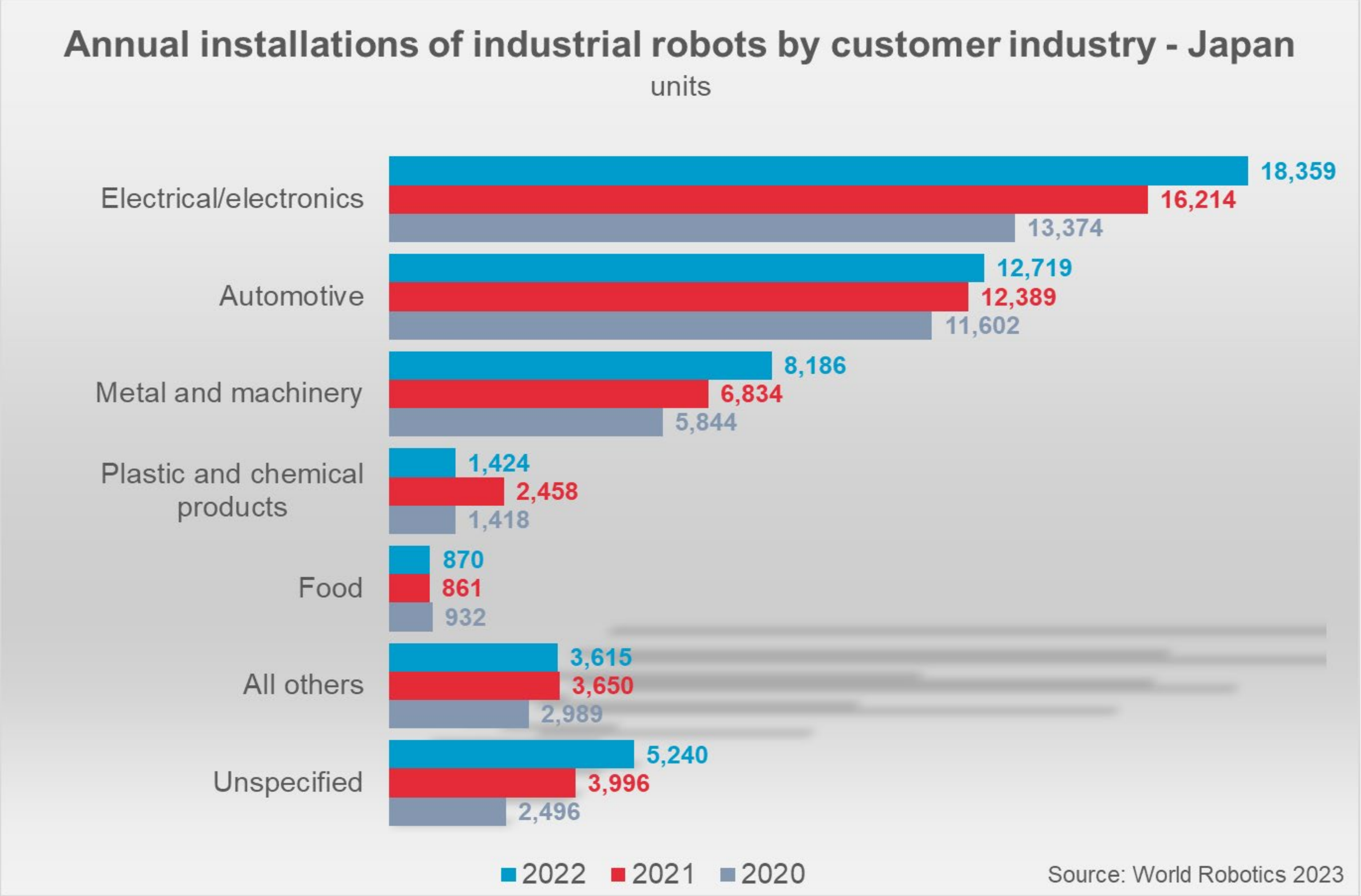


+7%
+26%
-16%
-5%
+15%
-9%

Japan recovers strongly **– second highest** installation count ever



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



+13%

+3%

+20%

-42%

+1%

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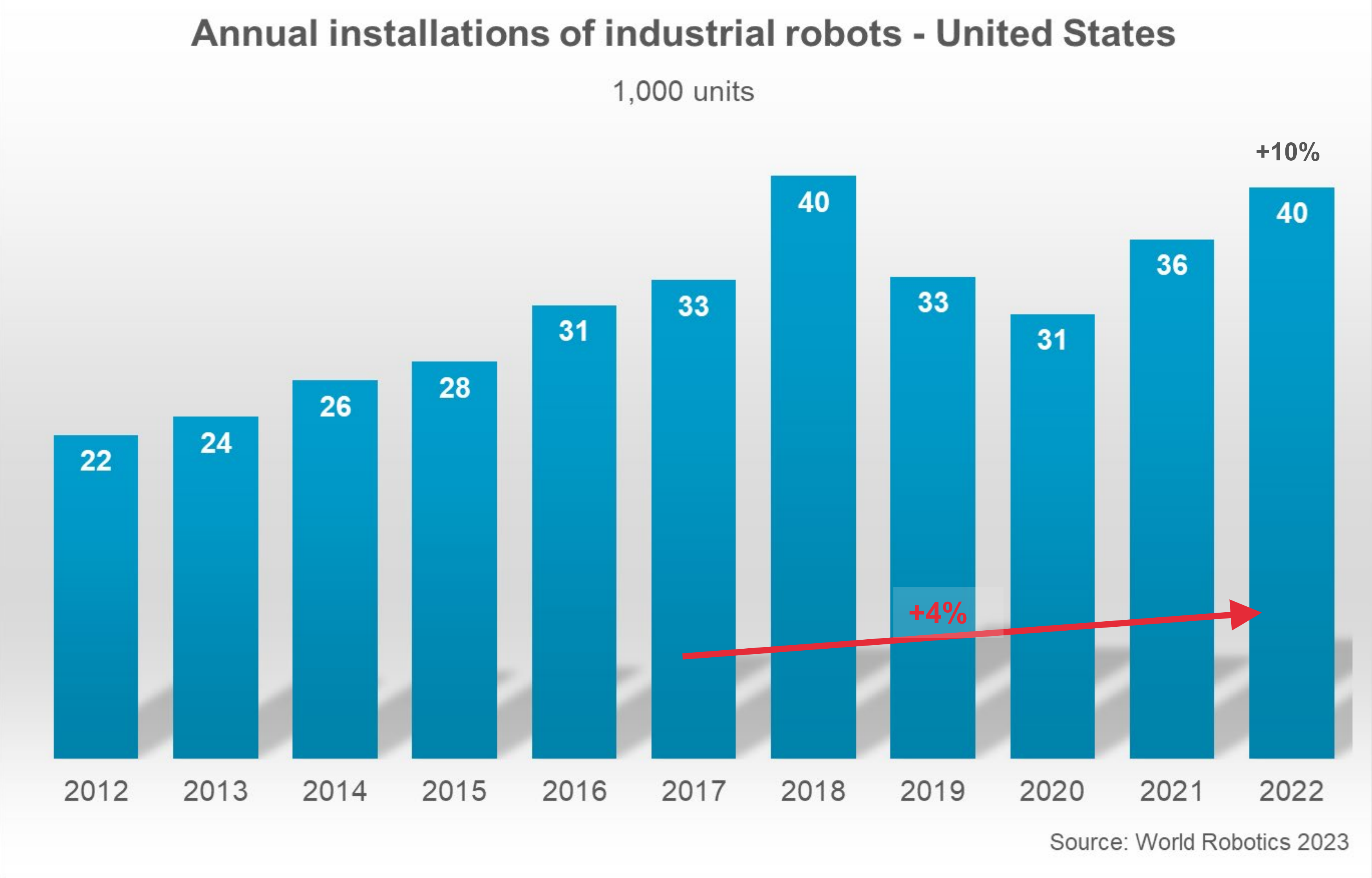
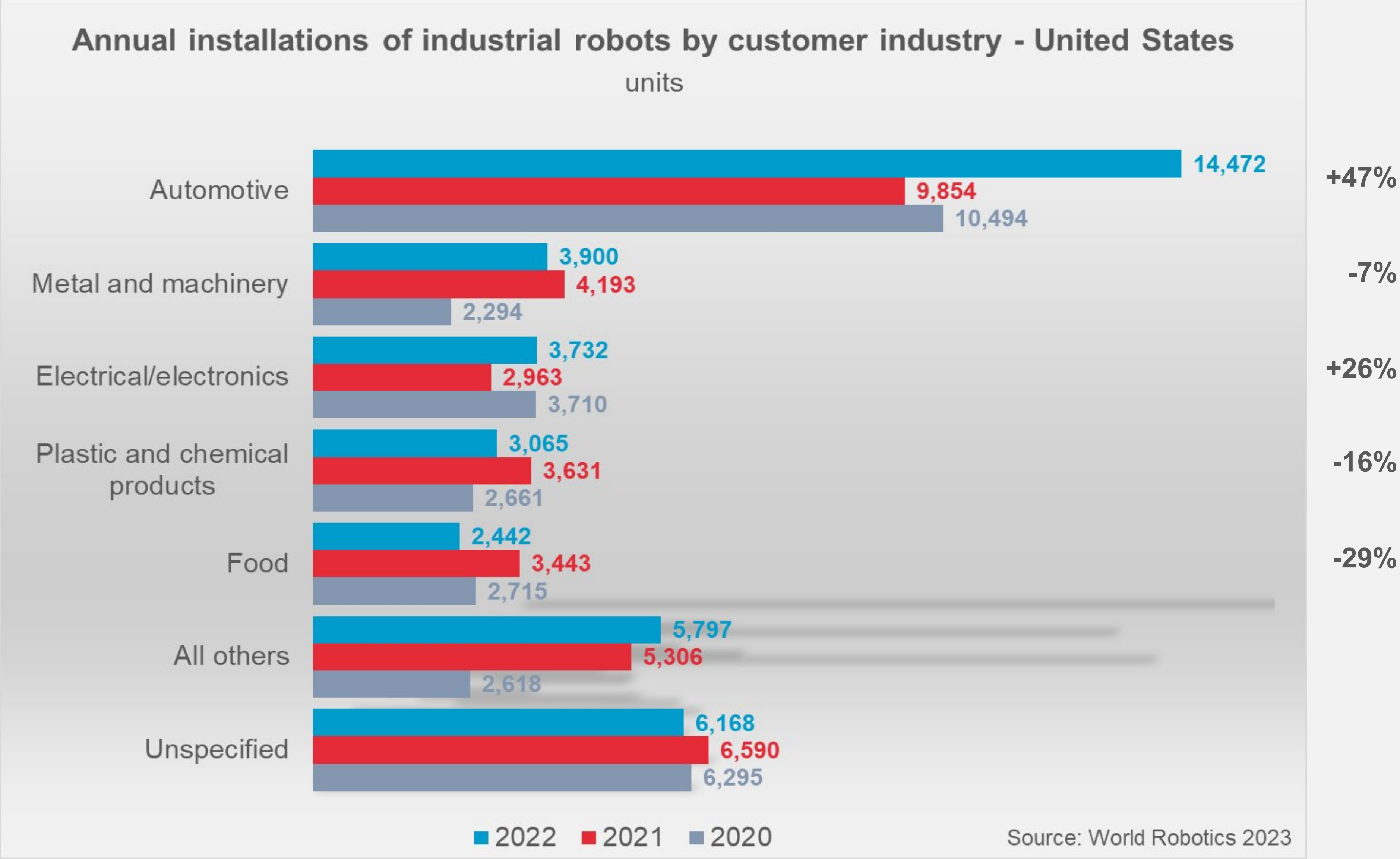
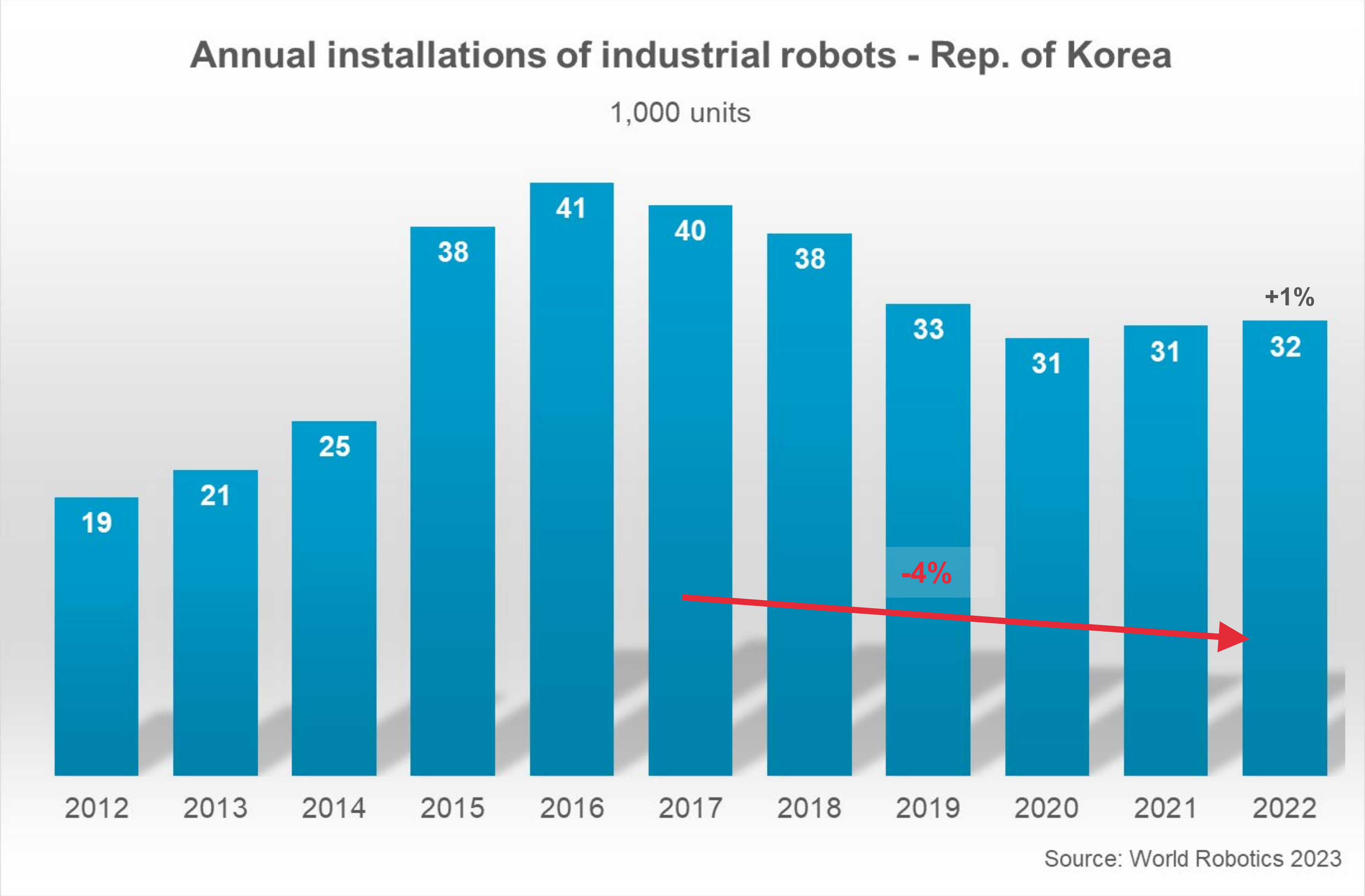
United States: **Second highest level** ever recorded



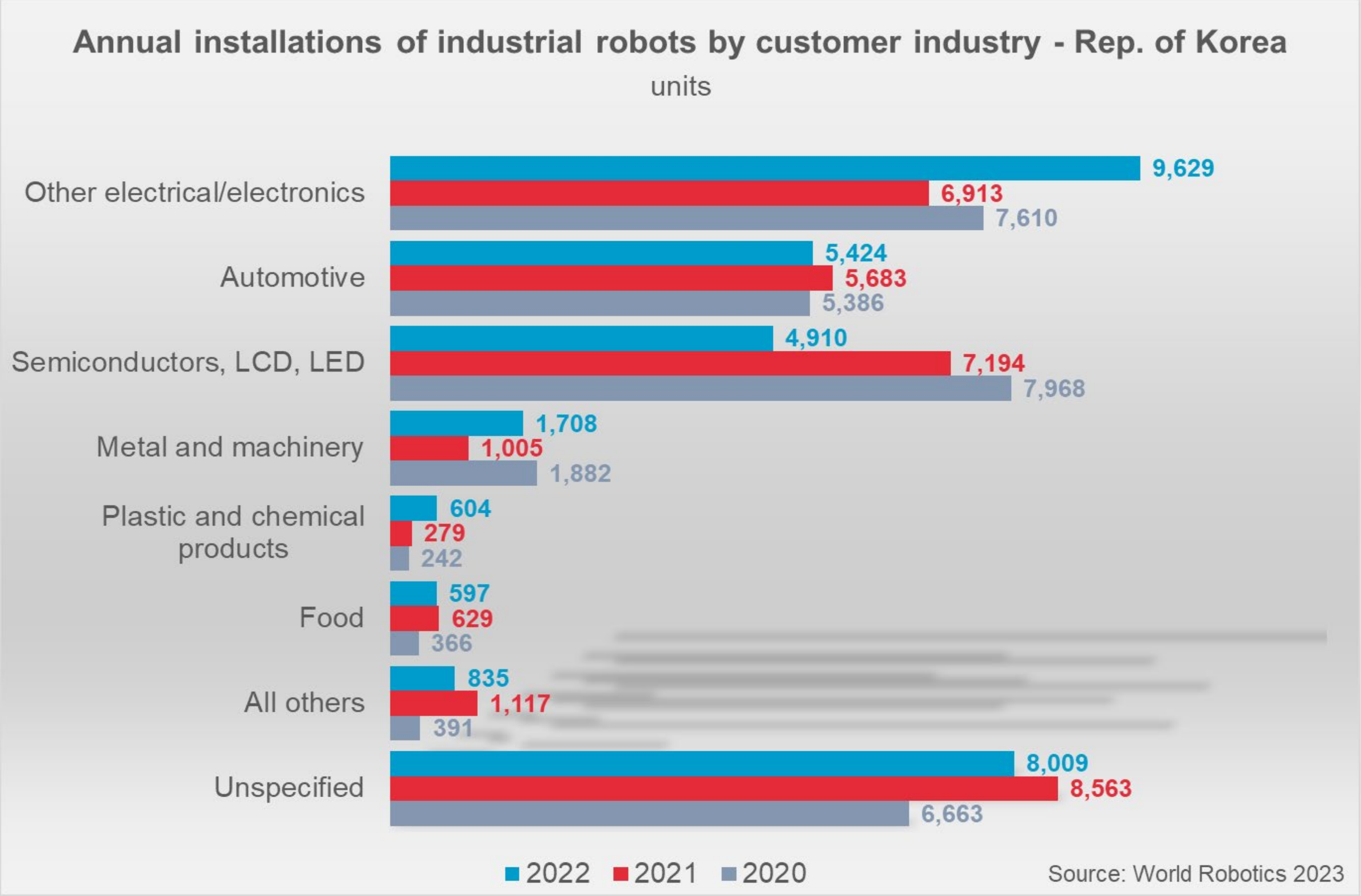
US **Automotive Industry** driving **growth**



Korean robot demand **moving sideways**



Korean **electronics industry** up 3%



+39%

-5%

-32%

+70%

+116%

-5%

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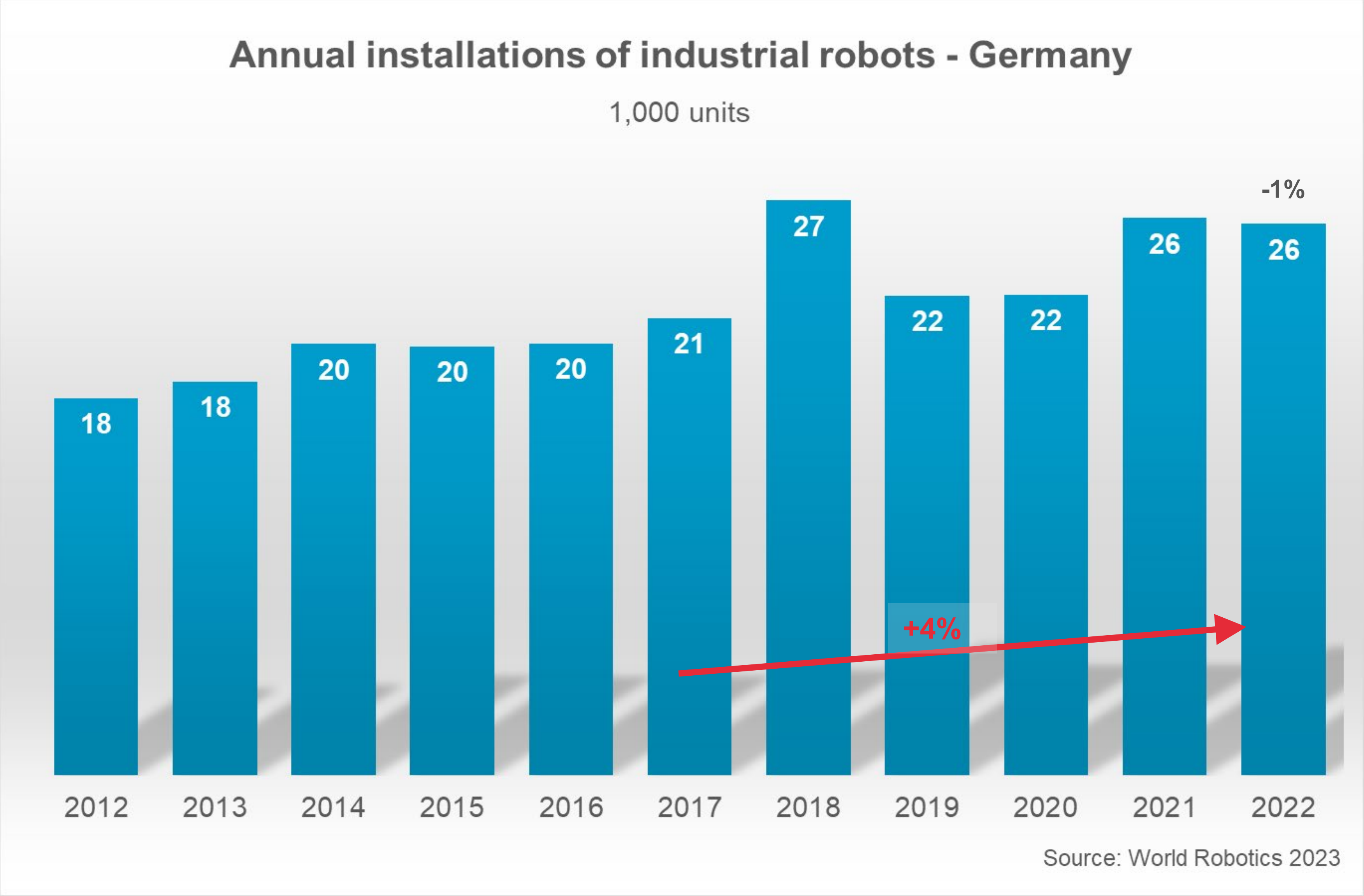
Germany slightly **declining**



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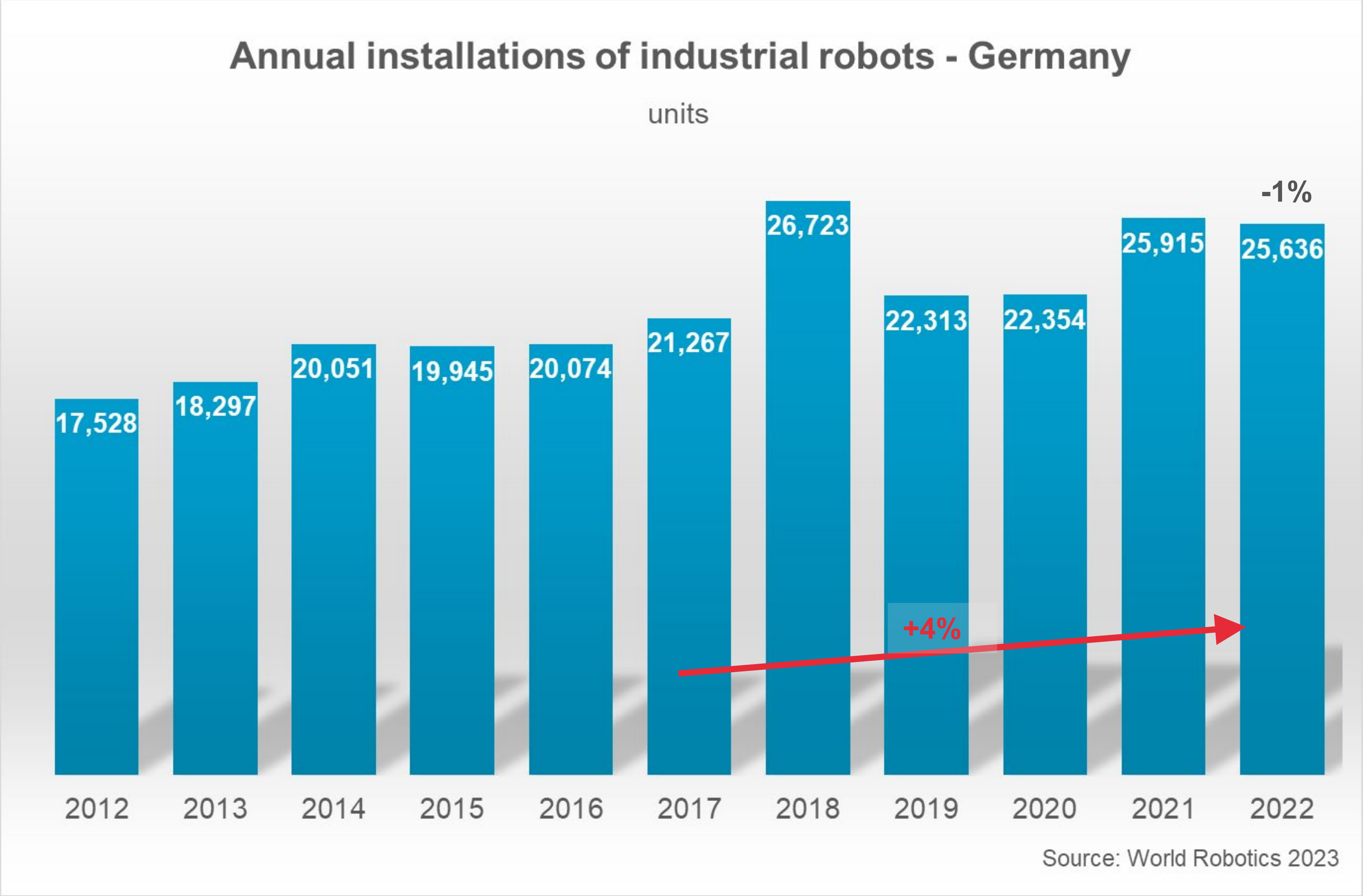
Germany slightly declining



Automotive declining sharply, continued growth in metal + machinery

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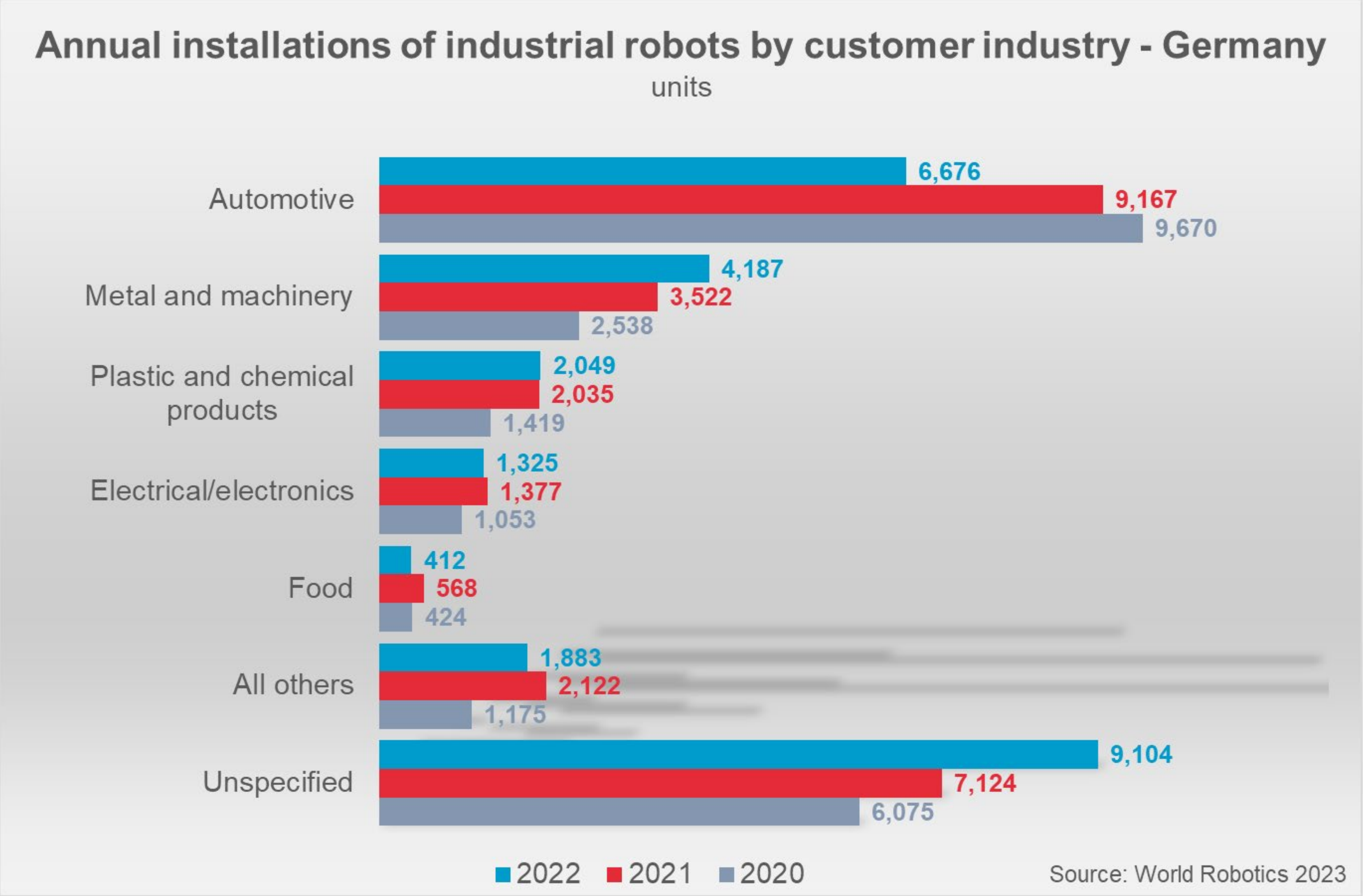

-27%
+19%
+1%
-4%
-27%

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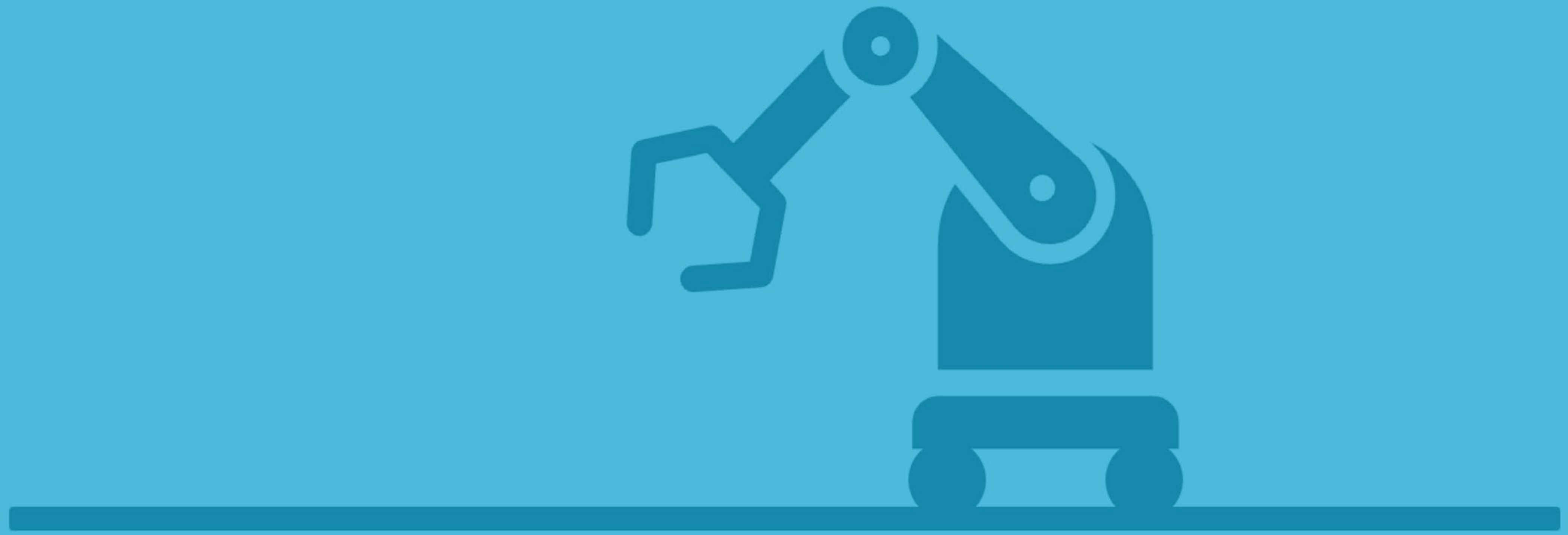
Trends and Forecast



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

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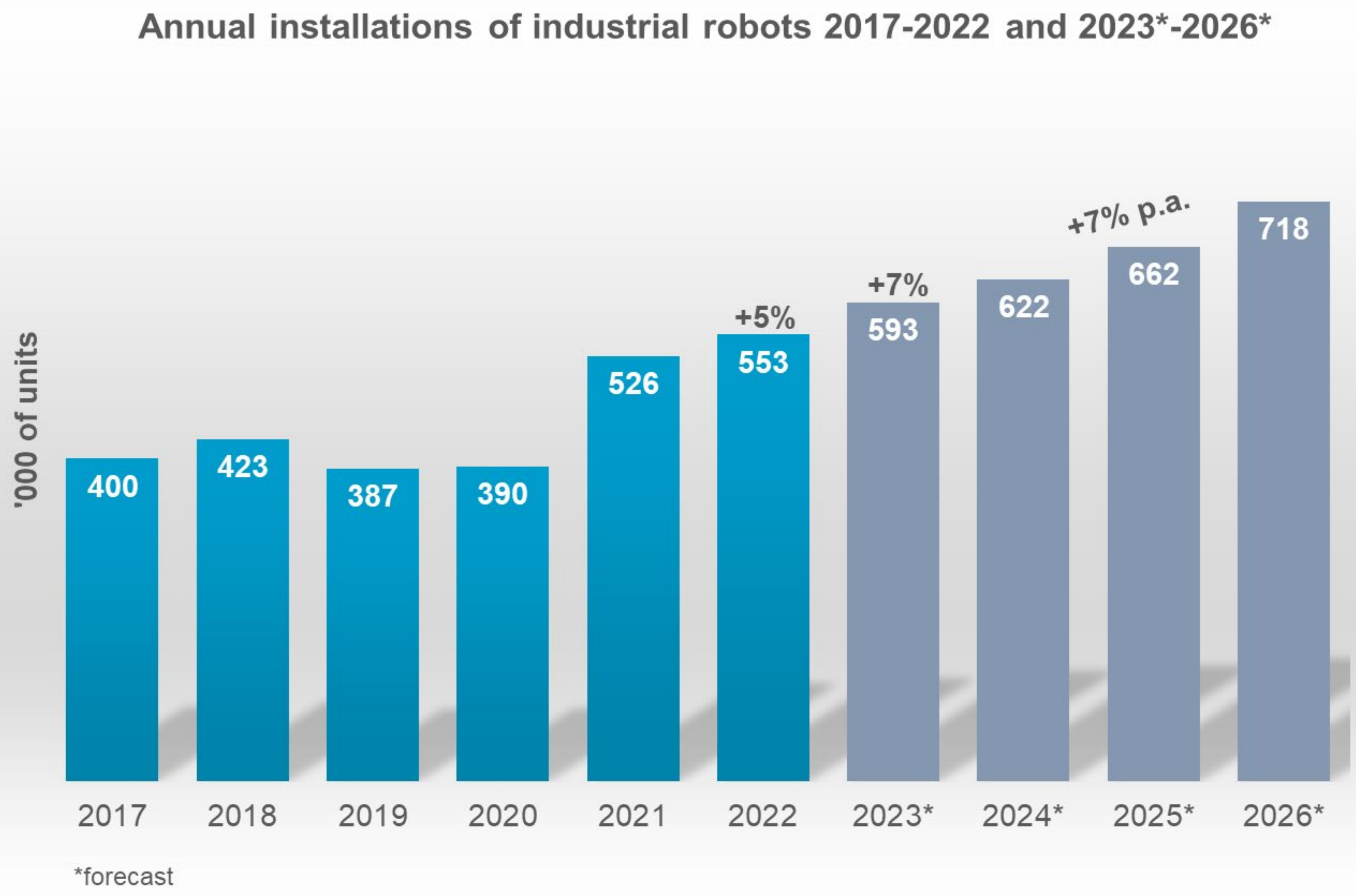
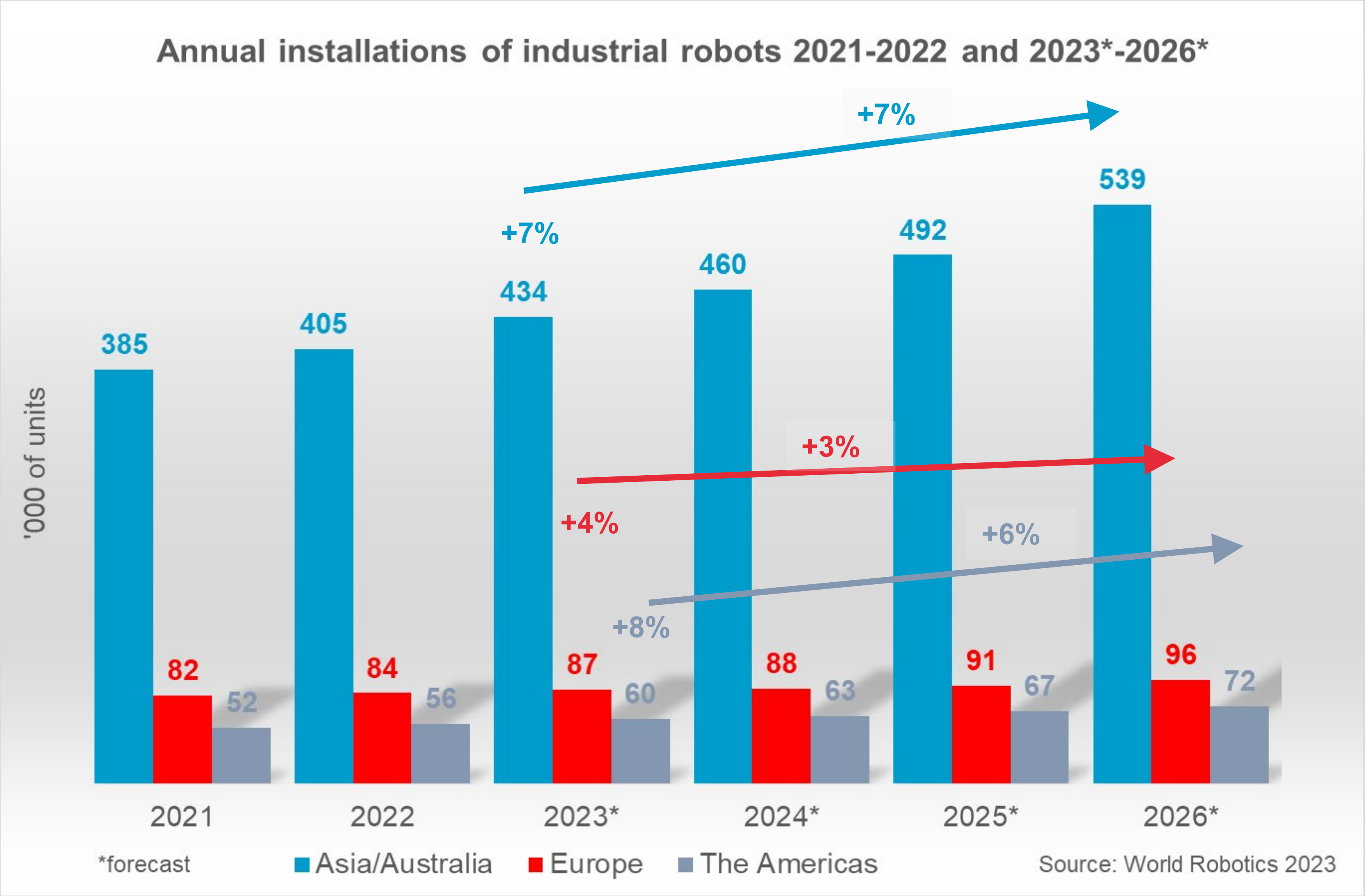


Source: World Robotics 2023

Forecast



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Short-term market determinants

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- **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

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- **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

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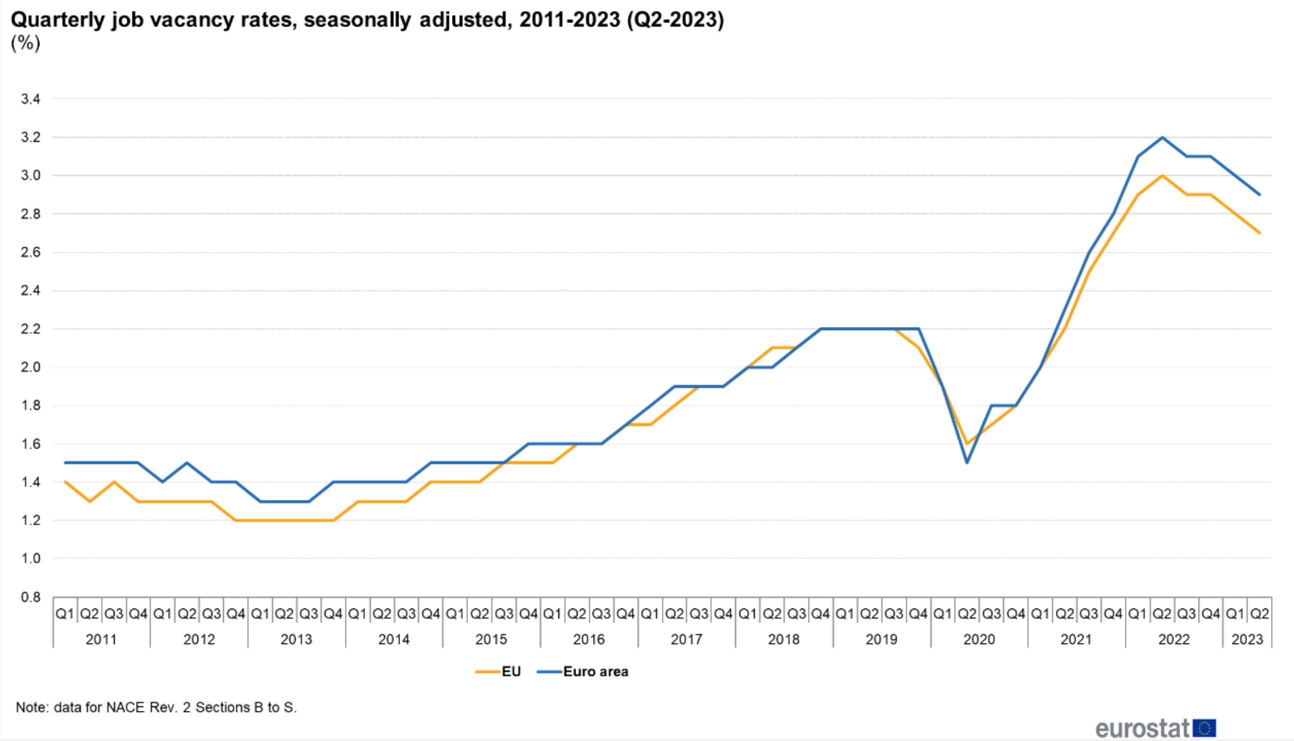
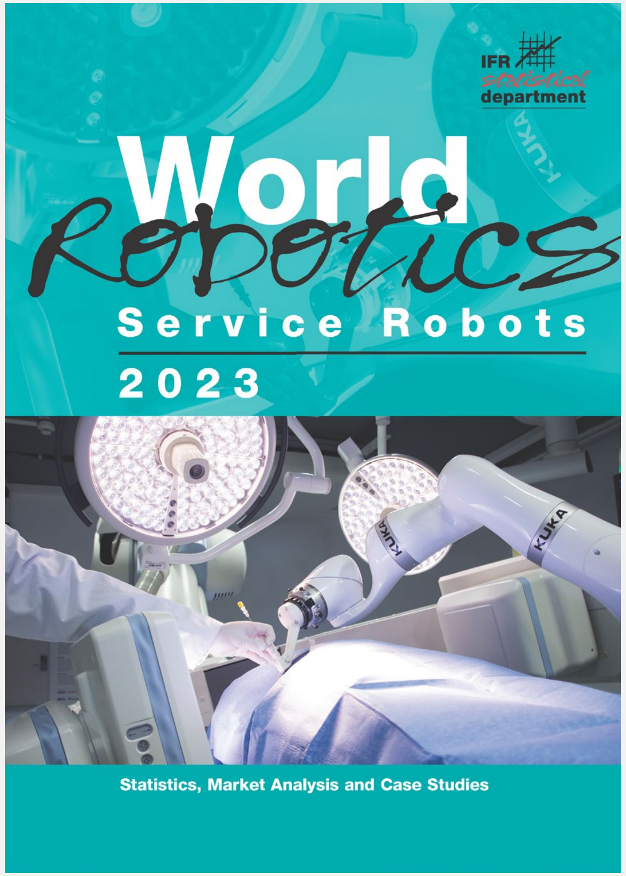
Job vacancy rates in the EU and Euro Area*



*Source: Eurostat

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

Service robots – top findings



2022: Continuous **growth**

New **professional service robots***

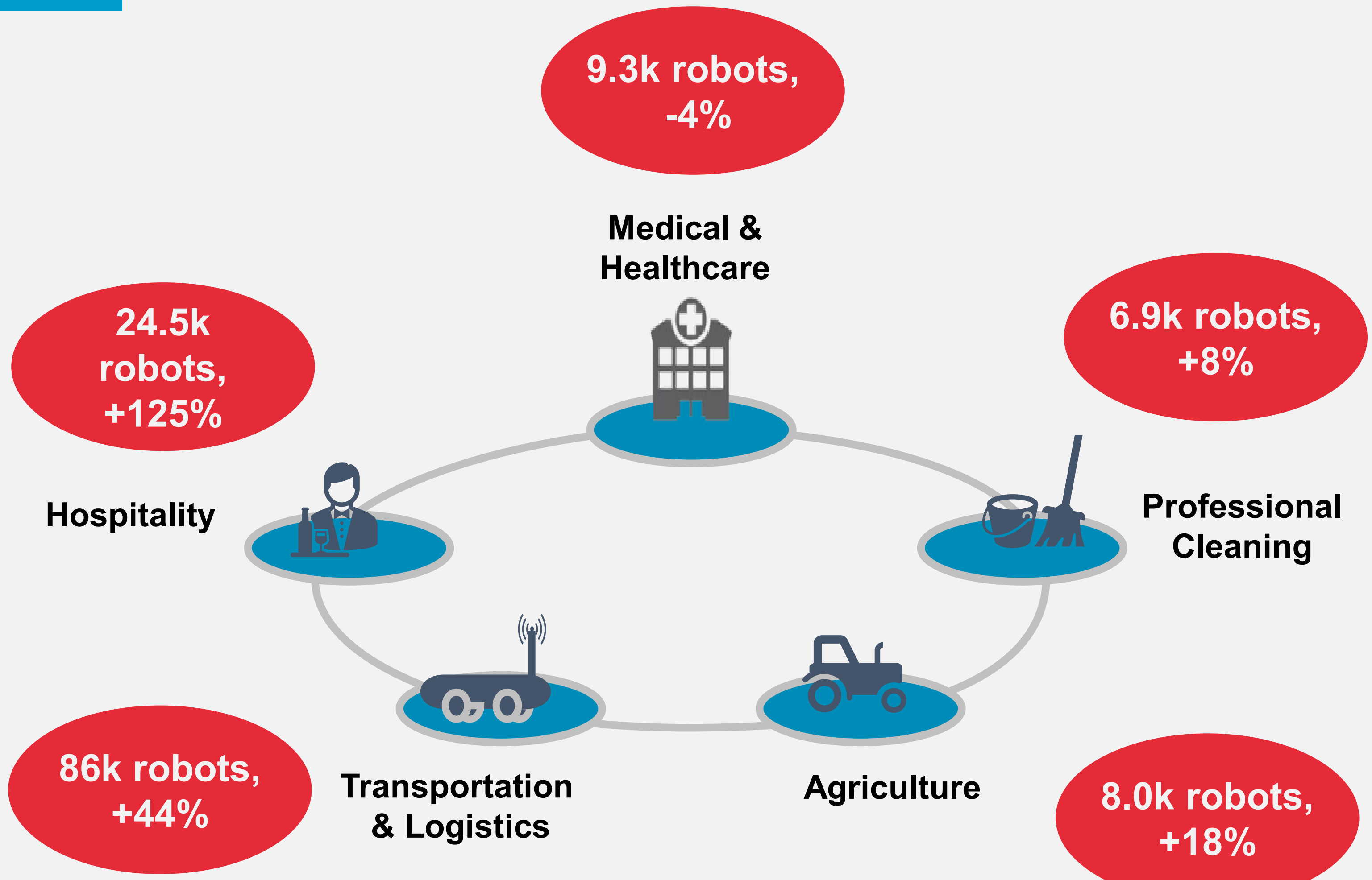
- 158,000 units (+48%)

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

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- 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 consi der 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

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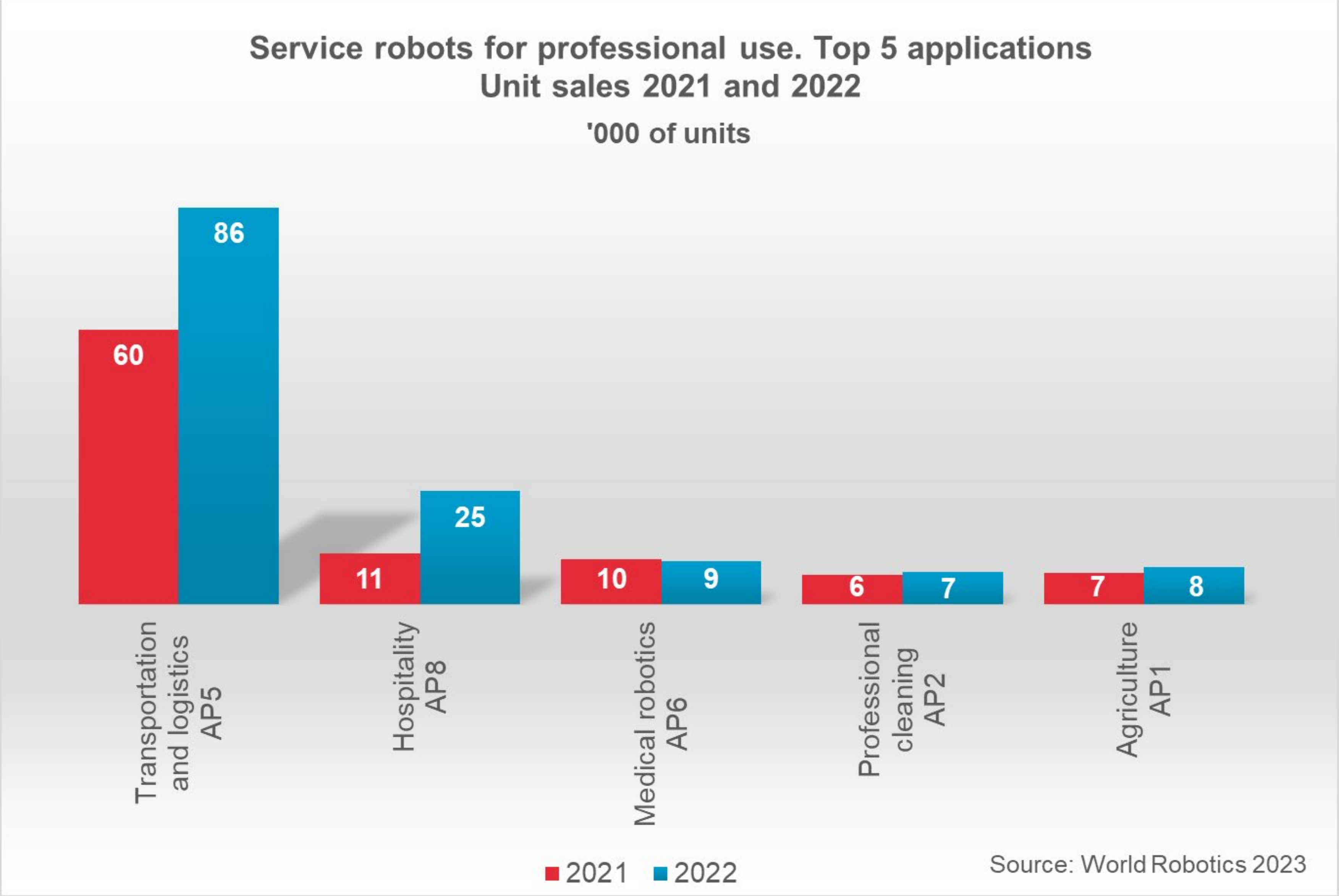
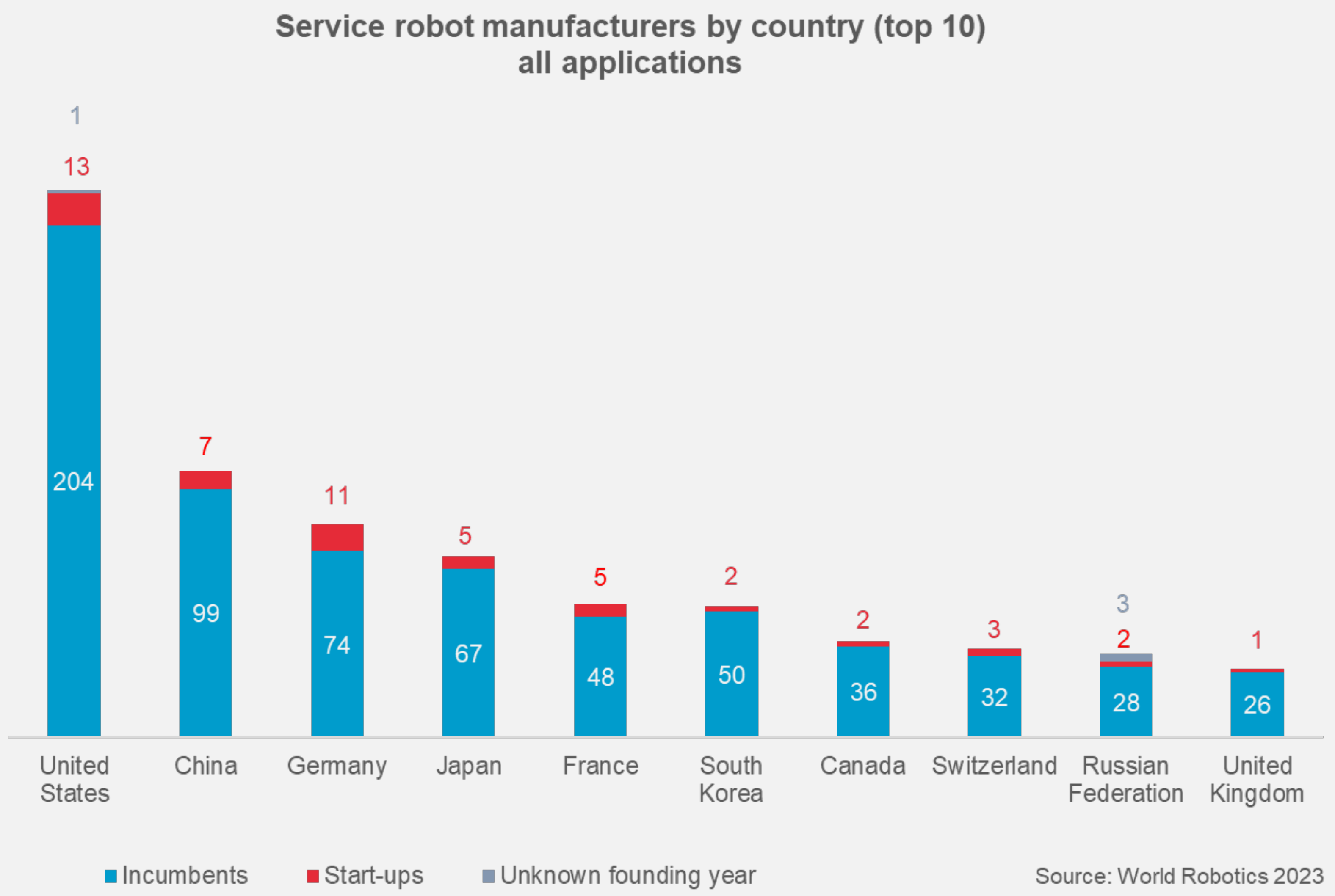
- Drivers for this development are a shortage of skilled workers and environmental problems that are increasingly coming into focus
- Safety is no longer seen as a barrier to market entry
- Prevention instead of symptom treatment in agriculture: Robots will be a key pillar in this regard by continuously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

Source: Small Robot Company

Main professional applications



The United States is home of most service robot suppliers



Source: World Robotics 2023

Trend of declining startups continues

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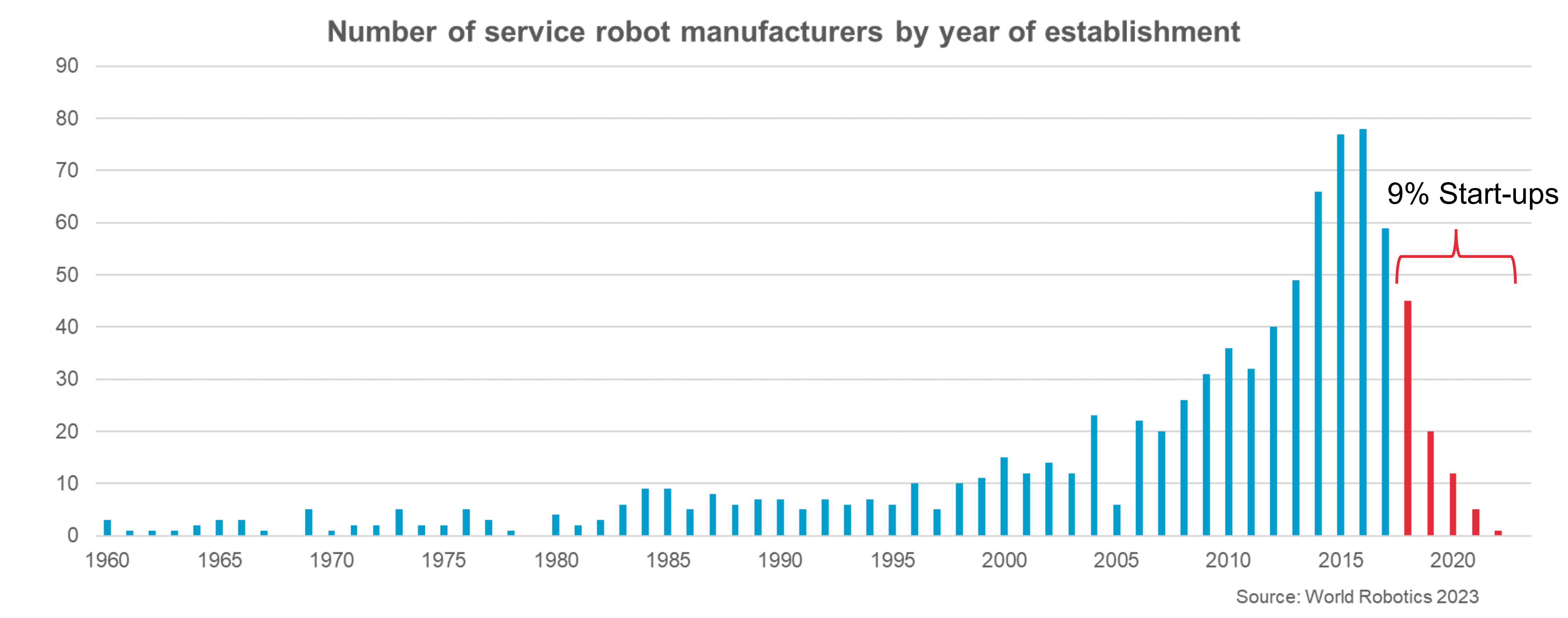

Almost 1,000 service robot suppliers worldwide showing the wide spectrum of use

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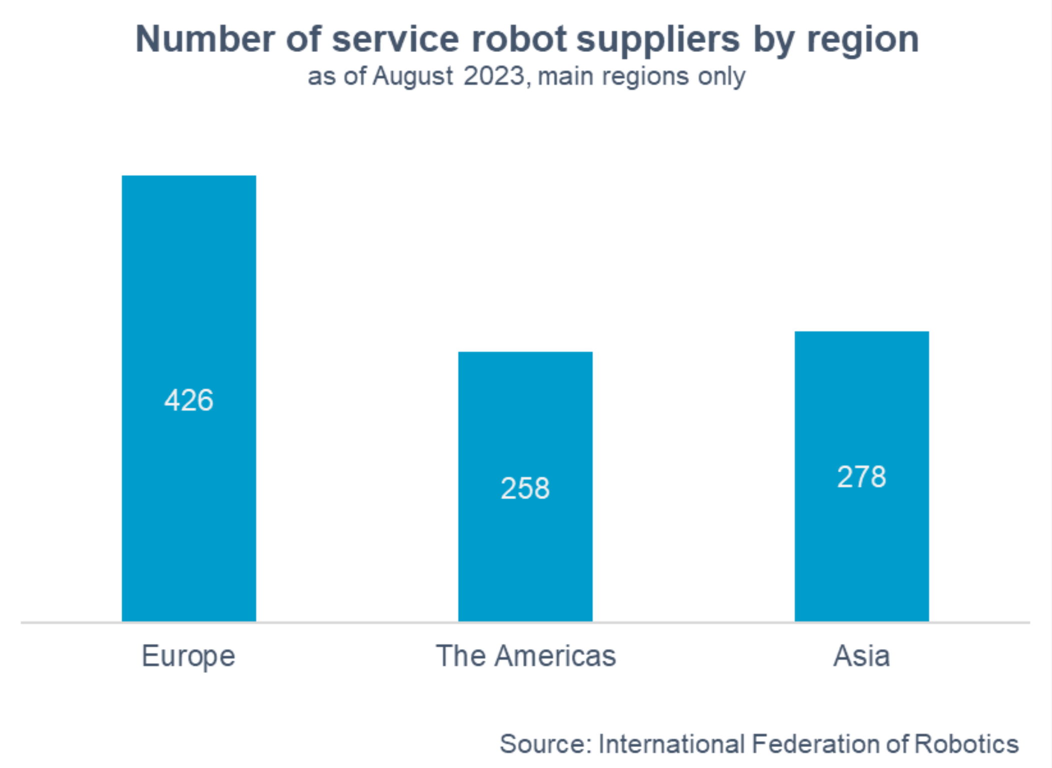
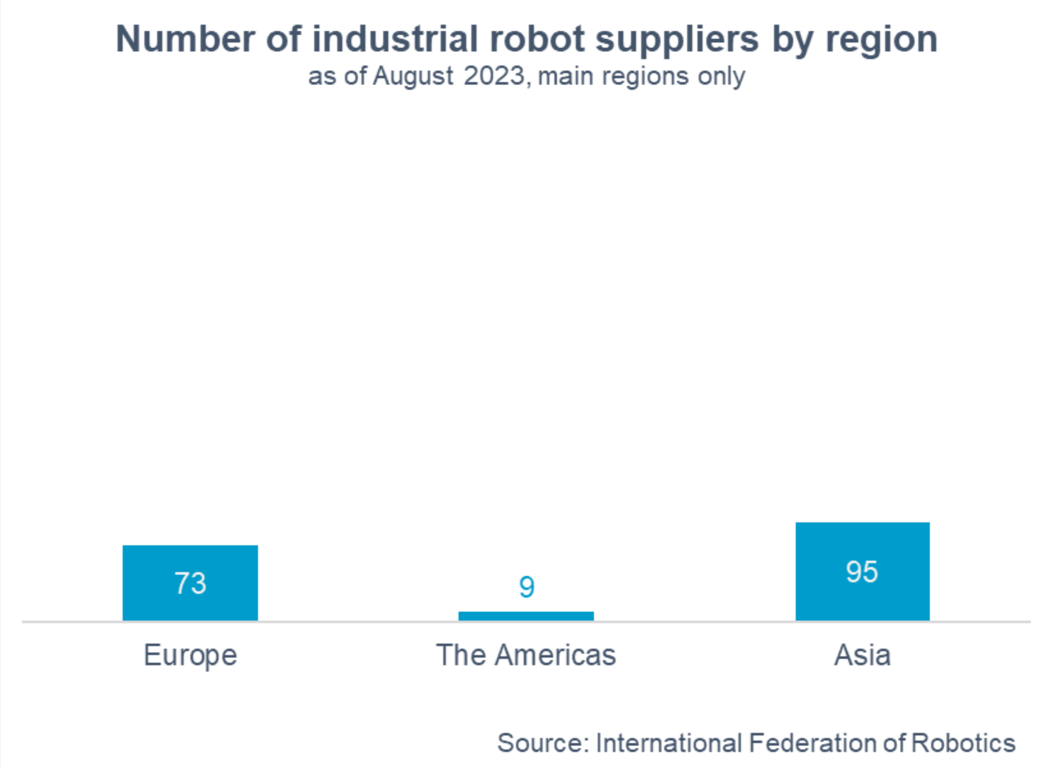
Five times more SR than IR suppliers



Less than 180 industrial robot suppliers



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

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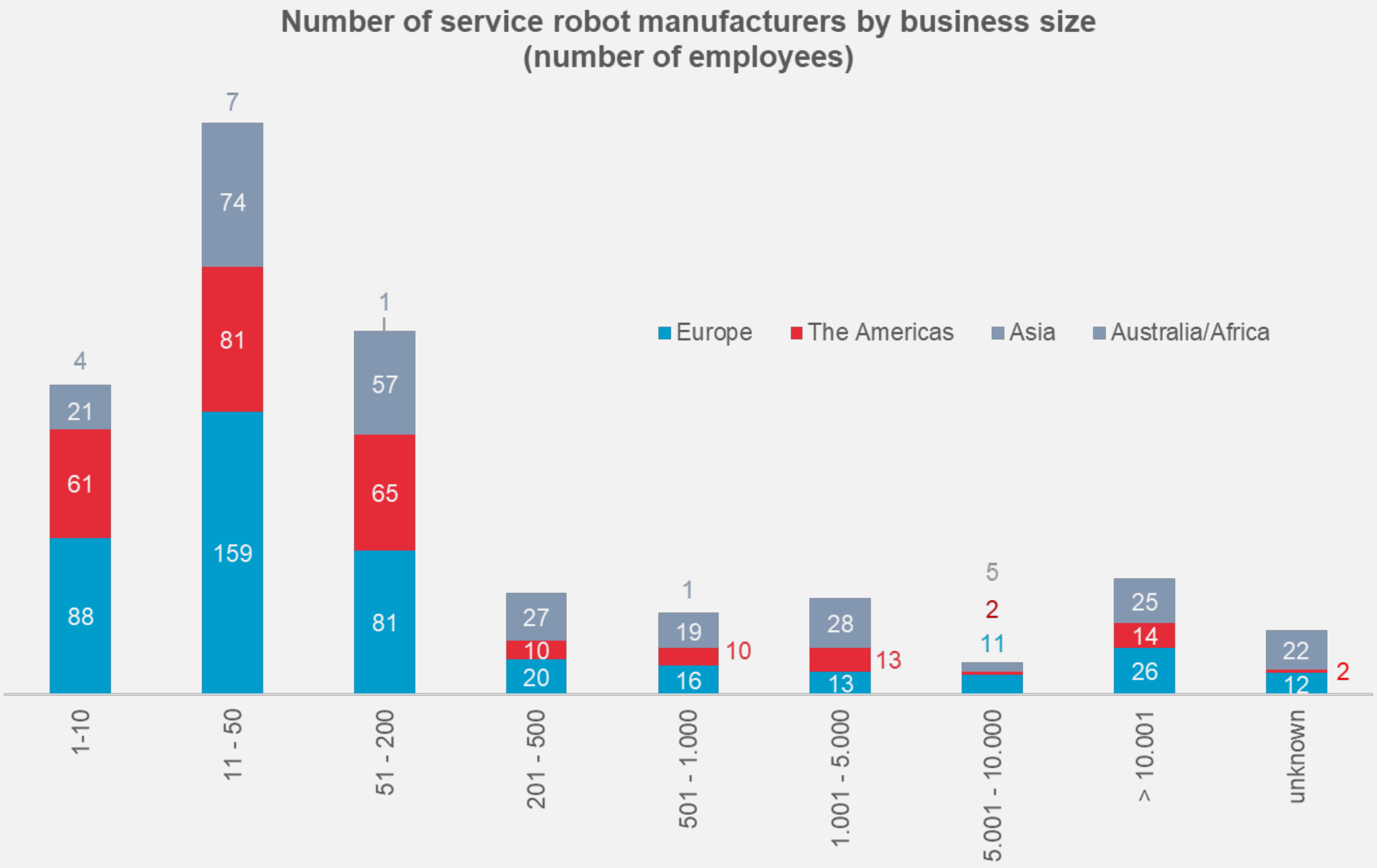

*(SME with <=500 employees)

Source: World Robotics 2023

Long-term Research Trends

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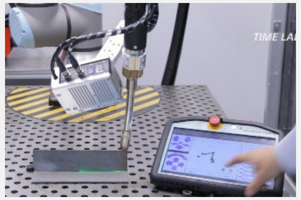
Industrial robotics

AI-enhanced Robots



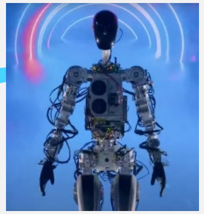
AMR

Cobots / dual arm

AMR with arms

Legged robots with arms

Humanoids



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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