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LIBRARY'S ROLE IN RESEARCHER SERVICES AND IN OPEN SCIENCE

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Abstract

Library's role in Researcher Services and in Open Science

Lappeenranta Academic Library was founded in 2011 as a joint library of Lappeenranta University of Technology (LUT) and Saimaa University of Applied Sciences. Researcher services form the present focus in library services development.

LUT Trailblazer strategy outlines its goals with four questions:

Are we going to burn up everything?

Is humanity condemned to suffer from water it has polluted?

Will waste be the grave of our future?

Will we let Europe degenerate to the world's back yard?

The strategy is a challenge to the library but also a great possibility. The organizational structure of the university is based on three schools and six interdisciplinary research platforms. The organization of the library is similar with three administrative chiefs and 13 service teams in which the employees determine their tasks. In 2016 financial cuts forced the library to downsize. This challenge and **simultaneous** development of new services was successfully managed due to the flexibility of the staff and by continuous upgrading of competencies.

LUT has Open Access and Research Data Policies with corresponding action plans. In 2016 LUT got a reward from the Ministry of Education and Culture for promoting Open Science. The library has had a big role in compiling and implementing the policies. It develops and offers open science services in the university and teaches open science issues. Within LUT the main cooperative partners of the library are the IT and the Funding Services. On national level the library cooperates with the Open Science and Research Initiative. Publication repository platform services are bought from The National Library of Finland and data repository services from the Centre for Scientific Computing. In the university LUT Research Portal (the CRIS) is the node of publication and research data.

The presentation describes the open science process and services and future plans from the library's viewpoint.

Keywords: CRIS, OA, Open science, Research data, University libraries, University repository

1. Lappeenranta Academic Library since 2011

The Finnish HE (higher education) network has met a large structural change during the last ten years and the change is still going on. Lappeenranta Academic Library, www.lut.fi/web/en/library, was established as a joint library of Lappeenranta University of Technology and Saimaa University of Applied Sciences in 2011. The library works in two campuses, the main campus in Lappeenranta and a small campus in the neighbor town Imatra. Now there is a project going to enlarge the university concern with Lahti University of Applied Sciences starting in the beginning of year 2018.

[Lappeenranta University of Technology](#) founded in 1969 is a science university with three schools (formerly faculties): School of Business and Management, School of Engineering Sciences, School of Energy Systems and with 1000 researchers and teachers and 5700 students. One third of students come abroad and on the campus there are working and studying people from 70 nationalities.

[Saimaa University of Applied Sciences](#) is a polytechnic including faculties of Technology, Business Administration, Tourism and Hospitality, Fine Arts, and Health Care and Social Services with 260 teachers and 3000 students.

Lappeenranta Academic Library is a medium sized higher education library in the Finnish perspective. University libraries as publicly funded organizations have also customers from outside the organization. Open and free access to libraries is based on general library model in Finland. People have a right to use libraries and traditionally the basic services are available free of charge. Also licenses to electronic materials have been subscribed so that outside customers (walk-in-users) have access to electronic materials inside library premises in the library network.

Lappeenranta Academic Library in Figures, year 2016:

- 350.000 library visits
- 195.000 e-books, 120.000 printed books, 1.350 printed journals, 40.000 e-journals
- 3.280.000 downloads of e-materials
- 4.460 students attended information literacy education

Library is organized in two administrative teams and in thirteen (13) matrix teams based on different functions. The employees determine their tasks in cooperation by taking into account each one's personal interests to develop her/his skills. The total number of the staff is 16 and the staff with academic degree is nine persons. In 2016 the staff was decreased 25 % due to financial conditions.

Six matrix team in the library are working in the area of open science: researcher services, current research information system (CRIS), copyrights, electronic materials, education and metrics teams.

2. Open Science in Finland

Finnish Open Access working group (FinnOA) started in 2003 and that was some kind of starting point of the Finnish open access development. In 2005 Ministry of Education recommended universities and other research organizations to found publication repositories and to begin parallel publishing of scientific articles and theses in them. This recommendation was fulfilled at the latest in 2008 within the universities. The national mandate of 26 universities of applied sciences to parallel publish all their publications and theses in Theseus repository was a big step even in global scale. LUTPub repository of Lappeenranta University of Technology was grounded already in 1999.

The Ministry of Education and Culture of Finland launched in 2014 the Open Science and Research Initiative (ATT) for the promotion of research information availability and open science platform for the years 2014-2017, <http://openscience.fi/>. The goal of the initiative is that Finland will be among the most advanced countries in the field of open science and that the possibilities

of openness are largely utilized in the society. The vision and the goals are described in details in the Open Science and Research Roadmap "Open science and research leads to surprising discoveries and creative insights" [Ministry of Education and Culture]. In addition to Ministry of Education and Culture main partners in the initiative are universities, universities of applied sciences, other research organizations, National Library of Finland and IT Center for Science. IT Center for Science is one of the developing partners of the European Open Science Cloud.

Open Science and Research Roadmap guidelines these four objectives:

1. Reinforcing the intrinsic nature of science and research
2. Strengthening openness-related expertise
3. Ensuring a stable foundations for the research process
4. Increasing the societal impact of research.

Each objective has defined goals, corresponding measures and concrete recommendations to reach the goals. The Open Science and Research Initiative is a whole from national goals and responsibilities to applications in every day work in research organizations

The initiative is very comprehensive. It has organized in cooperation with the partners a diverse series of education and seminars in all possible basic and up to date topics of open science and research on many university places. The seminars with the materials are gathered as a huge education package available through the network. There is also a special web course of open science and another web course under developing for doctoral students.

The initiative has started a lot of working groups in which knowledge is disseminated and recommendations are carried out.

Open science services for the Finnish research system have been developed and implemented within the initiative. The service system includes e.g. research data repository (IDA), metadata database (Etsin) for research data, open research data portal (AVAA), digital preservation system for research data with the administration system (REETTA) and tool for making data management plans (DMPTuuli) and the national databank on research infrastructures which is in pilot stage. Also the Language Bank of Finland and the Finnish Social Science Data Archive cooperate with the initiative. The national publication archives, Doria and Theseus belong to cooperating services. Doria contains resources by universities and research institutes and digitalized collections of the National library of Finland. Theseus provides online access to theses and publications from the Finnish Universities of Applied Sciences. Doria and Theseus are both based on DSpace open source software.

The national digital preservation system for research has been developed as one of the main services of the initiative. This service will be implemented during 2017. Considerable research materials will be taken in this service according to the principles agreed by research organizations, ministry of education and culture and the initiative. The preservation system is at first funded by Ministry of Education and Culture.

3. Library as a Partner in Open Science

University libraries have been active pathfinders in the open science field also in Finland. In LUT the first open access group was founded by the publication committee in 2013. Now the research vice president is the leader of open access working group which is responsible for steering and decisions of open science issues in the university. The group has members from the schools, IT Services, Research administration, Funding services and from Academic library. Academic library has been the founding catalyst in this process.

Academic library is an active partner in the national Open Science and Research Initiative working groups, e.g. in the research materials group, preservation group, data management planning group and in the web course group. For a small or medium sized organization this is valuable work to be prioritized to have update information in the university and for networking purposes. Academic library is also a member in Open Access Network of university libraries. The network is cooperative partner with the Open Science and Research Initiative and FinnOA group. This cooperation is important especially in these days when the future of the Open Science and Research Initiative is discussed. Academic library is also member in the International OA working

group of Ministry of Education and Culture and thus as Finnish cooperative partner in European Open Science Cloud developing. Lappeenranta Academic Library was the national Pasteur node in 2014-2016. Finnish university libraries have a long tradition of close and profitable cooperation and this is the case also in open science. Thus the efforts come to common benefit. For example Finnish university libraries are actively participating movement to change subscription costs to open access costs in the negotiations with publishing houses [Schimmer, 2017]. Finnish researcher community has started an appeal to support libraries in this aim.

4. Library's Tasks in Open Science

Academic library's achievements to promote open science began from establishing LUTPub publication repository and from beginning to save theses and dissertations there, first on abstract level. The next step was parallel publishing (self archiving) of university's publication series. All these are nowadays 99 % in full text form in LUTPub. Via this developing work the library got to know how to enlarge electronic publishing. LUTPub repository in part in DSpace based Doria database which is developed and maintained by the Finnish National Library. Five university repositories belong to Doria as well as five other organizational repositories and the digitized collection of the National Library. After these services it has been natural to follow global OA movement and develop LUTPub to handle parallel publishing (green open access) of articles and conference proceedings and also research data sets in small scale.

The Academic library arranges education of open science on all levels of university studies. This means introducing open science briefly in information literacy education for the first year students and on bachelor and on master levels in integrated information literacy courses or lessons. Especially important open science education is held in the doctoral school. This education is in the curriculum of doctoral school. Also the web course of Open Science and Research Initiative is meant to this purpose.

Researchers are the most important and most difficult target group for open science information. There are still misunderstandings and prejudices in open science area. It is thought to be expensive and OA journals are feared to be low in quality. In the area of universities of technology the near cooperation with enterprises and intellectual property issues have been taken as obstacles in open science. Copyright and intellectual property issues have been excellently taken care in the Open Science and Research Initiative as well as informing and recommendations about Creative Commons licences. It is encouraging that most of important research funders demand open access publishing of research outputs especially research articles and that these costs can be included in the research process costs. So guiding and dissemination of correct information is important.

Library takes benefit of all kinds of possibilities to have arena for open science information. This means visits to academic schools, thematic meetings or coffee breaks but also special seminars with panel discussions, presentations and posters. The international Open Access week is nationally advertised and a known happening. Naturally national interesting seminars and webinars are also advertised in university network. Library staff gives also personal guidance in this area and develops and maintains guidance on library and university research webpages.

Academic library was the key operator in compiling the open access policy and the corresponding action plan. Library is the main organizer and developer in implementing the action plan and also takes actively care of updating the plan.

Library's work as the central point of open science and the fulfilments are evaluated yearly in the development discussions. The numeric outcome of open access articles and other publications is yearly monitored in the data collection of Ministry of Education and Culture.

5. Trailblazer strategy of Lappeenranta University of Technology

Lappeenranta University of Technology is committed to promote Open Science in the university strategy. Ministry of Education and Culture evaluates yearly the development of open science in universities and research organizations compared with the goals set in the national Open Science

and Research Roadmap. In 2016 Lappeenranta University of Technology got a reward from the Ministry of Education and Culture for promoting Open Science as a result of this evaluation.

The strategy of Lappeenranta University of Technology is exceptional with for global questions:

- Are we going to burn up everything?
- Is humanity condemned to suffer from water it has polluted?
- Will waste be the grave of our future?
- Will we let Europe degenerate to the world's back yard?

One crucial goal of open science is disseminating scientific information efficiently and without economic barriers to help humanity resolve global and collective problems. In this regard the LUT strategy and open science ideology have a good sense of balance.

6. Open Access policy

The Open Access Policy of Lappeenranta University of Technology was published in December 2014. It states that parallel online versions of all published articles, other publications and dissertations will be published in LUTPub Repository according to green open access principles if the terms and conditions set by the publisher allow. And if the terms and conditions of the research funding allow, the copyright of scientific publications created in connection with the research shall remain with the researcher. In the action plan of the policy there is indicated that the researcher should publish in that journal or media which is most important for the researcher's merit and for the university's merits.

However, so far the percentage of parallel published articles is very low. The demand of parallel publishing in the policy is actually a recommendation until parallel publishing is automatized from CRIS system to LUTPub repository.

The policy is getting old and should be updated in near future to respond the development and changed environment in the field.

7. Research Data Policy

The research data policy of Lappeenranta University of Technology was adopted in 2016. "The openness of research data promotes high-level research, facilitates innovation, and ensures good research practices. The research data produced at Lappeenranta University of Technology is, as a rule, open and available for shared use. However, in certain cases there are grounds to restrict access to research data. The long-standing, confidential collaboration between Lappeenranta University of Technology and business enterprises should always be taken into consideration."

Research made to order is a challenge or problem in open science. The Open Science and Research Initiative has grounded a working group to handle this dilemma from legal point of view. It could be solved the same way as with theses so that inventive part of research has been begun to protect before publishing the results. Slightly and surely industrial and business enterprises will catch the idea how open science outcomes can benefit economic progression globally.

8. Researcher Services in Open Science

Researcher services concerning open science have been organized according to the research process phases (Fig. 1.). In phase 1, preparing research, library offers and guides researchers to use DMPTuuli tool for writing data management plans. DMPTuuli is tailored to fulfil different research funders' demands, e.g. Academy of Finland, The Finnish Funding Agency for Innovation and Horizon 2020. DMPTuuli is based on DCC's (Digital Curation Center, UK) open source software. DMPTuuli is easy to update locally if the instructions of funders change.

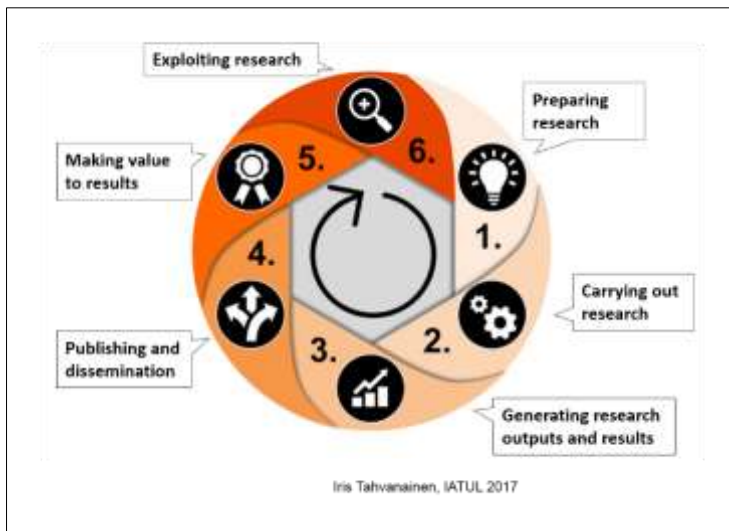


Fig. 1. Research process circle. [Tenhunen, 2015]

<https://www.lut.fi/web/en/library/for-researchers/open-science>

When preparing research agreements opening research data and results in publications should be taken into account. The research plan should include also publishing plan with a possible plan for article processing costs (APC).

In phase 2. carrying out research, electronic and other materials available via library are heavily used and also other information services, interlibrary loans and guidance. Academic library has organized e-materials to be found in LUT Finna portal. Finna portals for all universities as well as for universities of applied sciences were developed in national initiative managed by National Library of Finland.

In phase 2 data management plans can be defined. Research utilizing big data is also done in LUT especially in computer science. LUT offers Eduuni (<https://info.eduuni.fi/what-is-eduuni/>) group working environment for research groups to share and work with research data during the research process. Eduuni is MS SharePoint based and the application is ranked by Finnish universities' IT services to be a safe environment also for international use. Also B2DROP (EUDAT Research Data Services, www.eudat.eu) can be recommended.

In phase 3. it is important to analyze if there are needs to protect some outputs with intellectual property rights tools, e.g. with patenting. You must not publish anything anywhere otherwise the prerequisites for patenting are lost. In this phase research data must be deposited and described for coming use or for archiving. The details depend what has been agreed in the research agreements. The research metadata service Etsin has been built in the Open Science and Research Initiative's service package. Etsin has a simple minimum metadata model which can also be used in other applications. LUT recommends that research data metadata should be deposited in Etsin which is open access and anyone can find metadata of Finnish research datasets there.

LUT recommends to researchers to save their research data in national IDA Research Data Storage (<http://openscience.fi/ida>) or Finnish Social Science Data Archive (<http://www.fsd.uta.fi/en/>, interview data of Business and management school).

B2SHARE (www.eudat.eu) and Zenodo (www.zenodo.org) are also reliable repositories. Small datasets can be saved also in LUTPub repository. The Open Science and Research Initiative recommends the use of Creative Commons licensing, CC 4.0. BY for datasets and CC0 for metadata.

Phase 4, publishing and dissemination, are essential for the researcher's merits. It was stated in the LUT Open Access Policy that published articles and other publications will be published in LUTPub Repository according to green open access principles.

Publishing in high quality open access journals is also accepted. Publishing in hybrid journals is not recommended although Academy of Finland as a funder is accepting it now.

Articles and other publications parallel published in LUTPub are automatically harvested to [OpenAIRE](http://www.openaire.eu) (www.openaire.eu). OpenAIRE is a European network of Open Access repositories, archives and journals that support Open Access policies. OpenAIRE is a European Commission funded project [OpenAIRE]. Dissemination in social media, ResearchGate, Academia.edu, is very popular in researcher community but copyrights must be confirmed.

The important added value to research results is long term preservation. IDA Research Data Storage and Finnish Social Science Data Archive belong to the national Digital Preservation Solution for Research Data which is implemented in 2017. The preservation is divided in long term and semi long term preservation. The principles how the data will be chosen and divided to preservation are under development in the Open Science and Research Initiative and in Ministry of Education and Culture. Universities and other research organizations can affect this process. Academic library is responsible for guiding research data services and also the long term preservation. This is done in cooperation with IT Services. Researchers don't achieve any special merits for opening data for the present but this must be taken into consideration in near future. Naturally according to literature opening data and publications add citations to researchers' articles.

Ministry of Culture and Education gathers yearly publication information from universities. This information is published openly in Juuli portal (www.juuli.fi).

13 % from funding of universities depends on the amount of high quality publications. The quality is defined in the three level publication classification of the Finnish Publication Forum system. Openness of publications is also monitored in this data collection but it is not yet in the funding model.

A large Research Assessment Exercise (RAE) was performed in LUT in 2012. That included a comprehensive bibliometric analysis all researchers' outputs. RAE may be repeated in the near future and also altmetric analysis may be included and also research data information. For social media analysis PlumX service will be acquired this year.

We have not yet gathered any experiences how open science has affected innovation activity of the university. But anyway research made in the focus areas of LUT has got global awareness. LUT was just in 2017 ranked to places 501 to 550 in international QS (Quacquarelli Symonds, formerly named as Times Higher Education) ranking. The strengths of LUT are especially scientific quality and impact.

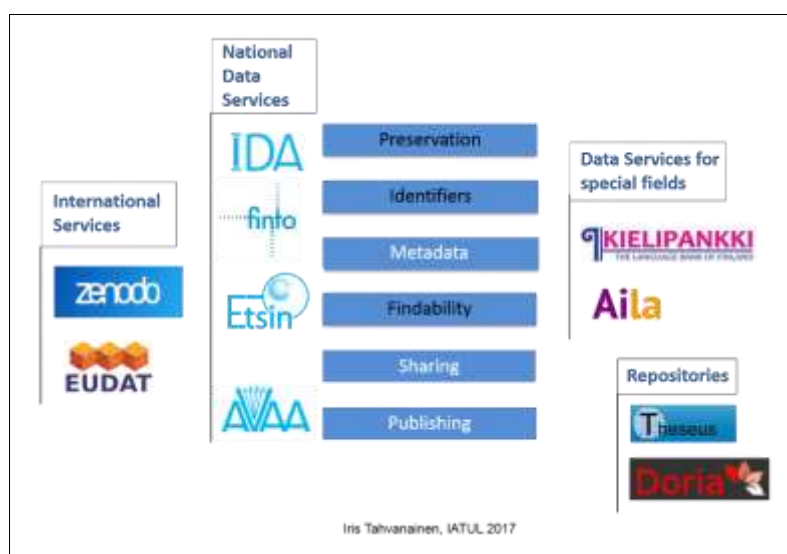


Fig. 3. Overview of research data and related services.

9. Future Plans

One prioritized task of Academic library is to promote research work and serve researchers. It is important that researchers need to feed their publication and research information only in as few systems as possible. That is why LUT CRIS (Current Research Information System) is coming to be the hub of all kind on research information, in addition to project and publication information also open access and research data information will be gathered.

There are for now only a few connections built between different research data systems, e.g.:

- LUT publication metadata is harvested from LUTPub repository to OpenAIRE
- metadata of research data is harvested from Finnish Social Science Data Archive to Etsin metadata service

However, there are concrete efforts going on:

- to deposit publication full texts in LUT CRIS and to transform them as agreed versions in LUTPub repository to be parallel published automatically
- to include research data metadata in LUT CRIS
- to transform research data metadata from LUT CRIS to Etsin national research data metadata service
- ORCID researcher ID is seriously recommended to every researcher to be used.

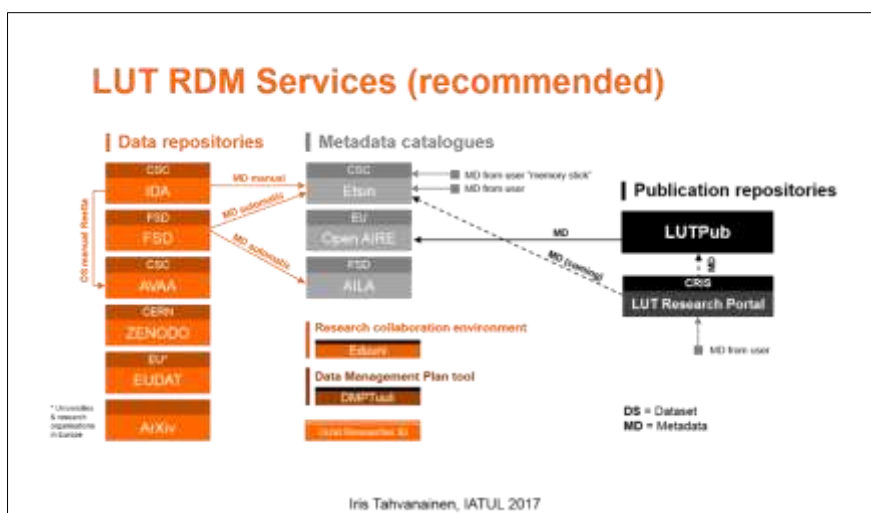


Fig. 4. Linking research data services.

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