

***FOCUS Expert Workshop
16th FEBRUARY 2016***

World Robotics Survey

Arturo Baroncelli

President 2013 - 2015 IFR - International Federation Of Robotics

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Engelberger Prize Award 2005

IFR 
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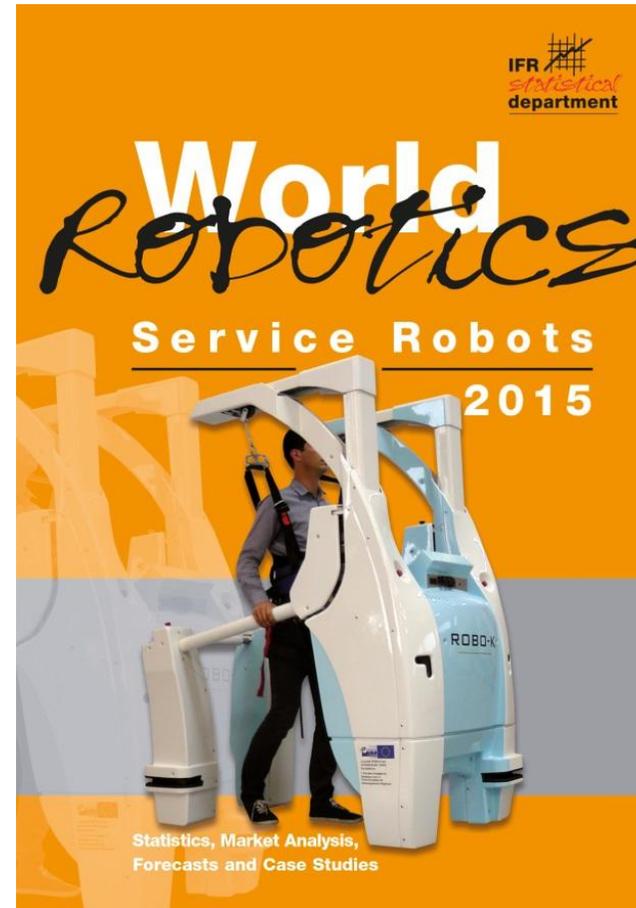
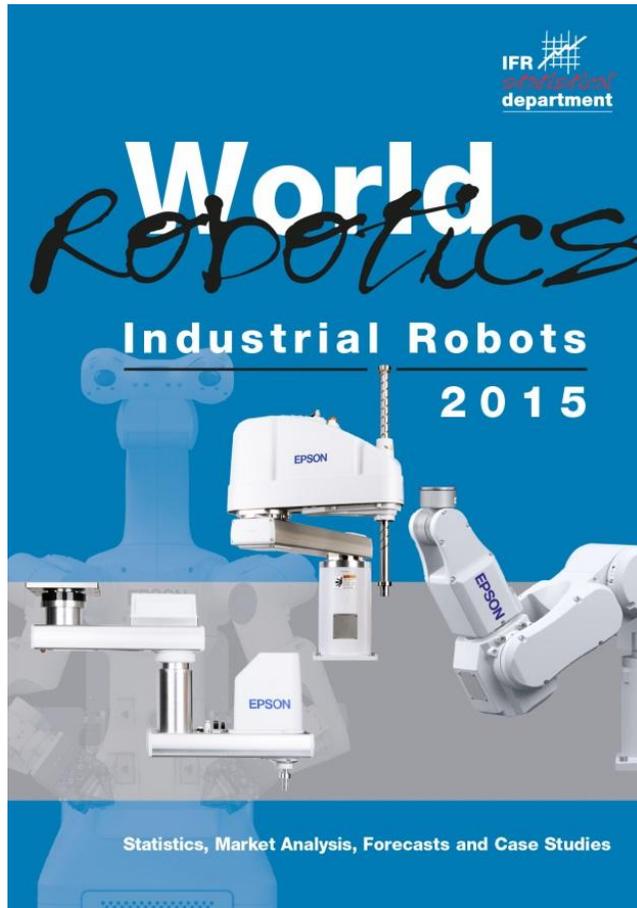
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International Federation of Robotics

Represents the global robotics industry

Robotics turnover 2014: \$32 billion

>50 members:

- National robot associations

- R&D institutes

- Robot suppliers

- Integrators

Sponsor of the International Symposium on Robotics (ISR)

Co-Sponsor of the IERA Award

Primary source for world-wide data on use of robotics – IFR Statistical Department



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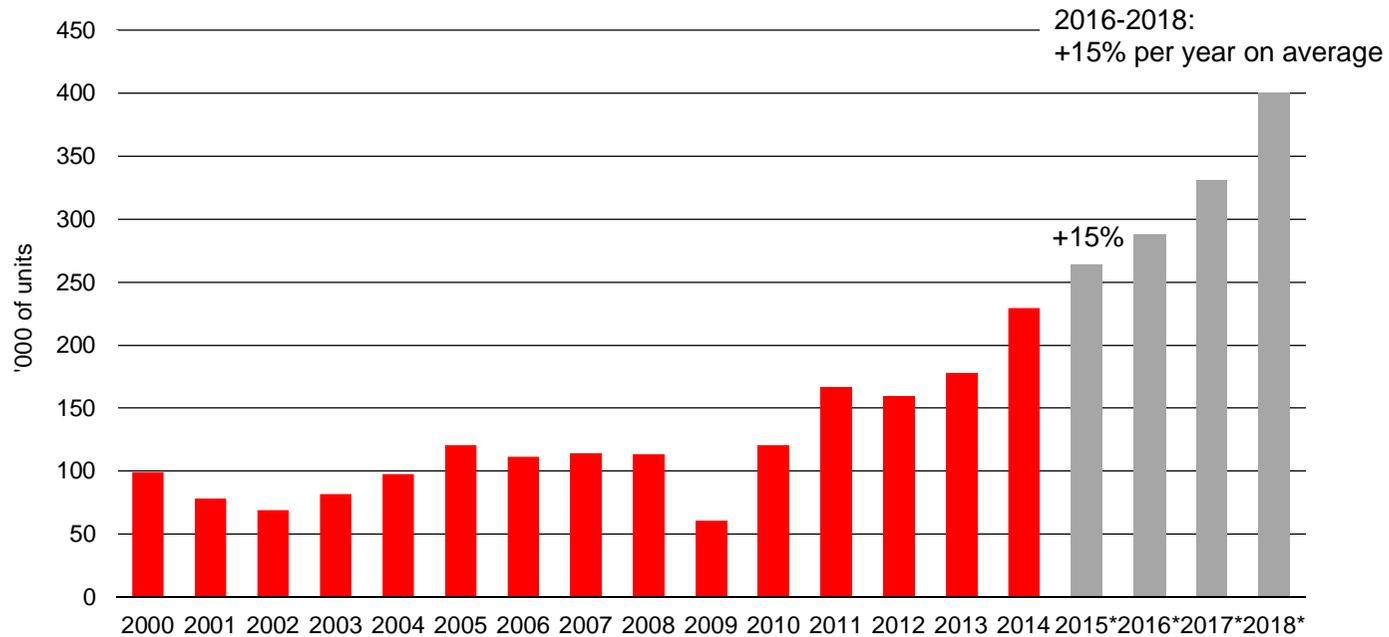


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Continued double digit growth

Worldwide annual supply of industrial robots
2000 - 2018*

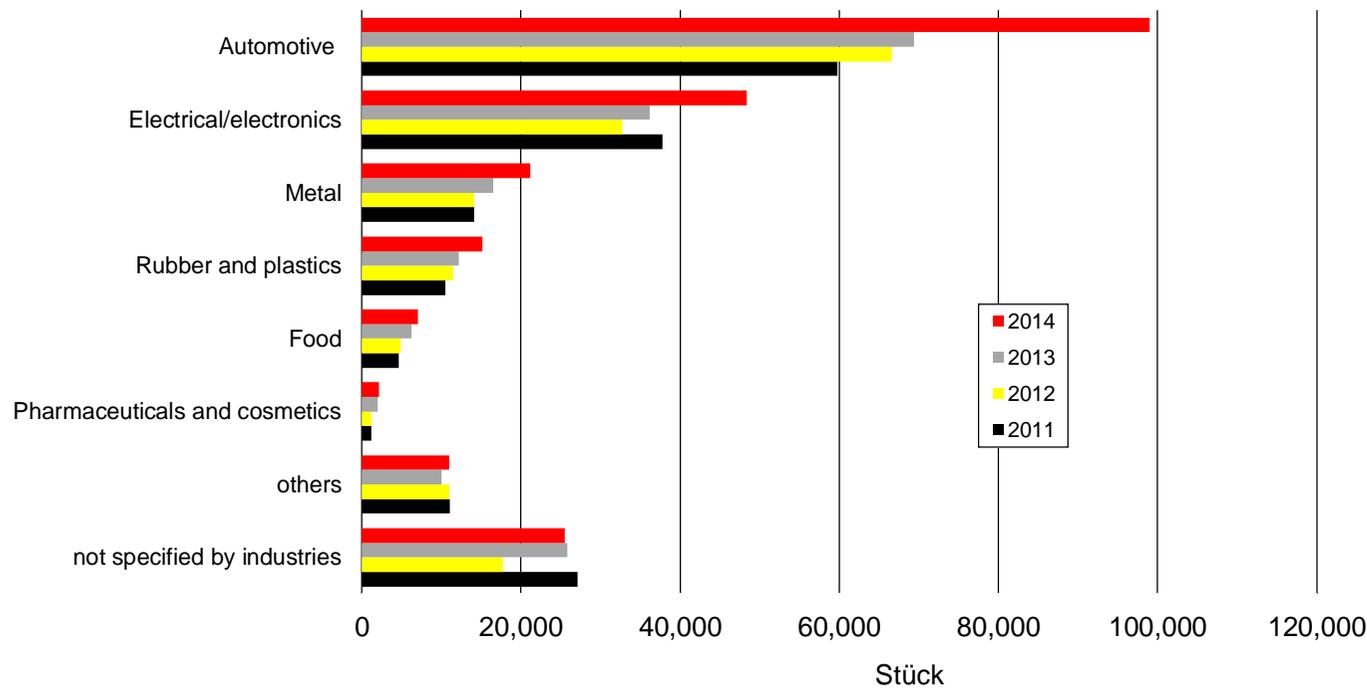


*forecast

Source: IFR World Robotics 2015

Main drivers: automotive and electronics

Estimated worldwide annual supply of industrial robots at year-end by main industries 2011 - 2014



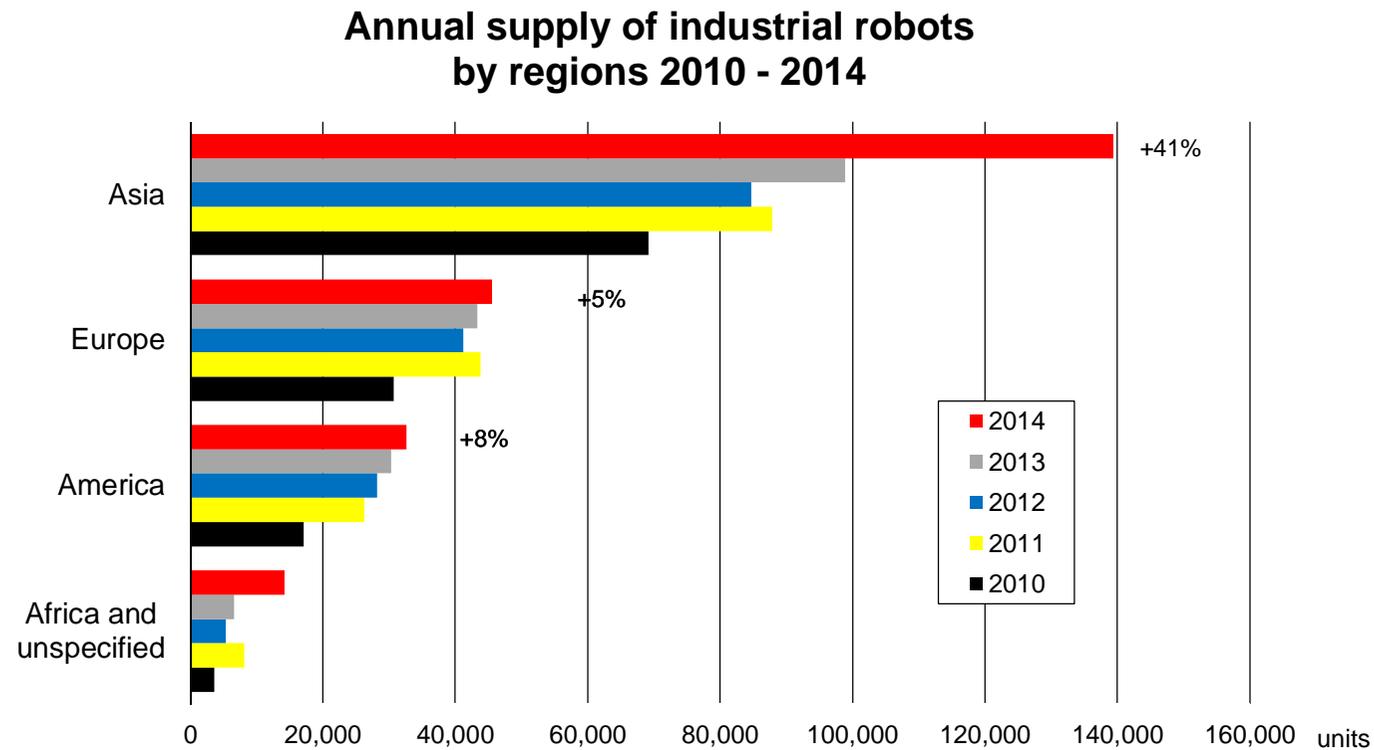
Source: IFR World Robotics 2015

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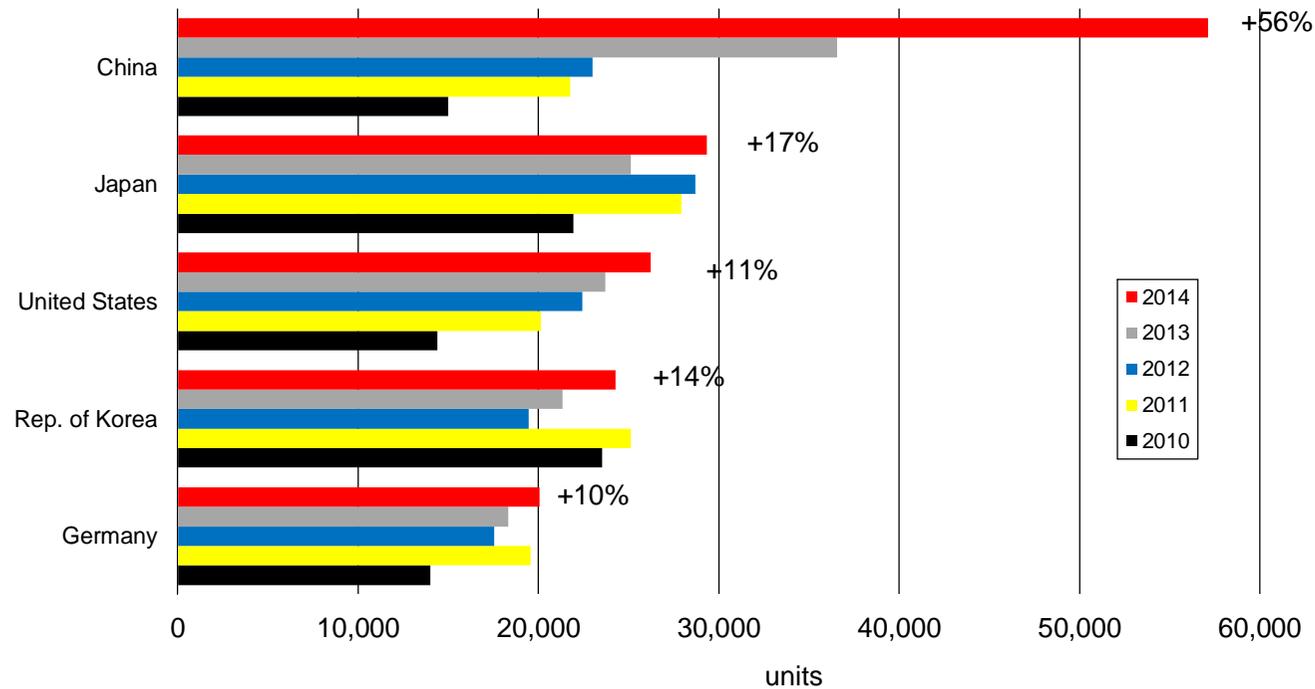
2014: Asia is the driver of the growth



Source: IFR World Robotics 2015

2014: about 70% of global supply in 5 markets

Annual supply of industrial robots
largest markets 2010 - 2014



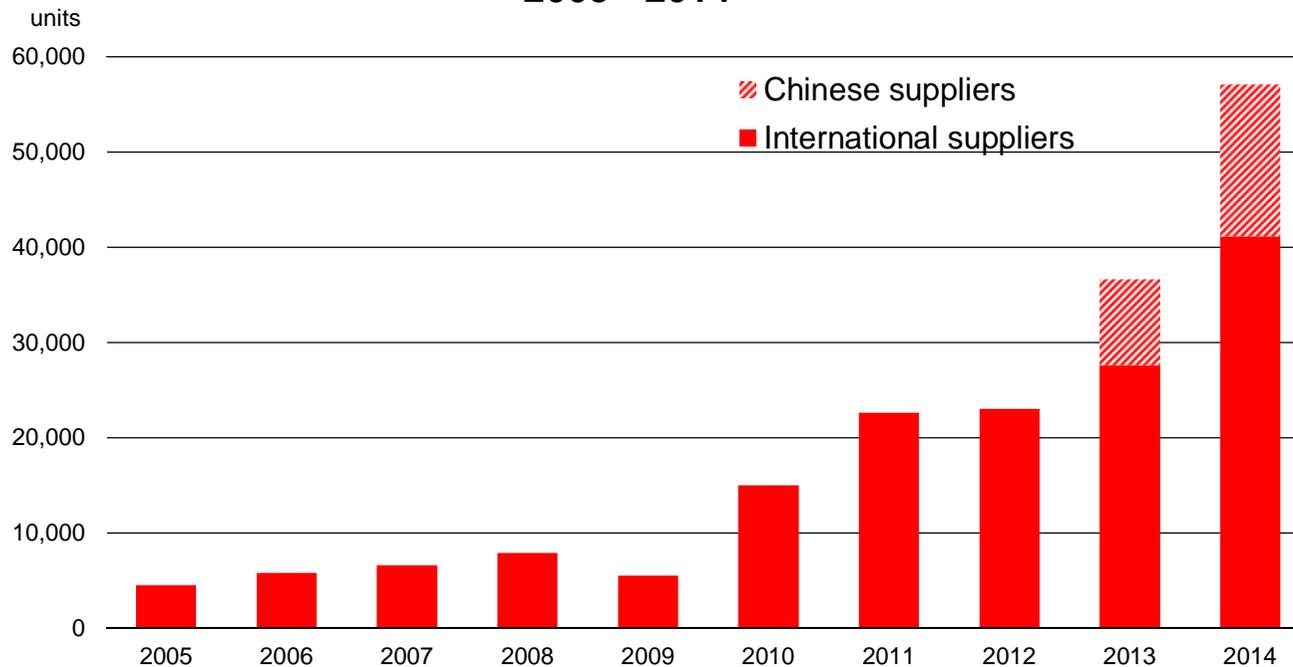
Source: IFR World Robotics 2015

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China: Rapid increase of robot installations

Annual supply of industrial robots to China
2005 - 2014



Source: IFR World Robotics 2015

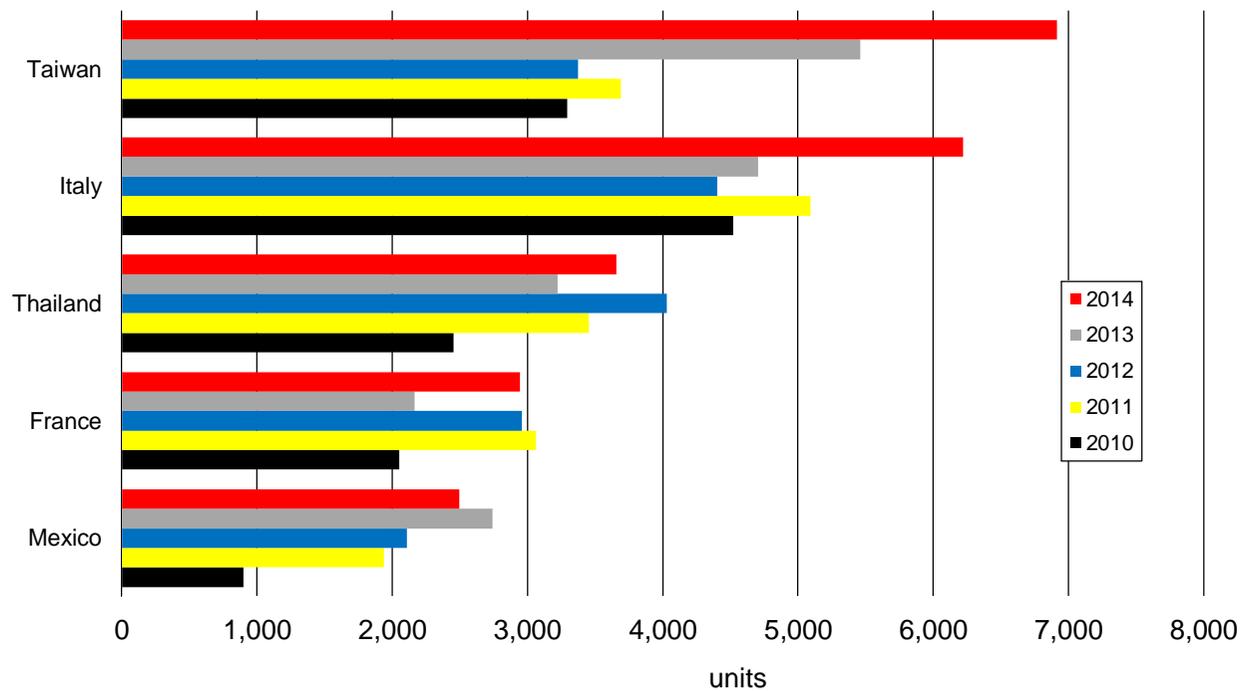
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Increasing importance of Taiwan

Strong recovery in Italy

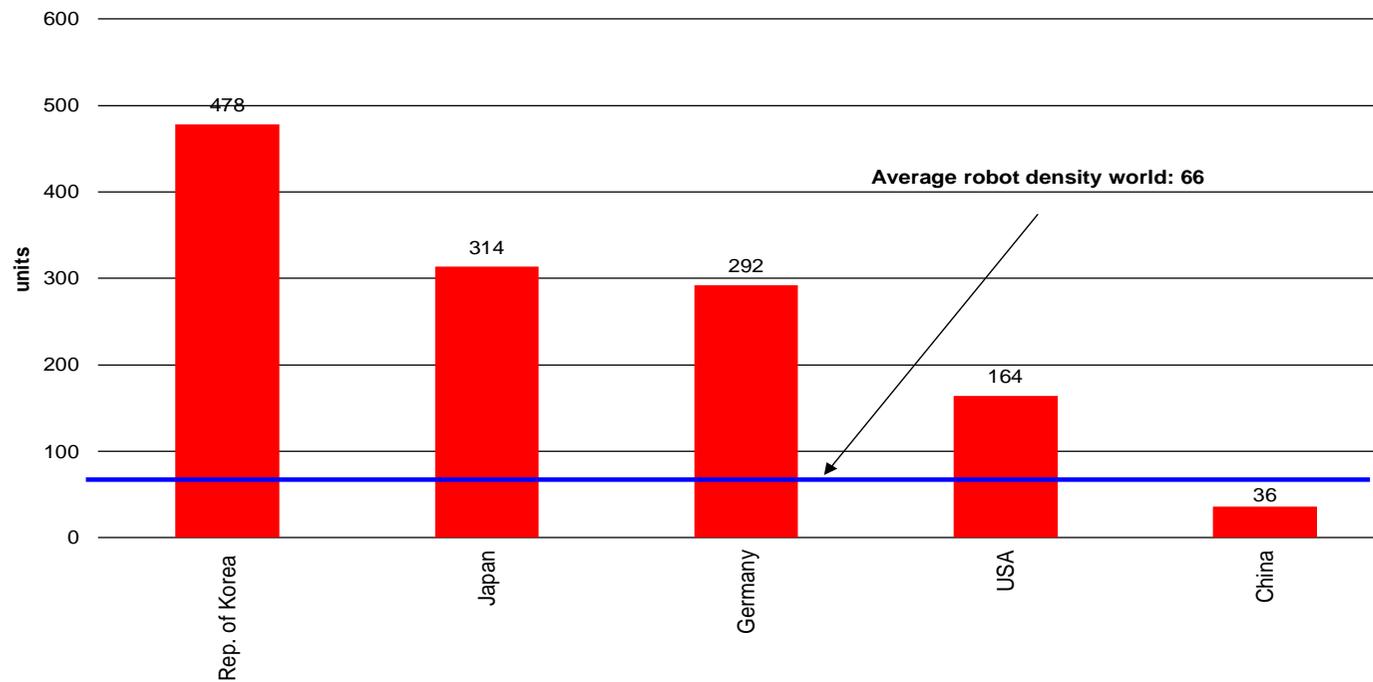
Annual supply of industrial robots
largest markets - continued 2010 - 2014



Source: IFR World Robotics 2015

Still very low robot density in China

Robot density* in the five biggest destinations of robot supplies in 2014



*Number of multipurpose industrial robots (all types) per 10,000 employees in the manufacturing industry (ISIC rev.4: C) 2014

Source: IFR World Robotics 2015

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Main trends 2015-2018: Industry 4.0

- Robots will play an important role in the new era of manufacturing: Industry 4.0
- Manufacturing will be transformed
 - Communication is all around
 - Integration of machinery, warehousing systems and production facilities as Cyber-Physical Systems
 - Vast increase of flexibility, cost effectiveness and productivity in smart factories
 - Jobs in factories will change
 - workers will be freed from repetitive routine tasks, and
 - will focus on jobs that require judgment, common sense, creativity, problem-solving skills and dexterity.

Main trends 2015 and 2018

- **Breakthrough of human-robot collaboration**
 - industrial robots assist workers in a variety of tasks
 - improve manufacturing quality and processes
 - increase productivity
 - assist an aging workforce, e.g. in physically demanding tasks



Source: KUKA

Source: IFR World Robotics 2015

Main trends 2015 and 2018

■ Simplification of the use of robots

- essential for all industries to be able to sustain efficient and flexible manufacturing
- High potential in small and medium sized companies

■ Mobile Robots

- support human-robot collaboration, and
- flexible manufacturing
- important tool for Industry 4.0



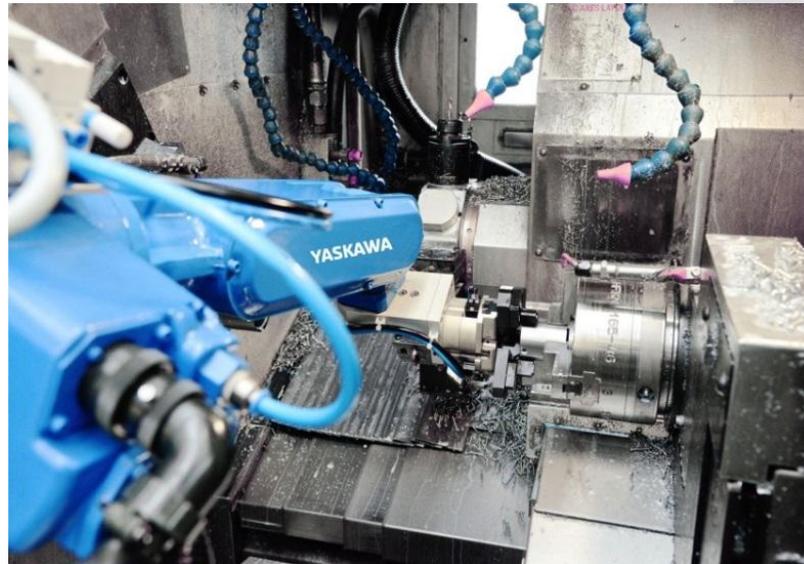
Source: Universal Robots



Source: KUKA

Bright prospects for robots between 2015 and 2018

- Most important driver of the growth: China
- And other Southeast Asian countries
- Continued increase of demand from North America
- Increasing sales in Western European countries
- Sales to Eastern European countries will gain momentum



Source: Yaskawa

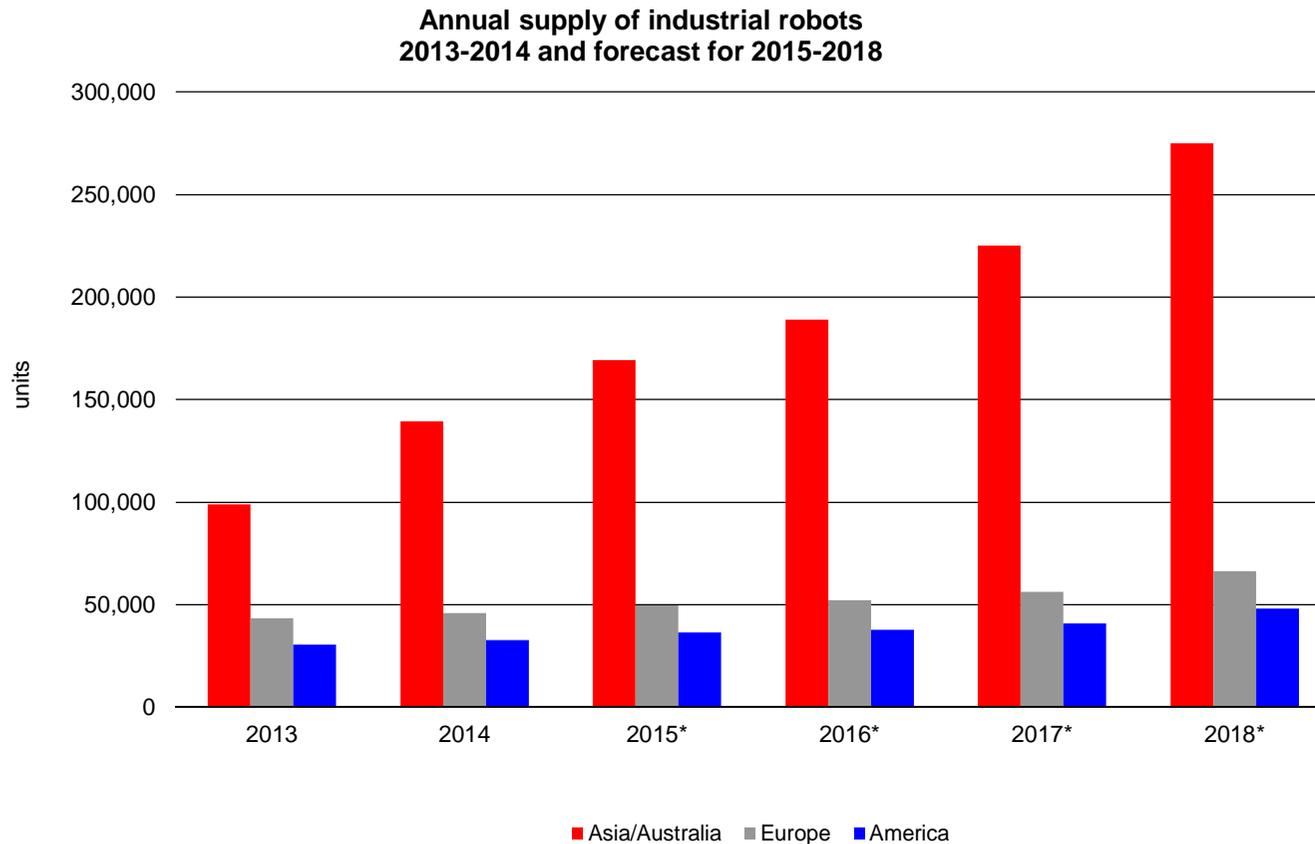
Bright prospects for robots between 2015 and 2018

- Automotive still strong
- High volume electronics manufacturing
- General Industry will grow faster
- Energy-efficiency and using new materials require continued retooling
- Decline in products' life cycle and increase in the variety of products require flexible automation



Source: ABB

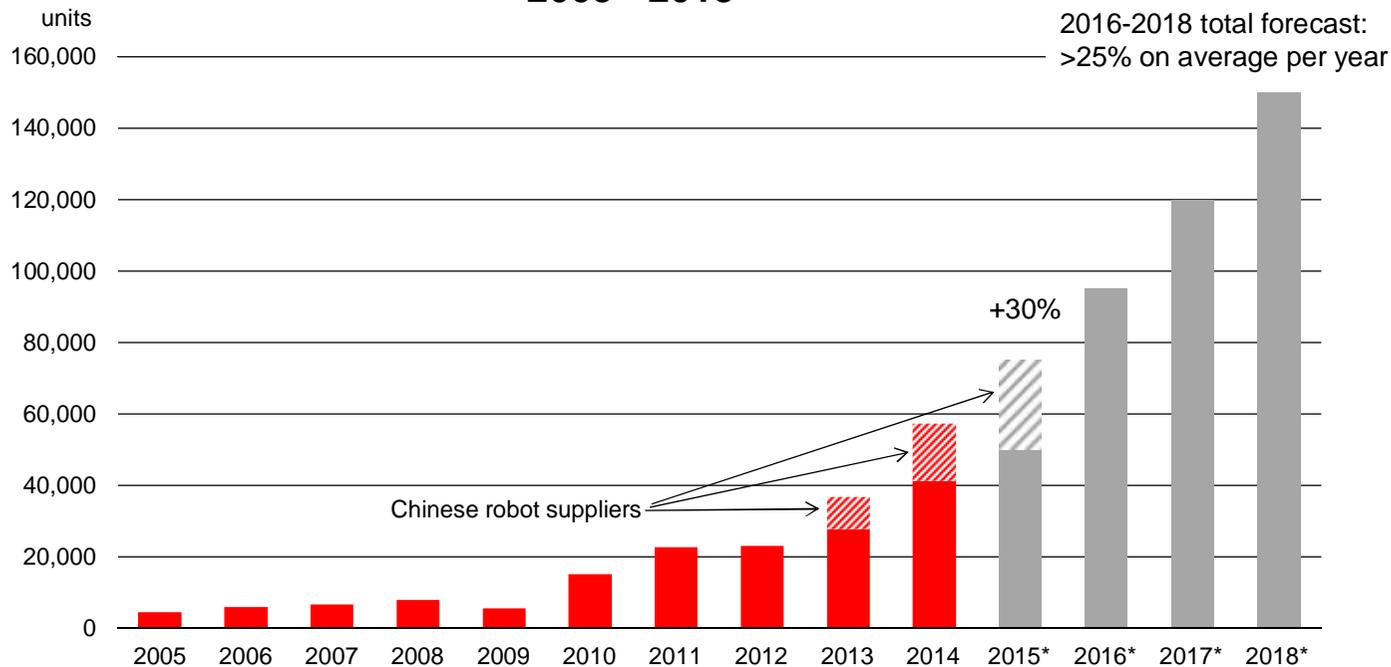
2015-2018: above average increase in Asia



Source: IFR World Robotics 2015

China: Continued substantial increase

**Annual supply of industrial robots to China
2005 - 2018***



* forecast

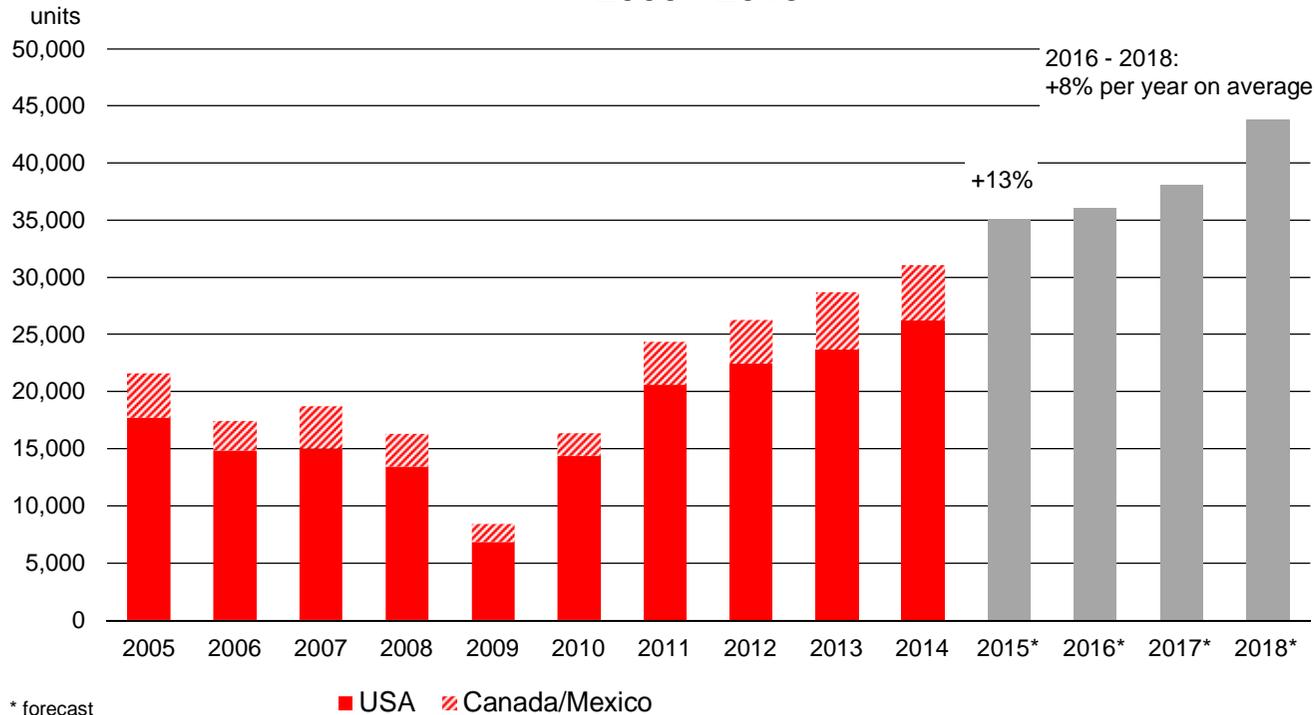
Source: IFR World Robotics 2015

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North America: continued growth

Annual supply of industrial robots to North America
2005 - 2018*



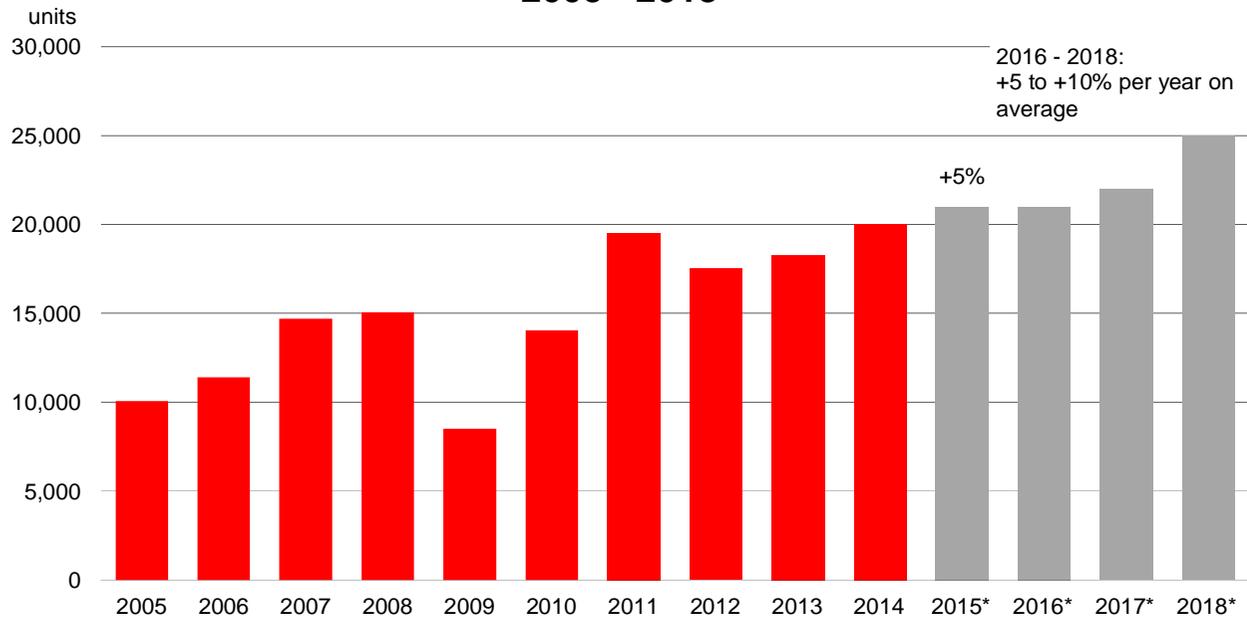
Source: IFR World Robotics 2015

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Germany: general industry will gain in importance

**Annual supply of industrial robots to Germany
2005 - 2018***



* forecast

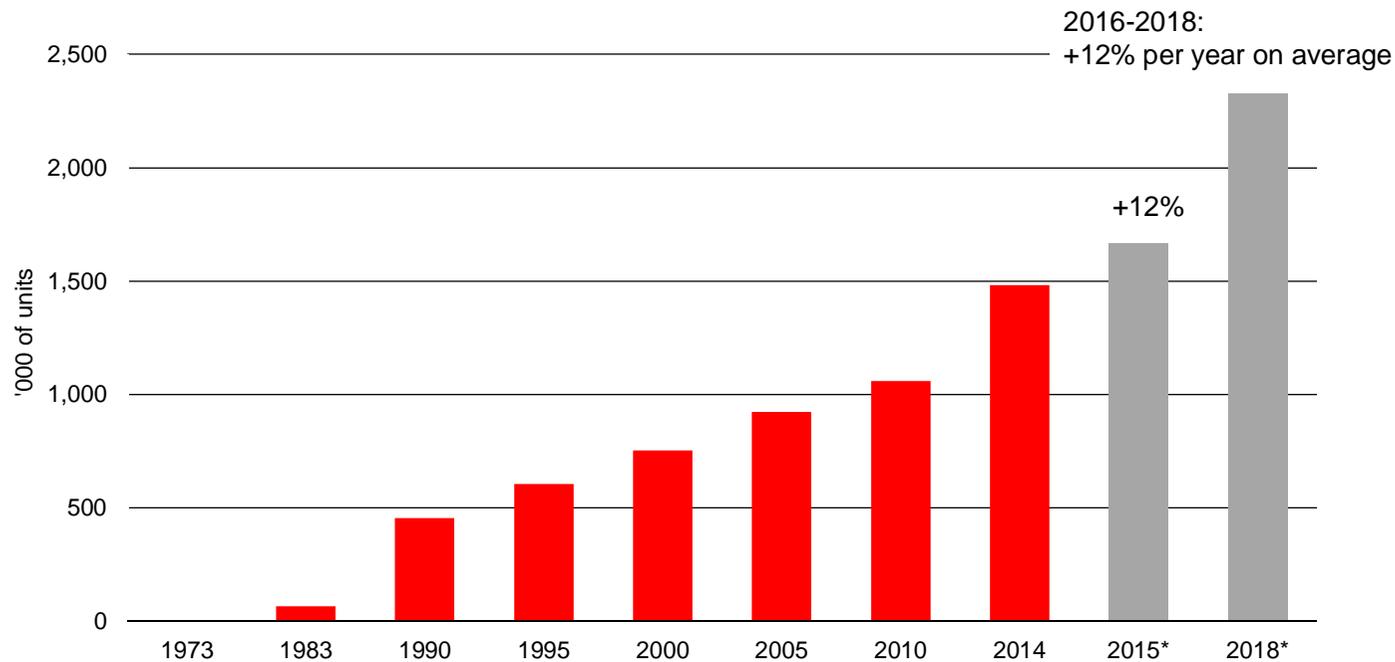
Source: IFR World Robotics 2015

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2018: 2.3 million robots in operation

Worldwide estimated operational stock of industrial robots



* forecast

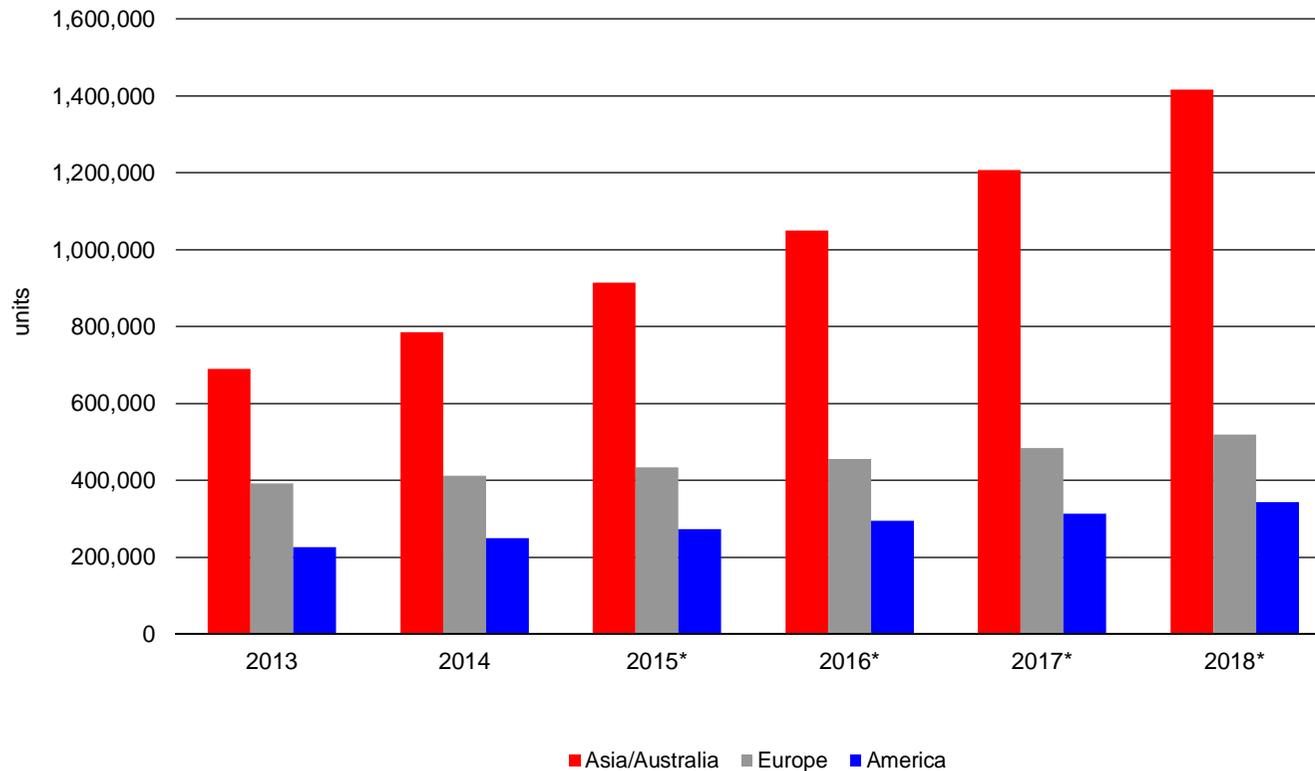
Source: IFR World Robotics 2015

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2018: 1.4 million robots in operation in Asia

Estimated operational stock of industrial robots
2013-2014 and forecast for 2015-2018



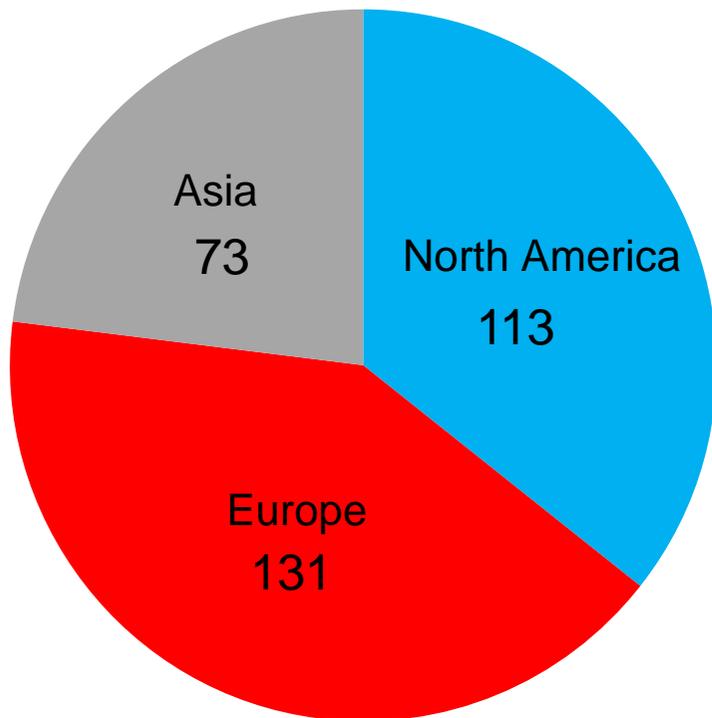
Source: IFR World Robotics 2015

Service robots

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Number of service robot manufacturers of all types by region of origin



- World Robotics Database: over 300 companies world-wide
- 15% of service robot suppliers are start-ups (criteria: technology-driven, company age under five years)
- „Start-up“-share growing quickly

By 2018: Sales of service robots for personal and domestic use will increase to 35 million units

■ **Main categories:**

- Vacuum and floor cleaning
- Lawn-mowing robots
- Entertainment and leisure robots
- Robots for elderly and handicap assistance



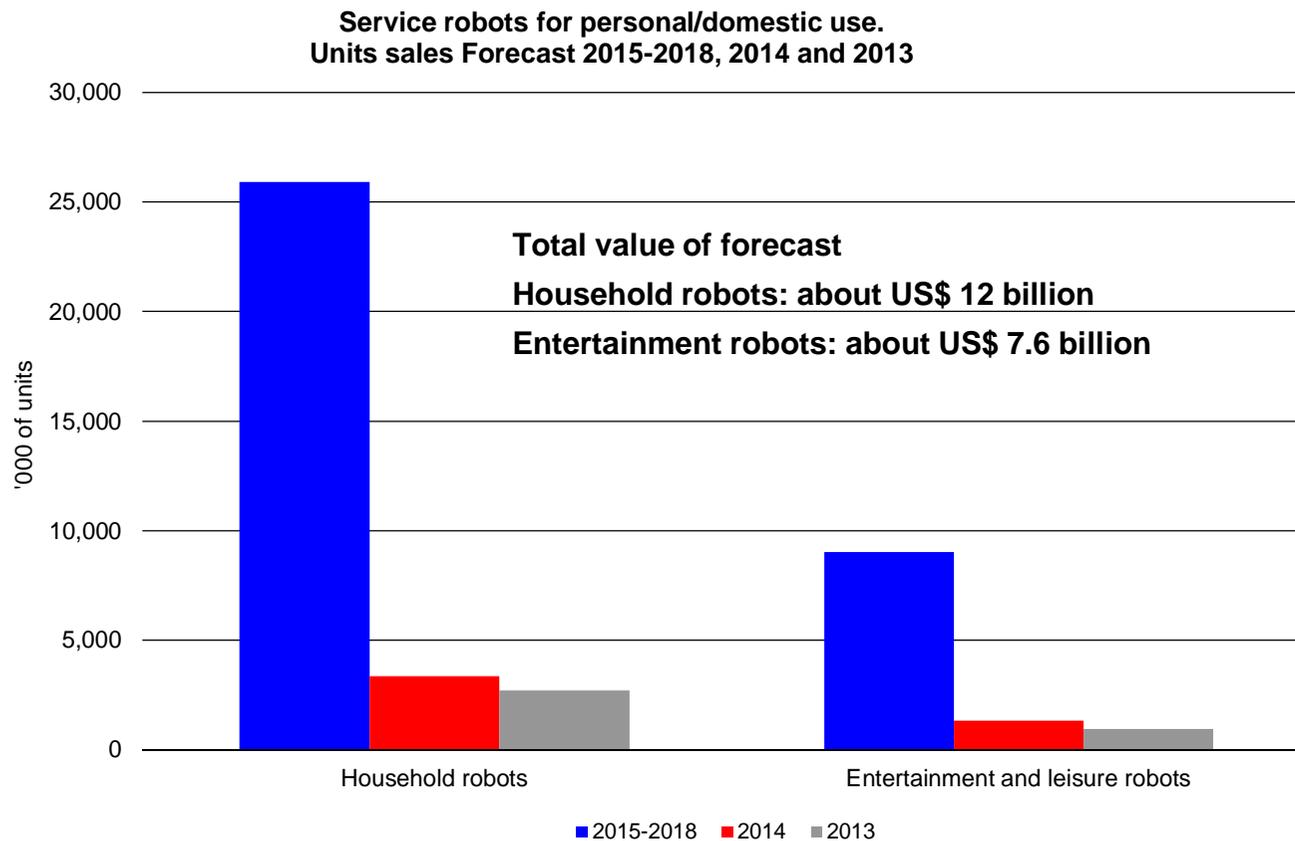
Source: Vorwerk (Vacuum cleaning)



thymio

Source: Manon Briod and Maria Beltran

By 2018: about 25 million household robots



Source: IFR World Robotics 2015

Future market for private handicap assistance

- Handicap assistance robots have taken off to the anticipated degree in the past few years.
- Strong increase in 2014
- Rapid longer-term growth expected
- Need for care will increase
 - Increasing number of disabled persons
 - Demographic shift

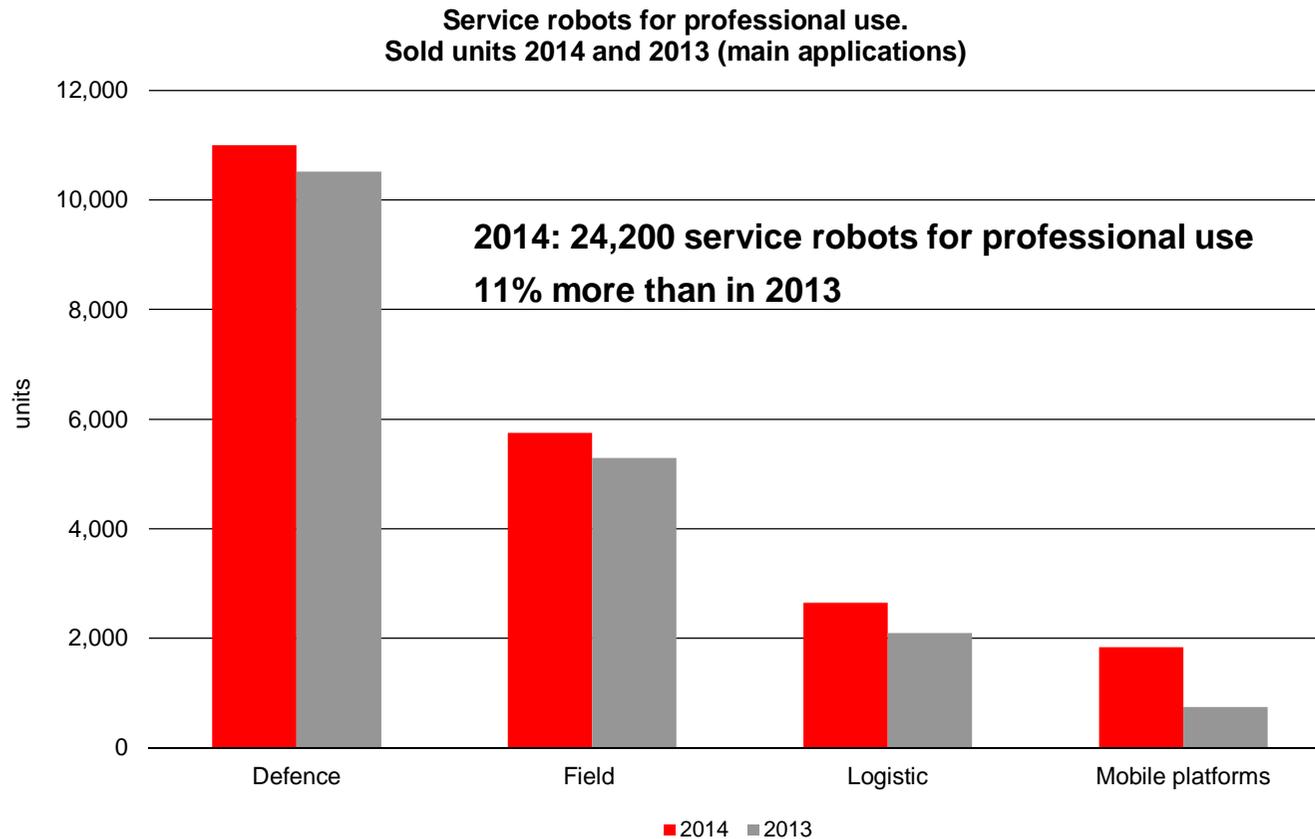


Source: Yujin Robot



Source: Focal Meditech BV, Netherlands

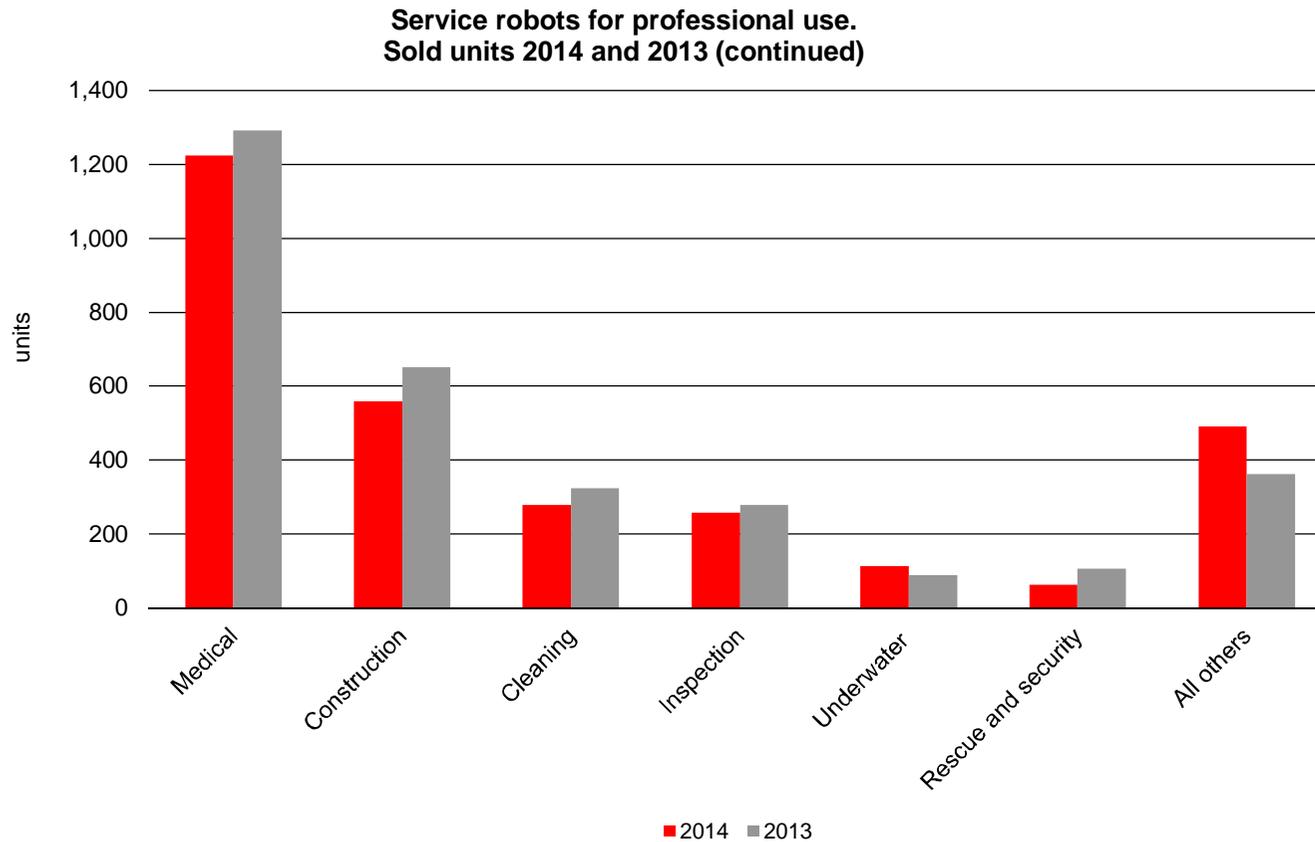
2014: Increase in all important applications



Source: IFR World Robotics 2015

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2014: Unit sales in low volume applications decreased



Source: IFR World Robotics 2015

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Trends in the service robot market

- Exoskeletons on the rise
 - Rehabilitation
 - Ergonomic support for reducing loads



Source: AlterG, USA



Source: Cyberdyne, Japan

Trends in the service robot market

- Logistic systems on the rise:
 - 2,700 units (mainly AGVs) installed in 2014, +27%
 - At least 14,500 units will be sold 2015-2018
- High growth potential for logistic systems
 - Human-Robot-Collaboration
 - Industrial and non-industrial sectors



Source: Panasonic



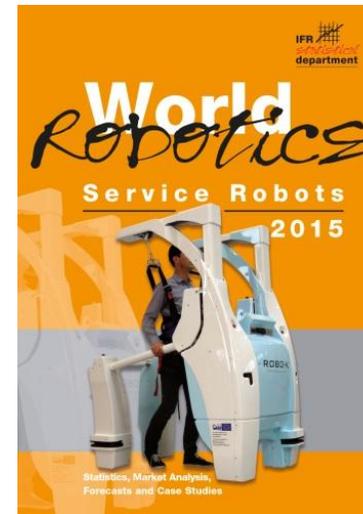
Source: Bluebotics

Other important service robot applications with considerable growth potential

- Medical systems
 - Diagnostic systems
 - Robot assisted surgery or therapy
 - Rehabilitation systems

- Field robots, especially
 - Milking robots
 - Farming and livestock breeding systems

- Mobile platforms in general use

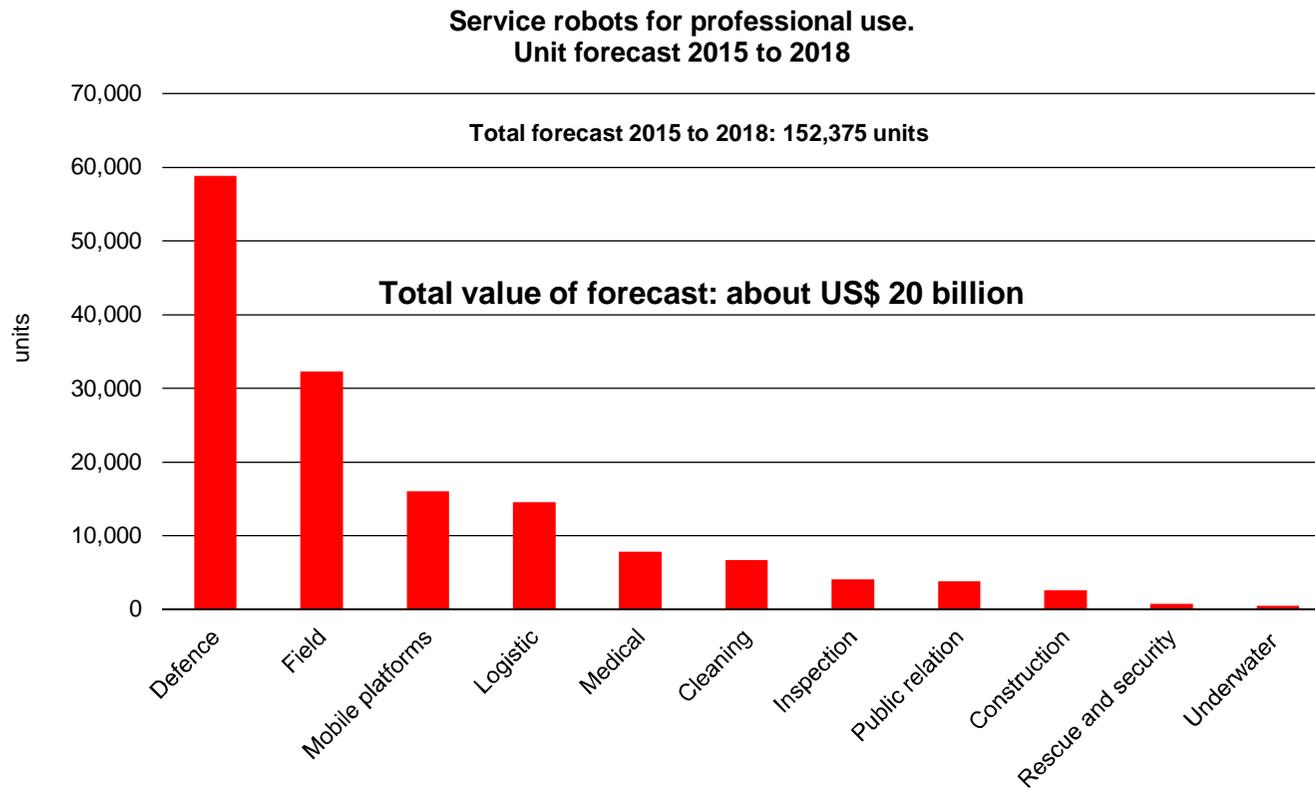


Source: BA Systemes



Source: Lely

2015-2018: about 152,400 new service robots for professional use



Source: IFR World Robotics 2015

THANKS !

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