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AN INSIGHT INTO LEXICOGRAPHIC PRACTICES IN EUROPE

Results of the extended ELEXIS Survey on User Needs

Abstract The paper presents the results of a survey on lexicographic practices and lexicographers' needs across Europe that was conducted in the context of the Horizon 2020 project European Lexicographic Infrastructure (ELEXIS) among the observer institutions of the project. The survey is a revised and upgraded version of the survey which was originally conducted among ELEXIS lexicographic partner institutions in 2018 (Kallas et al. 2019a). The main goal of this new survey was to complement the data from the ELEXIS lexicographic partner institutions in order to get a more complete picture of lexicographic practices both for born-digital and retro-digitised resources in Europe. The results offer a detailed insight into many aspects of the lexicographic process at European institutions, such as funding, training, staff, lexicographic expertise, software and tools. In addition, the survey reflects on current trends in lexicography and reveals what institutions see as the most important emerging trends that will affect lexicography in the short-term and long-term future. Overall, the results provide valuable input informing the development of tools, resources, guidelines and training materials within ELEXIS.

Keywords E-lexicography; lexicographic practices; lexicographers' needs; survey; ELEXIS

1. Introduction

In each and every European country, elaborate efforts are put into the development of lexicographic resources describing the language(s) of the community. Although confronted with similar problems, cooperation on a larger European scale has long been limited. The result is a rather heterogeneous lexicographic landscape characterised, on the one hand, by stand-alone lexicographic resources, and, on the other hand, by a significant variation in the level of expertise and resources available. Furthermore, as noted by Leroyer and Køhler Simonsen (2020, p. 184) „the digital revolution [...] is leading to metamorphoses not only in dictionary making processes and dictionary forms, but also in dictionary use and in the general status of lexicography“. The field finds itself in a transitional phase and as yet there is little consensus on the way forward (Rundell 2015, p. 310). Addressing these issues and paving the way for future lexicography, is precisely the goal of the Horizon 2020 ELEXIS¹ project, which is dedicated to creating a sustainable infrastructure for lexicography (Krek et al. 2018, 2019; Pedersen et al. 2018; Woldrich et al. 2020).

To gain more insight into current lexicographic practices, workflows and the specific needs of lexicographers, a number of surveys have been conducted within the project. This paper presents the results of the latest survey which was targeted at the ELEXIS observer institutions. The main goal of this survey was to complement the data from the earlier surveys (Kallas et al. 2019a, b) in order to get a more complete picture of lexicographic practices both for born-digital and retrodigitised resources in different institutions in Europe.

¹ <https://elex.is/> (last access: 25-03-2022).

After setting the background and introducing the methodology, we will discuss the results specifically focussing on similarities and differences between the answers from the observer institutions and those from the lexicographic partner institutions (Kallas et al. 2019a).

2. Background and methodology

2.1 ELEXIS

The main objective of ELEXIS is to create a sustainable infrastructure for lexicography to 1) enable efficient access to high quality lexicographic data so that it can also be used by other fields including Natural Language Processing (NLP), artificial intelligence (AI) and digital humanities, and 2) bridge the gap between more advanced and less-resourced scholarly communities working on lexicographic resources. To realise these goals, ELEXIS has an inclusive multi-layered organisation that aims at engaging different user groups with various levels of intensity during the project (see Fig. 1). The core of the organisational structure consists of 17 consortium partners. The consortium is composed of content-holding institutions and researchers with complementary backgrounds: lexicography, digital humanities, standardisation, language technology, Semantic Web and AI. Furthermore, the consortium cooperates with existing infrastructures, i. e. CLARIN and DARIAH.

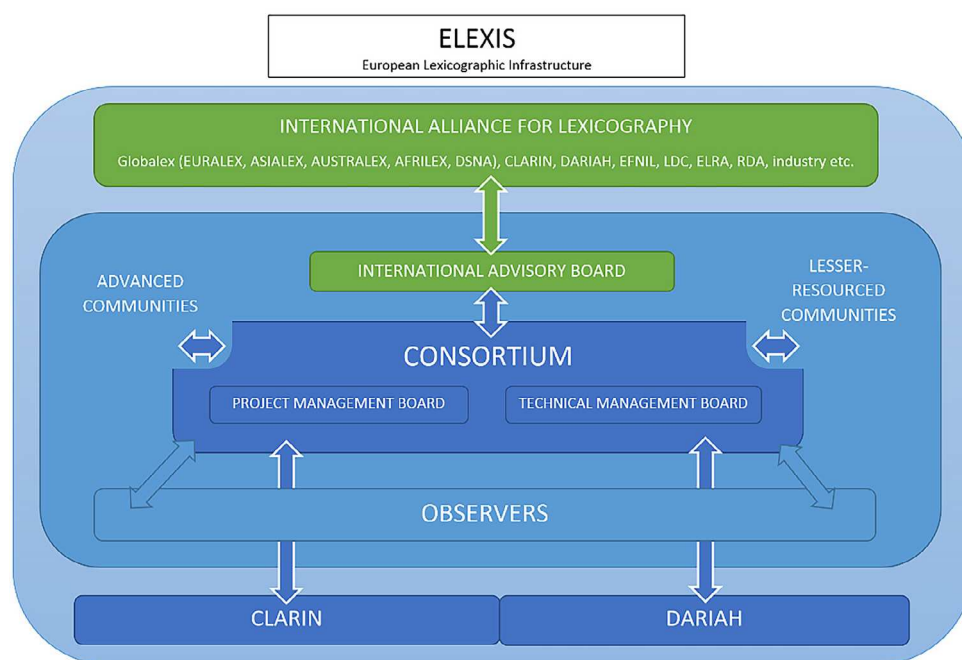


Fig. 1: ELEXIS organisational structure

Another organisational layer is formed by observer institutions that are directly included in outreach and dissemination activities through various channels. The central group of institutions that fall under the observer category are typically, but not exclusively, those producing quality lexicographic data and resources. As of March 2022, ELEXIS has 56 observers.²

² <https://elex.is/observers/> (last access: 25-03-2022).

Many of the ELEXIS partners and observers already participated and collaborated in the European Network of e-Lexicography (ENeL) COST action³ (2013–2017), which brought together the lexicographic community in Europe on a larger scale for the first time. In order to learn more about the lexicographic community, a number of surveys have been carried out within COST ENeL, providing valuable information on various aspects of the lexicographic workflow (Tiberius/Krek 2014), the tools that are used (Krek et al. 2014), and on the automation of the lexicographic process (Tiberius et al. 2015).

ELEXIS has used the results from the COST action. However, due to rapid changes in the field, further research and updates were needed. In July 2018, two surveys were launched focussing on lexicographers' needs. The first survey was targeted specifically at individual lexicographers, the second survey (which was more comprehensive) focussed on institutions and was sent to the eleven ELEXIS lexicographic partner institutions.⁴ In the final months of 2019, a third survey was held among partner and observer institutions in order to gain an insight into their licensing practices (Kosem et al. 2021). In May 2020, an impact survey was launched to assess different aspects of the technical and social infrastructure ELEXIS provides (Wissik et al. 2020).

As the 2018 survey on lexicographers' needs for institutions was only sent to the ELEXIS lexicographic partner institutions, it was decided to collect more data by extending this survey to the observer institutions. With this extra data, we get a more complete picture of lexicographic practices across Europe, different tools and methods used by lexicographers, as well as the lexicographic needs that institutions in Europe have now or anticipate to have in the short-term and long-term future.

2.2 Methodology

The survey for observer institutions is a revised and upgraded version of the survey which was originally conducted among the lexicographic partner institutions in 2018. The method chosen for the survey was an online questionnaire. The earlier surveys were conducted in Google Forms as the tool was easy to use and administer. However, as Google Forms does not support nesting of questions, which led to some unexpected results during the analysis, it was decided to switch to a more advanced survey system, i. e. 1ka.⁵ Furthermore, we improved the wording of certain questions, which were either unclear or interpreted in different ways by the respondents in the earlier surveys. For instance, the question 'Do you outsource parts of your lexicographic work to an IT company or language technology company?' was replaced by 'Does your institution use services of external providers, such as IT companies, language technology companies, self-employed software developers?' as the term 'outsourced' was not understood in the same way by all respondents.

The survey for observer institutions was the longest survey so far. It contained 121 questions divided into 6 sections: 1) General information, 2) Types of lexicographic resources.

³ <https://www.elexigraphy.eu/> (last access: 25-03-2022).

⁴ The ELEXIS lexicographic partner institutions are the Austrian Academy of Sciences, Institute for Bulgarian Language Prof Lyubomir Andreychin, Society for Danish Language and Literature, Institute of the Estonian Language, Trier University, Trier Center for Digital Humanities, Hungarian Academy of Sciences, Research Institute for Linguistics, K Dictionaries Ltd, Dutch Language Institute, Belgrade Center for Digital Humanities, Jožef Stefan Institute, and the Real Academia Española.

⁵ <https://www.1ka.si/d/en> (last access: 25-03-2022).

Software and tools supporting the workflow, 3) Publication and access. Crowdsourcing and Gamification, 4) Retrodigitised dictionaries, 5) Data formats. Metadata. Availability, 6) Past and Future. To obtain as much information as possible, the survey included not only “yes/no” questions, and multiple choice questions, but also many open-ended questions. Not all questions were obligatory. The intention was that one survey would be completed per institution and that it would be completed by a representative on behalf of the institution. We cannot, however, exclude that some personal opinions are reflected in some of the answers given.

The survey was opened from 13 July 2020 till 9 November 2021 to allow as many observer institutions as possible to complete it. Towards the end of this period personalised reminders were sent out.

3. Results

In this section, we present an analysis of some of the main results, pointing out similarities and differences between the ELEXIS observer and the lexicographic partner institutions (Kallas et al. 2019a). Findings from other surveys are included when relevant. Overall, the response rate was quite high. The survey was completed by 54 observer institutions from 32 countries.

3.1 Respondents' background, institutions and projects

The results show that the representatives of the institutions completing the survey are primarily people working as a corpus linguist, computational lexicographer or computational linguist, having at least 6 years of experience in lexicography (the majority having in between 11–20 years of experience in the field), and holding a PhD mostly in language or linguistics. This is similar to the results from the partner institutions, except that the representatives from the partner institutions have been in the field even longer, the majority having more than 20 years of experience in lexicography.

As can be seen in Table 1, there were slightly more universities than public institutions among the responding observer institutions. This is different from the situation among the lexicographic partner institutions which are mostly public institutions or non-profit organisations. To date there are no private/commercial companies among the observers.

Type of organisation	
Public institution (eg. National Institute, National Centre or Society)	23
University or one of its departments (usually legal person in public law)	26
Private / commercial company	0
Non-profit organisation (NGO)	4
Mixture of public and private (public-private partnership, PPP)	1

Table 1: Types of organisation of the observer institutions

The majority of the observer institutions receive funding for their lexicographic work at the national level. Some are directly funded by the government, others rely on grants from

national research agencies.⁶ Seven institutions indicated receiving private funding of which three (university and non-profit) rely solely on private funding.

These observations seem to suggest that lexicographic projects in Europe are heavily dependent on national funding by the government. This is in line with earlier results (Kallas et al. 2019a, p. 57) which suggested that lexicographic work in Europe is mainly done in public institutions and non-profit organisations. It also corresponds with the findings of the European survey on dictionary use and culture (Kosem et al. 2019, p. 96) where it was reported that in the majority of the countries participating in the survey, monolingual dictionaries are published solely or mainly by public institutions funded by the government. This observation is further confirmed by the answers on lexicographic expertise which show that monolingual projects are primarily carried out by public institutions, whereas bilingual and multilingual projects are mentioned more frequently by universities.

Similar to the ELEXIS partner institutions, the majority of the observer institutions employ between 1–10 lexicographers (summed up into full-time employment). Note though that 7 institutions do not employ any lexicographers at all. This is not completely unexpected as lexicographic work per se is not always a core task of the observer institutions.

Most lexicographers at the observer institutions do not work exclusively on lexicographic projects and spend more than 50% of their time on other tasks such as teaching, project management, and public relations. Only four institutions indicated that their lexicographers work exclusively on lexicographic projects. Three of those employ between 11–25 FTE lexicographers. Unlike the partner institutions, only less than half of the observer institutions provide training for their lexicographers. If training is provided, in-house training is most common, followed by specialised workshops and training schools. This is again in line with the findings from the earlier surveys where we observed that specific lexicographic training is often received on the job rather than obtained through formal education programmes. These findings emphasise the importance of the ELEXIS curriculum (Tasovac et al. 2022) and degree programmes such as EMLex (European Master in Lexicography)⁷ for the training of young generations of lexicographers.

Most observer institutions do have IT support, although 11 indicated that they have no software developers/IT people working at the institution. All partner institutions indicated having IT support. However, in most cases, the IT people do not work full-time on lexicographic projects. At most observer institutions they spend even less than 10% of their time on lexicographic projects.⁸

About half of the observer institutions indicated that they do use services of external providers, such as IT companies, language technology companies, self-employed software developers (mostly sporadically and some regularly). Four institutions indicated that they do not use external providers at the moment, but that they are planning to do so in the future. The remaining institutions indicated that they do not use such services at all. Development of an online application and user interface is the task which is most commonly outsourced. This is in line with the results from the survey from the partner institutions.

⁶ One institution noted that their National Science Foundation will only finance lexicographical projects if dictionary making is included in some linguistic topic, as then it is considered as a science project.

⁷ <https://www.emlex.phil.fau.eu/> (last access: 25-03-2022).

⁸ We do not know this for the lexicographic partner institutions as this question was not included in their version of the survey.

Next are retrodigitisation tasks such as scanning, typing and conversion. Retrodigitisation scores slightly higher in the survey for the observers than in the survey for the partner institutions. Other tasks which are commonly outsourced are the development of a Dictionary Writing System (DWS) or a Corpus Query System (CQS), setting up a database or the creation of a mobile app.

Like the partner institutions, the observer institutions have a 'varied' lexicographic expertise ranging from general and terminological dictionaries to specialised, learner's, historical, and dialect dictionaries (see Fig. 2).

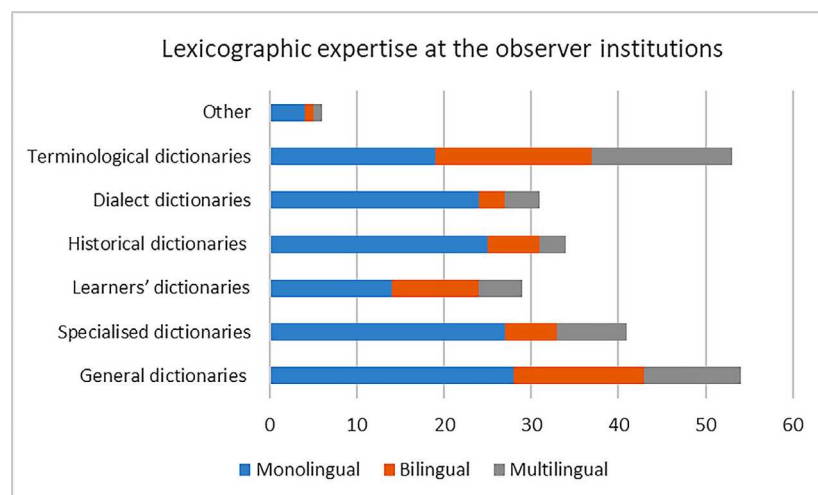


Fig. 2: Lexicographic expertise at the observer institutions

Expertise on terminological dictionaries is, however, more represented among the observer institutions than among the lexicographic partner institutions.

The amount of lexicographic resources per institution also differs. The analysis shows that most observer institutions have between 1 and 5 lexicographic resources whereas 5 out of the 11 partner institutions indicated having between 10–50 lexicographic resources and 2 having even more than 50.

The observer institutions were also asked about ongoing and future lexicographic projects. A total of 131 projects were mentioned, mainly specialised, monolingual and bilingual dictionaries. A fair number of IT-based projects, e.g. on automatic term recognition, were also mentioned. Such projects were not mentioned by the lexicographic partner institutions. As for future projects, the results from the observers seem to suggest that there is a shift from the compilation of general dictionaries towards specialised dictionaries focussing e.g. on neologisms, dialects, etymology, multiword expressions or morphology.

Similar to the resources of the partner institutions, most of the lexicographic data from the observer institutions is published online. The number of resources that are published as scanned or photographed electronic dictionaries is, however, much higher in the survey for the observer institutions compared to the survey of the partner institutions, where there was only one institution selecting this option. The main reason for publishing in print is that it is tradition; the dictionary is part of a larger project and previous volumes have appeared in print. This was also the main reason for publishing in print for the partner institutions. These results are also in line with what was reported by Kosem et al. (2019,

pp. 109–111) on the status of lexicography (types of dictionaries being compiled and their format) in the 26 countries involved in their study. Other reasons that were mentioned by the observer institutions for publishing in print, are lack of technical support or software and user demand. It was also pointed out that print dictionaries are still convenient when the intended audience does not have other means of accessing the dictionary, i. e. school children or elderly people. Finally, it was noted that printed dictionaries might still be used in the drafting phase for checking.

3.2 Software and tools

During the last decades, there has been a rapid development of Dictionary Writing Systems and Corpus Query Systems moving towards better interoperability between DWS and CQS and, as a next step, integrating them into one tool. The responses to both surveys show that a large number of different commercial, open-source and in-house tools are used to support lexicographic work in Europe. ELEXIS partners mentioned 11 DWSs and 8 CQSs, observers – 26 DWSs⁹ and 31 CQSs. Of the various systems, Sketch Engine¹⁰ is the most mentioned CQS and Lexonomy¹¹ – the most mentioned DWS.

CQSs are used commonly by observer institutions as well as by partner institutions. Of the 52 observer institutions answering these questions, 36 use a CQS and 16 do not (7 of them feel that they need one urgently). Overall, the institutions are satisfied with the CQS they use. The additional wishes expressed overlap with those mentioned by the lexicographic partner institutions, i. e. advanced corpus creation and annotation tools; better metadata management; additional functionalities (e. g. sense clustering; sense annotation and disambiguation; diachronic analysis; detection of translation equivalents); improved user ergonomics and customisation of the user interface according to user profile, e. g. CQS for learners.

For DWSs, the situation is clearly different from that of the partner institutions. Only 21 observer institutions use a DWS while 31 do not (14 of them feel that they need one urgently). In line with earlier results (Tiberius/Krek 2014; Kallas et al. 2019a), we see that at the observer institutions in-house solutions are still very common too. Most of the observer institutions using a DWS seem more or less satisfied with the system they use although concerns are expressed about the long-term sustainability of the system or about keeping up with technical improvements. Reasons mentioned by the observer institutions for not using a DWS are financial difficulties in purchasing lexicographic software or tools, but also the absence of knowledge and technical skills. This is why open-source tools such as Lexonomy are much welcomed. 22 observer institutions mentioned using Lexonomy, in projects (8), for teaching and training (7), and/or for testing (10).

Features of a DWS that are particularly appreciated by the institutions are the availability of support, customisation options, the possibility to adapt and add functionalities, the ability to work with multiple users and real-time updating of the database. Customisation concerns

⁹ In the survey a DWS was defined as “a piece of software for writing and producing a dictionary. It might include an editor, a database, a Web interface and various management tools – for allocating work etc. Specialised dictionary editing software includes customisations of existing/standard (XML) editors”. We are uncertain if all the systems mentioned fulfil this definition as some seem to be more targeted at terminology or corpus development.

¹⁰ <https://www.sketchengine.eu/> (last access: 25-03-2022).

¹¹ <https://lexonomy.elex.is/> (last access: 25-03-2022).

mostly schemas, DTDs and menus, search options, and export options (incl. export for saving and transformation (e. g. XML, CSV, JSON, TEI), for printing (e. g. pdf, Indesign), and for publishing online). Additional wishes include easy installation, support for interlinking lexical entries, providing links to corpus examples and metadata, adding multimedia files, and API access. Also the need for publishing policies and licensing regulations was stressed repeatedly. At the time of writing, some of these wishes have already been implemented in Lexonomy, such as adding multimedia files, API access and interlinking.

The integration of CQS and DWS and advanced semi-automatic dictionary drafting were also explicitly expressed wishes. Similar to the results from the survey of partner institutions, a minority can integrate data from the CQS directly into the DWS that they use and very few have them integrated into one system (4 observer institutions and 2 partner institutions). Integration of DWS and CQS has thus not yet become common practice in modern lexicography, although institutions feel that this would be beneficial, especially for the linking, selection and retrieval of examples and collocations.

Quite a few observer institutions note a lack of information regarding usability and effectiveness of available commercial and open-source CQs and DWSs and mention the availability of documentation and training materials as preliminary requirements for adopting a particular solution. Training and education are part of the ELEXIS agenda and the ELEXIS curriculum (Tasovac et al. 2022) will provide courses on mastering the ELEXIS tools.

3.3 Retrodigitisation

The survey contained a separate section on retrodigitisation, which received more answers from the observer institutions than from the lexicographic partner institutions (25 out of 54 versus 7 out of 11). The dictionaries of great interest for retrodigitisation are again dialectal, historical and onomastic dictionaries. Focus is also on (multi-volume) dictionaries with common vocabulary, which were published in the second half of the twentieth century.

No clear dependence can be found based on the lexicographic tradition in different countries: for example, there are institutions that do not deal with retrodigitisation in both eastern and western parts of Europe and the same applies to institutions working on retrodigitisation. However, a conclusion can be drawn about the type of institution that predominantly deals with retrodigitisation: thirteen public institutions (52%), eight universities or university departments (32%) and four non-profit organisations (16%) reported retrodigitisation, compared to nine public institutions (36%) and fifteen universities (60%) that did not. This suggests that retrodigitisation is more often practised in specialised lexicographic centres than in universities.

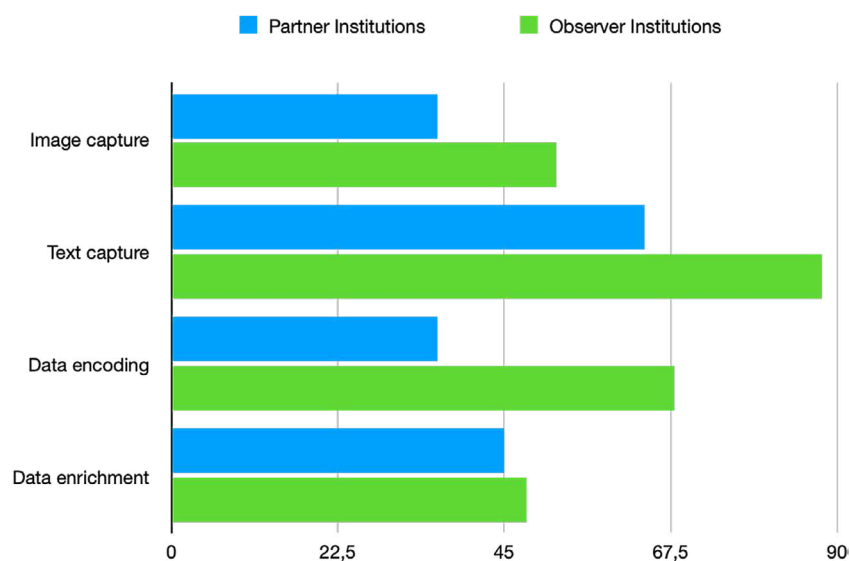


Fig. 3: Phases of retrodigitisation compared in partner and observer institutions

As shown in figure 3, the lexicographers from partner institutions take part mostly in activities such as text capture and data enrichment, while the activities of observer institutions prevail in text capture and data encoding.

The number of institutions (20) that offer access to their retrodigitised resources through an institutional portal or website constitutes 37% of all observer institutions and 80% of those performing retrodigitisation (compared to 45,5% of all partner institutions). Four of the observer institutions (16%) performing retrodigitisation offer access through an API, six (24%) by downloading image files, and 1 (4%) by downloading full text. Among the respondents that took part in this section of the survey fifteen institutions (60%) do not share the full text of their retrodigitised dictionaries with their users, compared with the ten institutions (40%) that reported sharing full text of retrodigitised dictionaries. The reasons for not sharing are copyright restrictions and still ongoing work.

Several options are available with regard to the integration of retrodigitised dictionaries with existing lexicographic resources: eight observer institutions (32%) keep their retrodigitised dictionaries as stand-alone resources, each retrodigitised dictionary has its own website; five observers institutions (20%) have one website or portal which provides access to all retrodigitised dictionaries; three observers institutions (12%) have one website or portal which provides access to all dictionaries (combining retrodigitised and born-digital dictionaries).

In general, interest in retrodigitisation of printed dictionaries is observed in the whole lexicographic community – among the ELEXIS partners and observers. In both surveys similar procedures and software tools were mentioned for the different phases of retrodigitisation (image capture, text capture, data encoding and data enrichment). This is reassuring and suggests that there are already some best practices in place for the retrodigitisation workflow.

4. General observations and wishes for the future

The results from our latest survey show that the lexicographic landscape in Europe is still rather heterogeneous. The observer institutions completing the survey can be divided into three groups, a) under-resourced, b) intermediate, moving towards online, and c) (techno-

logically) advanced. The ELEXIS infrastructure plays an important role in bridging this gap. For the future, respondents from both the lexicographic partner institutions and the observer institutions would like to see increased interoperability, linking and sharing of resources, more open-source programs and platforms as well as training on how to use them (this is especially important for institutions with limited funding for lexicographic projects, a problem which is mentioned frequently by the respondents), more NLP resources for low-resourced languages and (more) stable and established formats for data encoding in lexicographic projects. Although a shift can be observed from non-structured data to structured data, there are still quite a few institutions (46% of the observer institutions and 36% of the lexicographic partner institutions) using non-structured data format (e.g. in Microsoft Word) for at least some of their projects. This is frequently mentioned as a major hurdle for technological advances. ELEXIS aims to overcome this obstacle with the development of a general open standards based framework for internationally interoperable lexicographic work within OASIS.¹²

The respondents also envisage intensive integration of lexicographic data into the Semantic Web, AI, and NLP applications, as well as aggregating stand-alone lexicographic (and also terminological) resources into dictionary portals. Interoperability and linking are also part of the ELEXIS agenda. One of the main results of ELEXIS is the Dictionary Matrix which is formed of extensive links between key elements found in different types of dictionaries – monolingual, multilingual, modern, historical, etc. – creating a universal lexicographic metastructure spanning across languages and time. The Dictionary Matrix will be available as a public service, and the links between dictionary elements will be shared as Linguistic Linked Open Data (LLOD) enabling other fields to exploit the high-quality semantic data from lexicographic resources. To support linking, editing, enriching and publishing data from various sources, a set of services and tools have been developed within ELEXIS dedicated to the conversion of lexicographic resources to a uniform data format (e.g. Elexifier)¹³ as well as to the creation of new resources (e.g. Lexonomy).

Considering the obstacles that were mentioned, one of the biggest concerns seems to be funding. The need for funding is voiced in all the ELEXIS surveys and in all parts of Europe, from Ukraine to Iceland, from Portugal to Sweden, although it seems even more urgent in Eastern Europe where the phrase ‘lack of funding’ tends to be used, whereas in Western Europe the respondents speak of ‘difficulties’ obtaining funding. In addition, concerns are expressed about the low status of lexicographic work, which forms a constant worry for many institutions.

In line with the results from the lexicographic partner institutions and the individual lexicographers, some observer institutions expressed their concern about the low quality and reliability of (semi-)automatically built resources while high quality lexicographic data is still kept closed under restrictive licenses (both, public institutions and private publishing houses). Within ELEXIS serious efforts have been made to address licensing issues (Boelhouwer et al. 2020) and a number of flexible and diverse licensing options have been identified to encourage contribution of data (or parts of it) to the Dictionary Matrix. The survey results show that the process of making lexical resources more openly available has already started in the lexicographic community. Most partners and observers make their dictionaries available online for free. However, access to the data for reuse by others is still more

¹² https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=lexidma (last access: 25-03-2022).

¹³ <https://elexifier.elex.is/> (last access: 25-03-2022).

restricted. Only a few institutions indicated that their data is available for free without any restrictions. This suggests that more promotion and raising awareness is needed to open up lexicographic data.

A change in the role of lexicographers, as well as a shift in skills, can also be observed. These days, lexicographers are commonly involved in project management, data management, fundraising, teaching, and public relations. Also, there is a shift in the role of lexicographic institutions, as they become more of a data provider and less of a dictionary publisher. One of the ELEXIS goals is precisely to enable reuse of lexicographic data in other fields.

5. Conclusion

The survey of observers has provided further insights into existing practices and needs of lexicographers around Europe. It successfully complements the other surveys conducted in the ELEXIS project and in the ENeL COST action, giving a more detailed overview of the current situation in lexicography, emphasising the need for common standards, open-source tools and comprehensive training materials. It also shows the main wishes, needs and concerns of lexicographic institutions.

The results from all surveys have already provided valuable input for various tasks within the ELEXIS project, and will continue to inspire future developments within the infrastructure. On the basis of the combined results, a lexicographic practice map of Europe can also be devised, which is something we would like to explore in future research.

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