UBS

Longer Term Investments

Automation and robotics

CIO WM Research | 3 February 2017
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- We believe smart automation will power the fourth industrial revolution, combining the innovation in industrial and IT processes to drive global manufacturing productivity gains.
- Key automation end-markets are bottoming, in our view, providing good long-term growth prospects for the smart automation industry. We expect mid-to-high single-digit growth rates on average in the longer term. Rising wages and challenging demographic changes will pressure costs of manufacturing firms in emerging markets, driving automation investments.
- We recommend long-term investors add positions in this investment theme as we think key end-markets are nearing an inflection point after several below average growth years.

House view

The manufacturing industry has a history of being able to re-invent itself. Whether in the first industrial revolution of steam-generated power, or the next revolution supported by electric power, industry found ways to boost productivity. Another industry revolution is now underway, which we believe will transform the future of manufacturing. It is powered by smart automation (SA) as Industry 4.0 rises in importance. SA combines the innovation power of industrial and IT processes to drive gains in global manufacturing productivity. Industrial software raises automation equipment to the next level from purely improving efficiency and accuracy. Automation is increasingly a tool for total operations and asset management.

This report discusses recent trends and the outlook for factory and process automation, industrial software and 3D printing, as well as commercial drones and artificial intelligence. After several weak years with low investments, the global manufacturing sector is now recovering due to a better outlook for resource industries like oil and gas, and mining.

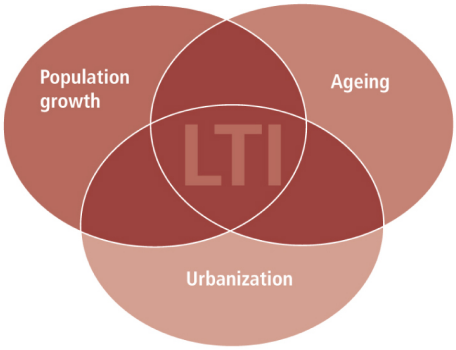
We believe automation companies can outperform the recovery due to structural trends like demographic changes, rising labor costs in emerging markets, the drive for productivity gains, and rising IT penetration. In particular, we think the industrial software and robotics segments offer high growth opportunities. These changes should lead to: 1) long-term, above-average earnings growth; and 2) re-rating potential for industrial companies with automation software exposure. Both should result in superior performance compared to the broader equity market in the years to come.

Introduction to the Longer Term Investments (LTI) series

› **The Longer Term Investments (LTI)** series contains thematic investment ideas based on long term structural developments.

› Secular trends such as population growth, ageing, and increased urbanization create a variety of longer term investment opportunities.

› Investors willing to invest over multiple business cycles can benefit from potential mispricings created by the typically shorter term focus of stock markets.



Related research

- US equities: Update: Beneficiaries of transformational technologies, 29 November 2016

Growth drivers

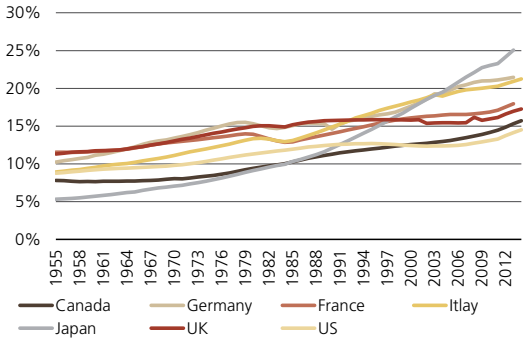
Based on our market definition, the automation market currently has a size of USD 156bn (see Fig. 3). Driven by several structural drivers (which are discussed in detail in this report), we expect an average revenue growth in the SA industry in the mid-to-high single digits. From an investment perspective, SA represents one of the fastest growing segments within the broader industrial and IT sectors during the next decade.

To understand the potential of the automation theme, it is important to identify the secular trends that could lead to strong growth in the next few years. We see several drivers that should stimulate sustainable growth over the coming business cycles:

- We think emerging markets (EMs) are one of the most promising growth themes. In EMs, robotics usage is still far behind developed countries, but an aging population in particular in developed countries (see Fig. 1), but also in EMs, the need to drive productivity gains, rising wages and the size of the manufacturing sector make it an attractive region for automation equipment. Particularly in China, the mass reallocation of cheap labor from the agricultural sector to manufacturing is coming to an end. Urbanization is slowing from 20 million per annum previously to 15-17 million at present.
- We expect rising IT penetration in the manufacturing sector (industrial software) to lead to a new wave of automation investments in developed countries. Compared to other industries like office automation or healthcare, the use of software or IT penetration is still lower in the manufacturing automation world, but we are now reaching an inflection point, with software moving down to the factory floor, accelerating automation within manufacturing.
- Over the last few decades, automation equipment has mainly been used to improve the efficiency and accuracy (quality) of products. In the future, industrial software (smarter equipment) will increasingly also be a tool for asset optimization (remote monitoring, predictive maintenance).
- The so-called Industrial Internet of Things (IIoT) enables communication along the entire value chain, improving productivity through the use of big data (see also our Longer Term Investment theme on "Digital Data").

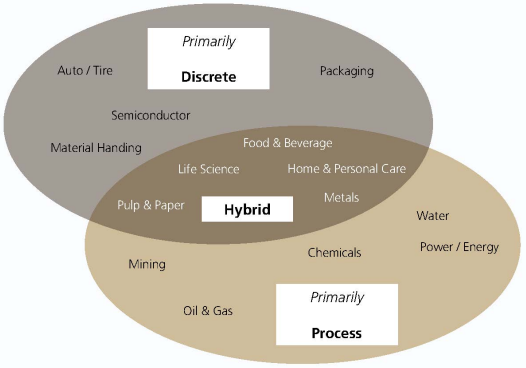
When people think about automation, most picture an industrial robot assembling a car. In reality, that is only one part of the entire automation value chain, which can broadly be split into several categories, with the most prominent ones being factory and process automation. Industrial software is becoming an increasingly important business driver in both segments. Factory (or discrete) automation generally describes assembling processes, such as our robot in the automotive industry, but also other automation processes in the general manufacturing industry, packaging and semi-

Fig. 1: Relative share of elderly people (aged 65 and over) quintupled in Japan over last 60 years, but also grew in every other country
Total % of population, 1955 – 2014



Source: OECD, as of January 2017

Fig. 2: Factory (discrete) vs. process automation

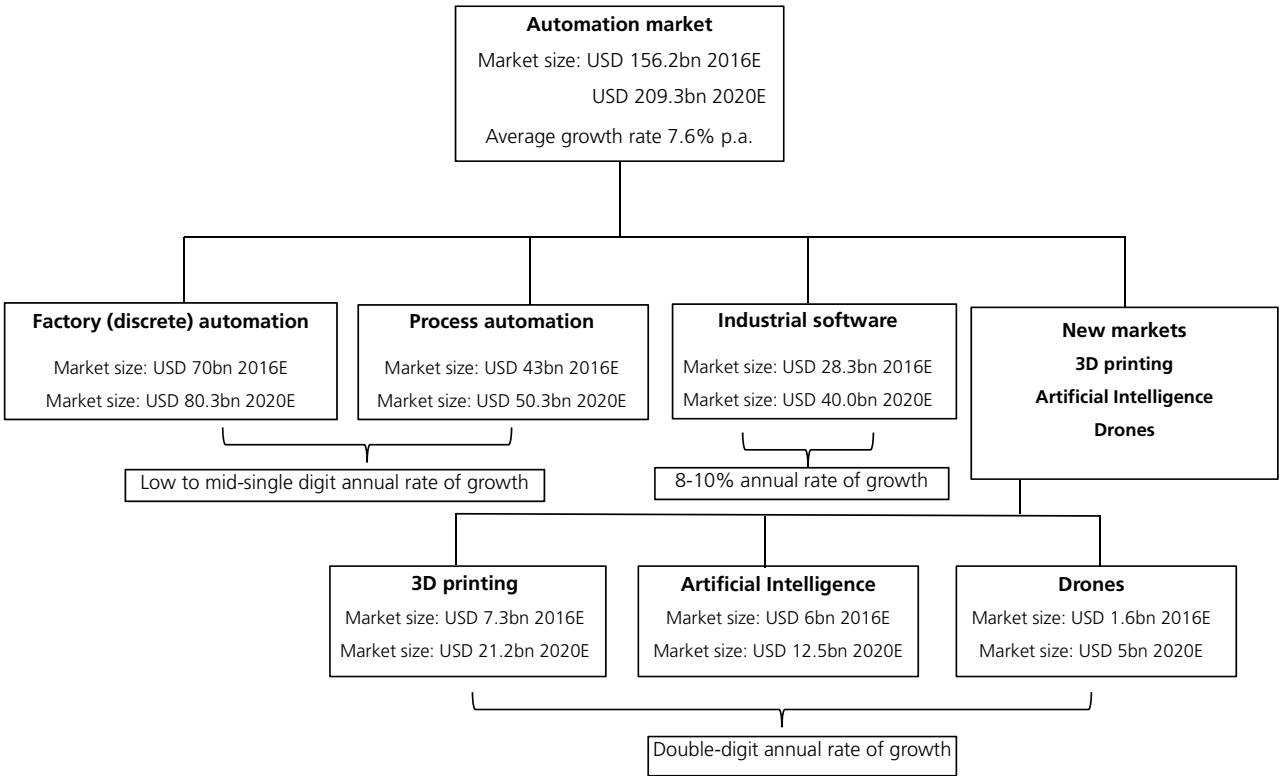


Source: CLSA

conductors, to mention the most important ones. Process automation means continuous production processes that transform raw materials into final products (e.g. mixing of liquids in refining, or distribution of electricity). Typical process automation end-markets are the oil and gas industry, refining, chemicals or power generation. Between these two sectors are several hybrid markets that use both factory automation and process equipment. Fig. 2 summarizes all the different automation end markets. Besides the traditional discrete and process automation market as well as the growing industrial software, we also count several new applications to the automation market like 3D printing, artificial intelligence and drones (see Fig. 3). Although the new markets are still relatively small compared to discrete and process automation, they clearly outperform the growth in the overall automation market (unfortunately, there are only a few and they are small listed pure-play companies).

We discuss all end-markets in more detail in the report. Our focus in the first section will be on the discrete and process automation industry as both end-markets are still most important for industrial automation companies. UBS estimates that the combined value is USD 113bn, with 35% attributable to process automation and 65% to discrete automation. If we include the emerging 3D printing market, artificial intelligence and drones plus revenues from pure-play automation software companies, then the total market volume amounts to some USD 156bn (see Fig. 3). The definition of the market size can vary from source to source. In our analysis, we have used a bottom-up approach and aggregated automation sales of the most important market participants.

Fig. 3: Industrial software and new trends like 3D printing, artificial intelligence or drones drive industry growth



Source: Company data, UBS estimates as of February 2017

Note: Our industrial software estimate includes only sales from software companies. Software sales from industrial companies like Siemens, ABB, Schneider Electric, etc. are included in either factory or process automation market due to limited access to detailed sales splits of industrial automation companies.

Factory (discrete) automation

The largest end-market in the factory automation market is the automotive industry; typical products are programmable logical controllers (PLCs), electric motors, sensors, robots and, of course, manufacturing software. The highly consolidated market is controlled by European and Japanese vendors, with six players (Siemens, ABB, Schneider Electric, Rockwell Automation, Mitsubishi Electric, and Fanuc) controlling more than half of the market (see Fig. 4).

On average, the discrete automation market grew 3.3% p.a. between 2006 and 2015. Robot shipments outperformed during this period (9% CAGR in the past decade) due to strong demand in EMs, particularly in China. After a weaker period for automation equipment in 2015 and 2016, the outlook for the Chinese manufacturing sector has improved again. We therefore expect growth rates of 3-4% p.a. in the next three years for the overall discrete automation segment, in line with historic growth patterns.

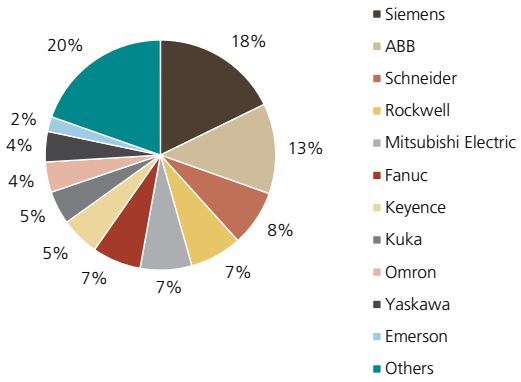
We think the robotics sub-segment is still very exciting. The segment will still be the main growth engine. For 2017-2019, the International Robotics Federation (IRF) expects at least 14% growth on average a year. Asia and Australia are expected to grow on average by 18% p.a., the Americas by 5% p.a. and Europe by around 8% p.a. On top of the software revolution, we see several additional drivers that should spur sustainable growth in the coming years. EMs account for roughly half of global manufacturing output. However, robot penetration is much lower than in developed countries. Despite the strong growth over the recent years in China and other EMs, the potential is still huge. In terms of robot density, China appears to be at a level comparable to Japan in the 1970s and South Korea in the late 1980s and the early 1990s. There is still a huge gap compared to the global average, and up to 90% compared to South Korea or Japan (see Fig. 5 and Fig. 6).

The IRF expects 160,000 robots to be installed in China alone by 2019 (total installation globally in 2015: 253,748), representing a global market share of 39% (expected total installation in 2019: 414,000). Other important markets are North America, Korea, Japan, Germany, Taiwan, Italy and gradually also India (see Fig. 7).

In the early 2000s, when EM companies first started investing in automation equipment, the underlying trend was toward better quality (machines are more precise than human beings), and initial attempts were made to increase productivity. Today, we see two additional trends for automation demand: rising labor costs, and labor shortage (an aging and better-educated population).

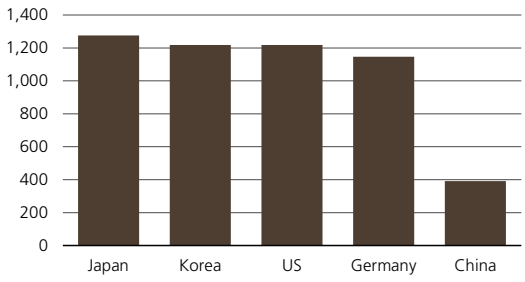
Since 2000, wages in China have risen significantly above other markets (see Fig. 8), and China's one-child policy triggered a decline in new labor supply and advanced the shift toward an aging population. While not every EM country is aging, with India as a case in point, the manufacturing-led economies like China, Korea and Taiwan clearly are. On top of this, rising levels of education have resulted in a fewer workers willing to take lower-pay manufacturing jobs.

Fig. 4: Factory (discrete) automation market share
Total USD 70bn in 2016E



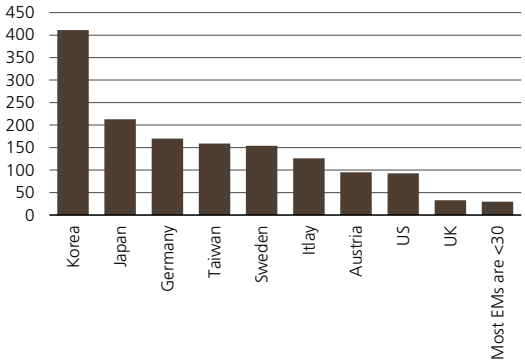
Source: Company data, UBS estimates as of February 2017

Fig. 5: Robot density in automotive industry by country, 2015
Robots per 10,000 employees



Source: IFR World Robotics (World Robotics Industrial Robots 2016)

Fig. 6: Robot density in general industry (all industries, excluding automotive) by country, 2015
Robots per 10,000 employees



Source: IFR World Robotics (World Robotics Industrial Robots 2016)

While the demographic challenge is a long-term issue, rising labor costs are an important short-term driver as higher wages shorten the payback period for robots. Other than the costs, efficiency is also much higher with robots; the best example is the automotive industry.

The market for robots is very consolidated; only four companies (Fanuc, ABB, Yaskawa, and Kuka) control a major part of the global market and more than three-quarters of robots were sold in just five countries/regions in 2015 (China, North America (US, Mexico, Canada), Korea, Japan and Germany).

Process automation

As mentioned earlier, process automation involves a continuous flow of raw materials (e.g. in the oil and gas or the chemical industries), where a high degree of measurement, timing and precision is important. The automation part is a kind of central computer that interacts with valves and sensors to run the process smoothly.

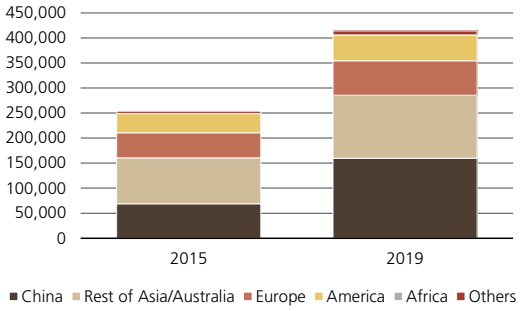
Without process automation systems, plant operators have to physically follow all parameters during the production process and afterwards assess the quality of the output. In addition, maintenance is not performed when necessary, but rather at regular intervals. Therefore, without automation equipment, it is much harder for plant operators to achieve best performance compared to an automated plant that has sensors and computers to analyze thousands of signals. Inefficiency in production processes and sub-optimal maintenance intervals make operations more costly.

Similar to factory automation, this market is also fairly consolidated (see Fig. 9). Six companies have a combined market share of 78% (Siemens, Emerson, ABB, Yokogawa, Honeywell, Schneider Electric, and Rockwell Automation).

The growth rate was on average 4% p.a. from 2006 to 2015, driven by a strong investment cycle in the chemical and the oil and gas markets. The shale gas revolution in the US has triggered a wave of investments in both sectors, supporting process automation.

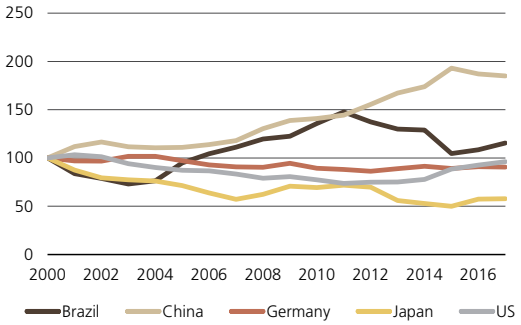
Over the last two years, market conditions for process automation have deteriorated. The oil price has collapsed, negatively impacting process automation capital expenditures (capex). Assuming that 2017 is a trough year and that there is growth through 2020, we expect around 4% annual growth off a low base.

Fig. 7: China dominates global robots demand
Expected newly installed robots in 2019 versus 2015



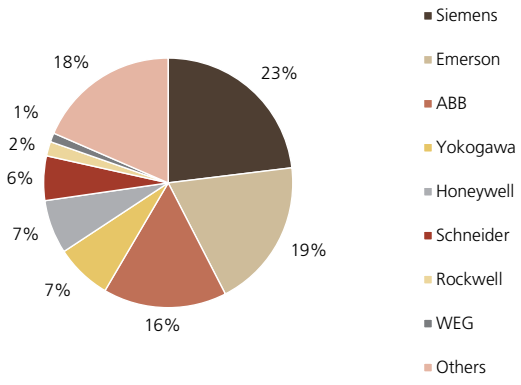
Note: Others = reported and estimated sales which could not be specified by countries
Source: IFR World Robotics (World Robotics Industrial Robots 2016)

Fig. 8: Relative unit labor costs (indexed to 100 in the year 2000)



Source: OECD, UBS, as of 26 January 2017

Fig. 9: Process automation market share
Total USD 43bn in 2016E



Source: Company data, UBS estimates, as of February 2017

Industrial software

The growth outlook for industrial software remains solid as more companies leverage the benefits of digitalization in product manufacturing. The rising trend is more apparent as many manufacturing companies have started to carve separate internal teams called "digital factories" to take advantage of software in manufacturing. Despite a mixed outlook for overall enterprise IT spending, the outlook for the software industry remains solid with mid-to-high single-digit growth in industrial software, which constitutes around 85% of the broader software industry, expected to post above-average growth.

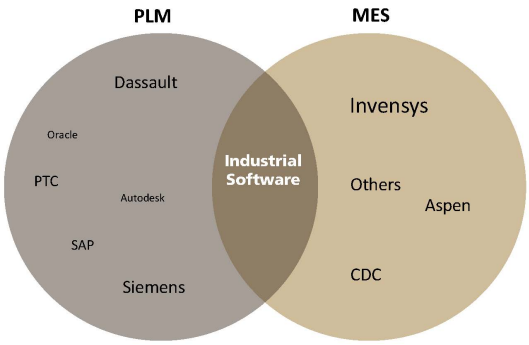
The two major sub-industries within the industrial software segment include product life-cycle management (PLM) and manufacturing execution systems (MES) (see Fig. 10). PLM is generally considered an enterprise level software system, whereas MES is a plant level system, the major difference being that PLM is used in development and corresponding production processes, while MES is used to optimize the production process. An example of PLM is a computer aided design (CAD) software program for designing products on the computer; an example of MES is operation management software. Key vendors in PLM include Dassault, Autodesk, PTC and Siemens; the top vendors in MES include Invensys, CDC Software and Aspen (see Fig. 10). Increasingly, IT service companies like IBM and Accenture have begun investing more in the industrial software and services to take advantage of the industry's strong growth outlook (see Fig. 11).

A survey done by PwC further supports our strong outlook for the industrial software segment. In PwC's survey of Germany's industrial companies, only one-fifth of the survey participants had digitized industrial processes along their value chain, with 80% of them planning to digitize within the next five years. In the process, an average 18% increase in efficiency is expected both in terms of better productivity and resource efficiency. Another study, by Cap Gemini, shows digitization boosts operating profits by 5-30% as manufacturing competitiveness rises.

Growth in industrial software will continue to depend on:

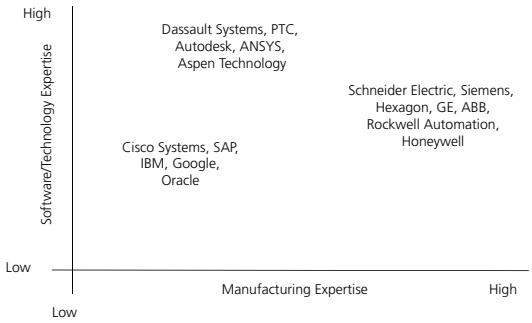
1. Solving design complexity: Industrial software helps manufacturing firms reduce design complexity, which is often a key bottleneck. For example, Renault's Formula One team leverages industrial software by using state-of-the-art simulation technologies for a broad range of applications including engine combustion, intake and exhaust, thermal cooling, batteries, electric motors, and turbochargers, thus enhancing its race competitiveness. Despite rising usage, we still expect significant growth potential for design-based software, particularly from EMs, given the low penetration.
2. Improved time to market: By solving design complexity and improving production efficiency through integrated tools, industrial software can significantly improve the time to market. A recent McKinsey study shows that digitization will reduce the time to market by 30-50%. In this regard, in addition to the advancement in 3D printing or additive manufacturing, drones

Fig. 10: Industrial software landscape



PLM=Product Life cycle Management
MES=Manufacturing Execution System
Source: Company reports, UBS

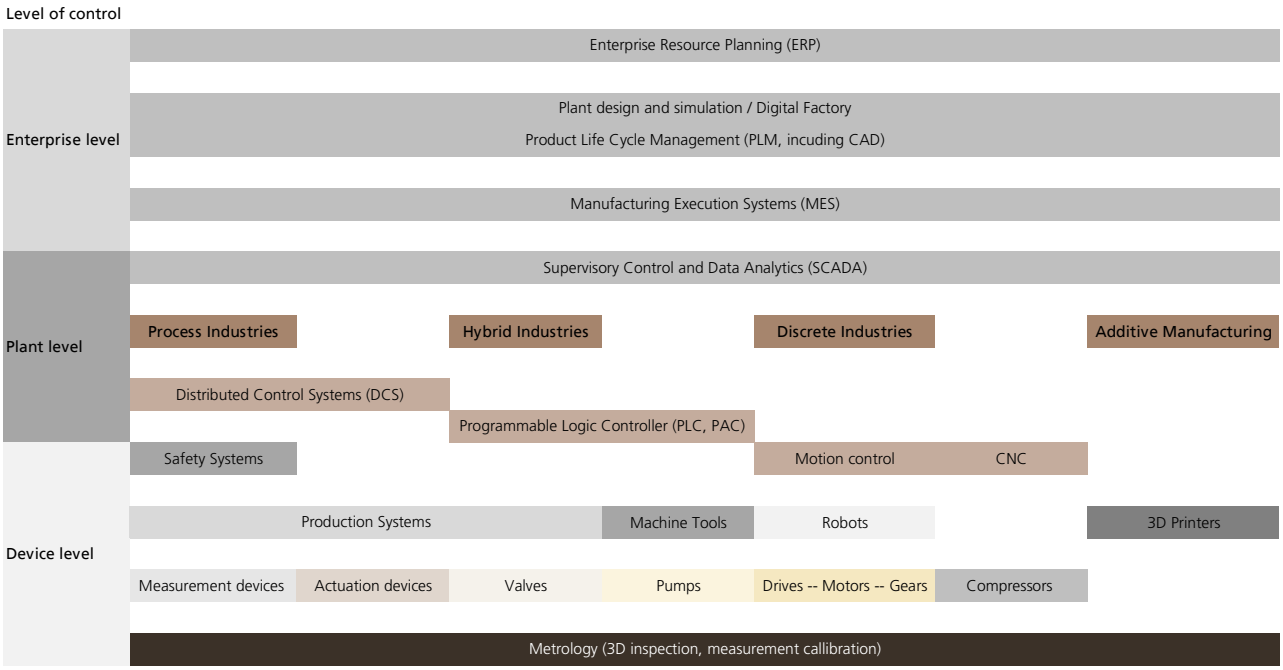
Fig. 11: Comparison of software expertise vs. manufacturing
Mix of industrials and IT companies, mainly large caps



Source: Based on BofA Merrill Lynch Global Research, adjusted by UBS

are fast emerging as a key IT tool for the growth of industrial automation.

Table 1: Overview of industrial software market



Source: J.P. Morgan

Implications for industrial companies

Today, industrial software accounts for between a low-single digit up to 30% of automation sales for the companies we have highlighted in this report (all numbers are estimates: software is 1-2% of Fanuc's automation sales, 4% for Rockwell Automation, 10% for Schneider Electric, 14% for ABB, and 28% for Siemens (32% if the Mentor Graphics acquisition is included]). However, the strong growth that we expect in this segment could make the difference through the next few cycles. Siemens, for instance, wants to double its number of software engineers by 2023 without an acquisition. As already mentioned, we expect 10% annual growth in the industrial software segment over the next few years. The resulting impact on automation companies at a group level is additional growth of around 1-2% on top of the normal hardware growth (through-cycle roughly 4%). Another point worth highlighting in this context is the higher operating margin level for industrial software sales. In 2016, average automation margins were 14-16% versus industrial software margins of more than 20%. Taken together, higher growth combined with better margins in the software divisions could have a strong positive impact on valuations too. Fig. 12 shows the margin and growth difference of the most important European capital goods and software companies over the last 15 years. Pure-play companies in the software sector trade at a 40% premium to "normal" hardware automation stocks.

To better understand the opportunity, let's do a quick calculation using two theoretical companies: Company A has a growing industrial software part and Company B is only focused on hardware (see Table 2). All characteristics being equal (cost of capital, leverage and asset intensity), automation Company A has a slightly higher margin than Company B (15% vs. 14%) due to better software margins and higher sales growth (5% vs. 4%).

The result is notable, the multiples are much higher - Company A trades at an 18% P/E premium to Company B and has an implied higher equity value of 27%. This example shows the positive earnings and margin impact of software growth and the resulting re-rating potential for automation companies. We think that this opportunity is not yet reflected in share prices, and investors have the opportunity to benefit from this trend over the next few years.

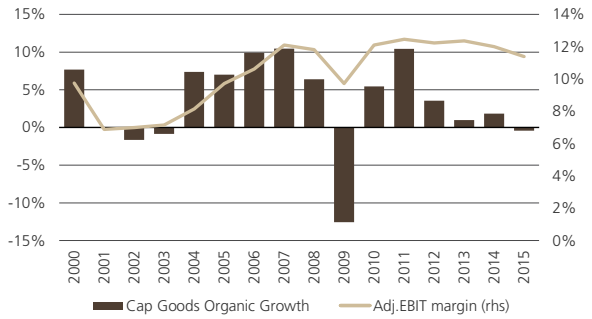
Table 2: Example of impact on value depending on growth

	Company A	Company B
Sales	100	100
Sales growth	5%	4%
EBIT margin	15%	14%
Debt	20	20
Interest	3%	3%
Tax rate	30%	30%
Net income margin	10.1%	9.4%
NWC / sales	10%	10%
Fixed assets/sales	20%	20%
Long term growth	5%	4%
Risk free rate	2.50%	2.50%
Equity risk premium	6%	6%
Beta	1%	1%
Cost of equity	9.70%	9.70%
Net income	10.1	9.4
NWC	0.5	0.4
Capex-depreciation	1.0	0.8
Free cash flow	8.6	8.2
Value of equity (Gordon Growth)	183	144
EV	203	164
EV/sales	2x	1.6x
EV/EBIT	13.5x	11.7x
P/E	18.1x	15.3x

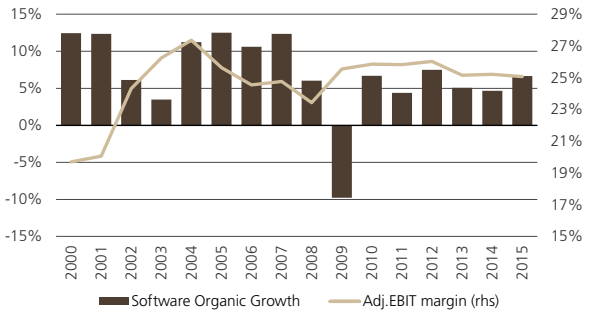
Note: NWC = Net Working Capital; EV = Enterprise Value
Source: J.P. Morgan, UBS

Remark: *The Gordon Growth Model is based on the assumption that the value of a company is worth the sum of all its discounted dividend payments. In this example, the value of equity is the discounted sum of free cash flows.*

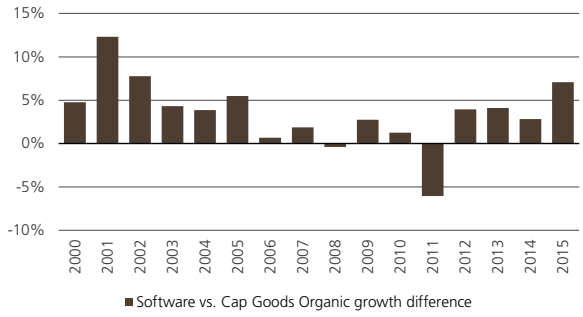
Fig. 12: Software - growth opportunities & margin potential
Over the last 15 years, software sales grew 2x and the margin is more than 2x higher.

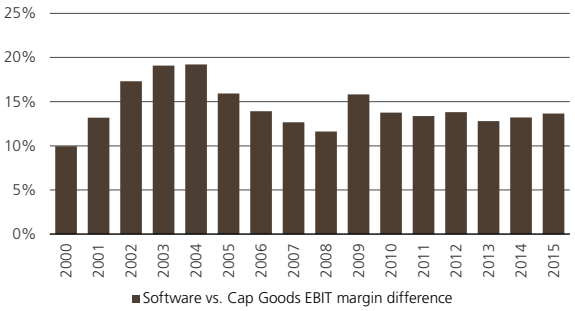


Big organic sales...



...and margin gap





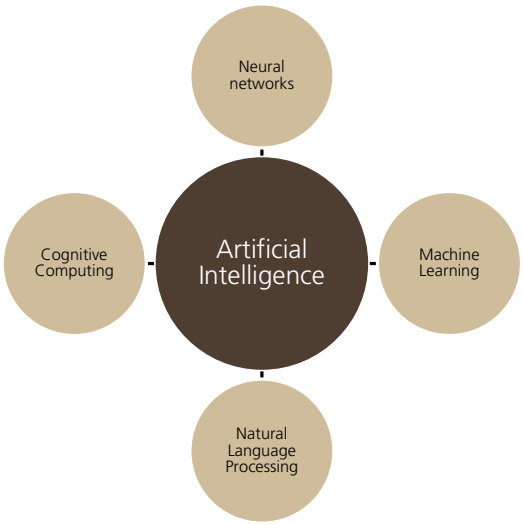
Note: rhs = right hand side
Source: Company data, Morgan Stanley, UBS

New long-term trends

Artificial Intelligence (AI) is at center of fourth industrial revolution

Artificial Intelligence, which we refer to as a set of tools and programs that makes software smarter in a way an outside observer thinks the output is generated by a human, is the next big thing in the automation space as it will have far-reaching implications on many industries. In the most simplistic terms, AI leverages self-learning systems by using multiple tools like data mining, pattern recognition and natural language processing. It operates like how a normal human brain functions during regular tasks such as common-sense reasoning, forming an opinion or social behavior. That said, AI is an umbrella term to cover a confluence of multiple technologies, such as machine learning, which includes deep learning, cognitive computing, natural language processing, neural networks, etc. (see Fig. 13).

Fig. 13: Artificial Intelligence is an umbrella term for many technologies



Source: UBS

The main business advantages of AI over human intelligence are its high scalability, resulting in significant cost savings. Other benefits include AI's consistency and rule-based programs, which eventually reduce errors (both omission and commission), AI's longevity coupled with continuous improvements and its ability to document processes - some of the few reasons why AI is drawing wide interest.

We believe AI can be divided broadly into three stages (see Fig. 14): artificial narrow intelligence (ANI), artificial general intelligence (AGI) and artificial super intelligence (ASI). The use cases of AI are manifold as AI-based software will push the limits of automation. Like a brain, AI powers the traditional sources of automation and robotics and drives progress of sectors like autonomous vehicles and drones. But as a standalone industry, AI-based software can create significant business opportunities. Some examples include virtual assistants or chatbots providing expert assistance, smart or robot advisors in the fields of finance, insurance, legal, media and journalism, and expert healthcare systems that provide medical diagnosis and assistance. Other benefits include significantly improving efficiencies in R&D projects by reducing time to market, optimizing transport and supply chain networks, and improving governance by better decision-making processes.

We are optimistic about the growth prospects of the AI industry. The exponential growth in computing power and the solid cloud and smart device ecosystem in place, coupled with favorable supply factors like low computing and storage costs, advanced algorithms and the increased availability of AI-based talent, are supportive factors. On the demand side, we believe corporates and governments are realizing the benefits of AI, resulting in increased attention and spending on AI projects. We expect AI industry revenues to rise from USD 5bn in 2015 to USD 12.5bn by 2020, growing at an average 20% a year. We expect growth rates to accelerate after 2020 as AI enters the second AGI stage, reaching a sweet spot with use cases and addressable market expanding significantly.

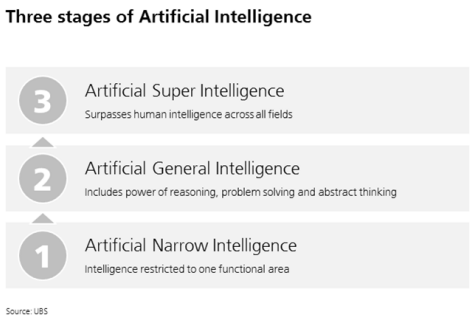
3D printing remains a long-term opportunity

Despite the recent mixed performance of 3D printing companies, we maintain our view that 3D printing holds promise in the long term. Beyond a few current applications, any dramatic benefits are only expected in the longer term. In the near term, rather than being applied to mass production, we see opportunities for 3D printers in businesses requiring rapid prototyping and high customization with small production quantities in the near future. Wohlers Associates, a leading industry research firm on 3D printing, expects the industry's revenues to grow from around USD 7.3bn in 2016 to USD 21.2bn in 2020.

The rise of commercial drones

Drones, which were initially restricted to military use, slowly expanded to personal use and are now literally taking off for commercial purposes. Also known as unmanned aerial vehicles (UAVs), drones are operated remotely or autonomously and generally carry a video camera to monitor flight. Although drones are still in their early days,

Fig. 14: Development of artificial intelligence



Source: UBS

Fig. 15: 3D printer- From bytes to bits

Source: Solidoodle

Fig. 16: Rising demand for drones

Source: iStock

they are being used across industries like manufacturing, utilities, agriculture, movie and government organizations at a fraction of the cost of a manned aircraft.

E-commerce and logistics companies are also beginning to experiment with drone technology, with Amazon, the global e-commerce leader, anticipating a future in which unmanned aircraft will exceed general air traffic, which today totals 85,000 flights a day. Thanks to its autonomous features, drones could be a new tool of industrial automation. For industrial companies, drones could prove handy for aerial inspection surveying, particularly in the oil, gas and mineral exploration and production industries, or for short cargo transport within the factory line, saving significant costs. Agriculture is another promising industry where drones can be widely used - for e.g. to survey crops and spot irrigation problems.

Despite the advantages of the drone market, we believe safety and other regulatory issues need to be addressed before we can estimate the industry growth. Currently, many governments across the world are in the process of setting up regulations related to safety and privacy.

Link to sustainable investing

We think that automation & robotics is part of the "Energy Efficiency" theme, which is a sustainability-themed investment. Energy efficient products and services help significantly to mitigate climate change through the reduction of greenhouse gas emissions. Energy demand continues to rise, particularly in emerging markets. A growing population, continued urbanization and rising wealth levels contribute to this structural trend. Energy efficiency gains through more automation can help to alleviate scarcity in environmental resources. Given the relatively large size of the global manufacturing sector, an aging population and rising wages, there is potential for a sustained expansion in automation equipment. As a result, automation is becoming a key business factor for a growing number of companies. From an investment perspective, smart automation represents one of the fastest growing segments in the broader industrial and IT sectors.

Link to Impact Investing and the UN Sustainable Development Goals (SDGs)

Rapid increases in productivity, driven largely by automation, have been among the most powerful drivers of human development over the last few centuries. There are many reasons to be optimistic about the role of automation in helping achieve multiple SDGs:

- There is significant scope in developing countries to increase productivity and economic output, contributing to progress on SDGs, including no poverty, zero hunger, good health and well-being, decent work and economic growth, and industry, innovation and infrastructure.

- Automation-driven reductions in the cost of manufactured products make technologies including solar and wind power systems, water filters, mobile phones and medical equipment cheaper and more available to low-income communities.
- Industrial software, precision machinery, ubiquitous sensors and advanced monitoring systems in manufacturing, mining and agriculture can increase resource efficiency and reduce water, energy and raw material usage. This positively impacts environmental SDGs like responsible consumption and production, climate action, life below water, and life on land.
- Artificial intelligence (AI) can improve health and well-being by promoting greater efficiency in existing healthcare systems, enabling self-monitoring and allowing for early diagnosis of medical conditions. Machine learning can further extend the availability of quality medical care to remote regions through automated diagnosis.
- Big data is increasingly being used to enhance decision-making in development efforts. Satellite imagery, combined with machine learning, can help map poverty more effectively and track illegal deforestation. Big data is also being used to improve efficiency in building and urban infrastructure design, smart power and water grids.

However, investors must also consider the potential SDG-related risks of automation. For example, automating low-skill and increasingly middle-skill jobs could increase workforce polarization and lead to greater inequality, at least in the short term, as new economy returns accrue to those with capital and the highest skills. Also, increasing industrial production efficiency does not necessarily lead to greater resource efficiency as lower-cost goods can spur higher demand and increase overall resource consumption. Furthermore, as machine learning is increasingly used to evaluate access to credit, insurance and jobs, there is risk that AI could replicate human biases and further exacerbate discriminatory social dynamics.

Automation's potential for social and environmental impact on multiple areas as outlined above, together with potentially higher growth and returns from disruptive technologies like AI, make it an attractive impact theme. Currently, few impact investing solutions focus exclusively on automation and robotics. Investors can access this theme through generalist private equity and venture funds as well as via direct investment opportunities, subject to eligibility, availability and ability to execute such investments. Artificial intelligence, in particular, is a current area of focus for venture capital, with over USD 5bn invested in 658 startups in 2016, according to CB Insights. When investing using non-impact-specific vehicles, impact investors must assess on their own whether individual investments meet impact criteria including intent, measurability, verification and additionality.

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Conclusion

We think that the current industrial revolution will turn today's manufacturing into smart factories over the next decade. The smart automation industry's total annual revenues stand around USD 156bn now. Despite the weakness in the last two years, we believe we are now at the trough in process automation. Also, the outlook for discrete automation is better, with improving trends in China and other regions. We believe that over the cycle the sector can grow by mid-to-high single digits, with industrial software, robots and the new trends discussed in the report the clear outperformers. We expect hardware companies with sizable software exposure to grow their automation business by mid-single digits and pure-play software companies by high-single to low-double digits.

Overall, we think that industrial software will be a growing differentiator for companies and investors. We expect the industrial software market to grow on average around 8-10% with superior margins. Software is at the center of this revolution, but there is also tremendous demand for automation hardware, such as robots, from EMs and several sectors which should lead to sustainable growth. To mention one obvious example, the rising trend of multiple IT devices per individual (compared to one PC in the past), coupled with shorter product cycles (six months to one year), is leading to a surge in device manufacturing and increasing complexity. Against this backdrop, the rising trend of automation by IT manufacturers is evidence of the recent strong demand for industrial robots. Other supporting long-term drivers are demographic challenges in key countries like China and, in general, increasing wages in EMs.

In summary, we should see two positives in this theme: 1) strong potential earnings growth: and 2) re-rating potential for industrial companies with automation software exposure. We think investors have the opportunity to benefit from the automation and robotics trend over the next few years.

Risks

In the longer term, we see a global industrial recession as the main risk that could negatively impact automation investments. In the short term, a subdued oil price could hinder petrochemical investments in process automation, and peaking automotive investments could hurt factory automation spending.

Appendix

Terms and Abbreviations

Term / Abbreviation	Description / Definition	Term / Abbreviation	Description / Definition
2011E, 2012E, etc.	2011 estimate, 2012 estimate, etc.	A	actual i.e. 2010A
CAGR	Compound annual growth rate	Capex	Capital expenditures
COM	Common shares	E	expected i.e. 2011E
EV	Enterprise value = market value of equity, preferred equity, outstanding net debt and minorities	p.a.	Per annum (per year)
Shares o/s	Shares outstanding	UP	Underperform: The stock is expected to underperform the sector benchmark
CIO	UBS WM Chief Investment Office		