



[The Digital Future](#)

Society 5.0

Japanese Ambitions and Initiatives

[Franz Waldenberger](#)

Facing pressing challenges in demography, politics and society, Japan seeks salvation in a digital future. All aspects of life shall be interconnected to make life easier. Prime Minister Shinzo Abe and his government are determined to turn this idea into reality soon.

Japan's society is rapidly ageing. Statistics show that by 2030, 40 per cent of the population will be 60 years and older. The solution to tackle the challenges ahead? Technology. The idea of "Society 5.0" emanated from the need to master the challenges of digitalisation and connectivity.

Thus far, Japan has introduced a series of initiatives regarding Society 5.0 by different actors, namely by the Cabinet Office, the Prime Minister, the Ministry of Economy, Trade and Industry (METI) and *Keidanren*, Japan's leading business organisation. How these actors and initiatives will be able to shape the future of Japanese society, constitutes an endeavor of crucial importance.

Japan has the second largest IT sector of all OECD countries.¹ It invests heavily in Information and Communication Technologies (ICT) related Research and Development (R&D) and its IT hardware products are highly competitive in international markets. Japanese researchers made major contributions to "ubiquitous computing", while Japan's telecommunication industry took a leading role in the development of the mobile internet. The country also boasts one of the highest penetration rates of mobile broadband.

However, Japan does not host a vibrant startup eco-system comparable to Silicon Valley that seems to provide an ideal testing field when it comes to exploring the potentials of digitalisation, connectivity, big data, artificial intelligence (AI) or blockchain technologies.² Like Germany, Japan maintains a relatively large manufacturing sector, yet it was Germany which first attracted international attention with *Industrie 4.0* as its national framework and platform

to comprehensively exploit the opportunities implied by digitalisation and connectivity.

Since 1998 Japan has organised an annual Global ICT Summit and has been launching its own initiatives with regard to ICT as part of its

- general economic policy (Prime Minister and its Cabinet),
- industrial policy (Ministry of Economy, Trade and Industry),
- science and technology policy (Cabinet Office / Council for Science, Technology and Innovation and Ministry of Education, Culture, Sports, Science and Technology), and
- its ICT strategy (Ministry of Internal Affairs and Communication).

In 2013, following the announcement of its ICT growth strategy, the government officially declared that it will make Japan "the world's most advanced IT Nation".³

The first industry specific responses to *Industrie 4.0* were the establishment of three (!) industry consortia, the Robot Revolution Initiative in May 2015⁴, the Industrial Value Chain Initiative in June 2015⁵, and the Internet of Things (IoT) Acceleration Consortium in October 2015.⁶ In addition there have been initiatives by the Japan Association of New Economy⁷ and the Internet Association Japan.⁸ As some of these terms might sound cryptic, it may be unnecessary to explain the technical details of the above mentioned consortia. However, the mere creation of these initiatives demonstrates the strong response *Industrie 4.0* has triggered in Japan.

The most comprehensive framework recently promoted by the Japanese government is “Society 5.0” (see table 1). Society 5.0 is used to highlight Japan’s unique position and role in mastering the challenges of digitalisation and connectivity. The term was introduced in the 5th Science and Technology Basic Plan of January 2016 with explicit reference to the national IoT initiatives in the US, Germany and China.

Society 5.0

The 5th Science and Technology Basic Plan formulates the ambitious goal of making Japan a

world-leader in the creation of a “super smart society”. The so-called Society 5.0 represents a state that appears almost utopian, a perfectly connected, highly efficient and inclusive society, which fully integrates the cyber and the physical world.⁹ Eleven systems are defined as tasks that need to be accomplished to achieve the final goal. The core is made up of three systems addressing important social and economic needs and requiring urgent action on a national level. All systems are addressed by separate initiatives, require close collaboration between academia, industry and government and are to be coordinated and integrated through a common

Table 1: Society 5.0 – Japan’s Initiatives at a Glance

<i>Institution</i>	Cabinet Office / Council for Science, Technology and Innovation	Prime Minister of Japan and His Cabinet / Japanese Economy Revitalisation Headquarter
<i>Title</i>	The 5 th Science and Technology Basic Plan ¹⁰	Growth Strategy 2017 ¹¹
<i>Focus</i>	Core systems: intelligent transportation systems, energy value chain, new manufacturing systems, additional systems: global environment information platform, infrastructures, hospitality, smart food chain systems, disaster resilience, integrated material development systems, smart production systems	Policy areas / strategic fields: „extension of healthy lifespan”, “realisation of mobility revolution”, „creating next generation supply chains”, „building and developing pleasant infrastructures and towns”, „FinTech”
<i>Supporting areas</i>	Technological domains: Cybersecurity, IoT system architecture, AI, device technology, network technology, edge computing, mathematical science	Cross-sectional tasks: <ol style="list-style-type: none"> 1. enhancing sources of value creation (platform / systems for exchange and use of data; IT related education / human resources; innovation / venture eco-systems), 2. reforms to support value creation (reform test cases; reducing administrative burdens; corporate governance reforms; expanding private / public partnerships and private finance initiatives), 3. better integration of local economies (SMEs, services, agriculture, tourism / sports / culture)
<i>Japan’s strengths / advantages</i>	Technologies: Robotics, sensor technology, actuator technology, biotechnology, human interface technology, material / nanotechnology, light / quantum technology	Japan facing severe demographic as well as energy / environmental challenges; pressing labour shortages; availability of big data

platform (the “Society 5.0 service platform”), that is yet to be launched. The “5th Plan” further lists several technological domains considered as fundamental for the promotion of the above systems and emphasises technologies, which are relevant for the eleven systems as well as for the fundamental technological domains and where Japan is in a leading position.

Society 5.0 plays a pivotal role in the recently updated growth strategy under “Abenomics”. Approved by the Cabinet in June 2017 under the title “Future Investment Strategy – Towards the Realisation of Society 5.0” (in Japanese), the Growth Strategy 2017 sees the efforts

undertaken towards Society 5.0 as “the key to break secular stagnation and achieve mid-and-long-term growth”. It argues that Japan is in an advantageous position to take the lead because

- it faces severe challenges like the rapid ageing of its population, the de-population of rural areas and energy and environmental issues, where Society 5.0 is expected to deliver urgently needed solutions,
- fears of mass unemployment associated with the 4th industrial revolution will be less relevant for Japan as the country’s labour force is rapidly shrinking,

<i>Institution</i>	METI/Industrial Structure Council – New Industrial Structure Committee	<i>Keidanren</i>
<i>Title</i>	„Future Vision Towards 2030s“ ¹²	Rebuilding Japan through the realisation of Society 5.0 (only in Japanese) ¹³
<i>Focus</i>	Specific strategies: Mobility (people and things); smart supply chain and production systems; health and nursing care; living (new cities, sharing economy, FinTech)	Tokyo 2020 as model case); region (advanced data analysis & robotics to agriculture, automated driving, robotics & smartphones to improve child and elderly care, a work environment in support of family life, diversified and decentralised energy system, resilient infrastructure); products and services (optimising value chains, fostering technologies where Japanese industry excels – devices, materials, supercomputing, ensuring international competitiveness of SMEs – top craftsmanship, new 3D printing); infrastructures (smart construction systems, big data & AI for asset management, virtual Japan); cyber space (data infrastructure, digital twin infrastructure, cyber security, resilience, etc.)
<i>Supporting areas</i>	Cross-sectional tasks: better rules (IP, data, standards, regulations); innovation eco-systems (CoEs, industry-academia collaboration, AI roadmap, venture business); rejuvenating economic system (risk capital, business restructuring, governance); human resource development and management; social security systems; regional economies, SMEs; developing business overseas	Comprehensive reforms / adaptations in five areas: public administration, legal system, technology, business organisation, human resources, education, work styles, social acceptance.
<i>Japan’s strengths/ advantages</i>	abundance of „physical“ data; manufacturing technologies; pressing social issues	no explicit emphasis

Source: Author’s compilation.

- the country has a competitive edge in integrating virtual data from the internet with real data provided by various service industries, transportation and manufacturing systems.

The Strategy 2017 specifies certain policy areas for future investment and outlines cross-sectional tasks needed to be tackled in order to realise the value creation potential of digitalisation and connectivity.

Society 5.0 represents a state that appears almost utopian.

Society 5.0 has also been incorporated in METI's "New Industrial Structure Vision", projecting the evolution of industry up to 2030. The outline defines a number of strategic areas and cross-sectional tasks. Strategic areas are further subdivided into subthemes with a future vision, a roadmap and breakthrough projects sketched for each subtheme. METI sees Japan capable of taking the lead in the realisation of Society 5.0 due to its abundance of well documented physical data, advanced manufacturing technologies and pressing social issues. In March 2017, METI announced the Japanese version of connected industries as an integrated part of a "human centric" Society 5.0. The concept incorporates three pillars:

1. a digital society based on co-working of humans and machines,
2. multilevel cooperation across regions, borders and time,
3. human resource development.

The concept has been promoted and further developed in a series of roundtables organised by METI in cooperation with representatives from Japanese industries. *Keidanren* endorsed the concept of Society 5.0 in its policy proposal "Toward realisation of the new economy and society" as early as April 2016. In July 2016, it came up with a proposal specifically targeting

the use of data ("In pursuit of an environment for utilisation of data. Towards the achievement of Society 5.0"). In February 2017, *Keidanren* published a comprehensive action plan to rebuilt Japan with Society 5.0 as its key concept.

In July 2017, as a follow-up to the G7 Information and Communication Ministers Meeting in April 2016 in Japan, the Japanese Ministry of Internal Affairs and Communication published





Wedding 5.0: In the long run, society 5.0 is seen as an argument to push for fundamental reforms of Japanese social institutions. Source: © Yuriko Nakao, Reuters.

a first draft of guidelines for Research on Artificial Intelligence (AI) as a basis for international discussions. The aim is to achieve multi-stakeholder participation and sharing of best practice among the G7 and OECD countries.¹⁴

Preliminary Assessment

Society 5.0 has certainly become the dominant framework for Japanese discourse about

the next industrial revolution. But what exactly defines it?

Comprehensiveness is the first pillar of the said framework. Society 5.0 moves beyond industry in the narrow sense. It fully embraces the potential social transformations inherent in the digitalisation and full-fledged interconnect- edness. The second characteristic is issue ori- entation; i.e. the potential of digitalisation and

connectivity are not discussed from a purely technological point of view (what is technologically possible), but with regard to their contribution to Japan's urgent social and economic issues, like ageing, depopulation, energy, productivity, regional revitalisation, disaster resilience. Furthermore, the entire process is laid out in a way that sees itself as a driver of reform: Society 5.0 is not only seen as the "new growth engine", but also as an argument to push for fundamental reforms of Japanese economic and social institutions. Lastly, a Japan specific focus matters: With reference to existing strengths of Japanese industry, Society 5.0 emphasises specific technology areas where Japan should take a lead, like the integration of virtual and physical data (sensor technology, autonomous driving, smart value chains/manufacturing systems), robotics/AI, new materials, blockchain/FinTech.

Comprehensiveness and issue orientation represent some of the pillars of Society 5.0.

To be sure, the policy proposals sketch very ambitious goals and appear utopian in many respects, but this is typical of Japanese policy initiatives.

Despite the common frame of reference provided by Society 5.0, the many ideas, proposals and initiatives remain only loosely coordinated. While this might not be surprising given the complexity and uncertainty surrounding the new digital future, it points to a typical structural problem confronting such a national strategy; namely the organisational boundaries within the public administration, between companies, industries or industry and academia. These boundaries obstruct the cross-sectional coordination and collaboration necessitated by the system-wide implications of Society 5.0, and engender numerous duplications of efforts. It remains to be seen whether the new vision can create a strong enough momentum or sense of

common mission to overcome the structural barriers, otherwise its implementation will be greatly constrained by lack of coherence and integration.

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- 1 Organisation for Economic Co-operation and Development (OECD) 2015: OECD Digital Economy Outlook 2015, in: <http://bit.ly/2FPeShG> [20 Mar 2018].
- 2 Joh, Anthony 2017: Tokyo-based podcaster explains Japan's declining startup scene and its future, Tech in Asia, in: <http://bit.ly/2ueSoBZ> [20 Mar 2018].
- 3 Prime Minister of Japan and His Cabinet 2013: Declaration to be the World's Most Advanced IT Nation, 14 Mar 2013, in: <https://bit.ly/2GIgQrO> [20 Mar 2018].
- 4 Robot Revolution Initiative 2015: The founding general meeting of the robot revolution initiative was held, in: <http://bit.ly/2G1NQo7> [20 Mar 2018].
- 5 Industrial Value Chain Initiative, <https://iv-i.org/wp/en> [20 Mar 2018].
- 6 Internet of Things Acceleration Consortium, <http://iotac.jp/en> [20 Mar 2018]. The term "Internet of Things" defines the increasing interconnection of 'intelligent' electronic devices, which are able to communicate with each other internally and with the Internet externally. Various household objects we use in our everyday life are equipped with processors and sensors to be able to communicate with each other. Cf. Gruenderszene.de, GS Lexikon. Internet of Things, in: <http://bit.ly/2HZQAz9> [20 Mar 2018].
- 7 Japan Association of New Economy 2018: Organizational chart, in: <http://bit.ly/2pEGAUr> [13 Mar 2018].
- 8 Internet Association Japan, <https://www.iajapan.org> [20 Mar 2018].
- 9 The four previous development stages of human society are the hunter-gatherer, agrarian, industrial and information society.
- 10 Council for Science, Technology and Innovation, <http://www8.cao.go.jp/cstp/english> [20 Mar 2018].
- 11 Prime Minister of Japan and His Cabinet 2018: Japanese Economy Revitalization Headquarter, in: <http://bit.ly/2DPD2DB> [20 Mar 2018].
- 12 Ministry of Economy, Trade and Industry 2017: A Final Report on the New Industrial Structure Vision was compiled, in: <http://bit.ly/2HZgByg> [20 Mar 2018].
- 13 Keidanren Policy & Action 2017: Rebuilding Japan through the realization of Society 5.0, in: <http://bit.ly/2pyZ2yd> [20 Mar 2018].
- 14 To ensure a human centered approach, the guidelines put forward nine principles for the sound development of AI R&D: transparency, controllability, safety, security, privacy, ethics, user assistance and accountability, cf. The Conference toward AI Network Society 2017: Draft AI R&D Guidelines for International Discussions, 28 Jul 2017, in: <http://bit.ly/2pxTJPI> [20 Mar 2018].