AI-Supported Automated Subject Indexing and Metadata Management with Annif and Finto AI at the National Library of Finland

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Abstract The National Library of Finland developed and implemented an automated subject indexing and classification tool, Annif, which is now also used by other National Libraries. The tool is integrated into Finto AI, an in-house metadata management system launched in 2020. These two AI-driven solutions were created by the growing volume of digitally collected data, the extensive digitisation of paper archives, inadequate AI support for various Finnish languages, and a lack of transparency in the services offered by external providers on the market. The successful implementation of Annif and Finto AI can be attributed to the strong collaboration between the project team and their external stakeholders, such as other National Libraries or universities, as well as the awareness within the Finnish National Library. Use cases, for example, from the University of Jyväskylä, highlight the value of these AI-driven solutions. However, challenges remain, such as identifying hidden errors in the automatically generated records. Fortunately, the National Library's extensive in-house expertise allows for the immediate detection of mistakes in both the code and the generated records.

Keywords National Library of Finland · National Library · AI · Annif · Finto AI · Automated subject indexing · External stakeholders

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I. Mergel, C. Schmidt (eds.), *AI Innovations in Public Services*,
https://doi.org/10.1007/978-3-032-01344-6_4

1 Introduction

The National Library of Finland, founded in 1640, is affiliated with the University of Helsinki and employs more than 230 experts in different library fields. It includes two branches: the Research Library and the Library Network Service. While the Research Library is responsible for traditional library services, the Library Network Services branch is responsible for developing the National Digital Library's service and work environment. Furthermore, the Library Network Services department provides services to other libraries, museums, and archives in Finland in the form of the open-source library system Koha, which is a system that can be used to manage acquisitions and borrowing [1]. Koha is used by many universities and other special libraries in the country [1]. Furthermore, the National Library of Finland is the administrator and primary developer of Finna (https://finna.fi), an open-source search service that was launched in 2013 [2].

In this chapter, we focus on the open-source toolkit called Annif (https://annif.org) for automated subject indexing and classification [3]. Annif is a multilingual tool that works independently of the indexing vocabulary in a modular fashion and "*integrates many text classification algorithms, including Maui, fastText, Omikuji, and a neural network model based on TensorFlow*" ([3], p. 265). The Annif tool enables user interaction through the command line interface (CLI) or the REST-style API [3]. These options can be utilised to integrate Annif with the Finto AI Web user interface, which is an in-house-produced metadata management system [3]. It applies traditional machine learning and language technology and consists of more lightweight software compared to large language models like ChatGPT. As one interviewee mentioned, "*It's more convenient in some cases, and we've been quite happy with that.*"

This chapter investigates how the National Library of Finland developed and implemented the AI-based solutions Annif and Finto AI. We begin by exploring the National Library's motivations for developing and implementing an automated subject indexing and classification system. Following that, we provide a comprehensive overview of the Annif and Finto AI project itself. Then, we discuss the internal and external actors involved in developing and implementing the AI-based solution. Before addressing the results achieved and the value (co-)created through Annif and Finto AI, we highlight the challenges the National Library of Finland faced. Finally, we present the lessons learned throughout the project.

2 Needs for the Implementation

With the increasing amount of data being collected digitally and the extensive digitisation of paper archives, the National Library of Finland needed to implement automated subject indexing. This minimises manual indexing work and ensures

consistency. It also allows for indexing library collections where manual indexing is impractical.

The National Library of Finland created an in-house solution for specific reasons. Finland has two national languages, Finnish and Swedish, and some dialects that most existing AI tools do not support. Additionally, most AI tools are commercial, providing little control over the AI system for the library and its patrons, and often are difficult to integrate into existing systems used for cataloguing and indexing. Consequently, in 2017, the National Library of Finland developed the automated subject indexing tool Annif in-house as an open-source tool.

The Annif project team initiated the first ideas about Annif at a Library Networking Services meeting for the management and the library colleges. They also conducted presentations about Annif outside the library and had previously established a first use case with the University of Jyväskylä, demonstrating its effectiveness to the management: "*I think that helped a lot in showing people that this actually works, this can be used, and they were brave enough to adopt the software full-on in early stages.*"

3 Description of the Project

Annif is an automated tool for subject indexing and classification developed by the National Library of Finland as open-source software. Table 1 provides an overview of the maturity level of Annif's development and implementation.

Annif has a modular architecture and is compatible with various text classification algorithms [3]. It can support regular and fusion backends, which can be added: "*Regular backends work directly on document text and produce a suggestion of possible subjects*", based on lexical and associative approaches ([3], p. 268). The fusion backends, also known as ensemble backends, "*use the suggestions from other backends as input and produce a combined suggestion*" ([3], p. 268).

To evaluate Annif, the National Library of Finland examined manually indexed corpora such as master's and doctoral theses from the University of Jyväskylä covering the years 2010–2017 [4]. They also used non-fiction e-books from 1998 to 2019, which are housed in the National Library and indexed in Fennica as well as a

Table 1 Maturity level of Annif's development and implementation

2014	Start of the Finto project
2017	Start of the first prototype of Annif consisted of "*a loose collection of Python scripts that implemented a minimal REST API and a simple web user interface*" ([4], p. 5).
2018	Begin developing Annif on a more robust technical foundation with the following features: multilingual support, independence from the indexing vocabulary, compatibility with various subject indexing algorithms, a command line interface, a Web user interface, and a REST API suitable for integration with other systems [3]. Additionally, it should be open-source software.
2020	Launch of the Finto AI service that is intended for production use.

database for non-fiction books published between 2000 and 2019 by the book distributor Kirjavälitys Oy [3]. Furthermore, the evaluation incorporated informal questions and answers on various topics collected from public libraries in Finland through the "AskLib" service and digital unindexed documents from the regional newspaper Satakunnan Kansa [4].

The National Library of Finland utilised this data to "*train, validate, and test subsets*" ([3], p. 271). In addition, the library also used humans to evaluate the results of the automatic subject indexing [3]. In 2019, the National Library of Finland organised a workshop where 48 librarians and specialists evaluated indexing created by humans versus by the Annif algorithms [3]. It was not declared to the participants whether the output was created by a human or machine [3]. The results revealed that the participants rated the human indexers slightly higher than the Annif model, with the Annif-assisted semi-automatic indexing falling in between [3]. In addition, the Finnish Public Broadcasting Company Yle, the National Library of the Netherlands, and the German National Library evaluated Annif and decided to implement it in their own libraries [3].

In May 2020, the National Library of Finland finally launched the Finto AI service: "The service offers an easy way for introducing automatic subject indexing into information systems, provided that the vocabularies and language support offered by the API service meet local requirements" ([3], p. 274). It can be used for Finnish, Swedish, and English subjects and can be found at ai.finto.fi [5].

To use Finto AI, the librarian manually inputs text into the tool. The librarian can easily copy and paste the summary into the tool. Then, they read the record summary and consider which subject heading might fit. After that, the librarian uses Finto AI to generate suggestions. Sometimes, Finto AI provides additional information that the librarians can add, but usually, they receive the same information that they have already familiarised themselves with. But there are reasons not to use Finto AI, as one interviewee stated: "*The biggest reason why I don't use it all the time is that it's time-consuming because what I'm getting from Finto AI is obviously guesses. It's not information that I can immediately rely on. I have to check again those subject headings that I do not immediately recognize as valid and that takes time*."

Despite its early shortcomings, Finto AI is beneficial in the following case: "*I usually use it only when I'm dealing with material that I'm not very good at myself and I want to get some extra feedback a little as if I had a colleague and would ask the colleague whether he has something extra for me.*"

Finto AI has been implemented at the University of Jyväskylä, where students submit their master's thesis online and receive suggestions from Annif on how to tag it with keywords [5]. They can use or discard the suggestions before a final check by a librarian [5]. Moreover, the Finto AI has been piloted at the Osuva repository of the University of Vaasa starting in 2020 and subsequently been implemented in the services of Kirjavältys Oy and the museum collection management programme Collecte [6].

3.1 Actors Involved in Co-producing AI Innovations

A variety of internal and external actors participated in the development and implementation of Annif and Finto AI. The collaboration among these stakeholders is referred to as co-production [7]. Co-production consists of five phases: co-commissioning, co-design, co-implementation, co-delivery, and co-assessment [7].

While co-commissioning is a prospective phase and co-assessment is a retrospective phase in the co-production process, co-design, co-implementation, and co-delivery are simultaneous co-production phases that are mutually dependent [7]. Table 2 gives an overview of the co-production process in the development and implementation of Annif and Finto AI at the National Library of Finland.

3.2 Internal Actors

The National Library of Finland has extensive in-house IT expertise. One employee stated, "*I would say that 30% of the staff of the National Library has some kind of IT title in their work description, and we have really dedicated professional software developers working for those projects.*" The library's substantial IT background benefits the institution by allowing for experimentation and the use of AI. The Interoperability Services team, consisting of three people, is responsible for

Table 2 Co-production process in the development and implementation of Annif and Finto AI at the National Library of Finland

Co-commissioning	*Prospective co-production phase.*	The Annif project team developed the first prototype in 2017 and tested a use case at the University of Jyväskylä. The library management and the public showed interest in it, leading to further work on the project.
Co-design	*Concurrent co-production phases.*	The Annif project team collaborates closely with external stakeholders to develop and enhance Annif by using, testing, and modifying the tool's code.
Co-implementation		Annif is not only implemented in the National Library of Finland but also in other libraries such as the National Library of Germany, universities like the University of Jyväskylä, organisations like Leibniz Information Centre for Economics (ZBW), and companies like the Finnish Broadcasting Company Yle.
Co-delivery		At the University of Jyväskylä, for example, students, librarians, and Annif work together to review master's theses. Students upload their theses to the Finto AI tool, review the suggestions, and then a librarian gives it a final check. This process in Annif is a semi-automated indexing system.
Co-assessment	*Retrospective co-production phase.*	The Annif project team warmly welcomes feedback and suggestions for improvement from external partners such as universities and other libraries that use the tool.

automated cataloguing as part of the Library Network Service department. The team members are either information specialists or software developers/system architects. They described their work atmosphere: "*So, it's a division of labor and all this coordination between how we do things. It's been there from the beginning. It's hardwired into us now…*."

In the Annif project team, different specialists from across the library are involved. The role of the information specialist in the Annif project is mainly content-related. This includes various administrative tasks, testing, and constructing different corpora to test Annif. The software developers primarily focus on Annif's system architecture and technical development. However, the interviewees mentioned: "*… we, are a three-person team, so we are pretty agile by nature. Everybody has to do everything that comes up*." They hold regular meetings and exchange information on Slack with the Finto working group.

Additionally, the Annif project team introduced various platforms for discussing the open-source tool with other Finnish libraries that use Annif, such as a Google Group Forum or email exchange.

However, using automated subject indexing also requires skills and competencies in manual subject indexing and subject description: "*You would have to have some or quite a lot of experience in working with subject description. I would never recommend that beginners or unprofessional people would be told to use this program…*" Furthermore, "*But if you're not familiar with that [subject indexing] then it's much more difficult and requires more expertise practice*."

3.3 External Actors

The National Library of Finland aims to create a community around Annif to promote the use of the tool and support its continuous development. On their Web site, institutional users are frequently updated [3]. Additionally, the Annif GitHub project provides technical descriptions and tips for using Annif, as well as reporting bugs and accepting pull requests [3]. They use GitHub to maximise their openness about Annif: "*We try to keep everything public, like the issues, pull requests, all the discussions. … we try to keep it public what is going on in the development side*." In addition, one interviewee stated: "*They can give us feedback, and they can submit bug reports and they have also submitted their own pieces of code. For example, Annif uses these algorithms that run in the background, so some of our organizations that also use Annif have also submitted into Annif, for example, these new algorithms*."

In addition, the Annif team provides a user forum called Annif-users and a hands-on tutorial that the National Library of Finland created with the Leibniz Information Centre for Economics (ZBW) in Germany [3]. The ZBW serves as an important technical resource for the development of Annif: "*ZBW is probably our most important user in terms of cooperation because they have also been able to provide actual code and algorithms*."

While other collaboration partners often lack extensive programming skills, it is valuable to maintain communication channels with them to understand how Annif is being utilised. This feedback helps the National Library of Finland identify strengths, weaknesses, and opportunities for further development: "*When it's not only used by us but also others, then we can get more and better ideas*."

According to Suominen et al. ([3], p. 275f) Annif and Finto AI are in use by the following institutions:

- JYX Digital Repository, University of Jyväskylä
- Kirjastot, an e-book platform for public libraries
- Kirjavälitys Oy, a Finnish book distributor
- Osuva, University of Vaasa
- Taju, University of Arts
- Theseus, used by a lot of Finnish universities
- Trepo, University of Tampere

In addition, the following institutions use a standalone Annif installation, which means they can install Annif by themselves and train their own models ([3], p. 277):

- Dissemin.in
- Finnish Broadcasting Company Yle
- Finnish National Audiovisual Institute (KAVI)
- Leibniz Information Centre for Economics ZBW
- National Library of Germany (DNB)
- National Library of the Netherlands
- National Library of Sweden

Future steps may involve intensifying cooperation with universities, as suggested by an interviewee: "*… if there could be some cooperation with maybe the universities that it could be implemented somewhere earlier in the process and perhaps with … the publishing sector. That's something I would be happy to see happening and also to see it develop towards a more interactive tool that gives more information ….*"

4 Challenges to Implementing AI in the Finnish National Library

During the development and implementation of the AI-based cataloguing solution, the National Library of Finland also faces some challenges, as described in this chapter. Over time, the Annif has become more accurate, with fewer obvious mistakes than before: "*It's more correct with the most basic things that is does and the user interface has also developed in that time*." Nevertheless, the interviewee stated: "*There has always been hidden mistakes and that's my biggest concern that we inadvertently give incorrect subject headings*." Therefore, it is important that librarians are still skilled in cataloguing and indexing subject headings: "*If the more*

inexperience the person using it is in doing this, the more difficult it is probably to spot these subject headings."

Furthermore, librarians require sufficient time to use the tool effectively in order to achieve satisfactory results: "*If I have enough time to use it properly, then it can actually make the end result better because I can use my own brain and I can use the extra help.*"

However, some librarians are concerned that the tool may replace human workers and lead to layoffs: "*But what I'm worried about is that it's seen on the upper levels/management level as something that may help reduce staff … That has, I think been from the very beginning something that many people, in addition to myself, are afraid of that it's been used—that it will be used in this way as an excuse to reduce staff.*" The National Library of Finland has not replaced human workers up to this point.

On the macro level, the development of AI by big commercial companies is a challenge and even a dangerous undertaking: "*[In] the current situation is quite dangerous because the development of the best AIs is basically being done by these big companies in California mostly or in China, and there's not that much transparency into what they are doing.*" Furthermore, the role of libraries is stated as follows by one interviewee: "*So, I see that the role of libraries as well as other public institutions could be to form a counterbalance against this, to try to use AI not to make money, but also for purposes that benefit society in general and also to counter bias, to try to come up with solutions to the ethical issues.*"

Therefore, libraries must constantly keep track of AI development and direction to learn and apply AI in ways that benefit their local interests. In addition, there are challenges to using AI and handling copyright: "*We can do things in-house, usually, but giving out this material to researchers or even to companies, it's not clear if it's allowed. The laws around this are evolving, but it's a little bit of a gray area.*"

5 Results

In the following, we show how the implementation of AI has impacted the operations of the Finnish National Library. We distinguish between the overall organisational impact and the general value that was created respectively co-created with the different stakeholders.

5.1 Overall Organisational Impact

At this time, the National Library of Finland is experimenting with AI tools, but the processes are not yet integrated at the organisational level, as one interviewee mentioned: "*I think it's pretty much the same for all of us that we are experimenting with it, but not really, not really implemented in the general process.*"

Furthermore, another interviewee stated: "*… at the moment, of course, the role of AI is marginal in the library setting. We have the Annif and it's doing its job, but it's of course, behind the scenes and it still needs some human help to give useful results. Where I see AI doing great steps at the moment is actually software development. Our developers use AI quite a lot, for example, in creating tests and also finding bugs and even writing some new code that they can ask the AI, how would you solve this problem, what code you would write.*"

For now, the National Library of Finland has decided against developing an AI department within the library: "*We have decided against treating AI as a new module that we would have an AI unit or anything like that in organisational terms. It needs to be implemented evenly across the organisation because the applications are varied and can be used in different ways, in different contexts. It needs a little bit of knowledge from pretty much everyone in the library, from the customer desk to the software developer.*" Nevertheless, one interviewee emphasised the advantages of opting for an open-source solution and developing an in-house automated subject indexing tool. However, this approach takes some resources: "*Basically, you need to have these people with technical skills working in-house because if you're only relying on companies and consultants, it's not going to work. You'd end up paying a lot of money, and probably the results will not always be what you wanted.*"

The overall organisational strategy towards AI in the National Library of Finland is to invest in their capabilities, which includes the AI competencies of the employees and the necessary technological infrastructure: "*You have to invest in the people, … you then don't have to pay that much for consultants or other types of external services*."

5.2 Value Created and Co-created

Using Annif and Finto AI benefits the National Library of Finland in several ways. Automated subject indexing can assist manual indexing through semi-automated indexing, where Annif suggests subjects for a new record that are then verified manually. In addition, the National Library of Finland tests Annif for fully automated indexing, where Annif's suggestions are accepted without manual verification.

The interviewees mentioned two benefits of using automated subject indexing tools in the future. First, the tool will become more communicative and, therefore, faster to use. Second, it gives the potential to work with stakeholders together. The interviewee stated, "*But the most useful thing that I have been thinking about for a long time is that it would be much better if the person who is the author of the resource would use it because he would know immediately if there are mistakes. He would also know if something's missing and could add it as a suggestion, and that would really make an immense help, especially with scientific texts*."

Moreover, one interviewee described: "*AI needs custodianships; someone has to look after it a little bit and keep a watch on it. That's something that libraries, I*

guess, will be doing in the future, that they are critical also on AI and it's quite okay to use it."

Another interviewee mentioned, "*The feedback we receive from end users is usually very positive, which is encouraging. It demonstrates that there is indeed a demand.*"

They also consider use cases, such as when students submit their theses to the repository. Since students typically lack experience with subject indexing, receiving suggestions from Annif through Finto AI really helps them. This also reduces the workload for librarians by minimising the need for checking and adding subject indexing.

5.3 Lesson Learned

Automated subject indexing requires skills and competencies in manual subject indexing and description. For this reason, they advise that beginners or non-professionals avoid using the tool. In addition, some librarian staff are worried that the AI tool is seen as a way to cut off staff and provide quick but inadequate input, which could lead to incorrect information in the library database. Therefore, one interviewee recommended using the tool carefully and thoughtfully to improve metadata but urged more cautious usage: "*I think that if it would be always used in a careful and well thought out manner, then it could actually make a difference or give us better metadata. But we have to or we should maybe be, I think, a bit more cautious than we are now*." Furthermore, they already started embracing open access, data, and software. Progress has been slow, but there has been a gradual shift towards these principles.

6 Conclusion

In this chapter, we investigated how the National Library of Finland developed and implemented the AI-based solutions Annif and Finto AI.

Due to the increasing volume of digitally collected data and the extensive digitisation of paper archives, the Finnish National Library recognised the need for an application to facilitate automated subject indexing, particularly for library collections where manual indexing proves impractical. Given the insufficient AI support for various Finnish languages and dialects, the National Library of Finland developed an in-house solution. Moreover, the desire for greater control over the AI system—compared to what commercial service providers offer—and the complexities involved in integrating such systems into existing library infrastructures

underscored the need for an internal solution. Finally, they started to develop Annif and Finto AI.

Annif is an open-source toolkit for automated subject indexing and classification that was developed in-house. It is multilingual, works independently of the indexing vocabulary, is modular, and integrates different text algorithms [3]. The Finnish National Library uses manually indexed corpora, such as master's and doctoral theses from the University of Jyväskylä, to evaluate the application Annif [4].

Annif is integrated into the Finto AI Web user interface, an in-house—produced metadata management system launched in 2020. Finto AI introduces automatic subject indexing into information systems and understands Finnish, Swedish, and English subjects [5]. This application is, for example, already implemented at the University of Jyväskylä, where students submit their master's theses using the tool and receive suggestions from Annif. The application allows students to use or discard the suggestions before a final check by a professional librarian [5].

The successful collaboration between the project team, the National Library itself, and external stakeholders has contributed significantly to the project's achievements. These stakeholders enhance the AI-based solutions by using, testing, and modifying the tool's code. Use cases from institutions such as the University of Jyväskylä, the Finnish Broadcasting Company Yle, and other National Libraries, including the National Library of Germany, demonstrate that Annif is effective beyond the Finnish National Library. Presentations in-house and outside the library provided an understanding and awareness of AI-based solutions.

However, AI tools have not yet been fully integrated into the general process of the Finnish National Library. Besides, the National Library of Finland decided against developing an AI department and tends to incorporate working with AI across the library. Therefore, due to the in-house developed applications Annif and Finto AI, the National Library has vast knowledge, and staff can immediately identify mistakes in the code or the automated produced records.

Using AI in the Finnish National Library presents challenges, including automated created records with hidden mistakes, time constraints for tool usage, concerns that AI may replace human work, or copyright issues. However, the positive feedback from the users shows how valuable the AI-based solutions are for National Libraries and other stakeholders that use the tools. Moreover, in the future, the tools will become more communicative; therefore, faster and closer collaboration with stakeholders could be possible. Finally, AI requires custodianship and oversight, and the National Library of Finland plays a vital role in this aspect of society.

Acknowledgements The work for this chapter was supported by the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement ID 101061516.

Appendix

Overview of the Annif and Finto AI at the National Library of Finland

Case and project name			
Annif and Finto AI at the National Library of Finland			
Country	**Number of employees**	**Type of AI solution**	**Year and maturity level**
Finland	+230	Open-source toolkit called Annif for automated subject indexing and classification integrated into Finto AI Web user interface, an in-house-produced metadata management system	2014: Start of the Finto project 2017: Start of the first prototype of Annif 2018: Begin developing Annif on a more robust technical foundation 2020: Launch of the Finto AI service that is intended for production use
Project description			
The National Library of Finland has created an open-source Annif toolkit for automated subject indexing and classification. Annif is multilingual, works independently of the indexing vocabulary, is modular, and integrates different text algorithms. Annif can be integrated into the Finto AI Web user interface, an in-house-produced metadata management system. To evaluate Annif, they use manually indexed corpora, such as master's and doctoral theses from the University of Jyväskylä. Additionally, humans evaluate the results of the automated subject indexing. Finally, in May 2020, the National Library launched Finto AI, which introduces automatic subject indexing into information systems and can be used for Finnish, Swedish, and English subjects. Finto AI is, for example, already implemented at the University of Jyväskylä, where students submit their master's thesis using the tool and receive suggestions from Annif. The students can use or discard the suggestions before a final check by librarians.			

Need(s) behind implementation	Actors involved	Challenges
1. Need for automated subject indexing arises due to the growing volume of digitally collected data and the extensive digitisation of paper archives. 2. Allows for indexing library collections where manual indexing is impractical. 3. Need an in-house solution due to the lack of AI support for multiple Finnish languages and dialects. 4. Need an in-house solution due to the lack of control over the AI system from commercial providers and the difficulty of integrating them into existing systems.	• The Annif project team developed the first prototype in 2017 and tested a use case at the University of Jyväskylä. The library management and the public showed interest in it, leading to further work on the project. • The Annif project team collaborates closely with external stakeholders to develop and enhance Annif by using, testing, and modifying the tool's code. The Leibniz Information Centre for Economics (ZBW) is an important collaboration partner, for example, in technical development. • Annif is implemented not only in the National Library of Finland but also in other libraries, such as the National Library of Germany, universities like the University of Jyväskylä, organisations like ZBW, and companies like the Finnish Broadcasting Company Yle. • At the University of Jyväskylä, for example, students, librarians, and Annif work together to review master's theses. Students upload their theses to the Finto AI tool, review the suggestions, and then a librarian gives it a final check. This process in Annif is a semi-automated indexing system. • The Annif project team welcomes feedback and suggestions for improvement, for example, on the GitHub platform, where external partners can report bugs and make pull requests, or in the user forum called Annif-users. Additionally, they provide a hands-on tutorial with the ZBW.	• The model constantly improves its accuracy, but hidden mistakes in, for example, subject headings remain a concern, emphasising the need for skilled librarians in cataloguing. Librarians need adequate time to utilise the tool effectively. There are worries that these tools may replace human jobs. • The development of AI by large companies poses challenges due to a lack of transparency, but libraries can harness AI to promote social good and address bias. Navigating copyright issues with AI is complicated, as the legal landscape constantly changes. • Despite these challenges, investing in library staff and infrastructure is essential for effective AI implementation.

(Continued)

Case and project name		
Annif and Finto AI at the National Library of Finland		
Results		
Organisational level	**Value created and co-created**	**Lesson learned**
Presentations in-house and outside the library provided an understanding and awareness of the development and implementation of the application. A first use case with the University of Jyväskylä demonstrated its effectiveness in the library management. However, one interviewee described that they are experimenting with AI tools but not have fully integrated them organisation-wide, and it has not yet been implemented in the general process. The Finnish National Library decided against developing an AI department. They aim to integrate AI across the organisation and understand its basics from everyone in the library. An in-house solution benefits from the huge amount of knowledge in-house, and staff can immediately identify mistakes in the code or the automated record produced. Annif operates behind the scenes and still requires human assistance to yield valuable results.	1. There is positive feedback about the efficiency of the indexing tools from users, for example, in the use case, where students submit their theses to the repository, which in return encourages the library to work further on it. 2. Automated subject indexing assists manual indexing through semi-automated indexing, where Annif suggests for a new record that is verified manually. Additionally, they test Annif for fully automated indexing. It minimises the need for librarians to check and add subject indexing. 3. In the future, the tools will become more communicative and, therefore, faster. This improvement gives further potential for working with stakeholders.	Automated subject indexing requires skills and competencies in manual subject indexing and description. For this reason, they advise that beginners or non-professionals avoid using the tool. In addition, some library staff are worried that the AI tool is seen as a way to cut off staff and provide quick but inadequate input, which could lead to incorrect information in the library database. Therefore, one interviewee recommended using the tool carefully and thoughtfully to improve metadata but urged more cautious usage. Furthermore, they already started embracing open access, data, and software. Progress has been slow, but there has been a gradual shift towards these principles.

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