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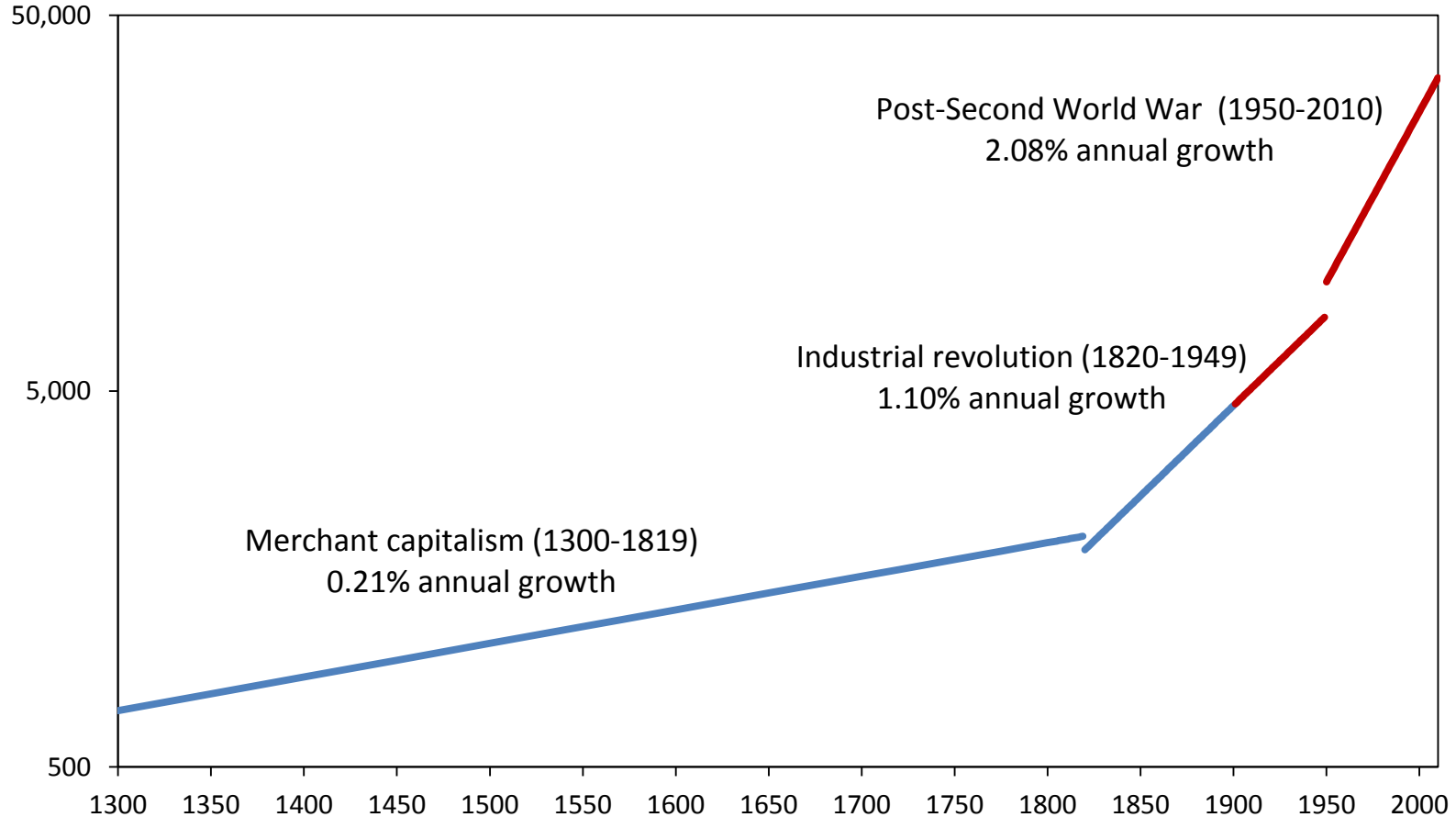


Breakthrough Innovation: *IP & Robotics*

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History of innovation-driven growth – We cannot take growth for granted

Real GDP per capita, 1300-2000, logarithmic scale



Robotics technology and artificial intelligence are breakthrough innovations

- Significant growth prospects and the potential to disrupt existing economic and social facets of everyday life.

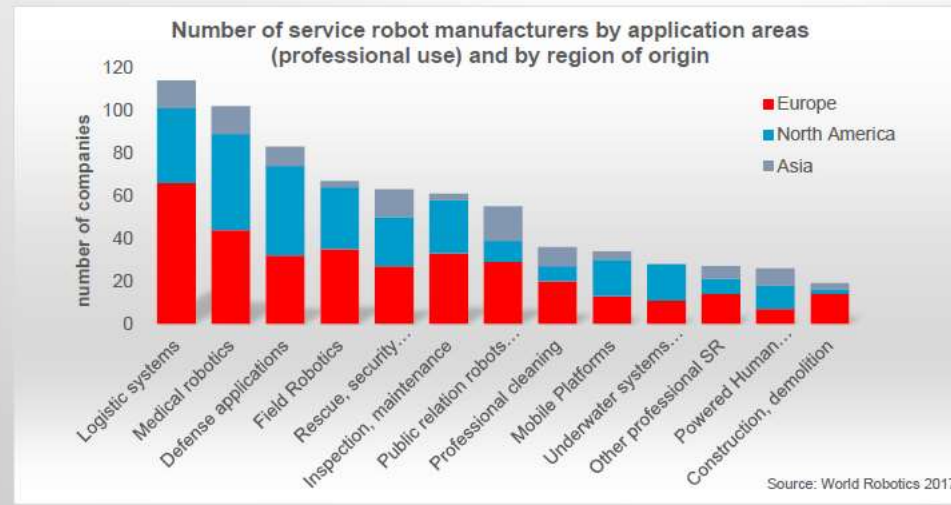


Source: International Federation of Robotics World Robotics 2017 edition

Increasing global use of robots

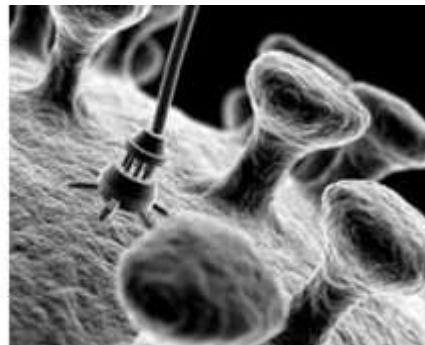
- China, Rep. Korea, Japan, US, Germany lead market
- Automotive industry main driver of automation, electronics industries
- Service robots in areas outside of manufacturing:
- Robotics in personal & domestic applications

European strongholds in service robotics suppliers: logistics, field, inspection/maintenance, construction



Future innovation systems: Robotics

- Individual passionate scientists & entrepreneurs still key
- Despite of Internet, physical proximity & clusters still matter
- Linkages can still not be taken for granted
- Journey from invention to commercialization still perilous
- Despite of cash-rich globalized companies, public research & governments & infrastructure still play structuring role



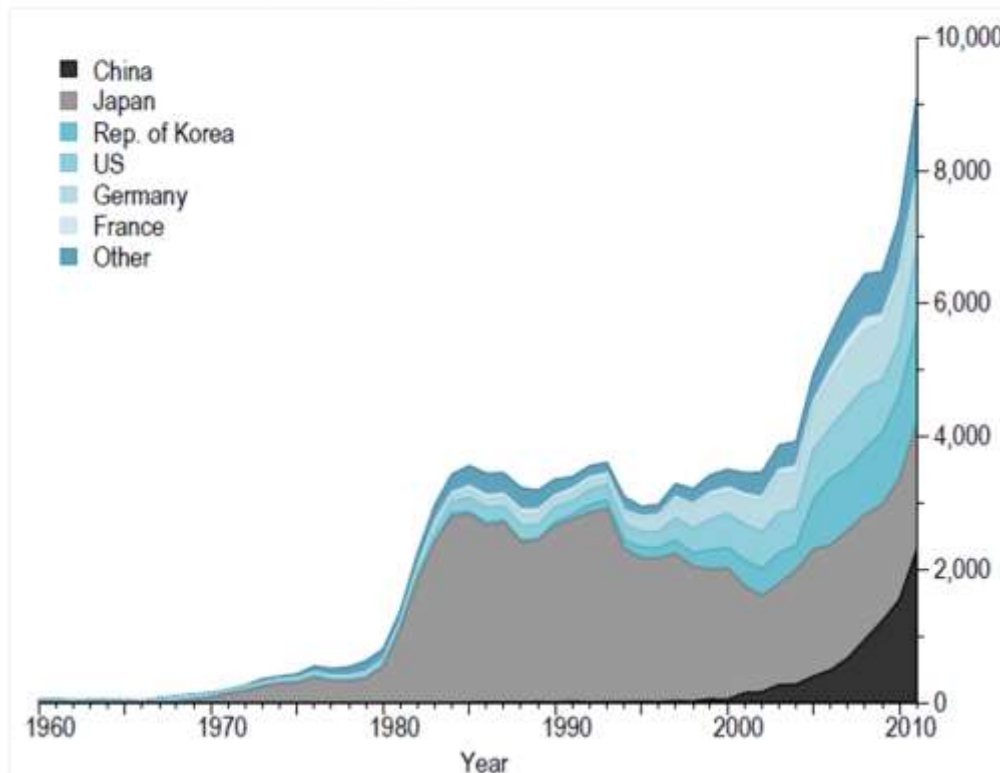
Protecting robotic breakthroughs via technological complexity and secrecy

- Technological complexity rules
- Secrecy is often used as a tool to appropriate innovation.
- Patents used to exclude third parties, secure freedom to operate, license technologies, avoid litigation.
 - For small firms patents are a tool to seek investment or a means of protecting their IP assets defensively against other, larger, firms.
- Industrial design rights, trade dress, and robotics
- Copyright protection is relevant to robotics too, mainly in its role in protecting software, and more recently in protecting so-called Netlists

Patents: Only China contests concentration in high-income countries

- China moving closer accounting for more than a ¼ of patents worldwide since 2005
- But stronger via public research organizations
- Automotive and electronics companies are still the largest patent filers, but new actors in fields such as medical technologies and the Internet are emerging.

First patent filings by origin, 1960-2011



Growing stock of patents owned by universities and PROs

Table 3.11: Top 10 robotics patent holders among universities and PROs, since 1995

Top 10 patenting worldwide			Top 10 patenting worldwide (excluding China)		
Shanghai Jiao Tong University	811	China	Korea Institute of Science and Technology (KIST)	290	Rep. of Korea
Chinese Academy of Sciences	738	China	Electronics and Telecommunications Research Institute (ETRI)	289	Rep. of Korea
Zhejiang University	300	China	National Aerospace Laboratory (now JAXA)	220	Japan
Korea Institute of Science and Technology (KIST)	290	Rep. of Korea	KAIST	188	Rep. of Korea
Electronics and Telecommunications Research Institute (ETRI)	289	Rep. of Korea	<i>Deutsche Zentrum für Luft- und Raumfahrt</i>	141	Germany
Tsinghua University	258	China	<i>Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung</i>	91	Germany
Harbin Engineering University	245	China	University of Korea	85	Rep. of Korea
National Aerospace Laboratory	220	Japan	Hanyang University	84	Rep. of Korea
Harbin Institute of Technology	215	China	Seoul National University	77	Rep. of Korea
KAIST	188	Rep. of Korea	National Institute of Advanced Industrial Science and Technology (AIST)	69	Japan

IP often part of knowledge sharing

- Great amount of collaboration in the robotics industry
 - Pre-competitive sharing (robotics platforms) and exclusion when at product-level
 - proprietary approaches co-exist with open-source robotics platforms
- Many patents have yet to result in increased litigation
- What happens to Robot IP?

Open economic question?

- Overall impact on globalized economic activity uncertain
- Overall job impact uncertain – labor substitution effect

Thank you!

World Intellectual Property Report

The World Intellectual Property Report is published every two years, with each edition focusing on specific trends in an area of IP.

<http://www.wipo.int/publications/en/series/index.jsp?id=38>