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■ Aiming for "Open Science" in its true sense

During his time as a Ph.D. student and in his previous role, Komiyama conducted research in data science applied to life sciences (bioinformatics). His work involved gathering papers and research data from international databases to train AI models. However, at that time, the amount of cited research data needed to be expanded to enhance AI accuracy for his purposes significantly. Meanwhile, scientists worldwide were beginning to discuss "open science": sharing research data at an early stage to accelerate the research and development cycle. Komiyama recognized that Japan would need an ecosystem for nationwide research data management and sharing to bring this vision to fruition.

After joining NII in 2016, Komiyama began to consider whether it would be possible to create a research data management system tailored for Japan based on the Open Science Framework (OSF), an open-source research data management tool developed by the Center for Open Science (COS) in the U.S. As he explored this idea, NII initiated the development of a research data infrastructure to advance open science and uphold research integrity. This evolved into the current NII Research Data Cloud (NII RDC), comprising three platforms dedicated to data management, publication, and discovery. Starting in 2017, Komiyama became involved in the launch of GakuNin RDM, a research data management platform, and has been leading its system development since its inception.

GakuNin RDM: An ever-evolving data management platform

GakuNin RDM is a research data management service that enables researchers to manage and share research data and related materials. In 2022, NII RDC entered its second development phase, and Komiyama's research group began creating new features to enhance convenience and strengthen data governance. Among the seven new features being developed for NII RDC, data governance and data provenance are being developed in collaboration with the GakuNin RDM team.

Komiyama's primary research and development work involves organizing and generalizing requests from research institutions and researchers and then integrating new features into GakuNin RDM. He finds this work highly rewarding, as the features he develops enhance GakuNin RDM, making it more user-friendly for researchers. Additionally, he is collaborating internationally with COS to contribute the functions created for GakuNin RDM in Japan back to the open-source tool, OSF.



One of the features Komiyama has developed is a research data trail management system. This system attaches a timestamp issued by a time-stamping authority (TSA) to all files on GakuNin RDM, allowing verification of the existence of research data at specific points in time. Additionally, it alerts the project manager if file contents are modified outside of GakuNin RDM, helping to uphold research integrity. As far as we know, similar functions have yet to be implemented in research data management systems in Europe or the United States, making this the first system of its kind worldwide.

■ Spreading awareness of the concept of research data management to all researchers

Komiyama is currently working on integrating his data management platform with the publication platform, one of the other components of NII RDC. Previously, the three platforms were developed independently, leading to interoperability issues. In the future, core functions within GakuNin RDM will enable researchers to register papers and research data directly in linked library systems.

Once the three platforms are fully integrated, papers will be published based on high-quality research data, making it easier for researchers to build upon previous findings. This integration will not only promote data sharing among researchers at top universities but also enable smaller universities, private companies, and the general public to access high-quality research data and publications. As a result, a broader range of research can be conducted, regardless of the research budget available.

Although awareness of research data management has undoubtedly grown, Komiyama recognizes that there is still a long way to go before it becomes an established system within research institutions and is fully embraced by researchers in general. Many challenges remain, such as integrating with international research data platforms, managing large-scale datasets, and ensuring compatibility with research tools. By continuously gathering feedback from users—including IT centers, academic libraries, and researchers— Komiyama aims to make the current system more user-friendly and secure while also developing a research data platform that meets international standards and providing it as a service.

Researchmap <u>https://researchmap.jp/yusuke_komiyama/?lang=en</u>

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