Thomas Schmidt*, Satoshi Tomita**,
Yuki Yamauchi*** & Jörg Sydow*

* Freie Universität Berlin, Germany, Department of Management
** Rikkyo University Tokyo, Japan, Graduate School of Business Administration
*** Doshisha University Kyoto, Japan, Faculty of Commerce

Contact: thomas.schmidt@fu-berlin.de

Entrepreneurial Storytelling and the Rise of Robotics/AI Start-ups in Japan

Abstract
The narrative perspective has been developed recently in entrepreneurship research in order to analyze how entrepreneurial innovation is co-created by founders and contexts. Instead of analyzing founders and contexts as distinctive levels, the notion of entrepreneurial storytelling points to the process of relational, temporal and performative enactment. More specifically, during the process of new venture creation legitimacy can be gained by creating intertextual links between the venture idea and its contexts. Given the lack of empirical research on the narrative perspective in entrepreneurship, we conducted a qualitative comparative case study on two robotics/AI start-ups in Japan. While in the first case a Japanese narrative was enacted (Japan's demographic problems, stagnation and Abenomics), a Silicon Valley narrative was enacted in the second case (chasing opportunities, high growth, venture capital). So far, both narratives seem to enhance the development of the start-up companies.

Keywords: entrepreneurship, Japan, narratives, grand challenges, demographics, AI, robotics

1 Introduction

With their entrepreneurial narratives, start-ups sometimes address grand challenges like climate change or poverty. In this regard, not only social enterprises matter (Dorado & Ventresca, 2013; Eisenhardt, Graebner, & Sonenshein, 2016; Ferraro, Etzion, & Gehman, 2015) but also for-profit start-ups that aim to make their start-up narrative more convincing in accord with societal challenges. In this regard, social impact and profitability are not conceived and presented as a trade-off (Lyneis & Sterman, 2016) but rather as complementary goals, sometimes not unlike in the case of hybrid organizations (Mair, Mayer, & Lutz, 2015). For example, healthcare as well as care for the elderly have been discussed as grand challenges (Vakili & McGahan, 2016) to which start-ups can contribute. In Japan, robotics/AI ventures also relate their founding narratives more often than not to the challenge of dramatically changing demographics in this country.

Based upon two start-ups in the Tokyo metropolitan area, we will explore how new ventures in Japan relate their founding narratives to such grand challenges or other argumentations in order to convince stakeholders, not least public agencies and financial investors, but also society at large of their ability to reconcile profitability with societal goals. Japan offers a great opportunity to study the "intertextual links" (Garud, Schildt, & Lant, 2014b) between founding narratives and societal challenges as in several respects, the latter are more advanced and pressing here than in most other developed countries. This is particularly true with regard to the aging society and challenges to the healthcare system that co-emerge with changing demographics.

With our exploration of the two cases we expect to provide not only insights into how entrepreneurs construct and eventually reconstruct their narratives along tensions between a firm's profitability and societal challenges but also strengthen the narrative perspective in entrepreneurship research (Garud, Gehman, & Giuliani, 2014a). In this way, we add to the interpretative perspective, which, despite the importance of entrepreneurs and their talking and acting in the start-up process, "has remained conspicuously sidelined" (Packard, 2017: 537) in entrepreneurship research in general and research on entrepreneurial innovation in particular. The same applies to the historical/processual perspective, which connects well to such a narrative approach, can almost be seen as a necessity in the analysis of stories and contexts, and also deserves more attention when analyzing start-up activities and practices (Lippmann & Aldrich, 2016).

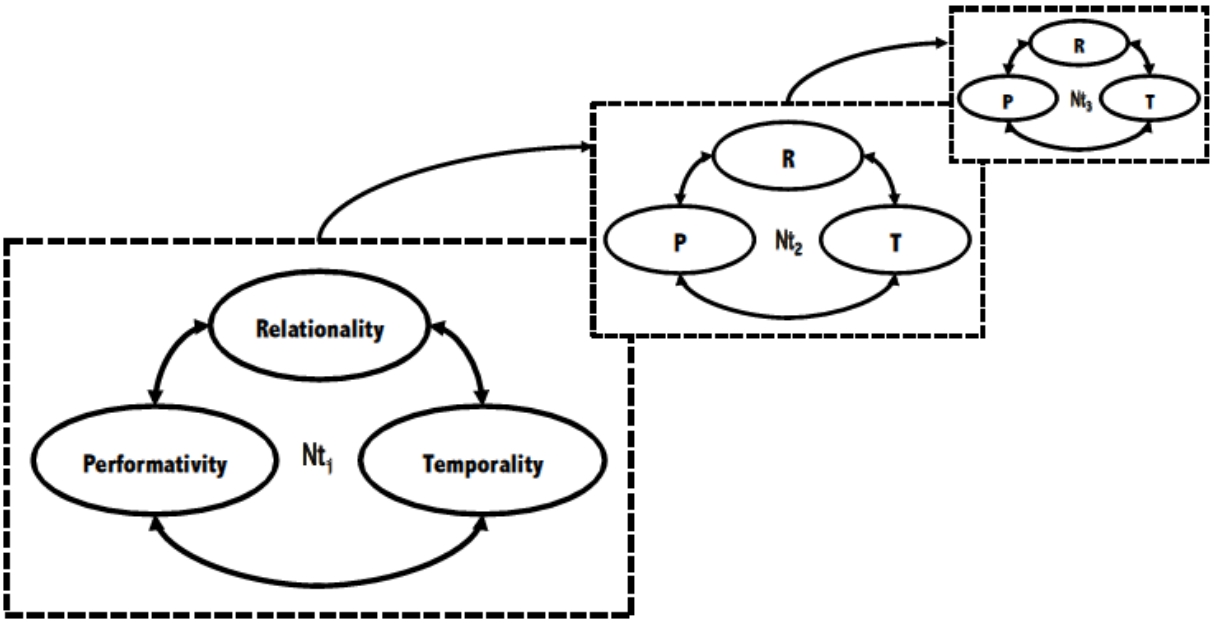
2 Entrepreneurial storytelling: Embedding narratives

Most recently, entrepreneurial storytelling (Doganova & Eyquem-Renault, 2009; Lounsbury & Glynn, 2001; Martens, Jennings, & Jennings, 2007) was revived as a methodology to better understand the entrepreneurial journey of start-ups in contexts. Most prominently, Garud et al. (2014a) point to the potential of this type of constitutive approach, paying particular attention to the entrepreneurial agency and the structure of the economic, organizational, technological and institutional context entrepreneurs act in and upon. The narrative perspective these authors have proposed addresses relational, temporal and performative facets of entrepreneurship (see Figure 1).

According to Garud et al. (2014a) "the *relational* facet refers to the constitution of agency through existing and anticipated relationships across social and material elements" (p. 1181). Respective narratives are not only texts (e.g. business plans, press releases, pitches) but also implied in the actions that entrepreneurs undertake (e.g. developing prototypes, raising capital, dealing with customers). In consequence, entrepreneurs contextualize their venture socially and materially within the ecosystem, cluster and/or value chain, trying to offer a "coherent and plausible account" (p. 1181), not least by comparing their founding idea, constructed narrative and projected numbers with others.

The *temporal* facet captures the unfolding of the entrepreneurial journey with respect to time, timing and temporality, including the sequencing, pacing, and entrainment of actions and events. Moreover, this facet allows for different temporal orientations of actors (including the entrepreneurs themselves and their multiplicity of stakeholders) and captures how past, present and future are mutually constituted in the process.

Finally, narratives are *performative*, that is, "they trigger action as entrepreneurs try actualizing the very arrangements they have proposed in order to generate meaning around their ventures" (Garud et al., 2014a, p. 1182). In order to become consequential, however, the narrative has to fit the social and material networks as well as the tempo and temporality envisaged, not least the history and the zeitgeist. But even if it does not fit the context, the narrative has a consequence, not least by disappointing expectations.



Relationality: Entrepreneurs contextualize by associating with social and material elements
Temporality: Entrepreneurs contextualize by accounting for the past, present and future
Performativity: Entrepreneurs contextualize by performing the conditions required for making progress
Nt_1, Nt_2, Nt_3: Entrepreneurs contextualize through narratives both in real time and over time (i.e., Nt_n)

Figure1: Narrative Perspective on entrepreneurship (Garud et al., 2014a: 1184)

Garud et al. (2014a, p. 1183) summarize their approach as follows: "These three facets – relational, temporal, and performative – form a narrative toolkit for appreciating how entrepreneurs constitute innovation. Entrepreneurs attempt to contextualize innovation by establishing links with the past, present and future to generate meaning. However, the conditions required to contextualize innovation do not always emerge as envisioned, thereby requiring entrepreneurs to revise their narratives." What is more, they crystallize their approach into a process model, which shows that these three sub-processes remain relevant when entrepreneurs contextualize their actions through constructed and reconstructed narratives over time.

3 Method

We apply a comparative qualitative case study design (Eisenhardt, 1989; Yin, 2014). More specifically, we analyze how two new ventures relate to grand challenges when creating, maintaining and eventually reconstructing their founding narratives: CYBERDYNE and Studio Ousia, both located in the Tokyo metropolitan area. We chose to identify suitable ventures in the emerging field of artificial intelligence (AI) and robotics, which is particularly advanced in Japan and situated in and around Tokyo. What is more, in Japan those technologies are considered as providing solutions to major societal challenges, including demographics and health. The two cases were selected from a larger set of start-ups initially contacted and interviewed. The major reason for choosing these two cases was the prominent position of the companies in the field of AI/robotics, the time of their founding about ten years ago, and last but not least initial knowledge (from studying publically available information sources) about their founding narratives and their links to societal challenges.

Data collection was based on an analysis of the companies' websites, press reports, and interviews with the management. In all, so far we have conducted interviews with 6 informants, 3 for each case, at their facilities plus several background interviews with

representatives from industry, government and research. In addition to interviews with industry experts, government officials and researchers, a media analysis of the Japanese AI/robotics discourse was conducted for a better understanding of the field. For the two ventures, data analysis concentrated on the founding narratives as presented in written documents and interviews. In particular, we employed the narrative toolkit developed by Garud et al. (2014a) and focused on intertextual links between these narratives and the aging society and accompanying challenges in Japan.

According to Doganova and Eyquem-Renault (2009), when looking for investors and other stakeholders, entrepreneurs need to convince these in terms of not only calculations but also narratives. In particular, the presentation of the new business model "must pass 'the narrative test' (is the story coherent?) and 'the numbers test' (do the maths work?)" (p. 1562, with reference to Magretta, 2002). Therefore, when analyzing a narrative, it is important to focus on the tensions the plot implies, with regard to the market, the technological and societal environment the firm is embedded in, and how these tensions are solved by the entrepreneur. In order to analyze the narratives of CYBERDYNE and Studio Ousia in a first step, we developed the following analytical framework (Table 1).

Starting with traditional narrative theory (Czarniawska, 1997; Freytag, 1863), the *exposition* refers to the general background in which an entrepreneurial narrative is embedded. The historical and cultural context opens up the space of possibilities for an unfolding narrative. The divergence of how an entrepreneur uses his or her own storytelling is typically affected by the historical exposition process, including eventual explanations why the story is constructed the way it is. This emphasis on history is not yet very common in entrepreneurship research (see, however, Lippmann & Aldrich, 2016; Vaara et al., 2016) but very important for understanding the start-up process and how it relates to society, not least from a narrative perspective. The *tension* refers to a conflict within the exposition, something that calls for change and action; in the case of an entrepreneurial narrative this can be related to a particular grand challenge or some minor event. For our purpose, we analyze tensions on two levels, first the grand challenge on the societal level and second the challenges that characterize any new venture. The *transition* is the crucial part of the entrepreneurial narrative: it is the narrative's climax, transforming the tension into a *new state* through acting and talking as constitutive parts of the entrepreneurial agency.

Process/Code	**CYBERDYNE**	**Studio Ousia**
Exposition	In Japan, there is a rather positive attitude towards robotics, due to popular comic books and the important role technology plays in education.	Research activities progressed in Japan but did not blossom. AI became a forgotten technology for a while.
Tension societal level	Japan succeeded in the technological advancement of robotics and created supporting systems for them.	Japan had no idea how to use AI technologies and failed to support their development.
Tension venture level	Robotics has great potential, but it is very research-intensive and therefore costly. These challenges can hardly be overcome by a start-up without close collaboration with research organizations and government support.	Technology of the company depends on one talented person (CTO), who has enthusiasm and a very good educational background. Collaboration with research organizations and government support seem less pivotal.
Transition	With the help of a variety of government support programs and close university ties, CYBERDYNE	Studio Ousia is the top AI start-up in natural language analysis because the CTO of the company has won several

	developed robotics technology to master grand challenges in Japan.	championships in international competitions and beat Google and Microsoft. He and the CEO work together like start-ups in Silicon Valley, attracting venture capital.
New state	CYBERDYNE has built a top-level reputation in the field of humanoid robots and is supporting other start-ups, including two AI ventures	Studio Ousia and their rivals are now creating the AI business field in Japan. They do not rely on legitimacy by relying on national institutions.
Narrative coherence	The narrative is coherently creating intertextual links between the venture and Japan's grand challenges and the need for a national support system.	The narrative is coherently creating intertextual links between the venture and VCs and also intertextual links between academics and businessmen in the AI field.

Table 1: Analyzing the two narratives in their basic narrative dimensions

In the discussion section, we will make use of Garud et al.'s (2014a) three facets of the narration (the *relational*, the *temporal*, and the *performative*) in order to analyze the relationship between grand challenges and entrepreneurial narratives in each of these phases of the process.

4 Robotics/AI in Japan

4.1 Exposition: The origins of the field[1]

Our informants told us that one important reason for the fit between Japanese culture and robotics/AI is that many Japanese love AI/robots due largely to the influence of popular comic books. The history of Japanese people's interest in robots indeed dates back to the 1910s. The 1st generation learnt about this technology from European novels, which caricatured robots as objects making people feel future-fit (Inoue, 1993). As a result, the first robot narrative in Japan appeared as a future symbol and conveyed a positive image. This narrative affected the 2nd generation. Osamu Tezuka, born in 1928 and one of the most influential comic creators in Japan, triggered a new narrative of a robot as a human being. This concept was similar to an AI robot. As a result, after being introduced by Tezuka to *Astro Boy* (1952), boys and girls in those days accepted this character in the comic and started to feel close to the robot. Subsequent creatives imitated Tezuka's style and strengthened the new narrative. Another narrative appeared a little later. Mitsuteru Yokoyama's *Iron Man No. 28* (1956) was a seminal work, in which people saw a giant mecha accompanied by human control. This more realistic style impacted not only on the next generation of writers but also on future AI/robotics engineers in Japan. One of our informants, who was a child during the 1960s, told us that some scholars in robotics/AI were influenced by 1970s comics and added that he himself had been affected by *I, Robot* (1950), written by Isaac Asimov (Robot as a future symbol) and *Cyborg 009* (Robot as a human being).[2] The point is that comic books indirectly supported Japan's AI/robotics blossoming in terms of sharing positive images

[1] We thank Masahiro Kotosaka of Keio University, Tokyo, and Toshimichi Miura of Japan Robot Association for their generous help with this section.

[2] (2006), *Normalization*, 301, (http://www.dinf.ne.jp/doc/japanese/prdl/jsrd/norma/n301/n301005.html)

regarding this technology amongst the people. Table 2 summarizes the changes of the narratives on which the discourse in Japan has been based.

Generation	Narrative	Trigger	Impact
1st	Robot as a future symbol	Importing from Europe (1910s)	Robot had a positive image for Japanese people and affected the 2nd generation
2nd	Robot as a human being	Tezuka (1952)	Making people feel close to robots
3rd	Robot as a mecha with human being's control	Yokoyama (1956)	Making engineers feel the possibility of creating a robot
4th	Robot as a realizable machine	Technological advancement	Realizing that producing a robot is not only for research labs but for factories

Table 2: Changing narratives of robotics protagonists in Japan

Another important, positive influence that contributed a lot to the development of the AI/robotics technology and industry in Japan is the educational system. The engineer training system in Japan's higher education system started at the Imperial College of Engineering in 1877. The engineer training school model spread quickly all over Japan. After WWII, those schools became part of national and private universities and provided study programs in AI and mechatronics, which combine mechanics, electronics, and control. In addition to universities, another higher education system for engineers was set up, starting in 1962, called the College of Technology in Japan, which offered a 5-year program for students starting from the age of 15. Graduates from these colleges were soon in high demand not only from companies but also from prestigious universities. In combination with these two educational systems, potential Japanese engineers could receive training all over Japan and traditionally kept in touch with robotics/AI.

The domestic narrative: Robotics

The current robotics industry in Japan has grown along with the domestic home-bound narrative. While Japanese researchers created basic technologies in this field, Japanese business concentrated on the application of these technologies. Governments supported the two streams from the 1980s onwards. The media talked about this favorably. The combination of these two streams and the respective government support constituted the domestic narrative: robotics technology was born in Japan.

The ElectroTechnical Laboratory (currently: National Institute of Advanced Industrial Science and Technology) founded in 1970 introduced one of the earliest models of robots, named ETL Robot Mk-I in October 1970. Some of its members specialized in motor control, others specialized in robotics designs, image processing or artificial intelligence. Later, the members of the Institute were spread around Japan. Some of them became researchers of private companies, most became professors at research universities. The Robotics Society of Japan was founded in 1983 and started to organize these researchers (Takase, 2016).[3]

The Society distinguishes four basic research streams (Manipulation, Locomotion, and Sensing and Integration) and applied research in business (Business).[4] The Society picked prize winning papers and selected probably valuable or useful works for Japanese society from the 1960s; we summarize them in Table 3. The table shows that academia in Japan created basic technologies for robotics. Each research component dealt with a specific technological problem. Robots appeared physically only when all the problems of each

[3] https://sankoukai.org/secure/wp-content/uploads/untold_stories/kunikatsu-takase_final.pdf
[4] http://rraj.rsj-web.org/en

component had been cleared. One informant told us it was crucial for starting-up robotics to not only minimize batteries, motors and peripheral circuits but also to mature an R&D environment for an embedded software and 3-D CAD, until the appearance of 3-D printers, up to the maturing of the laser range finder, generalization of necessary three-dimensional processing, generalization of the embedded CPU board, etc.

	1960	1970	1980	1990	2000	2010-2012
Integration etc.	0	6	10	15	12	5
Manipulation	1	7	15	14	8	2
Locomotion	0	1	12	12	8	9
Sensing	0	3	8	9	5	3
Business	1	6	4	12	20	5

Table 3: Price-winning papers picked by the Robotics Society of Japan

Compared to the struggle about the best technological solutions in academia, companies did not pay much attention to basic technologies but prioritized issues directly connected with potential profits, such as the improvement of technological performance. This is reflected in the number of papers showing that companies developed application technologies independently from academia. Most of the listed technologies were actually born in industrial robotics. The industrial robot in Japan started from an imitation in the late 1960s.[5] When Professor Joseph Engelberger, who developed one of the first industrial robots in the United States, came to Japan for the first time and made a presentation in 1966, over 200 company managers listened to his speech and Q&A continued for 2 hours. The companies that attended were keen on its technological potential, tried to produce primitive industrial robots and, in 1971, formed the Industrial Robot Conversazione (now Japan Robot Association). Following the release of the first domestic industrial robot in 1969 by Kawasaki Heavy Industries, Ltd. (KHI), the company succeeded in receiving orders of welding robots from Toyota and Nissan in 1972. Since robot employment by the motor industry was expected to make its market grow, the now leading companies like Yasukawa and FANUC started to put industrial robots on the market in the 1970s. The more the market expanded, the more independently each company engaged in R&D. As a result, the Japanese robot industry focused on the development of application technologies based on market demand and thereby became technologically strong in the 1980s.

The key organization for fostering the development of the robotics industry in Japan was and is the New Energy and Industrial Technology Development Organization (NEDO). NEDO was originally founded in 1982 but changed its purpose repeatedly. In 1988 NEDO took over R&D supports from other institutions and continually created new categories (Okuwada, 2003: 21). The development of humanoid robots based on academic technologies was supported by NEDO for the first time in the Machinery, Aviation and Space category. The project started in 1998 and was named the Humanoid Robotics Project; its initial total budget was 4.57 million yen (about 35 million €) for 5 years. Not only large industrial robot companies like KHI belonged to the project; it also included academic institutions like Sankai Laboratory, which had just completed the first prototype robot. This project emphasized the collaboration of robots and humans right from the start. The funding that followed imitated this style. The Basic Plan of the 21st Century Robot Challenge Program issued by METI in 2002 was almost the same with regard to project objectives. Following this policy, NEDO started several support programs. The Next Generation Robot Practicalization Project, for instance, started in 2004 with a total budget of 4.1 billion yen (about 31 million €). This

[5] This description is based upon Kusuda, Yoshihiro (2004). A history of Japanese Industrial Robotics. ***Survey Reports on the Systemization of Technologies***, 4: 1-47.

program aimed to exhibit humanoid robots on a special stage at the 2005 World Exposition, Aichi, Japan.

The current Japanese robotics ventures appear to be based on this domestic logic. They were born from Japanese academia and started business in Japan by receiving support from national institutions. The media also emphasizes that robotics is a domestic technology.

The global narrative: AI

Contrary to robotics in Japan, the current AI start-up companies have blossomed in Japan not along with a domestic but with a global narrative. Although the educational system and national support system were fundamentally the same as for robotics, AI start-ups differ from robotics ventures not only with regard to technology but also the founding narrative. As Japan failed to keep on creating basic AI technologies until the early 2000s, for a long time the nation did not provide the text a narrative could be based on. The boom of AI start-ups began in Japan only in the late 2000s, but it was not based on Japanese systems and institutions, which worked so well in the robot industry. It is true that Japanese research on AI technologies boomed in the 1980s and 1990s. Although a lot of money was invested, the technologies developed during these years did not lead to commercialization at all. The national support for AI technologies at that time is regarded as a great failure today. The institutions in charge of national support hesitated to provide money for AI technologies after its failure. As a result, the institutional system that fostered the development of robotics was not established for AI for years to come.

In fact, AI venture companies, blossoming in the late 2000s, started from the ideas of basic academic technologies developed mainly outside of Japan. Due to the earlier failure of AI investment in the 1990s, "AI" – or "Jinko-chino" in Japanese – is even a relatively new term in the media. The press only paid attention to AI after business incorporated its technologies. An article analysis of three major business newspapers (Nikkei, Nikkei MJ, Nikkei Sangyo) and three major business magazines (Nikkei Business, Toyokeizai, Weekly Diamond) revealed that the term has only been publicized since around 2015 (see Figure 2).

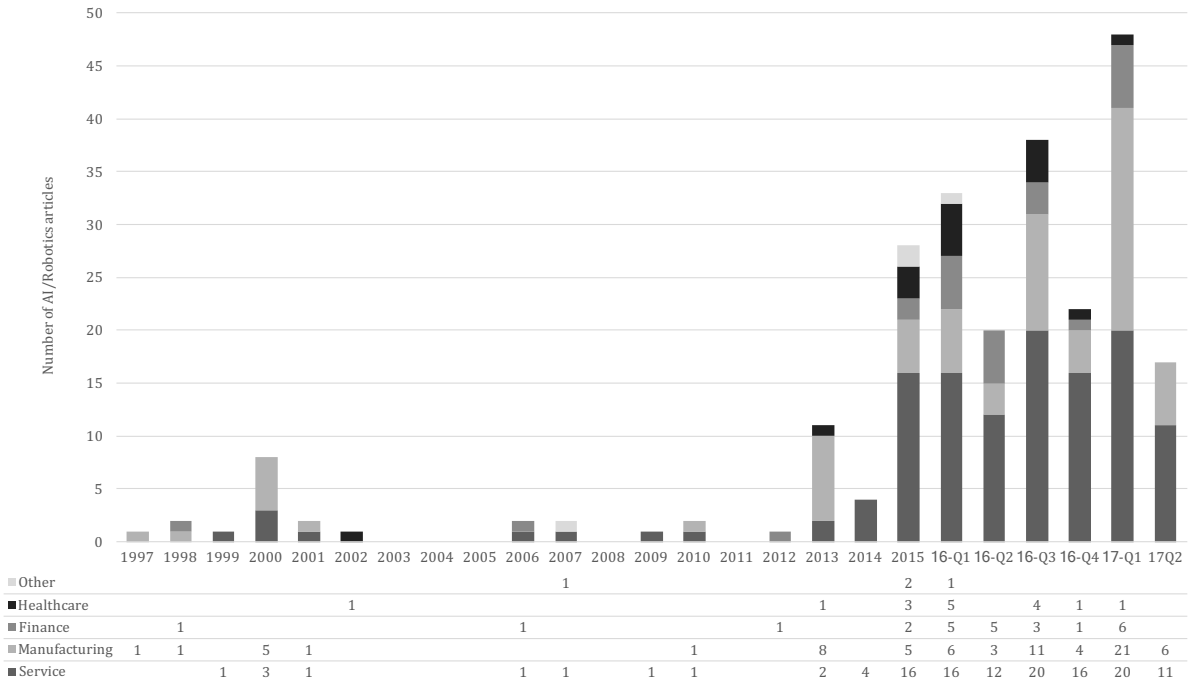


Figure 2: No. of in-depth articles per year concerning "AI" by sector

Source: article databases (Nikkei telecom, Nikkei BP search, Toyo keizai Degital and D-Vision net)

Before 2015, AI was discussed in these media in conjunction with robots for improving production efficiency and flexibility for industrial purposes. The term "AI" first appeared in 1997 in an article about the new strategy of FANUC for factory automation. In 2000, there were only 8 in-depth articles concerning AI as the long-term trend predicted for the 21st century business environment. From 2013 onwards, more articles on AI appeared, focusing particularly on autonomous driving and smart cars. However, it was only in 2015 that business media started to report on various cases of AI adaptations, not only by Japanese start-ups but also by large corporations. Recent articles are more about AI's application in service, finance, and the healthcare sector. In 2017, most articles covered a variety of other industries such as real estate, agriculture, and logistics. As business media started to pay attention to AI, the number of articles discussing the relationships between start-ups and industrial robots diminished.

The development of AI in Japan was strongly influenced by academia, not unlike robotics, in the beginning. Since the early 1960s researchers at the Institute of Telegraph and Telephone Engineers of Japan (later the Institute of Electronics, Information and Communication Engineers) or at the Information Processing Society of Japan started AI studies focusing on pattern recognition, which heavily influenced current AI technologies. Despite advancing research, the outcomes were not easily linked with business. There were far fewer connections between academia and business than in the case of robotics. In his address to the Japanese Society for Artificial Intelligence in 2016, the Society's President still noted the lack of collaboration between academic research and business.[6] Judging by business articles, Japanese AI seems to have appeared suddenly, but the technologies have in fact accumulated among academic researchers in Japan over many years.

Initially, national support was also strong for AI technologies, even compared to robotics. The 5th generation computer system project (5GP) started in 1982 with an initiative by METI. This project had a budget of 57 billion yen (about 4.5 billion €) for 10 years. 5GP gathered attention from the media as state of the art because of the era of "Japan as No. 1". But its output was poor and not commercialized at all. Based on respective reflections, the successor project, the Real World Computing Project (RWCP), started in 1992 and was finished in 2001, with a total budget of 48 billion yen (3.7 billion €). The key technology of RWCP was pattern recognition, based on current AI technologies. In our interview with the project leader Nobuyuki Otsu, Emeritus Professor of the University of Tokyo, he looked back at the time as follows:

> Traditionally, the METI project aimed at developing equipment. As a result, the development of the machine was required within the 5G project while research on AI itself had not been carried forward much. I think that this became a burden for the participating companies, lowered the motivation to participate in the subsequent RWCP, and became a factor that was not able to successfully hand over the advanced technology to industry.

Professor Otsu tried nevertheless to advance basic technologies and created research networks not only with big Japanese companies and research institutions but also global research institutions: GMD in Germany, ISS at Singapore University, SNN in the Nether-

[6] " … when watching demonstrations of AI applications that are performed in current IT ventures, at a research level, I feel a sense of déjà vu of various frameworks that universities and research institutions in Japan conducted more than 10 years ago: I feel that there is a great deal of potential in joint research and development by Japanese enterprises and Japanese universities and research institutions now and beyond" (http://www.ai-gakkai.or.jp/en/about/about-us/).

lands, and SICS in Sweden. This was the first trial for METI to include foreign institutions to support the development of the system. But after the economic bubble collapsed, the METI changed its policy drastically, refocusing again on subsidies for Japanese companies. Unfortunately, the media paid hardly any attention to RWCP because its technologies were not familiar with people, who regarded RWCP as the same as 5GP. Major electronic companies did not use the output of RWCP because they used the project as subsidies for companies and neglected its technologies. Otsu said regretfully:

> I told the METI to let Sony and those steel manufacturers that sympathized with our philosophy participate. But this offer was refused. The major electronic companies were not willing to join the project eagerly … Major companies pursued Internet technologies and terminal equipment like smartphones were being developed in America at that time. I think Japanese companies looked at America and hardly made any use of RWCP's achievements… If METI had accept Microsoft's offer to establish the research institute concerning AI in Japan in the late 1980s, Japanese companies could have used the output of RWCP more effectively.

In consequence, for a long time Japan missed the chance to develop business by utilizing AI technologies. Despite the fact that those technologies were traditionally researched in Japan, people saw them as a new term imported from foreign countries. As a result, AI start-up ventures like Studio Ousia emerged around the late 2000s, not based on a domestic narrative like in robotics, but based on a global narrative.

4.2 CYBERDYNE

Against the backdrop of the grand challenge of demographical change and increasing health-related concerns in Japan, and the promises of robotics, CYBERDYNE, started up in June 2004, intends to (1) make elderly people healthier and more productive, (2) address the problem of a growing lack of human labor, (3) support people with mild or severe disabilities (paraplegia), and (4) address Japan's problem of economic stagnation. These challenges, which could be addressed most effectively by focusing on the field of healthcare, were already visible at the time of the company's founding, at least for farsighted entrepreneurs.

The early days

Professor Sankai, founder and spiritus rector of CYBERDYNE, began to have a strong interest in robots and science when his mother bought him the novel *I Robot* in the 3rd grade of elementary school. He also loved the comics mentioned earlier: *Cyborg 009* and *Astro Boy*. After entering junior high school, his interest in science continued, as he told us. He bought a textbook about laser published for high school graduates, and tried to make rubies from aluminium oxide. His scientific attitude was formed during graduate school at the University of Tsukuba. Thanks to this institution, he went to thoracic surgery in class, and the surgeon showed him the operation next to him while explaining its meaning. He sometimes supported other laboratories and management staffs, for instance by creating a database for a medical center or a computer grading system for a school affairs section. In the interview, he told us laughingly that his attitude of helping people was possibly affected by *Astro Boy*, which was famous in Japan as a rewarding-the-good and punishing-the-evil story. Furthermore, he studied under two academic advisers. One specialized in power control bilateral servo with robot master slave and specialized in human-machine interaction, touching objects through remote control. Another professor specialized in artificial organs in the purification treatment of blood etc. Both professors advised him to cooperate with medicine. After getting a PhD in

1987, he started to create a virtual human body. Looking at the human physiology and exercise system, he wanted to recreate it all on the computer. In sum, his biography shows that he grew up under the Japanese narrative.

The foundation process

CYBERDYNE was started by Professor Sankai as a spin-off of the University of Tsukuba, now one of the leading universities of technology in Japan. The founder started research leading to the present humanoid robot as early as 1991. Between 1995 and 1997 he produced a prototype and in 1998 he launched the first humanoid robot named HAL-1 (Hybrid Assistive Limb). He continued R&D and showed HAL-5 to the world in the 2005 World Exposition in Aichi, Japan. Sankai, who is still at the Faculty of Engineering, Information and Systems of the University of Tsukuba, maintains close links to national institutions like the METI. When he started, he was a researcher, not an entrepreneur.

From 2002 onwards the Japanese government supported start-ups from universities. This was also a time when the Technology Licensing Organization (TLO) began to be established in national universities including the University of Tsukuba. At the same time Sankai accepted an offer from METI via the TLO and wrote an MOT textbook. He said this opportunity changed his attitude toward business:

> I studied the MOT, but I felt "superficial". Most textbooks just tweaked technologies as a licensor. This was useless. I thought managing technology must include creating a business and industrializing it. I was just an amateur, but I was at least able to notice it. This opportunity changed me.

While tied to those institutions and using a still simple university support system, Professor Sankai provided a capital stock with his personal 10 million yen (about 7.6 million €) in 2004. After exhibiting HAL-5 at the World Expo in Japan in 2005, he decided to intensify his business activities. However, at that time neither the university nor the government provided sufficient support for start-ups. Because Sankai did not even know the phrase "venture capital" (or VC) at that time, he borrowed 20 million yen from a small regional bank, using his own future salary as collateral. Shortly after one newspaper had written an article about his start-up, Daiwa House Industry Company, Japan's largest home-builder, called him. Sankai joined a roundtable for development projects in the Tsukuba area before its visit. The company made a successful bid for the project and asked him about its details and his HAL project. Sankai recalled the process as follows:

> Then, Daiwa House started to develop this area (*Note: "This area" refers to the Kenkyu Gakuen Area (the science research area), where CYBERDYNE currently exists*), so they wanted to hear my opinion. I was able to see the president easily. When I explained to the president, Higuchi, about the predecessor to HAL 5, he decided to invest 30 minutes after starting to talk. The investment was already decided before me showing the robot. I think he thought about the next industry. Japan was developed but someday the growth would stop. Investing in my company was one of the first options to open up the next industry.

The president of Daiwa House replied immediately and offered him the third party allotment increase. Daiwa House intended to use HAL not only in the main shopping mall in the Tsukuba area as an eye-catching object, but also in the nursing home and sports center business. In February 2007 he received 1 billion yen (about 7.64 million €). By November 2010, Daiwa House had increased its share to 4 billion yen.

Government support

The key organization for establishing the robotics industry in Japan was and continues to be NEDO. As mentioned earlier, NEDO supported the development of humanoid robots based on academic technologies. Professor Sankai joined the first support program for robotics in 1998 and the final report of the third program in 2005 picked up his robot, HAL-5, as one of the successful two cases (NEDO, 2007: 24-26). He told us that joining the support system run by national institutes was one of the opportunities to found a company:

> I founded CYBERDYNE on June 24, 2004, but the company was still like a walking baby. I had created the company's articles of incorporation. At that time METI thought about collecting robots from all over Japan for the Aichi EXPO 2005. I tried hard, as a member, for the Expo. Since some media interviews would come after the Expo, corporate activities would start full-scale in February 2006.

He continued to receive part of the funding from NEDO's successor project, Development of Basic Technology for Practical Applications of Human Assisted Robot, with a total budget of 2.62 billion yen (20 million €) from 2005 to 2007. Until today, NEDO has played a critical role not only in establishing the robotics industry in Japan but also for CYBERDYNE. With the help of NEDO, this firm internationalized its activities into Germany, supported by the International R&D and Demonstration Project in Robot Field with 0.68 billion yen (5.2 million €).

The situation today

Although not really part of the metropolitan region, the 49-minute train connection to Otemachi, the financial center of Tokyo, makes it part of the city's entrepreneurial ecosystem in. Currently, CYBERDYNE employs approximately 150 people. The company not only continues to maintain close links to the University of Tsukuba but has started to establish close collaborations with other research facilities in Tokyo, not least Keio University. Today, CYBERDYNE spends more than 50% of its budget on R&D. In addition, the field of healthcare, which is highly regulated, requires not only regulative expertise but, due to long-lasting approval procedures, also financial staying power. This is why CYBERDYNE, despite its focus on healthcare, has also started to offer products in a non-medical field. The funding need of CYBERDYNE continues to be high, less because of this expansion than because of its strategy to outsource manufacturing only for capacity reasons. At the time being, even marketing and sales are under the control of the company, more precisely of its executives. The need for more capital made CYBERDYNE go for an IPO at Tokyo Stock Exchange's Mothers' market in 2014, raising almost 75 million US$.

Today, there are very interesting use cases for CYBERDYNE's products. For example, there is cooperation with a hospital in Germany that is using HAL to help patients with paraplegia in training the remaining nerves in the spinal cord (Heise.de (Rainer Kurlemann), 04.12.2017). CYBERDYNE began renting out HALs to welfare facilities and hospitals in June 2009. By the end of 2017, almost 500 of these suits have been rented out to hospitals, not only in Japan but also in Europe; approval by the Food and Drug Agency (FDA) in the United States is pending. The company's products are also being used in industrial production and services. For example, CYBERDYNE's lumbar support suit is an exoskeleton that can be used by workers in factories/logistics or nurses in hospitals to support and ease human movements.

CYBERDYNE, especially its founder, Professor Sankai, has been successful in convincing first insurers in Japan and in Europe (Germany, Poland) to compensate patients for expenses. He "has managed to persuade private health-insurance firms such as AIG to

help cover the cost of some of his products" (The Economist, 2017). Thereby, face-to-face communication proved to be essential, motivating CYBERDYNE to set up subsidiaries in countries whose healthcare fields it has entered or intends to enter. Insurance companies, hospitals and doctors are the focal points. The latter have access to the products and use them on patients. In this process, not only intertextual links to Japan's grand challenges proved to be useful to convince their stakeholders. CYBERDYNE also used "hard facts" such as quality certifications they had received (e.g. from TÜV Rheinland). Most recently, CYBERDYNE invested into two Japanese AI start-ups, which, at some point in time, may help to advance its HAL technology.

4.3 Studio Ousia Inc.

Founded only three years later than CYBERDYNE, Studio Ousia's business is not only "somehow related to AI" but strongly related to its core, as Studio Ousia developed a QA engine as well as a semantic kernel allowing keyword extraction. The QA engine, which became available in January 2017, was developed using the technique of winning the artificial intelligence quiz competition held at the international conference NAACL (North American Association for Computational Linguistics) in June 2016. The engine is a highly accurate question answering system equipped with advanced AI. Presently, both products are market ready and Studio Ousia has four major customers. Marketing and sales are done directly by the two founders, supported by one of the company's other so far four full-time employees. From these customers Studio Ousia receives a fee for their cloud-based services, which are particularly important for customer support services based on Asian language capabilities (Chinese, Japanese). In this respect, Studio Ousia considers itself more capable than its mostly Anglo-Saxon competitors. Importantly, both products were developed and will be developed further with the help of Keio University and the Nara Institute of Science & Technology (NIST), according to the management of the company *the* knowledge provider in the Japanese AI field. The existing tie to NIST also helped Studio Ousia to gain the interest of Samsung (especially its Research Center). Via its investment arm, Samsung invested € 1.5 million in 2017. The founders of Studio Ousia assume that their "real AI" capability with regard to QA attracted the corporation's interest. Whatever the reason, the acquired capital will help Studio Ousia to hire qualified software engineers to further improve their technology. The company's aim is exponentially high growth, also internationally.

The early days

Dr. Ikuya Yamada, the founder of the company, went to the Shonan Fujisawa junior and senior high schools attached to Keio University at SFC (Shonan Fujisawa Campus). When he was in junior high school, he started programming and sold software online. He has worked as a software engineer since then. The reason for starting up a company came from the enjoyment of presenting software he had programmed:

> It was fun to publish the software I made. I was publishing software that I made using PC communication. It was my hobby to publish it in such a place. I enjoyed it. After that, when I entered the university I established a company and sold it at the same time I graduated.

When Dr. Yamada was in high school his team won the first and silver prizes in the international website contest ThinkQuest (a website which assisted students and teachers to create web-based learning projects and collaborate with peers globally) in 1998 and 1999. He wanted to know what made the Internet so interesting and wanted to start a related business. Soon after graduating from high school he founded his first company, Newrong Co. Ltd. He

thought of himself as half an engineer and half an entrepreneur at that time. The capital at that time came mainly from sales of online software and ThinkQuest's prize money. At first the company undertook any work like developing web apps, but started basic research two years after having been formally established. The company developed basic technologies to solve the NAT（the process of assigning a network device a public address inside a private network）traversal problem, which was a problem in P2P communication. But Yamada and his colleges decided to sell Newrong to Fractalist Co. Ltd., and he established a new company, Studio Ousia in 2007:

> About two years after starting up the first company I noticed I liked to study a basic technology more than business ... I had committed to business too much. Of course I learned a lot from it, especially the excitement of creating products ... But I started to study neural networks other than Internet technologies because I felt their limits and wanted to develop them.

When Yamada founded the company in the early 2000s, starting up a company by university students was still rare. As a result, the media focused on him repeatedly and asked him to tell his 'future'. He unintentionally used his storytelling for media. He did not concentrate only on business after starting Studio Ousia but rather had begun to study under the supervision of Professor Yoshiyasu Takefuji of Keio University, who is now responsible for the general development of the company's language processing technology.

The foundation process

Studio Ousia was originally based in the incubator center, which is called "The SFC Incubation Village" inside the SFC of Keio University. The funding was provided by a VC fund named Incubate Capital Partners and managed by the co-founder, Yasuhiro Watanabe. Watanabe, a successful venture capitalist in the Japanese tech field, became not only an investor and co-founder but also the CEO of the company. The organization of the management team, Yamada functioning as CTO and Watanabe acting as CEO, represents a typically American approach, commonly seen in California. This is in sharp contrast to CYBERDYNE, where the developer Professor Sankai acted and still acts as the president and representative director. Yamada said this option was natural for him:

> I am not interested in business so much, so I do not have much management ability. I am more interested in the technology. I think it is somewhat different to do business and create new things … We are not familiar with each other's areas so much ... We received some research projects from manufacturers after establishing Studio Ousia, but it was a time to study basic technologies concerning neural networks. Our present technology was born from its study process around 2013.

Since then, Studio Ousia has won several prestigious awards for its QA engine, including the WWW 2015 Workshop on Making Sense of Microposts (#Microposts 2015), Shared Task #1 in ACL 2015 Workshop on Noisy User-generated Text (W-NUT 2015), the Kaggle Master (2016), 2nd place at the WSDM Cup 2017 Triple Scoring Task (2016), and winner of the NIPS 2017 Human-Computer Question Answering Competition (2017). This was driven by the CTO's technological aspirations:

> I hoped to receive technological evaluation from an authority. I do not like just saying "our technologies are best." I did not think I would win when I entered the first competition…I fortunately won repeatedly, and then we thought its reputation was usable for our business.

With increasing digitalization, the movement to utilize AI and advanced automation is becoming noticeable, mainly in the financial industry. In January 2017, a question and answering system using ‘AI, a “QA Engine”, was created by Studio Ousia in collaboration with the Agriculture and Forestry Bank (which is a government-affiliated financial institution in Japan, targeting agriculture and fishery). Studio Ousia has already begun demonstration experiments to improve the efficiency of response to inquiries about internal lending concerning financing operations.

No government support

Studio Ousia has received almost no financial support from the government, while start-up consulting and R&D support was provided by Keio University and NIST and R&D. Instead, Studio Ousia received funds from Seed Technology Capital Partners operated by Watanabe. In the meantime, Nippon Information Development funds and Samsung Ventures Corporate Venture have also invested in Studio Ousia. Studio Ousia has completed the capital increase recently through allocation of 150 million yen (1.16 million €) from Samsung Venture Investment Corporation as the underwriter.

Since 2014, the Ministry of Internal Affairs has been promoting the ICT Innovation Creation Challenge Program, which is a support system for overcoming the so-called "Valley of Death" that many ventures face in the early stages. In order to create innovation in the ICT field, this project promotes the realization of R&D achievements by integrating the promotion of business development and R&D support by utilizing private business development know-how etc. with the aim of contributing to the creation of new business. This kind of support is completely different from robotics, where basic technologies emerged in academia. NEDO, which was the traditional supporting institution for the commercialization of technologies, did not affect the AI business.

Unlike CYBERDYNE, Studio Ousia did not co-create supporting institutions in Japan. Rather, the start-up was established using capital from VC funds and even received VC investment from outside Japan. Nevertheless, both executives consider themselves and their company to be part of the AI ecosystem in Tokyo, which is still of a rather nascent nature, however. The foundation narrative of Studio Ousia, hence, is similar to a typical Silicon Valley start-up.

Discussion and conclusion

The two case narratives illustrate intertextual links (Garud et al., 2014b) between the start-up and the societal narratives it is “born” into, though in two very distinct ways. Before exploring this issue further, one similarity between the two cases is noteworthy: entrepreneurs often talk and act differently before and after starting up a company. Before starting the business entrepreneurs do not have enough resources and lack legitimacy. To overcome this liability they make more use of existing institutions and narratives. However, after the business has started and generated first returns, an entrepreneur can tell his or her *own* story in order to get or strengthen legitimacy (Lounsbury and Glynn, 2001). With respect to this transition process, the two cases correspond to this insight. But to understand the transition, we have to pay attention to “anchor events” (Garud et al., 2014a: 1184) wherein diverse stakeholders can engage and coordinate their activities with regard to the three facets of the founding narratives delineated by Garud and his colleagues.

In the CYBERDYNE case, the development of the robotics industry is highlighted and historically embedded into the Japanese narrative contexts of robotics and demographic change. The founder of CYBERDYNE got started as one of the numerous members of the national robotics project. This project, in operation since 1998, has become an anchor event

for him. With regard to the *relational facet*, the founder of CYBERDYNE did not mold or shape reality, but built his narrative into the existing institutions. He was an inconspicuous element of the existing narratives, but had some connection to other robotics researchers and a few governmental officials. Regarding the *temporal facet*, he followed the national story until the World Expo in 2005. He adjusted his action to the project narratives. For example, he introduced the whole body suit robot that looks good for the purpose of exhibiting at the EXPO, although his research focused on the assisted robot for human limbs. On the *performative facet*, the founder did not use his own words on the communication front. He just followed the project aim and helped its narrative to spread. In the first phase he did not tell his own story, but joined in the national and academic discourse.

Only after establishing CYBERDYNE did Professor Sankai begin to tell a story of his own. Regarding the *relational facet*, he used his former research experience. As a researcher he coined the term 'cybernics' and received legitimacy for it from national support programs. He started to connect to VCs and the potential capital they could provide to grow his business by using the *temporal facet*. Here, he referred to the future of an aging society and stressed that his prototype included key technology for resolving the problems that come along with it. He did not explain much of the technologies in the investment interviews, but the first large fund provider decided to invest when they listened to this story with the clear intertextual link. The founder continued to tell the same story during investment interviews that followed. Regarding the *performative facet*, most importantly, he co-created robotics narratives with government and media. Because of the few new and successful industries in Japan following the stagnation in the 1990s, robotics technologies developed by Japanese researchers caught the eye of government and the media. Even though the founder of CYBERDYNE did not specifically work on increasing his reputation, governments and the media picked him up positively. Former experience in the 'anchor event' also provided him with the required legitimacy in his business. So he had chances to make recommendations to the cabinet, which sometimes accepted his advice. At the same time, he actively strengthened his storytelling to use the phrase 'for the first time in the robotics industry', though acknowledging that he realized some of it with the help of a national support system. Government, in turn, emphasized the positive outcome of its support and the media widely announced it – creating a virtuous cycle. The meaning of robotics grew through intertextual links between Sankai and the environment.

Studio Ousia is – apart from the change of the narrative before and after the founding of the company – very different from the CYBERDYNE case. Academia, large companies and NEDO tried to create the AI business field in Japan, but the attempt ended in failure. The founder of Studio Ousia had no option to connect with a national support system in the early 2000s. Therefore, he had to relate to another narrative context than the Japanese. Regarding the *relational facet* the founder, Dr. Yamada, used an 'anchor event' much earlier than Professor Sankai. When he was a high school student, he already became a winner at the international web contest, building a good reputation as a young engineer. He also received attention from the media as representative of student entrepreneurs, who were extremely scarce in Japan at that time. He did not use, however, a story of 'youngness' or 'entrepreneur' but of 'technology.' Regarding the *temporal facet* he unintentionally spoke about *his* future in response to the media interview. At first he did not think much of the future, but the media repeatedly asked him about the future. As a result he began to talk about the relationship between technology and the future. In terms of the *performative facet* Yamada founded his first company with the same members who had attended the competitions. They felt better starting a business rather than working part-time. He and his colleagues took it easy, participating in corporate activities like a game. Therefore he enjoyed the game with his friends in the business rather than actively doing business. Since they did not intend to expand business so much, they did not receive any investment.

After establishing Studio Ousia with Watanabe, Yamada shifted his attitude to working in a company from playing to business, and concentrated even more on the development of technology. In terms of the *relational facet,* he keeps on connecting himself and his company to up-to-date technologies, acting as the CTO in the newly founded company. This is nicely illustrated by the fact that the company still lists research papers on its webpage. Establishing the company with Watanabe and his connections to VCs was also an important change. While his previous business experience made Yamada more conscious of technologies, it also made him aware of the need to manage a business, which was dissimilar to managing technologies. Regarding the *temporal facet* he emphasizes not only his past experience with Internet technologies and the fact of being a young prize winner, but also explains the present up-to-date technologies for the purpose of solving current problems. Regarding the *performative facet* he used another competition as a new 'anchor event.' He won prizes at several competitions, actually one after the other. This fact was connected to his company in the media and VCs like Samsung Venture Investment Company became interested in investing.

While the CYBERDYNE narrative is closely linked to grand challenges in Japanese society (in particular, the aging society, increasingly framed as Society 5.0), the Studio Ousia narrative pretty much reflects the globally adopted Silicon Valley narrative (see Table 4). Both technologies were academically studied and institutionally supported in Japan, but the industrialization processes differed. As a result, the transition to new states shown in Table 4 was also different.

	The Japanese Society 5.0 Narrative (CYBERDYNE)	**The Silicon Valley Narrative (Studio Ousia)**
Relational facets	Relating grand challenges (e.g. aging society, healthcare) to the new venture's technology (robotics).	Relating the current problems (e.g. easy to use) to the up-to-date technology (AI).
Temporal facets	Acting for the future, i.e. at a critical moment, robotics can be critical to make the workforce healthier and more productive.	Acting at the right point in time, i.e. at the present time, AI can improve various aspects of the society.
Performative facets	The transition can be achieved when Japan's policy-makers and new ventures work together.	The transition can be achieved when new ventures work together with strong partners like VCs.

Table 4: The facets of the updated entrepreneurial narratives in the two cases

Our findings show that research on entrepreneurship needs to pay more attention to the narrative created and used by entrepreneurs. From the CYBERDYNE case we learn that the entrepreneur did not necessarily create his own story to expand business. Rather, the founder of the company utilized the narrative which already existed on the national level. After gaining legitimacy by linking into the existing narrative system, he gradually used his own storytelling but was careful not to contradict the former narrative. Since he had won legitimacy in real time, he was able to use a story about the envisaged future. The Studio Ousia case is very different, as AI technologies in Japan were regarded as a failure and an AI start-up did not get support from the state. Hence the founder of the firm did not have the

opportunity to link his founding narrative intertextually to Japanese society. Rather, he enacted the narrative from Silicon Valley, where companies like Amazon and Google told their story about their future.

In more detail, as the case of CYBERDYNE demonstrates, the entrepreneurial narrative helped to position the start-up not only in the web of social and material relations, but was timely with its intertextual links to emerging societal developments in Japan, now subsumed under "Society 5.0"; a label alluding to – but also transcending – the "Industrie 4.0" discourse in Europe, in particular in Germany. The temporal and performative facets are nicely demonstrated first by the allocation of public R&D funds from different government programs and later by the very successful IPO, for which the start-up even received the "IPO of the Year" (2014) award from Thomson Reuter.

In the case of Studio Ousia the entrepreneurial narrative is very different, in that it followed – and is still following – the global Silicon Valley model. The Silicon Valley narrative puts more emphasis on high-tech, university linkages, VC financing and angel investors. What is more, this narrative is much less characterized by explicit intertextual links to societal developments in the concrete society into which the start-up is born. Instead, the traditional liberal script – profitability serves societal interests – dominates the Silicon Valley narrative. In consequence, the relational, temporal and performative facets of the entrepreneurial storytelling differ from those in the CYBERDYNE case (see again Table 4).

New ventures are created within a specific historical context that may imprint on subsequent developments and even cumulate in a path-dependent development (Marquis & Tilcsik, 2013; Schneiberg, 2007; Sydow, Schreyögg, & Koch, 2009). This imprinting effect is what makes the original construction and, possibly, reconstruction of the entrepreneurial narrative in the early phases of starting up a business so important.

References

Czarniawska, B. 1997. ***Narrating the organization: Dramas of institutional identity***. Chicago: University of Chicago Press.

Doganova, L., & Eyquem-Renault, M. 2009. What do business models do?: Innovation devices in technology entrepreneurship. ***Research Policy***, 38(10): 1559-1570.

Dorado, S., & Ventresca, M. J. 2013. Crescive entrepreneurship in complex social problems: Institutional conditions for entrepreneurial engagement. ***Journal of Business Venturing***, 28(1): 69-82.

Eisenhardt, K. M. 1989. Building Theories from Case-Study Research. ***Academy of Management Review***, 14(4): 532-550.

Eisenhardt, K. M., Graebner, M. E., & Sonenshein, S. 2016. Grand Challenges and Inductive Methods: Rigor Without Rigor Mortis. ***Academy of Management Journal***, 59(4): 1113-1123.

Ferraro, F., Etzion, D., & Gehman, J. 2015. Tackling Grand Challenges Pragmatically: Robust Action Revisited. ***Organization Studies***, 36(3): 363-390.

Freytag, G. 1863. ***Die Technik des Dramas***. Leipzig: Hirzel.

Garud, R., Gehman, J., & Giuliani, A. P. 2014a. Contextualizing entrepreneurial innovation: A narrative perspective. ***Research Policy***, 43(7): 1177-1188.

Garud, R., Schildt, H. A., & Lant, T. K. 2014b. Entrepreneurial Storytelling, Future Expectations, and the Paradox of Legitimacy. ***Organization Science***, 25(5): 1479-1492.

Heise.de (Rainer Kurlemann). 04.12.2017. Cyberdyne: Wieder gehen lernen.

Inoue, Haruki. 1993. ***Nihon Robot Soseiki 1920-1938 (The Genesis of Japanese Robot in 1920-1938*)** Tokyo:NTT publishing (in Japanese).

Lippmann, S., & Aldrich, H.E. 2014. A rolling stone gathers momentum: Generational units, collective memory, and entrepreneurship. ***Academy of Management Review***, 41: 658–675.

Lounsbury, M., & Glynn, M. A. 2001. Cultural entrepreneurship: Stories, legitimacy, and the acquisition of resources. ***Strategic Management Journal***, 22(6-7): 545-564.

Lyneis, J., & Sterman, J. 2016. How to Save a Leaky Ship: Capability Traops and The Failure of WIN-WIN Investments In Ssustainability and Social Responsibility. ***Academy of Management Discoveries***, 2(1): 7-32.Magretta, J. 2002. Why business models matter. ***Harvard business review***: 86-92.

Mair , J., Mayer, J., & Lutz, E. 2015. Navigating Institutional Plurality: Organizational Governance in Hybrid Organizations. ***Organization Studies***, 36(6): 713-739.

Marquis, C., & Tilcsik, A. 2013. Imprinting: Toward a multilevel theory. ***The Academy of Management Annals***, 7(1): 195-245.

Martens, M. L., Jennings, J. E., & Jennings, P. D. 2007. Do the Stories They Tell Get Them the Money They Need? The Role of Entrepreneurial Narratives in Resource Acquisition. ***Academy of Management Journal***, 50(5): 1107-1132.

NEDO 2007. New Energy and Industrial Technology Development Organization (NEDO). http://www.nedo.go.jp/content/100092859.pdf

Okuwada, K. 2003. Introduction and development trend of surgical support robot. ***Science & Technology Trends***, 29(8):15-26 (in Japanese).

Packard, M. D. 2017. Where did interpretivism go in the theory of entrepreneurship? ***Journal of Business Venturing***, 32(5): 536-549.

Schneiberg, M. 2007. What's on the path? Path dependence, organizational diversity and the problem of institutional change in the US economy, 1900-1950. ***Socio-Economic Review***, 5(1): 47-80.

Sydow, J., Schreyögg, G., & Koch, J. 2009. Organizational path dependence: Opening the black box. ***Academy of Management Review***, 34(4): 689-709.

The Economist 2017. Japan is embracing nursing-care robots. ***The Economist***, of Nov 23rd 2017.

Vaara, Eero. Sonenshein, Scott and Boje, David. 2016. Narratives as sources of stability and change in organizations: approaches and directions for future research. ***Academy of Management Annals***, 10 (1):495-560.

Vakili, K., & McGahan, A. M. 2016. Health care's grand challenge: Stimulating basic research on diseases that primarily afflict the poor. ***Academy of Management Journal***, 59(6): 1917-1939.

Yin, R. K. 2014. ***Case Study Research: Design and Methods***. Thousand Oaks, CA: Sage.

Zadeh, L. A. 1965. Fuzzy sets. ***Information and Control***, 8(3): 338-353.