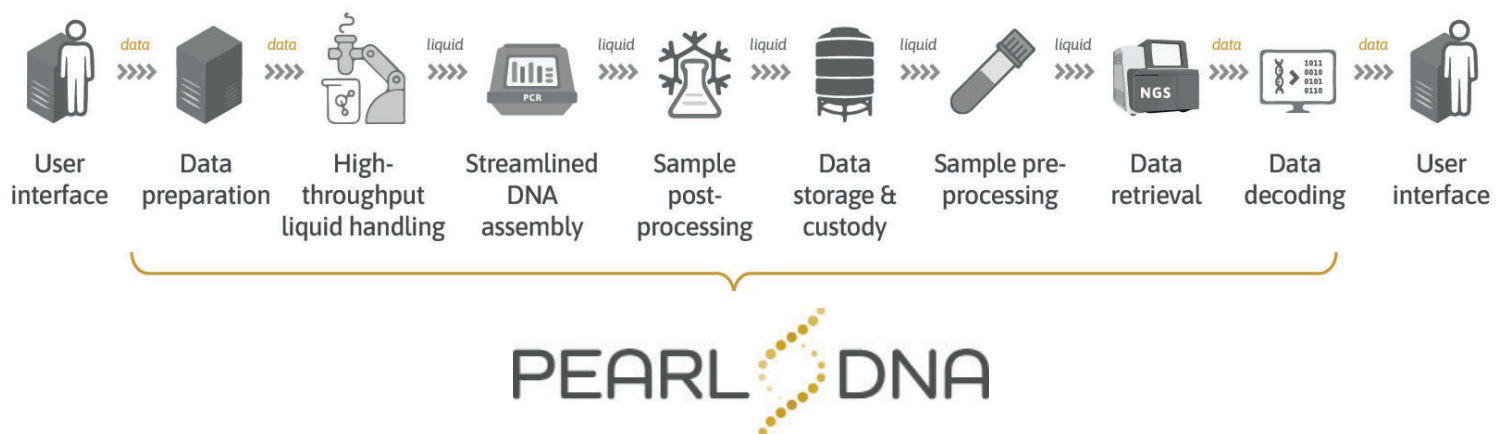




PEARL-DNA concludes successfully with major advances in DNA-based data storage

PEARL-DNA, a Horizon Europe project funded by the European Union that set out to demonstrate how digital information can be written into DNA, preserved and recovered accurately, has concluded its three-year research programme 30 September 2026.

For three years, six partners from four countries, including project lead **BioSistemika** (Slovenia), the Institute for Information Processing at the **Leibniz University Hannover** (Germany), DNA conservation technology provider **Imagene SA** (France), the Division of Molecular Biotechnology and Genomics at the **Technical University of Applied Sciences Wildau** (Germany), Institut iPrint at the University of Applied Sciences and Arts Western Switzerland - **HES-SO** (Switzerland) and EU-project management, communication and dissemination expert **accelopment Schweiz AG** (Switzerland), worked to address the growing challenge of preserving digital information on which science and society depend. DNA offers a way to store information in a very small space, with the potential for long-term preservation at room temperature. **The project has now delivered laboratory proof of concept and new technologies that could help make long-term data storage more resource-efficient, laying the groundwork for further development and future applications.**



DNA storage uses the same type of molecule that carries genetic information but encodes digital files in laboratory-made DNA. Sequencing the DNA allows the information to be converted back into a digital file. PEARL-DNA developed and tested the steps needed to connect this process, from preparing the data and writing it into DNA to storage and recovery. **A central achievement was the accurate recovery of a small digital file through the complete experimental workflow.** Software developed by the partners helps protect information against errors introduced during writing and reading, supporting reliable recovery of the original data. The project also demonstrated methods for selecting particular DNA-stored information from a larger collection.

To make DNA writing less resource-intensive, the consortium developed equipment and methods that work with extremely small liquid droplets. These enable DNA assembly with much smaller quantities of biochemical materials than conventional laboratory reactions, providing a basis for reducing material use and future processing costs. The partners also produced and tested a compact storage container designed to protect DNA at room temperature. This approach could reduce the need for cooling during long-term preservation.

Together, these results demonstrate the feasibility of the project's approach and provide a foundation for more automated, larger-scale systems.

These results support the long-term ambition to preserve valuable digital information while reducing the resources required to keep it. Potential applications include scientific archives, public records and other information that must be retained for long periods but is accessed infrequently. Further development is needed to increase capacity and writing speed, improve automation and establish costs and environmental benefits at scale.

The project's legacy also extends beyond digital storage. Its precise liquid-handling technologies could support laboratory work that uses smaller quantities of materials, while its storage containers and DNA quality assessment methods may benefit other applications in biotechnology.

Through the European Innovation Council's DigNA portfolio, PEARL-DNA also contributed to shared knowledge, discussions on common standards and engagement with potential users. Public software demonstrators and recorded webinars provide resources for further research. Partners have also developed plans to protect and build on the project's innovations, supporting the next steps towards practical applications.

About PEARL-DNA

Complex datasets generated from scientific research, experiments, simulations and observations in various scientific disciplines need to be stored first before analysis. However, we are running out of data storage with existing data storage options lacking longevity, density and cost efficiency to meet global demands. Funded by the European Innovation Council, the PEARL-DNA project proposes to employ DNA for data storage. Its unparalleled information density and stability over millennia make it an ideal data storage candidate. The project aims to push technological barriers and develop a DNA-based platform for storing digital data with features such as high writing speed, error correction and energy efficiency.

Contact

Project Coordinator

Dr. Tomaž Karčnik (BioSistemika)
tkarcnik@biosistemika.com

Project Communications

Anastasiia Aksonova (accelopment Schweiz AG)
aaksonova@accelopment.com

Partners



www.pearl-dna.eu | @PEARL-DNA



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Innovation Council and SMEs Executive Agency (EISMEA). Neither the European Union nor the granting authority can be held responsible for them. Swiss participants in this project are supported by the Swiss State Secretariat for Education, Research and Innovation (SERI) under contract numbers 23.00332 and 23.00328.