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Challenges in the Societal Implementation of Physical AI

Non-technical issues such as safety, quality, and the delineation of responsibility are emerging as a bottleneck

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Summary

- In recent years, there has been growing interest in 'physical AI' as a new area of application. Physical AI refers to AI that performs actions and tasks in the real world through robots and other means, representing a new form of AI application that differs from conventional business automation. However, given that it operates in the real world, this is not a field where widespread adoption will occur naturally through technological advancements alone.
- Internationally, the United States is leading the way with an approach centered on advancing foundational models, backed by massive computational resources, while China is simultaneously promoting adoption and standardization under policy-driven initiatives. In contrast, while Japan possesses strengths in fields that prioritize safety, quality, and on-site applicability, its investment in foundational models and computational resources falls short of that of the United States and China; consequently, it is difficult to say that Japan can realistically compete with the US and China on a scale comparable to theirs.
- Against this backdrop, the Japanese government has outlined a plan to leverage industrial data while developing domestic base models and evaluation and demonstration environments, with the aim of enhancing the competitiveness of the manufacturing sector and other industries. This strategy can be considered sound, as it focuses resources on areas where Japan's strengths can be most effectively leveraged.
- However, as Japan moves toward the societal implementation of physical AI, it faces different bottlenecks during the development and validation phase versus the deployment phase. In the former, constraints on field trials due to safety concerns and the potential impact on operations mean that it is important to secure simulation platforms and computational resources. In the latter, the pursuit of site-specific optimization tends to create significant implementation burdens, making it difficult to scale solutions across sites or achieve continuous improvement.

- Consequently, the success of deploying physical AI in society depends not only on the technical performance of the technology but also on how non-technical factors—such as safety, quality, and the delineation of responsibility—are designed. While Japan’s strength lies in having carefully established these conditions in a manner tailored to real-world settings, the key focus going forward will be on whether it can transform this strength into a form that can be applied across various sectors.

Attention

This report is a summary translation. The official document is only in Japanese.