Approaches to human resources and skills required for DX promotion in the age of generative AI

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Study Group on Human Resources Policy in the Digital Age

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1. Introduction

- As the socioeconomic environment of business is changing drastically, digital transformation (DX) has been widely recognized as a beneficial initiative for enterprises to continue creating value and existing in the market. On the other hand, most digital investment is still spent on maintaining and operating existing businesses. Only a small number of companies have used DX for their growth, and DX has yet to impact social change¹. The delay in DX due to the structural issues described in METI's DX report is one of the reasons why Japan's digital competitiveness lags behind other countries².
- To solve social problems and create value by harnessing the power of digital technology while taking advantage of the characteristics of each region, the government has set the "Vision for a Digital Garden City Nation." For the development of digital talents needed to accelerate DX in local companies and industries, the government has developed "Digital Skill Standards" that indicate the skills and abilities of those who promote DX and has built a platform to develop and retain digital talents³.
- Companies are currently addressing digital talent development, but not enough to solve the shortage of the growing demand as DX progresses, so there is an increasing expectation to utilize internal human resources through re-skilling or internal job transfer. Digital talents unevenly exist in urban areas and IT companies, making attracting human resources significantly challenging for local user companies, so developing and retaining digital talents is an urgent issue.
 METI has occasionally held the "Study Meeting on Human Resources Policy in the Digital Age" (the Study Group Meeting) to discuss with experts the issues and direction of digital talent policy in the new age.
- In this context, the emergence of generative Al⁴, including the widespread use of ChatGPT, which began at the end of 2022, enables companies and industries to achieve various operational and business transformations using Generative AI. It is

https://www.cas.go.jp/jp/seisaku/digital_denen/pdf/20221223_honbun.pdf

¹ METI "DX Report 2.2 (Summary)," Jul 2022, Information-technology Promotion Agency (IPA) "DX White Paper 2023: 進み始めた「デジタル」、進まない「トランスフォーメーション」", March 16, 2023, Source: METI "DX Report 2.2 (Summary)," July 2022 https://www.meti.go.jp/shingikai/mono_info_service/covid-19_dgc/pdf/002_05_00.pdf Source: IPA "DX White Paper 2023", March 16, 2023, https://www.ipa.go.jp/publish/wp-dx/dx-2023.html ² In the International Institute for Management Development (IMD) World Digital Competitiveness

Ranking 2022, Japan ranks 29th among 63 countries Source: IMD "Digital Ranking 2022" <u>https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/</u> In addition, according to IPA's DX White Paper 2023, 54.2% of respondents implemented companywide DX initiatives in Japan compared to 68.1% in the U.S. Source: IPA "DX White Paper 2023," March 16, 2023, <u>https://www.ipa.go.jp/publish/wp-dx/dx-2023.html</u>

³ Comprehensive Strategy for the Vision for a Digital Garden City Nation (Cabinet decision on Dec. 23, 2022), P31-32, etc.

⁴ This report applies the definitions in the "Tentative summary of AI issues (AI に関する暫定的な論点整理)" (AI Strategic Council, May 26, 2023).

expected that even companies that have not yet used digital technology well can leverage such innovations to achieve rapid transformation and catch up on the delay of DX.

- Under such circumstances, while there are many individual generative AI users at the global level⁵ with little support for regulation⁶, concern about the impact of AI on work is relatively higher⁷, and business use is lagging compared with other countries⁸, which may lead to Japan becoming a backward country in the use of GenAI against the expectations of positive users. To catch up with the rest of the world, it is necessary to further promote DX by understanding generative AI technology and its appropriate use. To this end, it is also necessary to consider how to train digital talent for such changes.
- "Tentative summary of AI issues (AI に関する暫定的な論点整理)" (May 26) of the "AI Strategic Council" launched on May 1, 2023, indicates the development and retention of digital human resources as follows⁹:

"It is also important to develop and retain digital talents. Although various talent development initiatives, including the Digital Skill Standards, have been provided as learning guidelines, an expedited review is required in light of the emergence of AI, especially generative AI."

- In this context, in light of the emergence and evolution of generative AI, the Study Group discussed digital talent development initiatives to date, with the following three points to consider.
 - 1 How should the impact of generative AI on digital talent development be viewed
 - ② Specific impact on digital talent development and skills required for digital talent (e.g., changes in importance of each skill and requirement for new skills)

⁵ According to a study by Nomura Research Institute (NRI), Japan ranks third in the Openai.com traffic share by country (Nov 2022 - Apr 2023), behind the U.S. (1st) and India (2nd) Source: NRI "日本の ChatGPT 利用動向 (as of April 2023) ", May 26, 2023 <u>https://www.nri.com/jp/knowledge/report/lst/2023/cc/0526_1</u>

⁶ According to Boston Consulting Group (BCG) study, "the percentage of people who see a need for Alspecific regulation" is 64% in Japan vs. the average of 79% in the 18 countries surveyed. Source: BCG, "デジタル/生成 AI 時代に求められる人材育成のあり方" (9th Study Group on Human Resources Policy in the Digital Age, "Document 3"), July 6, 2023, P28 <u>https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/009_03_00.pdf</u>

⁷ According to BCG's sturdy, 40% of people in Japan are optimistic about the impact of AI on jobs, vs. the global average of 52%, while 38% of Japanese are concerned, vs. the global average of 30% Source: Ibid., P.21 and P.25

⁸ According to BCG's sturdy, the percentage of companies using GenAI is 24% in Japan, vs. the global average of 40%.

Source: BCG, "デジタル/生成 AI 時代に求められる人材育成のあり方" (9th Study Group on Human Resources Policy in the Digital Age, "Document 3"), July 6, 2023, P29

 <u>https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/009_03_00.pdf</u>
 ⁹ Source: Al Strategic Council, "Tentative summary of Al issues", May 26, 2023

https://www8.cao.go.jp/cstp/ai/ronten_honbun.pdf

- ③ Approaches to human resources and skills required for DX promotion in the age of generative AI (including review of the Digital Skills Standards and use of the Platform for Digital Human Resources Development)
- This report "agilely" summarizes human resources and skills measures and approaches to be currently taken for the appropriate use of generative AI, focusing on speedy technological progress, based on sequential interviews with experts on AI, generative AI developers, user companies, and talent developers and discussions and opinions of the study group members, in response to the emergence and rapid evolution of generative AI. It also should be noted that the content of this report will be continuously updated as generative AI and its application technologies are constantly advancing even while this report is being written.

2. Social impact of generative AI and where Japan stands now

2-1. Characteristics and impact of generative AI

Generative AI technology expected to advance rapidly

- We are currently in the third AI boom, driven by technological progress, more powerful machines, and more available data, and innovation in deep learning continues. It is said that Generative AI has an even more significant impact on society by extending AI into the product domain.
- ChatGPT, released by OpenAI on November 30, 2022, became a worldwide sensation due to its high-performance capability. ChatGPT is based on GPT-3 or GPT-3.5, launched in 2020, and can interact in a more conversational way than traditional large language models (LLMs)¹⁰. GPT-4 has a high degree of logical thinking capability and surpasses the accuracy in many languages, including Japanese, than GPT-3.5 using English¹¹.
- Generative AI is expected to advance rapidly in areas such as texts, codes, images, videos/3D and audio models. At the same time, the methods for using generative AI show significant progress.

Generative AI is being used across different age groups due to its ease of use, helping to replace professional tasks

- Generated AI, especially large-scale language models (LLMs), are based on language, making it easy to use across ages.
- It is also expected that the barriers to using the tools needed to improve productivity and add value will become low, helping to emerge tools that possibly replace previously challenging professional duties.

Generative AI will have an impact on nearly all future jobs

 On March 17, 2023, OpenAI and the University of Pennsylvania published a paper, "GPTs are GPTs (General Purpose Technologies)," predicting that large language models (LLMs) are a once-in-a-decade technology, comparable to the Internet, transistors, engines, electricity and so on., and that 80% of the U.S. workforce will be affected by language models¹².

https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/011_04_00.pdf

¹⁰ Source: Yutaka Matsuo, "生成 AI 時代の人材育成" (8th Study Group on Human Resources Policy in the Digital Age, "Document 5"), June 13, 2023, P10

 <u>https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/008_05_00.pdf</u>
 ¹¹ Source: Microsoft Japan Co. Ltd., "Azure OpenAI" (11th Study Group on Human Resources Policy in the Digital Age, "Document 4"), July 31, 2023, P.6

¹² Source: OpenAI, OpenResearch, University of Pennsylvania "GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models", March 27, 2023 https://arxiv.org/pdf/2303.10130.pdf

• According to a study by Goldman Sachs, AI could automate a quarter of U.S. jobs in the future¹³. Another research by Access Partnership shows that about 70% of the total workforce in Japan is expected to be affected by AI¹⁴.

2-2. Social change through generative AI

Generative AI is expected to create significant business opportunities in Japan through productivity improvement and adding value, and it potentially contributes to solving various social issues

- Generative AI is expected to help improve labor productivity in various industries and companies, especially in white-collar jobs and solve various societal issues
 - Generative AI is highly capable and can learn large volumes of data, summarize and analyze it to provide suggestions. Its ability is expected to influence various skills needed in coordination, problem-solving, technology design, programming, and other fields.
 - More tasks based on predefined rules and past cases, such as administrative support and legal work, are seen to be automated by generative Al¹⁵. Use cases are being established in different departments within companies, such as developing new drugs and improving productivity in customer support. Using generative AI can achieve various business reforms, including in white-collar jobs where it has been challenging to apply AI.
 - Industries such as finance, insurance, professional, scientific, technical services, and IT are likely to have a more significant impact from generative AI. On the other hand, agriculture, forestry, and fishing, often considered unrelated to AI, can also be impacted at a certain level¹⁶.
 - Generative AI also potentially contributes to solving various social issues, such as increasing productivity, value addition and filling the workforce shortage gap in Japan.

¹³Source: Goldman Sachs, "The Potentially Large Effects of Artificial Intelligence on Economic Growth", March 26, 2023, <u>https://www.key4biz.it/wp-content/uploads/2023/03/Global-</u> <u>Economics-Analyst_-The-Potentially-Large-Effects-of-Artificial-Intelligence-on-Economic-Growth-Briggs_Kodnani.pdf</u>

¹⁴ According to a study by Access Partnership, 70% of all workers in Japan will have more than 5% of their work affected by generative AI. This includes 21% of workers affected by 5-10% of their work, 24% affected by 10-15%, 24% affected by 15-20%, and 1% affected by more than 20%, respectively.

Source: Access Partnership, "生成 AI の経済的影響: 日本の働き方の未来 ", June 2023, P.18 https://accesspartnership.com/the-economic-impact-of-generative-ai-the-future-of-work-in-japan/

¹⁵ A Goldman Sachs study estimates that a quarter of current U.S. jobs could be automated by AI, particularly in administrative (46%) and legal (44%) tasks, but less likely in physically demanding jobs such as construction (6%) and maintenance (4%) works.

Source: Goldman Sachs "The Potentially Large Effects of Artificial Intelligence on Economic Growth", March 26, 2023, <u>https://www.key4biz.it/wp-content/uploads/2023/03/Global-</u> <u>Economics-Analyst_-The-Potentially-Large-Effects-of-Artificial-Intelligence-on-Economic-Growth-Briggs_Kodnani.pdf</u>

¹⁶ Source: Access Partnership, "生成 AI の経済的影響: 日本の働き方の未来", June 2023, P.14 <u>https://accesspartnership.com/the-economic-impact-of-generative-ai-the-future-of-work-in-japan/</u>

> Generative AI has the potential to unlock significant business opportunities

- According to an analysis by the Boston Consulting Group (BCG), the market for generative AI is expected to be worth \$120 billion (approximately 17 trillion yen) by 2027. The largest markets are "finance, banking, and insurance" at \$32 billion, followed by "healthcare (medical and wellness)" at \$22 billion and "consumer goods" at \$21 billion¹⁷.
- Companies that have worked on DX can achieve even more advanced DX through generative AI. For companies that have not yet achieved successful DX, generative AI will expand the possibilities for achieving DX.

From a business perspective, the use of generative AI is expected to drive DX, which requires management commitment, the establishment of an internal organization, internal training, and design skills that differentiate customer value

- The first step is understanding what generative AI can do and moving beyond business improvement to transforming enterprise-wide business processes and structure
 - The adoption of generative AI technology is still in its infancy at this point, so the first step in this phase is to use generative AI to gather information, brainstorm ideas, and so on to understand what it can do.
 - After this phase, using it for company-wide business processes and structural transformation is essential, not just for partial business improvement.
 - Management commitment, establishing an internal organization, and training are essential to achieve this.
- Using generative AI to improve and transform the customer experience of existing services and products also requires design skills to differentiate the customer value of services and products
 - Generative AI is expected to significantly improve the customer experience of existing services and products, including the user interface, due to its advanced interactive capabilities using natural language. Therefore, it is an excellent opportunity for companies to use generative AI not only to transform their business processes and organizations, but also to improve and transform the customer experience of their services and products.
 - On the other hand, technological advances in generative AI and the expansion of its use may make the customer value delivered by services and products using this technology more homogeneous and identical. Therefore, it is necessary to differentiate the quality of services and services themselves from the customer's perspective, which may lead to the creation of new services, products, and businesses.
 - Differentiation requires understanding customers' issues and needs, defining customer value, solving customer problems, and designing and validating

¹⁷ Source: DIGITAL BCG, "これだけは知っておきたい生成 AI の基本とすごさ", June 26, 2023, <u>https://digitalbcgjapan.com/reports/detail/basics-of-generative-ai-summary</u>

services and products that customers want. The need for talent with such broad design skills is expected to increase.

- In promoting the above responses, gaining a positive understanding from management and communication of such technologies, establishing an internal organization and providing internal training are important by leveraging its characteristics of which management can easily recognize the benefits of generative Al
 - Generative AI is expected to accelerate DX through a top-down, organizationwide implementation because barriers to use are low, and management can easily recognize its benefits. Executives are highly interested in generative AI worldwide, with many responding to their daily use¹⁸.
 - The ability to quickly adopt and use emerging technologies such as generative AI for promoting DX depends largely on gaining a positive understanding from management, communicating such technologies, establishing an internal organization (internal team that can take the lead), and providing internal training for active use, and the progress of initiatives depends on whether companies have these foundations.

¹⁸ BCG's research shows that, on average, 80% of global executives responded using generative AI daily compared to 20% of frontline employees. Source: BCG, "デジタル/生成 AI 時代に求められる人材育成のあり方" (9th Study Group on Human Resources Policy in the Digital Age, "Document 3"), July 6, 2023, P29 <u>https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/009_03_00.pdf</u> [Column: Case study examples of companies using generative AI]

① Nissin Foods Holdings Co., Ltd.¹⁸

The company developed its interactive AI system "NISSIN AI-chat powered by GPT-4 (NISSIN AI-chat)" using Azure OpenAI Service and Microsoft Power Platform provided by Microsoft Japan Co. Ltd., which was released to approximately 3,600 employees of domestic group companies (excluding some) on April 25, 2023 (Tuesday). It was smoothly introduced with the CEO's message for promoting its use and has been used in various departments.

The company has established a dedicated environment solely for the Nissin Foods Group to ensure security, which has restricted business use within this environment only. Users are asked to confirm the message below on the initial screen for safety use and are also randomly reminded of these compliance instructions after the second use to improve their literacy.

CEO MESSAGE



急速に進化を遂げている対話型AIは、業務効率化や生産性向上につながる革新的なツールです。 日清食品グループは、こうした新たなテクノロジーを積極的に取り込んでいくべきだと考えています。 しかしながら、個人情報、コンプライアンス、フェイク情報など、多くの問題をはらんでいるのも事実です。 対話型AIの回答が正しいとは限りません。 回答を鵜呑みにせず、自身でしっかりと確認し、精査しなければなりません。 また、対話型AIから得られる情報を二次利用する際は、 個人情報流出や著作権侵害などに十分注意する必要があります。

NISSIN-GPTを利用することで、私たちはより多くの時間を創造的な活動に費やすことができます。 自分自身や組織の更なる成長を加速するために、NISSIN-GPTを上手に活用してください。

一去探究系



¹⁸ Source: The official website of Nissin Foods Holdings Co., Ltd., "セキュリティ対策を施した Microsoft Azure 上で独自システムを開発!対話型 AI「NISSIN-GPT」をグループ社員 3,600 人に向け 4 月 25 日 (火) に公 開", April 25, 2023, <u>https://www.nissin.com/jp/news/11557</u>

[Column: Case study examples of companies using generative AI]

2 Panasonic Connect Co., Ltd.¹⁹



Usage in the first three months of service commenced at Panasonic Connect

¹⁹ Source: The official website of Panasonic Holdings Corporation, "Microsoft Azure OpenAl Service を 活用した AI アシスタントサービスを国内全社員向けに導入," March 16, 2023 https://news.panasonic.com/jp/topics/205071

²⁰ Source: The official website of Panasonic Holdings Corporation, "AI アシスタントサービス「PX-GPT」をパナ ソニックグループ全社員へ拡大 国内約 9 万人が本格利用開始", April 14, 2023 <u>https://news.panasonic.com/jp/press/jn230414-1</u>

²¹ Source: The official website of Panasonic Holdings Corporation, "パナソニック コネクトの AI アシスタントサー ビス「ConnectAI」を自社特化 AI へと深化," June 28, 2023 https://news.panasonic.com/jp/press/jn230628-2

2-3. The current use and issues for the future in Japan

Compared to the rest of the world, business usage in Japan tends to be lower than personal usage

- According to BCG's research on the percentage of people using generative AI daily in companies and organizations by position, such as executives, managers, and frontline workers, Japan's rate is significantly lower than the global average for all positions²². The usage rate of generative AI in companies (mainly large enterprises) is only 24% in Japan, compared to a global average of 40%. In contrast to the trend towards active use at the individual level, Japan is already considered to be falling behind the rest of the world when it comes to corporate use. According to a survey by Teikoku Databank, only 9.1% of companies (mainly small and medium-sized enterprises) reported using generative AI in their operations²³.
- Just as the delay in DX was caused by companies not taking the initiative to use digital technology but instead leaving it to external parties, the adoption rate of AI generation by companies is likely to remain low without momentum for companies to use AI generation internally.

It is hoped that the active and appropriate use of generative AI through management awareness and human resource development changes will provide opportunities for Japanese companies to catch up and accelerate their DX.

 The lack of established use cases of generative AI makes it challenging for companies to know how to use it²³. Instead, they ban it for business use due to its risks and concerns, such as information leakage and copyright issues, when used in companies. This may be due to various reasons, such as a lack of management awareness and digital literacy among business people²⁴, including managers, and a shortage of digital talent²⁵ who build momentum for use in companies. Therefore, to use generative AI to promote DX, raising management awareness and training and

Source: IPA "DX White Paper 2023(DX 白書 2023)," March 16, 2023 https://www.ipa.go.jp/publish/wp-dx/dx-2023.html

²² 98% of Japanese companies (n=976 out of n=1,001) have 500 or more employees, while the global average is 93% (including Japanese companies) (n=12,029 out of n=12,898). Source: BCG, "デジタル/ 生成 AI 時代に求められる人材育成のあり方" (9th Study Group on Human Resources Policy in the Digital Age, "Document 3"), July 6, 2023, P29

²³ According to a survey conducted by Teikoku Databank (n=1,380, of which n=176 were for large companies and n=1,204 for small and medium-sized companies), 9.1% responded using generative AI in their operations, and 37.8% of companies considering using generative AI answered they did not have a clear picture of its use. Source: TDB "生成 AI の活用に関する企業アンケート," June 20, 2023 https://www.tdb.co.jp/report/watching/press/p230608.html

²⁴ According to the Information-technology Promotion Agency, Japan's (IPA) DX White Paper 2023, 27.8% of companies in Japan responded they have management and executives who understand AI, compared to 70.5% in the US; 11.3% of companies in Japan answered they have employees with both frontline experience and basic AI knowledge who can drive AI adoption in their companies, compared to 60.9% in the US.

²⁵ According to the Information-technology Promotion Agency's (IPA) DX White Paper 2023, the most common issue with AI adoption was "lack of AI talent (49.7%)". Source: Ibid.

retaining talent is essential. The government is also expected to foster an environment to train and retain digital talent, including the appropriate use of generative AI within companies.

• While Japanese companies are said to be lagging in their DX and digitalization internationally, it is hoped that the active and appropriate use of generative AI, which management can easily recognize the benefits of, will provide an opportunity to catch up on a delay and accelerate DX.

Generative AI adoption rate in enterprises & % of Regular users(mainly in large companies)



(Source) BCG AI at Work survey (2023)

3. The specific impact of generative AI on digital human resources development and skills

Rapid technological advancement in generative AI requires proactive learning in a changing environment without hesitation and the organization's readiness to do so

- As civilization and technology have advanced, the roles and skills of people have continuously changed in line with changes in the industrial structure. Similarly, with the emergence and development of generative AI, changes in the sources of value added by labor and existing roles and skills are expected.
- When considering the state of digital human resources development in the age of generative AI, it should be noted that, as a prerequisite, the speed of human resources development spent several years like before cannot match the speed of current generative AI technology, which advances monthly. The emergence of generative AI is a new trend, and organizations that use it in their operations and those that do not may gradually see differences in operational efficiency and productivity improvement and their business transformation in the future.
- Therefore, the talent who drives enterprise DX using rapidly evolving digital technologies must have a mindset and attitude that embraces changes without hesitation, welcomes new challenges, and continues to learn proactively in response to environmental changes. Generative AI is making continuous and significant progress, and the business use of generative AI is expanding rapidly worldwide. It is believed that the attitude to use generative AI appropriately and actively without waiting and talent with the mindset and attitude to be willing to learn continuously and proactively will become even more critical. In addition, it is essential to improve the environment within companies to enable such talent to keep learning in response to the speed of technological advancement and environmental changes.

Appropriate use of generative AI (e.g. ability to instruct, verbalize and communicate) is an essential skill to learn

- > In the Age of AI, businesses and society at large must encourage reskilling
 - In a Microsoft survey, 63% of leaders responded that future employees would need new skills to keep up with the proliferation of AI, and 56% of employees answered they were not equipped with skills to complete their tasks²⁶. The AI era requires in-house training and reskilling across society.
 - According to a World Economic Forum survey of the 15 skills most demanded between now and 2027, analytical thinking topped the list, followed by creative thinking in second place, and the ability to work with AI and big data in third place²⁷.

²⁶ Source: Microsoft Japan Co. Ltd., "Generative AI and Skilling" (9th Study Group on Human Resources Policy in the Digital Age, "Document 2"), July 6, 2023, P.12

https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/009_02_00.pdf ²⁷ Source: World Economic Forum "Future of Jobs Report 2023", May 2023,

https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf

- Acquiring abilities to instruct (develop prompts), verbalize and communicate are essential
 - As long as the means of human communication uses language, the ability to instruct (develop prompts, commonly referred to as prompt engineering²⁸), verbalize, and communication skills (including Japanese language skills) are necessary to generate outputs from a generative AI effectively. Although some believe prompt engineering will soon become obsolete as technology advances, it is meaningful to learn as a skill as long as humans use language to interact with generative AI.

Traditional skills and abilities (such as "strategic thinking" and "critical thinking") remain important

- Traditional subjects such as communications, liberal arts and mathematics will likely remain important.
- Significant changes are also needed in the workplace, and the expected roles and required skills of talent will likely change dramatically with these changes. On the other hand, traditional skills such as "strategic thinking," "critical thinking," and "change resilience" are likely to become more important than ever due to changes in processing work by generative AI and demanded skills associated with the changes.

As automation significantly reduces the 'workload' and requires more creative output from people, including specialists, skills such as human creativity (e.g., entrepreneurship) and business design become more important

- Traditionally, humans have been seen as flexible and machines and computers inflexible, but the emergence of generative AI, which can be controlled by natural language, has created ones with both characteristics. In the future, generative AI will facilitate creative tasks and enable advanced creativity. Therefore, will (what to achieve) and worldview will become more critical.
- In addition, when generative AI replaces many tasks, decision-making, relationshipbuilding, and other work relatively become more critical. In white-collar work, routine tasks will be significantly reduced, and more time will be spent on tasks such as problem formulation, consideration of solutions, quality control and review, resulting in a potential productivity improvement. Therefore, the ability to use generative AI to implement hypothesis testing procedures quickly while performing business will become increasingly important.
- As generative AI streamlines tasks, the roles and work styles required for people change dramatically, and more creative jobs unique to humans are expected to increase. Roles can be changed, like managers will focus more on management, employees will be committed to planning, proposing, and creating value for customers, and other tasks will be delegated to AI. Therefore, human creativity (e.g., entrepreneurship) and skills will become even more critical.

²⁸ OpenAI defines prompt engineering as "giving clear and effective instructions to a generative AI." Source: "Best practices for prompt engineering with the OpenAI API" as described in OpenAI Advice and answers from the OpenAI Team <u>https://help.openai.com/en/articles/6654000-best-practices-for-prompt-engineering-with-openaiapi</u>

- In the age of generative AI, it is widely expected that business people will be required to take on value-added tasks to increase operational efficiency, so it will also be important to acquire the skills of business architects and designers who are closer to users and the business.
- According to a survey by GitHub, 70% of programmers and other developers who have Copilot's AI tools on GitHub are positive about generative AI because it improves their coding skills, increases productivity through more efficient coding, and helps them focus on creative work, suggesting that generative AI and its development can impact the human resources development and skills of programmers and other IT professionals²⁹.

It should be aware that using generative AI may reduce the opportunities for working people to gain experience through their work, requiring countermeasures to address such issues

• While generative AI can improve work efficiency, too much reliance on AI can lead to a loss of opportunities for working people to gain experience and grow through their work. In particular, the impact on inexperienced members of society, such as recent graduates, who traditionally perform basic tasks and gain experience through conversations with their peers, is likely significant. From a human resources development perspective, executives and managers need to be aware of this potential impact and consider countermeasures, such as providing alternative opportunities to gain experience.

²⁹ According to a survey of US developers conducted by GitHub (a platform for programmers), 92% of developers use Copilot's AI tools on GitHub, and 70% see significant benefits from using AI tools. Specifically, they cited improved coding skills (57%), increased productivity (53%), and the ability to focus on non-repetitive tasks, new development and creative tasks (51%) as benefits. Source: GitHub, "Survey reveals AI's impact on the developer experience", June 13, 2023, https://github.blog/2023-06-13-survey-reveals-ais-impact-on-the-developer-experience/

4. Approaches to human resources and skills required for DX promotion in the age of generative AI

Based on the discussion in the Study Group, the concept of human resources & skills (literacy level) required to promote DX in the age of generative AI is categorized into three as follows

(1) Mindset, attitude and literacy

(1) Mindset & attitude required to use generative AI

While the essence of the mindset and attitude required for DX promotion remains essentially the same due to its universal nature, the following additional factors are considered necessary for using generative AI.

- Intention to use generative AI appropriately for productivity improvement and business transformation by combining it with skills such as the "ability to ask questions" and "ability to develop & test hypotheses" that are required for business people
- Understanding that generative AI can lead to unexpected results and potential risks of copyright and other rights violations, information leakages, and ethical issues
- ♦ A willingness to continuously learn and change without hesitation while keeping an eye on the impact of the emergence and pervasiveness of generative AI on daily life and business, as well as the changes just around the corner

(2) Basic digital literacy

- Generative AI is not seen as a temporary boom but a significant irreversible change, so AI literacy becomes more important. At the knowledge level, the first step is to acquire basic knowledge about the mechanism of generated AI and its advantages and disadvantages. In addition, for the appropriate use of developed AI, especially for the proper evaluation of its outputs, it is necessary to understand on a daily basis and be aware of the systematic use of existing knowledge.
- On the other hand, while generative AI is easy to implement, it also involves risks such as information leakage. Therefore, ethics and training in generative AI will become increasingly important. In addition to developing guidelines, companies must foster an organizational culture in which employees understand and feel comfortable using generative AI.

(2) Acquiring ability to instruct (develop prompts), verbalize & communicate communication & other skills

- Governments and companies are beginning to use generative AI, and many domestic companies are developing large-scale language models. A new profession, prompt engineers, is attracting attention to develop and improve prompts for generative AI to produce the best possible results. As long as humans use language to communicate with generative AI, acquiring skills such as instruction knowledge (developing prompts), verbalization, and communication (including Japanese language skills) will be essential.
- At the same time, it is said that the instructions (the way prompts are written) are rapidly changing, being automated and replaced as technology advances. While instructions (prompts) are essential, it is more important to train talent who can

identify areas to automate and consider combining technologies to automate those areas.

- (3) "Ability to ask questions," "ability to develop & test hypotheses," & other skills obtained through experience
- To use generative AI effectively, it is essential to have abilities to analyze and think about the situations in which AI should be used, ask questions, evaluate the outputs of generative AI, and think critically to decide whether to use the generated outputs as they are. These are developed through experience and are required as basic skills regardless of types of jobs or roles.
- Since the use of generative AI may reduce the opportunities for working people to gain experience through work, it is important to provide hands-on training opportunities in companies.

5. Response on human resources and skills

5-1. METI's policy responses

(1) Review of the "Digital Skills Standards (DSS)"

- With the emergence and development of generative AI, digital skills required for business people involved in DX are expected to be also changing and more critical in some areas.
- Therefore, the Digital Skill Standards for DX literacy (DSS-L) (created in March 2022), which defines the knowledge and skills that all business people involved in DX should acquire, was reviewed. Specifically, descriptions of the mindset and attitude required for the appropriate use of generative AI and understanding the fundamental mechanisms, technology trends, usage and associated risks were included.
- This review created an opportunity to disseminate and promote DSS.

(2) Posting of the use of generative AI courses on the "Manabi DX"

 "Manabi-DX," a portal site operated by METI and the Information-technology Promotion Agency, Japan (IPA) that presents educational content produced by the private sector and universities in an integrated fashion for the acquisition of digital skills in an integrated manner has added courses for learning how to use generative AI. It is planned to add more courses so students can learn the latest technologies related to generative AI under appropriate supervision.

(3) Use of generative AI in "Manabi DX Quest"

 METI's digital human resources development program, "Manabi DX Quest," will use generative AI and other technologies starting this year to help participants solve issues they are working on in the training program. Specifically, they will be used for information gathering, brainstorming and ideation in analyzing and considering countermeasures, as well as for making suggestions using generative AI in exploring solutions to issues faced by companies. This is expected to be a handson learning opportunity for participants to learn how to use generative AI and other technologies in the DX promotion process.

(4) Revision of the syllabus of the "IT Passport Examination" & release of sample questions on the topic of generative AI

• In the "Information Technology Engineers Examination (ITEE)," which is designed to objectively evaluate the skills and abilities of individuals with digital skills, the syllabus of the "IT Passport Examination," the basic (literacy) level of the examination, will be revised in August this year to include questions related to generative AI, and sample questions will be released.

5-2. Case study examples by private organizations to promote the use of generative AI

- In the Japan Data Scientist Society²⁹, the Skill Definition Committee reviews the "Skill Checklist," which is linked to the skill standards set by the government, and the IPA's ITSS+ (plus) "Task List" in the field of data science every two years and publishes the ones, and a significant update is planned in light of the emergence of generative AI.
- Japan Deep Learning Association (JDLA) ³⁰ has developed a draft of usage guidelines to facilitate smooth implementation by organizations considering generative AI and released the "Guideline for the Use of Generative AI" in May this year. The JDLA also held the "JDLA Generative AI Test 2023" in June this year, which tested the skills and knowledge required to use generative AI properly.
- Association to Generalize Utilization of Generative AI (GUGA) ³¹ is planning and developing the "Generative AI Passport" as a primary test for implementing generative AI in society. The first test will be held in September this year, and training courses for enterprises and local governments are also planned.
- Development of Digital Human Resources (DDHR) ³² published "Proposals for the Use of Generative AI in the Private Sector" in May this year. In July this year, it began offering a "Generative AI Literacy Test" for small and medium-sized enterprises.

³¹ The Association to Generalize Utilization of Generative AI (GUGA) (<u>https://guga.or.jp/</u>)

²⁹ The Japan Data Scientist Society (<u>https://www.datascientist.or.jp/</u>)

³⁰ Japan Deep Learning Association (JDLA) (<u>https://www.jdla.org/</u>)

³² Development of Digital Human Resources (DDHR) (<u>https://www.ddhr.jp/</u>)

6. Medium- to long-term issues to be discussed

- Based on the discussions of this study group, as mentioned above, the digital skills and other standards were simultaneously reviewed. However, the impact on more professional human resources development and skills for DX promotion are currently unclear, so the discussions are to be continued as a medium- to long-term issue for the future while keeping a close eye on the evolution of generative AI.
- Specifically, the future impact on the "Digital Skill Standards for DX Promotion" (DSS-P) (created in December 2022), which defines the roles of five types of human resources for DX promotion and the skills to be acquired, will be considered and updated based on the opinions of experts, as well as taking into account the technological trends of generative AI.
- In addition, a review of the "Information Technology Engineers Examination (ITEE)" in light of the emergence of generative AI is essential. In addition to revising the syllabus and releasing sample questions for the IT Passport Examination, questions for other categories of examinations will also be reviewed and updated based on expert opinions and other factors.
- Generative AI and other emerging technologies are constantly evolving, so necessary policies must be agilely and constantly reviewed in light of their progress.

7. Conclusion

- As noted at the beginning of this report, this report is an "agile" summary of actions that should be taken now in response to the emergence and rapid progress of generative AI, taking into account the speed of technological progress in terms of approaches to the human resources and skills required for the appropriate use of generative AI. The discussion points in the previous chapter "6. Medium-to long-term issues to be discussed", as well as new issues that arise as generative AI progresses, will be discussed on an ongoing basis and reflected in the content of this report.
- Given the potential of generative AI, it is essential for companies to use it not only as a tool to improve operational efficiency and productivity but also for transformation, i.e., to create competitive advantage by transforming products, services, business models, operations themselves, organizations, processes, and corporate culture³³.
- However, at this point in time, when the adoption of generative AI is still in its infancy, it is critical to have an attitude of not just waiting but rather trying to use generative AI appropriately and proactively to leverage it for business innovation while being cautious about copyright and other rights violations, information leakage, and other issues. In the study group, participants were presented with case studies of companies that quickly created an internal environment for the safe use of generative AI. The next phase can be to develop more human resources with generative AI literacy, who can further deepen their understanding of the benefits and risks and what generative AI can do when it is actually used.
- The ability to quickly adopt and use emerging technologies such as generative Al depends largely on gaining a positive understanding from management, communicating such technologies, establishing an internal organization (internal team that can take the lead), and providing internal training for active use.
- In addition, to link the use of generative AI not only to partial operational efficiency improvement but also to business innovation and customer experience innovation to increase corporate value, the retention of digital talent, which has long been a challenge for Japanese companies, is paramount, and the provision of internal training to develop skills in the use of AI is also important, as discussed earlier. The ease of use and development offered by generative AI (the democratization of technology) will provide a significant opportunity for companies to attract and retain talent.
- The previous discussion in this report mentioned that "Japan is already lagging behind the rest of the world in terms of enterprise-level applications," but even during this brief study group discussion, various methods of using generative AI in business are being developed³⁴. It is important to "keep learning and changing

³³ Source: METI, "The Digital Governance Code 2.0," created in November 2020 and revised in September 2022.

https://www.meti.go.jp/policy/it_policy/investment/dgc/dgc2.pdf

³⁴ For example, developing plugins in ChatGPT to extend its functionality has sparked global competition. Although the number of Japanese companies participating in this field is growing, it is still small worldwide (19 companies as of July 31, 2023). The core business of many of these digitally native Japanese companies is in the internet business.

without hesitation, while catching up with the trend". It is hoped that further progress in DX will be made by using generative AI with an appropriate sense of urgency while staying in touch with such information.

• With the emergence and progress of generative AI, it is also hoped that this report will help companies that are about to engage in DX through the use of generative AI, or that are trying to educate and train talent in their companies to further accelerate DX.

Source: Microsoft Japan Co. Ltd., "Azure OpenAI" (11th Study Group on Human Resources Policy in the Digital Age, "Document 4"), July 31, 2023, P. 16 and P.17 https://www.meti.go.jp/shingikai/mono_info_service/digital_jinzai/pdf/011_04_00.pdf

Reference 1. List of study group members

<Study Group on Human Resources Policy in the Digital Age, the list of study group members> (honorifics omitted)

(Chair)

Keiichiro Mitani, Executive Chief Engineer, Executive Consultant, NTT DATA Institute of Management Consulting, Inc.

(Commissioners) In Japanese alphabetical order

Saburo Arima, Executive Officer and CTO, Saison Information Systems, Co., Ltd.

Takuo Ishikawa, General Manager, Career Development Division, Human Capital Group, Hitachi Construction Machinery Co., Ltd.

Naoko Ishihara, ExaWizards Inc. Head of Institute for Work, AI and Digital

Yuji Shimada, Visiting Researcher, Research Institute of Industrial Technology, Toyo University

Takafumi Takahashi, Chairman and Co-Founder, Brainpad Inc.

Kunihiro Tanaka, President and CEO, SAKURA Internet Inc.

Hiroki Daichi, Representative Director, Rector, inc.

(Observers)

Secretariat of Science, Technology and Innovation Policy, Cabinet Office, Government of Japan

Gender Equality Promotion Division, Gender Equality Bureau, Cabinet Office, Government of Japan

Council for the Realization of the Vision for a Digital Garden City Nation, Cabinet Secretariat, Government of Japan

National center of Incident readiness and Strategy for Cybersecurity (NISC), Cabinet Secretariat, Government of Japan

Group of Strategy and Organization, Digital Agency, Government of Japan

Director of the Information and Communications Bureau, Ministry of Internal Affairs and Communications (MIC), Government of Japan

Digital Inclusion and Accessibility Division, Information and Communications Bureau, Ministry of Internal Affairs and Communications (MIC), Government of Japan

Technical Education Division, Higher Education Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT), Government of Japan

Office of Counsellor for General Affairs, Director-General for Human Resources Development, Ministry of Health, Labour and Welfare (MHLW), Government of Japan

Office of Human Resources Development for Companies, Director-General for Human Resources Development, Ministry of Health, Labour and Welfare (MHLW), Government of Japan

The Information-technology Promotion Agency, Japan (IPA)

(Secretariats)

IT Innovation Division, Commerce and Information Policy Bureau, Ministry of Economy, Trade and Industry (METI) Boston Consulting Group, Inc. (BCG)

Reference 2. Schedule and major developments of the study group

<Study Group on Human Resources Policy in the Digital Age, the list of the major developments>

8th session (1st of this year) June 13, 2023 Speaker: Matsuo Yutaka, Professor of Graduate School of Engineering, The University of Tokyo

9th session (2nd of this year) July 6, 2023 Speakers: Microsoft Japan Co. Ltd., and Boston Consulting Group, Inc. (BCG)

10th session (3rd of this year) July 20, 2023 Speakers: Nissin Foods Holdings Co., Ltd., Chugai Pharmaceutical Co., Ltd., Panasonic Connect Co., Ltd.

11th session (4th of this year) July 31, 2023 Speakes: ExaWizards Inc., Globis Corporation, Microsoft Japan Co. Ltd.

12th session (5th of this year) August 3, 2023 Discussion and conclusions

Reference 3: List of interviewees (titles omitted, in Japanese

alphabetical order)

Jun lio	Professor at the Faculty of Global Informatics, Chuo University
Ryutaro Okada	Executive Director, Japan Deep Learning Association(JDLA)
Makoto Koizumi	Project Advisor, Japan Deep Learning Association (JDLA) Resercher, The System Design and Management Research Institute, Graduate School of System Design and Management, Keio University
Daisuke Kochu	Senior Director, AI Analytics Department, NEC Corporation Skill Definition Committee Member, The Japan Data Scientist Society
Satoshi Saeki	CMO, Shinsei Financial Co., Ltd. Vice Chair, Skill Definition Committee, The Japan Data Scientist
	Society
Yukio Saegusa	Founder & CEO, Coolsprings Corporation
Norimitsu Takahashi	President, Digital Growth Academia, INC Skill Definition Committee Member, The Japan Data Scientist Society Director, Open Government Consortium
Jun Taguchi	Chief Editor & Executive Producer, Impress Corporation
Yuto Takei	Information Security Officer, Mercari, Inc.
Hiroshi Takechi	Executive Expert, Cyber Security Strategy Division, NEC Corporation Representative, The Information Security Operation providers Group Japan (ISOG-J)
Jin Tsunoda	President, Development of Digital Human Resources/Professor, Faculty of Social Systems Science, Chiba Institute of Technology CEO, Digital Human Resources Japan, Inc.
Masamitsu Naito	Director General, Association to Generalize Utilization of Generative AI (GUGA)
Kensuke Niizuma	Director, Association to Generalize Utilization of Generative AI (GUGA) Representative Director, BOSAI SYSTEM Co., Ltd.
Tetsuharu Hanazaki	Examinination Committee, The Information Technology Engineers Examination (ITEE)
Eiiti Hanyuda	Director, Mamezou Co., Ltd. Director, Kowamex Inc. CTO, Mamezou Holdings Co., Ltd.
Takayuki Fukatsu	CEO, THE GUILD inc CXO, note inc.