4 SCIENCE

Share your knowledge

Company Overview 2023

Introduction

4Science provides outstanding solutions for research information & data management and for cultural heritage. Our solutions include DSpace 7 and its extensions DSpace-CRIS, DSpace-GLAM, Dataverse and OJS. Our services range from installation and configuration to maintenance to customization and consultancy.

Our team draws on decades' worth of domain expertise and experience including technological, methodological, and policy-related, the fruit of numerous collaborations with universities and research institutes around the world, and backgrounds working in national research and education technology agencies.

4Science's mission is to contribute actively and substantially to the global open scholarly infrastructure, enabling institutions to share their knowledge and expertise sustainably, via fully interoperable systems and standards.

Openness is a defining value of 4Science, highlighted in three main areas. Firstly, open research (open science, open data, openaccess) and open digital cultural heritage. Secondly, open-source software and community-based collaboration; thirdly, adoption of key international open standards and protocols, to enable innovation, interoperability and sharing, from persistent identifiers (DOI, ORCID, ROR) to OpenAIRE guidelines, IIIF, etc.

4Science's solutions are designed to enable institutions to manage research information & data, or cultural assets, with full interoperability, global connectedness and robust security.

A Certified Platinum Provider of DSpace and leading contributor of DSpace 7, Trusted Provider of the Cloud Security Alliance, Selected Partner of AWS, ORCID and DataCite Certified Service Provider, Partner of COAR and of the PKP, Member of euroCRIS, 4Science is also ISO 9001:2015 certified, bringing a high level of assurance with its services. In December 2022, 4Science became listed in the MTF Direct Market (Wien).

Summary

Client testimonials

"Exemplary responsiveness"

"A far better experience" (than other solution providers in the same sector)

Robert Wilson, Middle Tennessee State University, 2021

"Experience in the space and knowledge in the area of digital libraries and repositories" - key element in helping you meet your objectives

"Completely satisfied"

Mario Bernardes, Universidade de Coimbra, 2021

"I and my colleagues very much appreciate the cooperation with the team of 4Science and are pleased with the results achieved"

Markus Mueller, Univers. Bern, 2021

Solutions

DSpace

DSpace is the most widely used repository software with more than **3000 installations** around the world. It is free, open source and completely customisable to fit the needs of any organisation.

The **DSpace Community** is the broadest open-source repository community globally, and continues to grow, with 93 members, representing 23 countries. **As one of 3 DSpace Certified Platinum Providers**, 4Science has a key role in the DSpace community and is the leading contributor to **DSpace 7**.

Why are we a reliable partner?

As a Certified Platinum Provider,, 4Science is a leading player in the DSpace community and a successful Service Provider serving more than 100 institutions with DSpace(-CRIS/GLAM), and a major contributor to the community since 2003. We have a significant role in developing DSpace 7, with over 10,000 hours of software development & coordination tasks in all WGs (Angular UI, REST API – including lead of sub-team, Entities). We also serve the community with two DSpace Committers (since 2006), participation in the Leadership and the Steering groups, and other roles in community initiatives and promotion of DSpace.

We are the creators and maintainers of DSpace-CRIS, DSpace-GLAM, RDM solutions based on DSpace (CKAN integration), add-on modules to enhance the functionality of repositories and digital libraries based on DSpace: IIIF Image Viewer, PDF Document Viewer, OCR & Transcription, Video / Audio Streaming.

> 4Science S.p.A.
Viale A. Papa, 30
20149 Milan, Italy
Tel. +39 02 3971 0430

> Other offices
Rome, Ravenna
www.4science.com
info@4science.com

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LEI 8156005C8604D23F7649
D.U.N.S. 433959163
Company within the Itway Group including under Art. 2497 c.c.

DSpace-CRIS

DSpace-CRIS is a comprehensive, free and open-source Research Information Management System (CRIS/RIMS). It supports the entire research domain.

It is based on DSpace, providing broader functionality and an expanded data model, relying on its large community.

It is compliant with and supports key international standards, facilitating interoperability and data transfer.

DSpace-CRIS enables secure, integrated and interoperable research information and data management – in a single solution.

DSpace-CRIS offers an advanced, consolidated and performant implementation of the Configurable Entities, which inspired the configurable entities in DSpace and started ten years earlier than DSpace.

Why do you need it?

To collect and manage research data and information, including your researchers and groups, departments and organisational units, laboratories and infrastructures, projects and collaborations, contracts and events, publications and patents, awards, etc.

To assess your performance and allocate resources efficiently.

To promote your assets and activities.

To track and apply for new funding opportunities.

To exchange information with external systems and databases (ORCiD, PubMed, WoS, etc.).

Why are we a reliable partner?

The team at 4Science created DSpace-CRIS back in 2009, continuously extending and improving it. We have successfully implemented many DSpace-CRIS projects in institutions all over the world.

We are committed to share what we do, and we make all the most important software enhancements available as open source.

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DSpace-GLAM

DSpace-GLAM is a free open-source platform for the implementation of projects dedicated to the creation and management of digital collections and digital libraries, the preservation and protection of digital content, with a specialized disciplinary approach in the management of descriptive metadata. Collections, collections, funds are managed in full compliance with scope standards or freely defined by institutions. The platform is integrated with a IIIF image viewer, an OCR module, media servers etc.

Why do you need it?

To manage the entities of the cultural heritage domain (collections, funds, people, events, concepts, places, etc.) in libraries, museums, archives, foundations, press offices, tourism sector, etc.).
To create relations between digital objects and entities to fully describe the cultural context. DSpace-GLAM, enhances the possibilities of creating (and managing) thematic routes, cultural tourism itineraries, digital exhibitions, narratives describing different communication contexts.
To tailor your collections to the needs of your audience: scholars and researchers, visitors, citizens, tourists, interested in discovering or acquiring new knowledge about the territories being visited.

Why are we a reliable partner?

The team at 4Science created DSpace-GLAM and its add-ons, such as the IIIF Image Viewer, in 2016, continuously extending and improving it.
We have successfully implemented many digital libraries in institutions all over the world.
We are committed to share what we do and we make all the most important software enhancements available as open source.

Dataverse
https://www.4science.com/dataverse/

OJS
https://www.4science.com/ojs/

Exclusive Add-on Modules

4Science can offer exclusive add-on modules, both for DSpace and DSpace-CRIS/GLAM, which amplify your services and enhance the utilisation, dissemination and breadth of impact of your digital assets, including enabling better reuse and dissemination of your research datasets; or which enhance the user experience with images and multimedia materials: https://www.4science.com/dspace-add-ons/.

The IIIF Image Viewer enables the integration of the repository with any IIIF Image API compliant server. The viewer offers extremely high-quality navigation of items with multiple images/bitstreams in a single-page, two-page (booklet), and thumbnail view mode. The current view, page, zoom level and rotation can be shared as URLs and it is possible to copy & paste code to embed the viewer into external websites (e.g.: blogs and institutional websites) without losing proper attribution. The viewer has a side panel that shows the item metadata in order to preserve the integrity of the information and the identity of the repository.

The Document Viewer is an extension of the IIIF Image Viewer module. It allows the online visualization of PDF files in the browser, with no need for external plugins and minimal bandwidth use. Partial and resized image files are downloaded by the browser at the optimal resolution for the current device and zoom level. The viewer prevents end users from copying & pasting the content of the file, and download of the original PDF file can also be prevented. The viewer provides a "search inside" feature with highlighting for PDFs where text extraction is possible. Combining the Document Viewer module with the OCR module enables the "search inside" feature to be exploited and also highlights scanned (image) PDFs.

The OCR & Transcription module enables the integration of DSpace with an external Optical Character Recognition software. For each image a curation task allows to extract its text representation in hOCR format for full-text indexing in SOLR. In the presence of the IIIF Image Viewer module, the OCR module also provides support for IIIF Search API, which enables the activation of the search functionality inside the IIIF viewer, providing search within images, navigation through the results and highlighting on the image of the OCR text corresponding to the search terms entered. The internal search engine also provides the suggestion of search terms during typing.

The Video/Audio streaming module allows streaming audio/video content loaded in the repository through the integration with a Media Server and the adoption of the DASH protocol. The module allows transcoding of the most popular audio/video and enables adaptive streaming, for maximum reduction in the use of bandwidth, automatically providing each user the best possible resolution of the stream based on the device in use (supported resolution) and on the available connection speed.

The UX Plus Module: Enhance users and administrators UX for public visualisation and data collection. The module provides a collection of enhancements to DSpace, aiming to improve the User Experience both for final users and for repository administrators during their daily duties. Custom renderings are available to visualise in a more effective way specific metadata values, and graphical representations of search results using charts. Input forms feature a WYSIWYG editor. A function for repository managers allows to filter collections by facets and quickly identify open tasks.

The Analytics & Reporting module: 4Science was awarded a contract from the Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (Concytec) for the development of the National Platform #PeruCRIS, based on DSpace-CRIS and funded by the World Bank. In the context of the project, a very sophisticated solution was developed for the analytics and reporting functions. This solution provides DSpace-CRIS with a powerful set of tools for data analysis, reporting and visualisation, based on a combination of state-of-art and open-source technologies OpenSearch, SuperSet and Dremio. Video: https://www.youtube.com/watch?v=IWcPQtsGL3E&t=35s

Find more add-on modules here: https://www.4science.com/dspace-add-ons/.

At 4Science, we are committed to releasing everything we develop in open source, including all the add-on modules. We follow a transparency principle for each module we publish: description of the available ready-to-use code; plan and ideas on future functionalities; target budget for open-source release; fee requested to get involved.

Each customer interested in using the modules pays a fraction of the total target budget (minimum contribution) to access the source code and start using the module. If needed, customers can also secure our services and assistance. Our customers are also "Supporters": with your contributions you make open source release possible. With a contribution, a perpetual licence will be granted to your institution to use the software for any direct needs including reuse in other projects, without the right to transfer the licence to a third party. You will have perpetual access to the code repository where future developments will be made. All code is released according to a roadmap. Code release will be immediate where that code evolution is no longer undertaken by 4Science.

Services

Our highly experienced and qualified team has supported a wide range of organisations, including educational, cultural, academic, governmental, international, and private sector entities, throughout the different phases of digital projects and programmes. We guarantee project effectiveness and full compliance with international methodological and scientific standards.

For each of our solutions, we provide a set of services that can be tailored to meet your requirements perfectly.

Installation & Configuration

We can install, deploy and configure the software of your choice on your infrastructure, supporting your IT staff or managing the whole process on our own. The presentation layer can be configured according to the desired look-and-feel. To populate your new environment, we can retrieve information from an older repository, a legacy database or from external services such as bibliographic databases or map existing data into new formats.

Maintenance & Helpdesk

At 4Science we take care of your issues, from urgencies such as security or outage problems to functional failures, from database to configuration changes, from new requirements to simple helpdesk questions.

Silver, Gold and Platinum SLAs

We provide different levels of maintenance, according to your needs and budget: Silver, Gold and Platinum Service Level Agreements are available for monthly, yearly or multi-year agreements*.

*LTP features might be included in the SLAs upon request.

Support ticketing and Helpdesk

Assistance can also be purchased as packages or pay-per-use deals (e.g. 50-hour or 100-hour packages).

The support-ticketing system, based on Jira Service Desk, an ITIL-certified system by Atlassian, makes it easy to request help, track progress on issues, monitor usage and produce reporting.

Real-time chat and remote video call systems are also available to solve the most urgent and/or complex issues.

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ISO 9001
BUREAU VERITAS
Certification

Advanced services

System integration

We can integrate your new solution with several other systems in your institution via APIs or other models: human resource software, Ongoing Projects, Student Careers, Awards, Community services, OJS/OMP etc.

Authentication/Authorisation

The solutions we provide can easily work with your LDAP, Active Directory, Single Sign On solutions (like for example CAS or Shibboleth). Authorisation rules can be inherited from your systems.

Software customization

We provide analysis, design and development of software customisations to implement new features and services or to modify existing ones. All customisations are then proposed to the open-source software Community to reduce your future maintenance costs.

Reporting & analytics

Multidimensional analysis and bibliometric information turn your data into information and information into knowledge.
The DataMart can be shared with your existent Data Warehouse infrastructure to provide comprehensive analysis.

Long Term Preservation (LTP)

Your data is too valuable to get lost.
The solutions we offer are compliant with the Open Archival Information System Reference Model (OAIS) and we have several options to enhance the LTP reliability and differentiate the LTP strategy, integrating specialized LTP services.

Consultancy and Training

At 4Science we have a long and extensive experience in setting up institutional and disciplinary repositories, research information systems, and complex IT projects for research governance and digital libraries at national and international level.
Our experts, project managers and engineers are the right consultants to support the analysis of your requirements, the design of specifications, and the planning and management of your project. Both on-site training and remote interactive sessions hosted

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on our professional Video Conference System can be organised to fit at best to your schedule and budget.

Hosting

We offer different hosting options, all secure and scalable.

Application management and database management are performed in trustworthy certified ISO 27001 cloud environments (we are partners of Amazon AWS).

SaaS solutions are also available where customers are the only owners of the data and their configurations.

If you already have your cloud provider, we will work with you to support the project in the environment of your choice.

Credentials and Clients

Building on decades of expertise within the team, 4Science has accumulated a breadth of international experience developing digital repositories and research information management solutions with international organisations, academic institutions and public and private organisations, serving numerous clients in five continents over the world: https://www.4science.com/we-work-for/.

Highlights below of some of the most notable projects and collaborations for international and national organisations and for single institutions and companies:

- **OpenAIRE** is a European Organisation formed by partners from all EU countries and beyond, who collaborate to work on this large-scale initiative that aims to promote open scholarship and substantially improve the discoverability and reusability of research publications and data. A network of National Open Access Desks (NOADs) organises activities to collect H2020 project outputs, and supports research data management. 4Science has been successful in gaining awards from OpenAIRE on several occasions.

- In 2018, we were funded by **OpenAIRE** to implement two new protocols, recommended by the **COAR Next Generation Repositories Working Group**: **Signposting patterns** and the **ResourceSync framework**: the project achieved the implementation of the OpenAIRE Guidelines for Data Archives and the OpenAIRE project API. The project aimed to increase the interoperability features supported by the most widely used platforms in the open science ecosystem for Literature Repositories, Data Repositories, Journals platforms and CRIS/RIMS, such as DSpace, Dataverse, OJS.

- **In 2019, we were funded by OpenAIRE to implement the OpenAIRE Guidelines for CRIS Managers in DSpace** (CRIS extension), to enable repositories to expose rich metadata on research information to OpenAIRE, using the CERIF data model. This model is a very

complex one, *representing the entire research domain*, and its implementation in DSpace was a very challenging achievement.

- **In 2020, we were funded for the project: "OpenAIRE ELD - Enrich Local Data via the OpenAIRE Graph"**. With OpenAIRE ELD, 4Science released two new services: Data Correction, to enrich repository data by exploiting the vast amount of information made available by OpenAIRE, and Publication Claim, to ensure that the repository remains up-to-date by automatically discovering new content produced by the institution's researchers in the OpenAIRE Graph, thus reducing the manual input from researchers. Both services are available for repositories running on the most recent DSpace versions (including the CRIS extension). OpenAIRE services have become much more visible and easier to adopt for the DSpace community. The Notification Broker is immediately actionable in the repository: missing or additional information inferred by OpenAIRE can be reviewed and applied to the local data with one click, e.g. missing or additional metadata such as abstract, subject, project, PIDs, etc. The Publication Claim service allows institutions to grab publications from the OpenAIRE Graph and to match their researchers' profiles with them. The service also allows the individual researcher to improve the system's inference/analysis capabilities confirming or rejecting identified matches. The solution offers a dashboard for repository administrators and researchers to manage these services but also a full REST API for further integration. More details at:
  https://www.openaire.eu/openaire-eld-enrich-local-data-via-the-openaire-graph.

- In 2022, 4Science was **awarded the ELD-ADVANCE** project by the **EOSC-DIH (European Open Science Cloud - Digital Innovation Hub)**. Open Access and Open Science policies are spreading throughout Europe: we believe that all the Institutions that are implementing (or are willing to implement) an OA/OS mandate/policy for their repositories and research assets will benefit of the ELD-ADVANCE functionalities, enabling a better control on tracking (and measuring) the impact of research assets and their authors, increasing institutional prestige, impact and credibility. We aim to achieve full impact with a better out-of-box integration with the most widely used tool and repository system in the world, DSpace, in its latest and most stable versions (7.2/7.3). More details at: https://eosc-dih.eu/eld-advance/.

  Working with EOSC and OpenAIRE demonstrates 4Science's superior system integration capabilities, not just for individual customers, but for services that benefit the entire international scholarly community and ecosystem.

- On June 15, 2020, with over 1,3 million USD financing from the **World Bank's** Investment Project: "Improvement and Expansion of the Services of the National System of Science,

Technology and Technological Innovation (Sinacyt)", the **Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (Concytec)**, a government organisation under the Presidencia del Consejo de Ministros in Peru, signed with 4Science (for software customization and development) and Semicrol (for documentation and training in Spanish language) the contract for the development of the National Platform #PeruCRIS. The #PeruCRIS Platform is the central component of the #PeruCRIS National Project, which seeks to establish, develop and operate the National Information Network on Science, Technology and Technological Innovation (CTI), in order to consolidate and manage the country's scientific and academic information, generate statistics to support decision-making at the institutional, regional, sectoral and national levels; as well as to provide global visibility to the activities, capabilities and scientific production of Peruvian researchers.

- The #PeruCRIS national platform is based on a highly customized version of DSpace 7 and the CRIS extension, and aligned with international standards and recommendations such as CERIF. It is composed of five directories: human talent, scientific production, projects, institutions and infrastructure; it will provide timely and reliable information services on the actors, activities and capabilities in the field of R&D&I with national coverage; and, the CV of Human Resources, a federated authentication API, a national observatory of STI, access to sources of scientific information and funding opportunities. It will also provide the necessary tools for monitoring and evaluation. More detail available at: https://perucris.concytec.gob.pe/.

This is the largest existing project in the world using DSpace 7 technology, and for an entire national community, which will set an example for other countries. 4Science is proud to be a key player in such an important initiative for developing countries.

- The **Fraunhofer Society** is a major German research organisation with 75 institutes spread throughout Germany, each focusing on different fields of applied science. With over 29,000 scientists and engineers and an annual research budget of over €2.8 billion, it is the biggest organisation for applied research and development services in Europe. In 2016, 4Science was awarded the design and implementation of a highly customized DSpace solution to manage the research performance indicators for the institutes. Current work by 4Science also includes data analysis and staff training and support. The project was presented at CRIS2018: the 14th International Conference on Current Research Information Systems (Umeå, June 13-16, 2018): https://dspacecris.eurocris.org/handle/11366/644. The system has been in production since September 2018. Then, in 2019, 4Science was awarded another challenging project, a repository system to collect, manage, preserve, and disseminate the intellectual output of the institutes, replacing the current repository Publica, and the entities that populate

Fraunhofer's research domain. Together with its stakeholders, the solution is being designed and modelled to be integrated and interoperable with all data sources, both external and internal, such as ORCID, bibliographic and bibliometric databases, HR and IDM systems, and more. The system is based on DSpace 7 and its CRIS extension and went live in April 2022: https://publica.fraunhofer.de/.

- "Synergies for Societal Impact in Current Research Information Systems" (SynSICRIS) is a 3+2-year project (2018-2023), funded by the **German Federal Ministry of Food and Agriculture (BMEL)** through the funding body Federal Office for Agriculture and Food (BLE). The SynSICRIS project develops a way to record and evaluate the contributions and solutions of research and development to social challenges, using agricultural research as an example (https://www.uni-kassel.de/forschung/en/synsicris/). Partners of this project are Kassel University (coordinator) and DISY (IT) in Germany. The SynSICRIS project includes design, prototypical realisation, prototypical installation, and a pilot site, end-user test, and validation of a software system. The system design, development, and implementation have been awarded to 4Science as an extension and adaptation of DSpace in its version 7.

- The **University of Bern** is a university in the Swiss capital of Bern, founded in 1834, although its roots go back to the sixteenth century and its collegiate school. It is regulated and financed by the Canton of Bern. It is a comprehensive university offering a broad choice of courses and programs in eight faculties and some 150 institutes. With almost 20,000 students, the University of Bern is the third largest university in Switzerland. 4Science is working on an ambitious project for the implementation of a highly customized institutional repository and research information management system based on DSpace and the CRIS extension. Together with the staff of the university (IT, librarians, research office), we analyse, design, and implement advanced configurations and software customizations to represent the university's data model, business processes with customized workflows, and a modern UX to provide an easy, meaningful, and relevant experience to its users. The repository is integrated with a variety of institutional and external sources: https://boris.unibe.ch/.

- **Jisc** is the UK higher, further education and skills sectors' not-for-profit organisation for digital services and solutions. For UK institutions, Jisc's Publications Router service works with publishers to capture articles, match them to their authors' institutions and deliver them directly into the relevant repositories. It is now interoperable with a wider range of systems that institutions use, including research information management systems and CRISs, as well as repositories. Collaboration with 4Science, who have developed the

relevant patches for the latest DSpace versions, means that Router can now deliver the full richness of **RIOXX** metadata fields (as well as full-text articles) into recent versions of DSpace. Parallel work includes compliance with the Research Excellence Framework (**REF**) in the UK, demonstrating the value of institutional repositories for research evaluation as well. Although currently aimed at UK institutions, Jisc would like to enable Router to serve institutions in additional territories. 4Science provides yet another example of a highly complex project, with a key infrastructural enhancement, serving an entire country.
Details of the implementation are available here:
https://github.com/4Science/rioxxintegration/blob/master/README.md.

- The **Consejo Superior de Investigaciones Científicas (CSIC)** is the largest public institution dedicated to research in Spain and the third largest in Europe. Its mission is to foster, coordinate, develop and promote scientific and technological research in order to advance knowledge and economic, social and cultural development. Its institutes are spread across the country, with 15,000+ staff representing 6% of all the staff dedicated to R&D in Spain, generating about 20% of all national scientific production. Based on DSpace and the CRIS extension, DIGITAL.CSIC, https://digital.csic.es/, is the institutional repository of the organisation. It collects, manages, preserves and disseminates the research results of CSIC, providing open access to knowledge. It is integrated with the institutional Research Information System with a role in monitoring the research output and in the research evaluation exercise. 4Science provides support for upgrades and software customizations.

- The **National University of Singapore (NUS)** is ranked consistently as one of the world's top universities and the first in Asia. It is the oldest and largest higher education institution in Singapore. Founded in 1905 as a medical college, NUS presently offers the most extensive college degree courses in Singapore. 4Science has been awarded the contract for enhancements, software customization, upgrade, and maintenance of the Institutional Repository ScholarBank@NUS, based on DSpace, https://scholarbank.nus.edu.sg/. Its goals are to collect, preserve, and showcase the research output of NUS researchers, including articles, books, patents, and datasets.

- The **Institute for Advanced Study of Princeton (IAS)** in the United States of America is an independent, postdoctoral research centre for theoretical research and intellectual inquiry founded in 1930. The IAS is perhaps best known as the academic home of Albert Einstein, Hermann Weyl, John von Neumann, and Kurt Gödel, after their immigration to the United States. Although it is close to and collaborates with Princeton University, Rutgers University, and other nearby institutions, it is independent and does not charge

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tuition or fees. 4Science implemented the IIIF Image Viewer to support remote research and enhance the user experience accessing images of the precious ancient inscriptions kept at the Institute: https://albert.ias.edu/handle/20.500.12111/120. More recently, 4Science was awarded the upgrade of Albert Repository to DSpace 7.

- Established in 1978, the **Hamburg University of Technology (TUHH)** in Germany prides itself on interdisciplinary research and innovation, with first-class teaching and project-based learning at the heart of the university. 4Science supports the Institutional Repository and Research Information Management System, based on DSpace and the CRIS extension, providing advanced configuration, custom software development, specialized training, and consultancy. The repository is integrated with a variety of institutional and external sources. The ambitious programme is to represent all research activities and outputs at TUHH, including research data: https://dspace.tub.tuhh.de/.

- The **University of Trieste** was established in Italy in 1924. Today, with 23,000 students and 1,000 professors, it is ranked among the best universities in Italy by THE World University Rankings and it is at the centre of the Trieste Research System, represented by the UnityFVG Portal, https://ricerca.unityfvg.it/, which collects and disseminates research information about the universities of the Friuli-Venezia Giulia region. OpenstarTs, https://www.openstarts.units.it/, the university's institutional repository (IR) collects, manages, stores and disseminates the digital objects produced by the researchers and the doctoral theses, harvested by the National Library for preservation purposes. The IR also interfaces with the University authentication system and with other institutional databases, such as the CRIS, the HR, the student registry. Both the portal and the repository are based on DSpace, customized and hosted by 4Science.

- The **Office for Democratic Institutions and Human Rights** (ODIHR) is a department of the Organization for Security and Co-operation in Europe (OSCE). ODIHR is the institution responsible for tolerance and non-discrimination, human rights and the fight against hate crimes in the 57 OSCE participating States. ODIHR has been appointed as the collection point for information related to tolerance and non-discrimination by participating States in collaboration with the civil society and intergovernmental organisations. TANDIS (Tolerance and Non-Discrimination Information System) is the repository that was developed to share information, to promote good practices and initiatives, and to provide information about tolerance and non-discrimination throughout the OSCE region. In 2017 4Science, the winner of an international bid, created a new repository based on DSpace and the GLAM extension, migrated TANDIS content, implemented advanced search &

browse features and usage statistics. TANDIS is accessible at this link: http://tandis.odihr.pl/.

- **EuroCRIS** is a not-for-profit international organisation with 300+ members that brings together experts on research information in general and research information systems (CRIS and RIMS) in particular. The mission of euroCRIS is to promote cooperation within and share knowledge among the research information community and interoperability of research information through CERIF, the Common European Research Information Format. 4Science implemented the API technical solution of the "DRIS+: Enhancing the euroCRIS Directory of Research Information Systems (DRIS)" project, funded by OpenAIRE, aiming to enhance the euroCRIS Directory of Research Information Systems (DRIS) and to make it automatically searchable via a dedicated API. CRIS systems are now gradually setting up the OAI-PMH endpoints that allow their metadata feeds to be exposed, validated and harvested by OpenAIRE. A CRIS directory (DRIS) that allows their persistent identification effectively supports the process for their validation and inclusion in the list of certified data providers to OpenAIRE. The DRIS is based on DSpace, hosted and customized by 4Science, and available at https://dspacecris.eurocris.org/cris/explore/dris.

- With 1,000+ researchers and 50+ million EUR annual turnover, the **National Institute of Geophysics and Volcanology (INGV)** in Italy is the largest European body dealing with monitoring of geophysical and volcanic phenomena, seismic surveillance, early warning and forecast activities. Earth-prints, http://www.earth-prints.org/, is the institutional and disciplinary repository of INGV that collects, manages, disseminates and preserves datasets, peer-reviewed books and articles, theses, proceedings, web products, for the institutes on the Italian territory and serving the geophysics community abroad, featuring a customization on authors' affiliation management and display, a tool to integrate the repository with a business intelligence application for reporting and evaluation purposes, and an integration with OJS to publish articles from the Annals of Geophysics. Hosted and customized by 4Science, the repository is based on DSpace.

- The **University of St. Gallen** (HSG) is a research university located in St. Gallen, Switzerland, that specialises in business administration, economics, law, international affairs, and computer science. Established in 1898, its campus is listed as a Swiss heritage site of national significance. The HSG consistently ranks among the best business schools in the world. It has almost 10,000 students, of which more than 3,000 are master's students and more than 600 are doctoral students. Although one of Switzerland's smallest universities, HSG has Switzerland's largest faculty for business administration. In 2008 the HSG passed an open access policy. With its Alexandria Research Platform, the HSG is above all endeavouring to guarantee free access from outside its walls to as many HSG

research results as possible. However, the online platform is not just used as an archive for scientific publications. It offers an interested public other content too: working papers, newspaper articles or discussions, reports on current research projects and personal profiles of academics. In 2021 4Science was contracted to upgrade Alexandria to DSpace-CRIS 7: https://www.alexandria.unisg.ch/.

Partnerships and collaborations

4Science partners and collaborates with a range of strategically important international organisations and communities: https://www.4science.com/we-work-with/. 4Science is closely involved with **DSpace as a Certified Platinum Service Provider**, serving more than 100 institutions with DSpace, and the main active contributor to the community since 2003 through its qualified staff and DSpace Committers. We have a leading role in developing DSpace 7, with thousands of hours of software development & coordination tasks in all Working Groups (Angular UI, REST API – including lead of sub-team, Entities). We also serve the community with participation in the governance (Leadership and the Steering Groups), and other roles in community initiatives and promotion of DSpace. Our technical experts are the creators and maintainers of **DSpace-CRIS** and **DSpace-GLAM**, extensions of DSpace with a more flexible data model and more functionality (https://wiki.lyrasis.org/display/DSPACECRIS/DSpace-CRIS+Home), and **add-on modules** to enhance the functionality of repositories and digital libraries based on DSpace: IIIF Image Viewer, PDF Document Viewer, OCR & Transcription, Video / Audio Streaming, and more (https://www.4science.com/dspace-add-ons/).

4Science is a partner of **COAR, the Confederation of Open Access Repositories** (https://www.coar-repositories.org/), an international association with over 100 members and partners from around the world representing libraries, universities, research institutions, government funders and others. COAR brings together the repository community and major repository networks in order to build capacity, align policies and practices, and act as a global voice for the repository community. 4Science actively participates in **COAR Vocabularies Editorial Board** to support interoperability across repositories, and in the **"Next Generation Repositories" Working Group of Experts**, including and expert from 4Science, with the aim of defining solutions for innovation: https://www.coar-repositories.org/news-updates/what-we-do/next-generation-repositories/.

4Science is also involved in the study and implementation of the **"Notify" project**, aiming to develop a standard and interoperable approach that will link reviews and endorsements from different services with the research outputs housed in the distributed network of preprint servers, archives, and repositories. The Notify protocol is a model for (bi-directionally) linking resources held in repositories with related resources held in networked services using a distributed, message-oriented approach based on W3C Linked Data Notifications (LDN):

https://www.coar-repositories.org/notify-repository-and-services-interoperability-project/. 4Science has been awarded the implementation of the Notify protocol for DSpace.

4Science actively participates in many **OpenAIRE** (https://www.openaire.eu/) initiatives, contributing to the guidelines, implementing services, participating in meetings and webinars, promoting goals and actions, and conducting funded projects. OpenAIRE is a European network of infrastructures (aggregators, interoperability services, repositories, archives, and journals) that supports Open Science, funded by the European Commission. 4Science was awarded several funding opportunities to integrate OpenAIRE services in DSpace (see more details on all the joint projects in the dedicated section).

4Science collaborates with the **European Open Science Cloud (EOSC)** and its Digital Innovation Hub (EOSC-DIH, https://eosc-dih.eu/). EOSC is an international and multi-partner cooperation supporting institutions and companies to accelerate the transition to more effective Open Science and Open Innovation by removing the technical, legislative and human barriers to the re-use of research data and tools, and by supporting access to services, systems and the flow of data across disciplinary, social and geographical borders.

4Science supports **euroCRIS** (https://eurocris.org/) and its mission, participating in the activities to enhance, promote and implement the CERIF standard to model the Research Information domain in interoperable contexts and applications such as OpenAIRE and DSpace-CRIS. Our team members are active in community engagement, e.g. filling the position of Deputy Leader of the "CERIF and CRIS architectures" Task Group for many years.

4Science is the only DSpace service provider among Participating Institutions of the **IIIF community** (https://iiif.io/) defining open standards that help libraries, archives, and museums make the most of their digitized collections with visualisation, deep zoom, annotation capabilities, and more.

4Science is unique in being the only DSpace Certified Platinum Provider that can demonstrate this breadth and depth of engagement, active participation and substantive contribution in these key communities.

The Team

None of this would have been possible without the highly qualified, experienced and multidisciplinary staff at 4Science - details available here: https://www.4science.com/we-are/.

A detailed Curriculum Vitae for each member of our key staff is available upon request.
A selection of our presentations and contributions can be found here:

https://www.4science.com/english-4science-media-channel/

https://wiki.lyrasis.org/display/DSPACECRIS/Project+documentation

https://scholar.google.com/scholar?q=susanna+mornati

https://scholar.google.com/scholar?q=andrea+bollini

Certifications

4Science brings a high level of assurance to the services it provides for its clients, via the following key **certifications:**

DSpace Certified Platinum Provider
https://dspace.lyrasis.org/rsp/

Trusted Provider of the **Cloud Security Alliance** with documented practices on the security of our solutions on the cloud (**CSA-STAR**)
https://cloudsecurityalliance.org/membership/current-solution-providers/
https://cloudsecurityalliance.org/star/registry/4science-spa/

AWS Partner
https://partners.amazonaws.com/partners/0018a00001u8gTrAAI/4Science%20s.p.a.
Our Cloud Services are based on AWS (certified with ISO/IEC 27001:2013, 27017:2015, 27018:2019, and ISO/IEC 9001:2015):
https://aws.amazon.com/compliance/iso-certified/

Best ORCID Certified Service Provider

> 4Science S.p.A.
Viale A. Papa, 30
20149 Milan, Italy
Tel. +39 02 3971 0430

> Other offices
Rome, Ravenna
www.4science.com
info@4science.com

> Share Capital € 50.000
Business Register MI 02451840397
LEI 8156005C8604D23F7649
D.U.N.S. 433959163
Company within the Itway Group including under Art. 2497 c.c.

ISO 9001
BUREAU VERITAS
Certification

https://info.orcid.org/orcid-certified-service-providers-list/

DataCite Registered Service Provider
https://datacite.org/service-providers.html

ISO 9001:2015 Certified
https://www.4science.com/wp-content/uploads/2022/11/Certificate_IT311660_2022_4SCIENCESPA_9001.pdf

No other DSpace Service Provider can claim to have such quality and quantity of certifications. Our certifications are listed here: https://www.4science.com/certifications/.

Presentations and contributions at international events

4Science participates in many major events internationally, regularly contributing presentations on innovative projects, technologies and standards: https://wiki.lyrasis.org/display/DSPACECRIS/Project+documentation, and sponsorship where appropriate.

Five presentations by 4Science have been accepted at **Open Repositories 2023**.

At **Open Repositories 2022** we delivered five presentations: https://www.conftool.net/or2022/index.php?page=browseSessions&search=4Science.

- o **Andrea Bollini, Corrado Lombardi, Giuseppe Digilio, Luca Giamminonni, Susanna Mornati**. (2022, June). DSpace 7 ORCID Integration. Zenodo: DSpace 7 ORCID Integration | Zenodo. Slideshare: DSpace 7 ORCID Integration (slideshare.net)
- o **Andrea Bollini, Irene Buso, Susanna Mornati, Giuseppe Digilio, Luca Giamminonni**, Androniki Pavlidou. (2022, June). The EOSC DIH "ELD Advance" project. Zenodo: The EOSC DIH "ELD Advance" project | Zenodo, SlideShare: The EOSC DIH "ELD Advance" project (slideshare.net)
- o **Andrea Bollini, Corrado Lombardi, Stefano Maffei**, William Welling, José Carvalho. (2022, June). Implementing the Notify protocol and standard practices in DSpace. Zenodo: Implementing the Notify protocol and standard practices in DSpace | Zenodo. Slideshare: Implementing the Notify protocol and standard practices in DSpace (slideshare.net)

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o **Andrea Bollini, Claudio Cortese**, Michael Spalti. (2022, June). Bringing IIIF to the DSpace community. Zenodo: Bringing IIIF to the DSpace community | Zenodo. SlideShare: Bringing IIIF to the DSpace community (slideshare.net)

o **Andrea Bollini, Emanuele Ballarini, Irene Buso, Mykhaylo Boychuk, Claudio Cortese, Giuseppe Digilio, Riccardo Fazio, Damiano Fiorenza, Luca Giamminonni, Corrado Lombardi, Stefano Maffei, Davide Negretti, Sara Orlandi, Luigi Andrea Pascarelli, Matteo Perelli, Immacolata Scancarello, Francesco Pio Scognamiglio, Susanna Mornati** (2022, June). DSpace-CRIS, anticipating innovation. Zenodo: DSpace-CRIS, anticipating innovation | Zenodo. SlideShare: DSpace-CRIS, anticipating innovation (slideshare.net)

Other presentations in 2022:

EuroCRIS 2022, Dubrovnik, June 2022

o **Scancarello, Immacolata, Bollini, Andrea, Buso, Irene, Fazio, Riccardo,** Mornati, **Susanna,** CRIS design & implementation: best practice in an academic use case. CRIS design & implementation: best practice in an academic use case | EuroCRIS

COAR 2022, Madrid, May 2022

o **Andrea Bollini,** Status of discussions with repository platforms: DSpace and the Notify Project, Status of discussions with repository platforms: DSpace - Presentazioni Google

Praxistreffen 2022

o **Andrea Bollini,** Analytics & Reporting at different levels for a CRIS based on DSpace: the use case of the Peruvian National Platform, Analytics & Reporting at different levels for a CRIS based on DSpace: the Peruvian National Platform - YouTube

At **Open Repositories 2021** (https://or2021.openrepositories.org/), 4Science provided 10 live presentations, showcasing our recent achievements, innovation and collaborations:

o Donohue, Tim, Lowel, Art, & **Bollini, Andrea**. (2021, June). Getting Started with DSpace 7.0: Basic Training. Presented at the Open Repositories 2021 (OR 2021). Zenodo. http://doi.org/10.5281/zenodo.4908060, Video: https://www.youtube.com/watch?v=TZXhplxdjyQ (duration: 2h 45').

o **Giuseppe Digilio, Andrea Bollini, & Claudio Cortese**. (2021, June). Enhanced Submission & Workflow: DSpace 7. Presented at the Open Repositories 2021 (OR 2021). Zenodo. http://doi.org/10.5281/zenodo.4923573. Video: https://www.youtube.com/watch?v=8jgn0h38Zr8&t=4326s (starting at: 1h 23' 00").

o **Andrea Bollini, Mykhaylo Boychuk, Pasquale Cavallo, Claudio Cortese, Giuseppe Digilio, Riccardo Fazio, Damiano Fiorenza, Luca Giamminonni, Corrado Lombardi,**

Alessandro Martelli, Luigi Andrea Pascarelli, Matteo Perelli, Francesco Pio Scognamiglio, Susanna Mornati. (2021, June). DSpace-CRIS 7 is here!. Presented at the Open Repositories 2021 (OR2021), Zenodo. http://doi.org/10.5281/zenodo.4923701. Video: https://www.youtube.com/watch?v=8jgn0h38Zr8&t=4326s (starting at: 1h 03' 55").

o **Bollini, Andrea, Mornati, Susanna, Digilio, Giuseppe**, Piščanc, Jordan, Artini, Michele, & Atzori, Claudio. (2021, June). Results from the OpenAIRE Call for Innovation: Enrich local data via the OpenAIRE Graph. Presented at the Open Repositories 2021 (OR2021), Zenodo. http://doi.org/10.5281/zenodo.4923451. Video: https://www.youtube.com/watch?v=yCuoBcpiNso&t=5685s (starting at: 0h 01' 08").

o William Roy, Courtney Earl Matthews, **Andrea Bollini, L. Andrea Pascarelli, Susanna Mornati**, Kathleen Shearer, Pierre Lasou. (2021, June). ORCID and OpenAIRE Compliance for DSpace. Presented at the Open Repositories 2021 (OR2021), Zenodo. http://doi.org/10.5281/zenodo.4973626. Video: https://www.youtube.com/watch?v=yCuoBcpiNso&t=5685s (starting at: 0h 14' 21").

o Steve Byford, Adam Rehin, **Andrea Bollini, L. Andrea Pascarelli, Susanna Mornati**. (2021, June). Publications Router: populating repositories automatically. Presented at the Open Repositories 2021 (OR 2021). Zenodo. https://doi.org/10.5281/zenodo.4974760. Video: https://www.youtube.com/watch?v=xMuj_EIj_GE (starting at: 0h 43' 36").

o Marta Crippa, **Claudio Cortese, Emilia Groppo, Andrea Bollini, Riccardo Fazio, Francesco Pio Scognamiglio**. (2021, June). 8 Terabytes of Music to Explore with DSpace-GLAM and IIIF: the Digital Library of the Milan Conservatory. Presented at the Open Repositories 2021 (OR 2021). Zenodo. http://doi.org/10.5281/zenodo.4916278. Video: https://www.youtube.com/watch?v=xMuj_EIj_GE (starting at: 0h 19' 50").

o Gabriele Rossini, Paolo Nassi, Roberto Canevari, Massimo Aurelio, **Claudio Cortese, Emilia Groppo, Andrea Bollini, Riccardo Fazio, Matteo Perelli, Francesco Pio Scognamiglio**. (2021, June). Pavia Digital Library: enhancing and supporting interoperability within the Cultural Heritage Domain with DSpace-GLAM. Presented at the Open Repositories 2021 (OR 2021). Zenodo. http://doi.org/10.5281/zenodo.4922877. Video: https://www.youtube.com/watch?v=yCuoBcpiNso&t=5838s (starting at: 1h 34' 23").

- o Cesar Olivares, Francisco Talavera, Abel del Carpio, **Susanna Mornati, Andrea Bollini, Claudio Cortese, Corrado Lombardi**, Alfonso Maza, Ana Puente de la Puebla. (2021, June). PeruCRIS: A National Research Information Infrastructure based on DSpace-CRIS. Poster presented at the Open Repositories 2021 (OR 2021). Video: https://www.youtube.com/watch?v=j0ca0CYyk-w (starting at: 0h 7' 06").
- o Birge Michaela Wolf, Doris Lange, Thorsten Michaelis, Andrea Moser, Stefanie John, Andreas Abecker, Stefan Lossow, Lucia Hahne, **Andrea Bollini, Giuseppe Digilio, Susanna Mornati**. (2021, June). Introduce Impact-Pathways in a CRIS – support societal impact orientation in research projects and funding processes. Poster presented at the Open Repositories 2021 (OR 2021). Video: https://www.youtube.com/watch?v=j0ca0CYyk-w (starting at: 0h 51' 37").

This activity is a unique achievement among DSpace solution providers.

Contacts

Central contact point: info@4science.com Phone number: +1 (816)905-8227

Susanna Mornati, Chief Operating Officer: susanna.mornati@4science.com

Irene Buso, Business Development Manager: irene.buso@4science.com

Federico Verlicchi, Business Developer USA: federico.verlicchi@4science.com,

Headquarters and Branches

4Science European headquarters is located at Viale A. Papa 20, 20149 Milan, Italy. Other branches are in Rome and Ravenna.

4Science USA is located at 251 Little Falls Drive, 19808 Wilmington, DE.

info@4science.com

www.4science.com

VAT no. IT02451840397
LEI code no. 8156005C8604D23F7649
D.U.N.S. no. 433959163