

DX Human Resource Development in the Digital Age

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Abstract

Today, one concept more than any other is driving the way businesses are structuring for the future. Digital transformation (DX) promises to revolutionize everything from products and services to business models. But this transition can't happen on its own. To get there, companies need workers with the skills and knowledge to understand, manipulate and deploy data and digital technology to meet the needs of customers and society. With DX talent now in high demand, companies worldwide are struggling to recruit competent DX talent, increasing the need for DX human resource development. NEC has launched the NEC Academy for DX, a one-stop service offering solutions for DX human resource development required for the digital age. We will describe that program in this paper and examine a number of case studies conducted at NEC Academy for DX that demonstrate the effectiveness and efficacy of this program.

Keywords



DX, digital transformation, human resource development, AI, data science, design thinking, cybersecurity, NEC Academy for DX

1. Introduction

For businesses to survive and thrive in this new era requires comprehensive business model reforms at every level in all industrial areas where data and digital technology are tightly integrated into every aspect of a business's operations. Shortages of staff with the requisite skills in digital transformation (DX) is now a serious societal issue. *DX Report 2 (Interim Report)* compiled by the Ministry of Economy Trade, and Industry in 2020 stresses the importance of developing the necessary human resources to push DX forward¹⁾. Another report, *DX White Paper 2021*, published by the Information-technology Promotion Agency, analyzes the DX human resource shortages faced by Japanese companies in terms of both quantity and quality, concluding that the need to scale up training of DX talent is urgent²⁾.

At NEC Academy for DX, the trainees are organized into three different groups or "strata" to facilitate the development of targeted policies (**Fig. 1**). The first stratum is composed of people who will work exclusively in the DX domain, implementing the latest technologies to transform and maintain digital businesses. The second



Fig. 1 The three strata of DX trainees.

stratum consists of the DX execution talent. These are the people who design and carry out various business or organizational operations and projects that leverage the power of digital technology. Finally, the third stratum is comprised of all employees who are now required to utilize in their daily activities the digital technology deployed by the organizations they work for.

Going forward, it is safe to assume that most companies in most industries will attempt to accelerate their efforts to promote and implement DX. Recruiting and training skilled DX talent to achieve their efforts is now a matter that requires immediate attention.

In this paper, we will examine the skills required by DX talent in the digital age, discuss the points to bear in mind when training them, and introduce NEC's DX Human Resource Development Offering by looking at various case studies of the NEC Academy for DX.

2. DX Human Resource Development Approaches

In our view, training of DX human resources can be separated into three main phases: decision making in DX human resource strategies, practical DX human resource training, and continuous diffusion of DX culture (Fig. 2). The first phase — decision making in DX human resource strategies — is predicated on exhaustive research into possible policies and projects. In the second phase — practical DX human resource training — DX specialists are trained in all aspects of the field so that they can play a leading role in the achievement of DX at the company and are expert enough to train other employees in DX literacy. The third strand in this multi-layered training involves continuous diffusion of DX culture. This can be done by offering continuous DX training courses and supporting the DX talent at the company.

When DX promotion is implemented, it invariably sends shock waves reverberating throughout the company, radically reforming its business models and challenging traditional ways of management. To ensure success, it is critical that these three phases be cycled repeatedly and that top management be fully committed. Nor is it sufficient to focus on DX specialists and DX users. All employees — including ordinary employees who would not normally interact in a deep way with technology — will need to habituate themselves to the new ways of doing business. They will need to relearn things they think they are accustomed to (reskill) and they will need to continuously learn new things in order to internalize a mindset dedicated to DX promotion. Only when all employees are united in the shared goal of reforming the company's business operations, as well as its structures, processes, cultures, and environments, only then will it be possible to take up the bold challenges necessary to establish their competitive superiority.



Fig. 2 DX human resource development approaches.

3. Key Points When Training DX Talent

When promoting DX, operational planning and development involves close cooperation between multiple staff each of whom has a different skill set. Working together, they execute a particular project by choosing and adopting optimal technologies and solutions to achieve the benefits DX has to offer. Below we highlight the key points — clarified through the DX training endeavors carried out thus far — that we believe must be taken into consideration and applied according to the three strata of the DX trainees (Fig. 3).

3.1 All employees

While specialists and planners design, develop, and implement digital technology, it is all employees who will interact with that technology on a daily basis, using it to achieve the company's goals and leveraging in service of their daily tasks. To overcome any latent fear of change, these employees will need to understand the value brought by DX and to acquire basic knowledge of digital technology (AI, IoT, cloud, etc.) (Fig. 4). This means they will need a level of business data literacy sufficient to enable them to accurately interpret and evaluate data for utilization in various tasks while making data-driven, logical decisions. They also should learn how to operate and utilize the various business systems which have

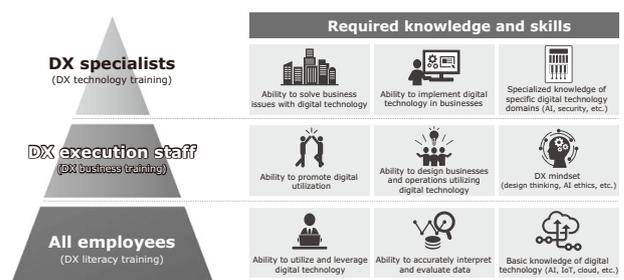


Fig. 3 Knowledge and skills needed by DX trainees.



Fig. 4 Key points when training all employees.

been expanded and upgraded to an extremely sophisticated level via digital integration and play an active role in providing feedback on how to improve and enhance the system for actual utilization in their daily operations.

To accomplish this, a wide range of training programs and seminars must be offered that will enable all employees to acquire the requisite knowledge and skills of DX.

3.2 DX execution talent

These are the people responsible for planning and promoting competitive digital businesses. In order to successfully transform a business, the DX execution talent have to be able to design roadmaps that clearly delineate the end goals and chart out a course for reaching those goals. This means not only having a grand vision, it also requires a clear understanding of essential business issues that need to be addressed and the ability to select the technologies most appropriate to solving those issues (Fig. 5).

When promoting DX that transforms conventional on-site operational flows, it is necessary to validate the proposed value through proof of concept (PoC). At the same time the judgment points for the introduction have been clearly defined, while obtaining cooperation from busy on-site departments. The DX execution talent are also responsible for assessing the business value of a technology validated through the PoC process even when it has already been extensively applied to other on-site departments and similar operations.

DX execution training requires training programs centered around various past DX cases in the same industry and other industries, workshops for learning how to implement DX and obtain design thinking, and accompanied coaching for new business creation and operation reform.

3.3 DX specialists

These are the people who make digital transformation a reality. Responsible for implementing the digital busi-

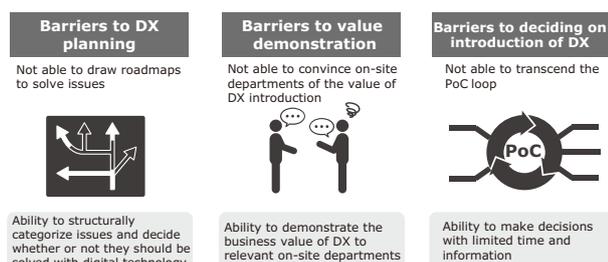


Fig. 5 Key points when training DX execution talent.

nesses planned by the DX execution talent, DX specialists need to have specialized knowledge in fields such as data science, AI, and cybersecurity, as well as the IT skills necessary to implement and operate digital technologies. Also important is enthusiasm for learning new things while actively keeping an eye on rapidly changing digital technology.

A number of references are available that allow us to measure the skill levels of DX specialists. For example, the Japan Data Scientist Society released a checklist to define the skill levels of business capability, data science capability, and data engineering capability³⁾ required for data scientists who play a central role in the technological aspects of DX at a particular company. For definition of the skill levels of cybersecurity talent, the Workforce Framework for Cybersecurity (NICE Framework) published by the U.S. National Institute of Standards and Technology is useful. In Japan, the Security Body of Knowledge (SecBoK) human resource skill map released by the Japan Network Security Society⁴⁾⁵⁾ is another valuable source of information.

To optimize training, DX specialists should be provided with opportunities to repeatedly practice problem solving utilizing digital technology through various simulations such as mock projects and machine exercises, as well as opportunities to actually work through real projects (practical on-the-job training).

4. DX Human Resource Development Policies

Garnering training knowhow gained in the areas of AI, security, cloud, and design thinking, NEC launched the NEC Academy for DX, which is a one-stop service to support DX human resource development required in the digital age. The training policies adopted at the academy are introduced below (Fig. 6).

4.1 DX literacy training for all employees

The NEC Academy for DX offers training programs for DX literacy in which all employees learn the basic skills



Fig. 6 DX training policies.

they need to function in the DX domain. These programs can help deepen their understanding of what can be accomplished with digital technologies that support DX (AI, IoT, cloud, etc.), how those technologies can be utilized to create value, as well as the importance of learning to use DX and the risks of not using it.

4.2 DX business training for the DX execution talent

With a view to accelerating digital utilization in business departments, it is necessary to offer DX Human Resource Development Offering (e.g., AI/data utilization planning support) that include groupwork, ideathons, and OJTs. While studying representative usage cases of DX, course participants can learn the key points regarding business planning and become accustomed to utilizing AI and data. After participating in simulations (workshops and homework) that combine operation-specific, industry-specific domain knowledge and digital knowledge, they take part in repeated hands-on OJTs with accompanied coaching.

4.3 Enhancing the skills of DX specialists

To enhance the practical capability of DX specialists, DX Human Resource Development Offering is recommended that combine machine exercises, project-based learning (PBL), and OJTs in fields such as AI and cybersecurity. NEC has launched an adjunct service called the NEC Academy for AI, where participants can be trained as competent data scientists. Trainees in this academy learn to utilize data analysis and AI in their businesses through OJT and PBL case studies with guidance from mentors who are active on the front lines of various fields⁶⁾.

NEC also provides yet another service called the cybersecurity training ground. Designed to train cybersecurity talent, the cybersecurity training ground puts trainees in the thick of the action through simulated attacks on system vulnerabilities. This lets them experience the actual damage that such attacks can generate and push them to come up with a rapid and robust response. Through this experience they can acquire the practical skills they will need to build robust systems able to withstand cyberattacks. DX specialists can only obtain the skills to solve the real-world challenges they will face by actually experiencing those challenges in hand-on simulations. At NEC, our priority is to develop DX human resources equipped with all the tools and knowledge needed to take on real-world challenges with confidence, which is why we place emphasis on the provision of opportunities for practical experience.

4.4 Future prospects of the NEC Academy for DX

While implementation and utilization of digital technology are moving forward with surprising speed, that progress could slow down if shortages in DX human resources are not soon met. Working closely with our clients, NEC Academy for DX supports the training of DX talent on a continuous basis, while promoting strategies to develop DX human resources and disseminate DX culture through each company. Over the next three years, we hope to graduate 6,000 DX personnel ready to work at companies committed to DX⁷⁾.

5. Conclusion

This paper has discussed the training methodology for the DX personnel based on the case study at NEC Academy for DX. The need for skilled DX personnel has never been greater, yet concern that Japan will fall behind in DX is increasing. Competition between companies for the few available competent DX human resources puts enormous stress on any business hoping to make the transition to the digital future. Because it takes time and money to train DX talent, it is important to commit to start training DX talent as early as possible. By sharing the DX human resource development methodologies NEC has developed in-house, we will help our customers increase their labor productivity and international competitiveness, thereby contributing to the achievement of a human-centered digital society where everyone can make secure and effective use of digital technology.

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The details about this paper can be seen at the following.

Related URL:

NEC Academy for DX (Japanese)
<https://jpn.nec.com/dx/nec-academy/>

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