Personal access to documents using different literacy levels

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Abstract

Providing information in ‘easy-to-read’ aims at improving accessibility through easier understandable text which is more appropriate for different target groups. Particularly, legal notifications are often hard to understand. This paper presents an app and its’ underlying online system that enables users to read such information, adapted to their individual reading skills. The online system allows creating and managing translations of complex information of notifications. It maps a three-step process of translation including stakeholders located at different institutions on a content management system, which provides information of scalable complexity in terms of language level and level of detail. Users use their personal mobile devices to access this information. The app is used to identify documents with the built-in QR-code reader utilizing the back-facing camera of the smart device. After identification of this specific instance of the document, the app fetches the information, including personal data, and presents it at the user-preferred language level. Privacy and security issues were considered as well as requirements necessary to ensure accessibility.

Keywords Easy-to-read · App · Self-determination · Literacy · Accessibility

1 Introduction

Accessibility gained recognition and acceptance as a key issue at a global level. Physical accessibility and technical accessibility (e.g. accessible Web- or Software-design), the complexity of language use and understandability of content, come into focus. International and national legislation as,

e.g. the UN-Convention on the Rights of People with Disabilities [1], promote and push ‘easy-to-read’ as a fundamental right for equal access and inclusion [2]. To make information easier to read and easier to understand the content, vocabulary and structure of information must be adapted according to accepted guidelines (e.g. the ‘capito’-method [3]). Thus, it is possible to support people who have difficulties in reading or understanding information. For years, accessible information has been understood as a specific need of people with cognitive disabilities. This target group also consists of people that have more difficulties with one or more types of mental tasks than the average person, and to some extent deaf-blind people and also persons with dementia. But, in reality, easy-to-read information is important for all people who have difficulties in reading and understanding written information. Thus, the target groups of ‘easy-to-read’ must be extended to people with low literacy levels and people having a different first language. According to the International Federation of Library Association and Institutions (2010) [2], international studies show that in most countries more than 25% (up to 40–50%) of the adult population does not reach the level of literacy or reading skill expected after basic education.

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2 State of the art

Statistics and studies speak of 1–2.5% of the Western World's general population and 5–12.5 million people in the European Union and European Free Trade Association (EFTA) [4] having a need of access to information in 'easy-to-read'. As the target group is not recognized as a valuable group of consumers, R&D and availability of assistive technologies and services are lagging behind.

Also in the accessibility movement, understandability with 'easy-to-read' came in focus considerably late. Looking at the development of WCAG 2.0 [5], understandability is of course mentioned as a principle for a long time, measurable criteria, methods, techniques and tools are under discussion only as of recently for WCAG 2.1 [6, 7]. A task force called Specialist Task Force 488 (STF488) has been established to professionally establish understandability at the same level as other criteria in WCAG [7, 8].

The number of websites in 'easy-to-read' is growing, yet they usually provide content which discusses issues related to cognitive disabilities itself. In addition, only a small number of accessible or assistive apps supporting 'easy-to-read' are available, i.e. the Bible and Hurraki [9]. And again here, they are often not designed with accessibility in mind and do not refer to different literacy levels of 'easy-to-read'.

Currently, a lot of effort is being made to develop systems that automatically convert text in an easier to read and understandable format. Systems like the IBM Content Clarifier¹ analyse any text and automatically condense content into a simplified form. These approaches use methods to replace complex words with simpler synonyms on the lexical level or modify the syntax of text to remove grammatical complex structures. Other approaches use machine learning algorithms to discover methods for simplifications [10, 11].

3 Easy-to-read

Reading is a complex cognitive process making the reader understand the meaning when working with text. This process includes skills such as perception of single elements (e.g. letters, words), structuring and connecting towards comprehension. Skilled readers selectively scan text to get information relevant to understand the meaning. Reading letter by letter is only needed for unfamiliar words. International studies [2] show that up to 50% of the adult population does not reach the reading level expected to deal with text classified as being 'standard'. Providing text in 'easy-to-read' supports people who have difficulties in one

or more of the complex skills involved in reading. 'Easy-to-read' is a young scientific field with the goal of improving understandability of text for different user groups like people with cognitive disabilities, low literacy and second-language readers. In the field, researchers develop methods, techniques and tools to (a) support clear and simple writing, (b) easy to depict and follow formatting of text, and (c) enriching text with graphical/symbolic and other media alternatives. 'Easy-to-read' is not an own language with own grammatical structures. 'Easy-to-read' is a method and technique using the respective language in a way that is suitable for a particular target group [2]. One method and technique supporting authoring text in 'easy-to-read' is the Capito-Method [12]. The Capito-Method has been developed by a group of organizations with a practical background and an extensive experience in writing and formatting information for people with cognitive disabilities. Compared to other approaches in Europe, the Capito-Method is significantly different. Approaches like 'Ratgeber für Leichte Sprache'² from Netzwerk Leichte Sprache³ [13], international list of criteria from ILSMH (International League of Societies for Persons with Mental Handicaps) [14] or European list of criteria from Inclusion Europe (Information for all—European standards for making information easy to read and understand) [15] are just a set of criteria that should be followed to make text easy to read. The Capito-Method extends such approaches and makes criteria measurable and their implementation compulsory. The Capito-Method is based on the following components:

- a set of criteria;
- a quality standard based on a defined process to be followed;
- a certification scheme measuring if criteria are fulfilled and the process has been followed, issued by the Austrian technical inspection association (TÜV Austria) and;
- a protected quality label.

This quality standard includes a set of general guidelines defined to overcome cognitive accessibility barriers for different target groups. The guidelines are in accordance with the International Federation of Library Associations and Institutions (IFLA) guidelines for easy-to-read material:

- Avoid abstract language;
- Be logical. The action should follow a single thread with logical continuity;
- Action should be direct and simple without a long introduction and involvement of too many characters;

¹ <https://www-03.ibm.com/able/content-clarifier.html>.

² Advisor for plain language

³ Network for plain language

Fig. 1 Capito-quality seals [12]

- Use symbolic language (metaphors) sparingly. Such language may be misunderstood by some readers;
- Be concise. Avoid several actions in a single sentence. Arrange words in a single phrase on one line, if possible;
- Avoid difficult words but use language that is adult and dignified. Unusual words should be explained through context clues;
- Explain or describe complicated relationships in a logical manner, where events take place in a logical chronological framework;
- Encourage writers and illustrators to get to know their target audience and be informed about what it means to have reading difficulties. Let them meet their readers and hear about their experiences and daily life;
- Test the material with actual target groups before it goes to press.

At a more granular and operational level, the quality standard of the Capito-Network [3] includes a set of about 170 criteria which are grouped into different literacy levels following the Common European Framework of Reference for Languages (CEFR) [3]-levels A1 to B1. They also take target groups with different disabilities (low vision, blindness, hearing impairment, deafness, motor disabilities and mental disabilities) but also low literacy and second-language readers into account. As mentioned, besides wording also layout issues and alternative media are addressed with these criteria (Fig. 1).

A key principle for quality assurance in the Capito-Method is the review and quality control by representatives of the target group. Only content that passes this quality control complies to the Capito-Quality standard and can be certified. The Capito-Quality label is available at three literacy levels: A1, A2 and B1. Only members of the Capito-Network [12] have access to all details of the quality standard and the full set of criteria and are allowed to use the Capito-Method. All members of the Capito-Network are fully committed to the quality standard and ensure the implementation of high-quality easy-to-read information.

4 Map literacy levels

An international study from the Organisation for Economic Co-operation and Development (OECD): Programme for the International Assessment of Adult Competencies showed

that a large percentage of the population has deficits regarding literacy [16]. Participants taking part in the survey had to solve standardized tasks that were rewarded with points. Depending on the amount of points, participants were ranked at 5 levels:

- *Below Level 1* can read brief texts on familiar topics and locate a single piece of specific information identical in form to information in the question or directive;
- *Level 1* (176 points) can complete simple forms, understand basic vocabulary, determine the meaning of sentences and read continuous texts with a degree of fluency;
- *Level 2* (226 points) can integrate two or more pieces of information based on criteria, compare and contrast or reason about information and make low-level inferences;
- *Level 3* (276 points) can understand and respond appropriately to dense or lengthy texts, including continuous, non-continuous, mixed or multiple pages;
- *Level 4* (326 points) can perform multiple-step operations to integrate, interpret or synthesize information from complex or lengthy continuous, non-continuous, mixed or multiple-type texts that involve conditional and/or competing information;
- *Level 5* (376 points) can perform tasks that involve searching for and integrating information across multiple, dense texts; constructing syntheses of similar and contrasting ideas or points of view, or evaluating evidence and arguments.

Table 1 shows the outcome of Programme for the International Assessment of Adult Competencies (PIAAC) main study.

The table shows that a high percentage of the population of each participating country has low literacy skills. A recent study in the German language area focused solely on people with low literacy and lowest literacy, which showed similar results [17]. This underlines the demand for support, services and tools to improve understandability and in particular for a more personalized access at different levels of language use.

To present information in different language levels, there is the need to define literacy levels to give the user the ability to switch the information presentation between these levels. Therefore, the CEFR, which covers six reference levels (A1, A2, B1, B2, C1 and C2, with C2 being the highest level), was utilized for this project.

Table 2 explains these reference levels [5]:

Different levels of ‘easy-to-read’ correspond to level A1 and A2 and plain language to level B1 of the CEFR. The ‘Spaß am Lesen’-publishing-company points out a big gap between the reading, writing and listening skills of the German adult population and the complexity of information

Table 1 PIAAC results [16]

State	Below 226 (%)	From 226 to below 276 (%)	Sum-marized (%)
Japan	5	23	28
Finland	11	27	38
Netherlands	12	27	39
Sweden	13	29	42
Norway	13	31	44
Estonia	13	34	47
Russian Federation	13	35	48
Czech Republic	12	38	50
Slovak Republic	12	36	48
Canada	17	32	49
International Average	15	34	49
Korea	13	37	50
England and N. Ireland	17	34	51
Denmark	16	34	51
Germany	18	34	52
USA	18	34	52
Austria	16	38	54
France	22	36	58
Spain	28	39	67
Italy	28	42	70

used in everyday communication of public authorities and private institutions [18]. A high percentage of the German population is using literacy level B1 and B2. Public authorities and private institutions, however, mainly publish information at literacy level C1. Table 3 shows the literacy levels of the German adult population (18–64 years of age) [19] in combination with the Common European Framework of Reference for Languages (CEFR) [20].

The table shows that more than 40% of the adult German population has a need to get information at language levels A1, A2 or B1 and to close the gap indicated by the ‘Spaß am Lesen’-publishing-company. Utilizing the CEFR language level categorization and the set of rules offered by the Capito-Method [3], information can be transferred into different literacy levels that can be applied to the personal needs of the individual user.

5 Idea

One common problem for people with learning disabilities is that notifications from the government are often difficult to understand as they are written at a language level that is beyond their linguistic capabilities. This is on the one hand a problem for the government as it will produce extra work when people do not understand notifications as they either

Table 2 CEFR

Language level	Explanation
A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a specific type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help
A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can explain simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need
B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise while travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans
B2	Can understand the main ideas of complex text on both specific and abstract topics, including technical discussions in his/her field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options
C1	Can understand a wide range of demanding, longer texts and recognize implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices
C2	Can understand with ease virtually everything heard or read. Can summarize information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of proficient meaning even in more complex situations

Table 3 German literacy level and CEFR

Literacy level	Alpha level	% of adult population	Amount of adult population (summarized) (million)	CEFR
Illiteracy	$\alpha 1$	0.60	0.3	–
Functional illiteracy	$\alpha 2$	3.90	2.0	A1
Functional illiteracy	$\alpha 3$	10.00	5.2	A1–A2
Poor writing skills	$\alpha 4$	25.90	13.3	A2–B1
Adequate and advanced writing skills	$\alpha 4$	59.70	30.8	B1, B2, C1, C2

ignore the notification or directly call for help. On the other hand, it is also some sort of discrimination when information that is potentially important for a person is not delivered in an appropriate and accessible way [21]. Unlike in Britain and other countries, in Austria, a more inclusive text from the beginning or an additional explanation of the original legal phraseology will not become reality in the near future due to administrative constraints.

Our solution deals with this issue by creating a scalable and extendable system that allows users to easily acquire personalized translations for notifications from the government via a smartphone application, called ‘Smart Informiert’. The translations can be fetched by scanning a QR-code that is on the document and are then displayed on the smartphone. The user is able to choose between different language levels, starting from A1 (very basic) and ending at B2 (still less complex in comparison with the original document) of the CEFR categorization. Users can switch dynamically between language levels allowing them to always get the information in a format that is appropriate for them.

The application fetches data from an online system that hosts the original document and its translations at different language levels. Currently, in most European countries, this is done by external companies that specialize in the conversion of text into other language levels and not the government itself. The conversion is expensive as the target group has to validate the conversion of the document. If no errors are found during the evaluation process, the conversion is finished otherwise the conversion has to be corrected and again evaluated, making the process time-consuming. Observations showed that many of the paragraphs in government notifications are the same. The presented system allows reusing conversions for a paragraph of one notification for another notification. By this, only new paragraphs in notifications need to be translated which saves money and time.

6 Workflow

As mentioned above, the mobile app ‘Smart Informiert’ gathers its data from an online server that hosts the documents and the corresponding translations. As documents can

change over time, revisions of the documents are saved as well. This guarantees that not only the correct document is displayed but also the right revision in case an older QR-code was entered in the application. In our system, each revision of a document is deconstructed into the basic elements of text:

- Paragraphs
- Headings
- Tables
- Lists
- ...

Those basic elements can be combined to create a structure that we named ‘snippet’. A snippet therefore stores a combination of basic elements of a document like paragraphs and headings and also the translations into different language levels. Once such a snippet is stored in the database it can be assigned to different documents revisions when meaning and the arrangement of some of the basic elements of the revision fit the snippet. By this, conversions can be reused for different revisions of documents. To implement personalized government notification, so-called placeholder values can be entered in the original content of the snippet and the different language levels. When creating a new notification, the placeholder values are exchanged with values from the database, e.g. the first name of the notification receiver.

As seen in Fig. 2, a revision consists of several snippets that store the original content and also the conversion into the different language levels. Therefore, improvements and corrections of errors in the conversion of a snippet always apply to all document revisions which is a major advantage in our system. When creating a new revision, the system also tries to auto-assign snippets by comparing the metaphone of all existing snippets with current parts of the new revision. Although metaphones were used originally for indexing words and phrases by their pronunciation, they can be applied to different scenarios as well. It is part of newer PHP versions and is often used for string comparison too. In the context of this project, metaphones are used for string comparison and similarity measures of each basic element

Fig. 2 Data structure

of every snippet. By this, already existing snippets can be detected in a reasonable amount of time and can be identified with a high probability.

As the process of creating an accessible document is complex, the online system hosts four roles:

- *Document manager* Manages documents and the revision of documents and inputs new revisions into the system;
- *Document translator* Assigns snippets to revisions, manages and creates snippets. The document translator also performs the conversion of snippets to the different language levels. Due to the legally binding nature of the document, fully automatic translation and simplification of these kinds of documents is not possible from a legal point of view. However, semi-automatic translation and simplification is supposed to be added in the future with the document manager being liable to the correctness of the text;
- *Document issuer* Creates new government notification based on a revision in the system

The advantage of this role system is that the document translator does not need to be a member of the government staff and can also be outsourced to a company as he or she only is permitted to translate content for snippets. As the snippets are used for the creation of a notification and personal data is entered with the placeholder values, the document translator will never see any sensitive information. When the document issuer creates a new notification, a QR-code is also created as part of the notification (see Fig. 3).

Users are able to scan the QR-code with the presented app and can then fetch a translated, personalized government notification from the server that is displayed within the app. They are able to switch to the desired language level that suits their reading skills best. Dynamically switching between language levels is possible during the ongoing process of reading the notification.

Fig. 3 Workflow

7 Security

The current prototype was developed using Drupal 7.⁴ Therefore, it is based on PHP⁵ and MySQL.⁶ The system hosts a HTTPS-REST⁷ service where users are allowed to create one request each minute to prevent brute-force attacks. HTTPS creates a secure channel over an insecure network. This ensures reasonable protection from eavesdroppers and man-in-the-middle attacks and provides the system with reasonable security for communication between client and server (Fig. 4).

To increase security, the QR-code consists of an URL and a key. The URL can be used to make a REST request to the server that will respond with an encrypted version of

⁴ <https://www.drupal.org/>.

⁵ <http://php.net/>.

⁶ <https://www.mysql.com>.

⁷ https://de.wikipedia.org/wiki/Representational_State_Transfer.

Fig. 4 Security mechanism

the personalized government notification. The key within the QR-code is then used to decode the response resulting in the readable government notification. This guarantees that even if the HTTPS-connection would be attacked the data would still be very hard to decode.

8 Android—App

‘Smart Informiert’ consists of two parts, the online system, which handles creation, modification and storage of document translations at different language levels, and an app for mobile devices. This application is used to identify printouts of documents, to fetch translations from the online system and to present it to the user at the preferred language level.

8.1 Identification of documents

Many people have problems understanding the language and wording in official documents from the government, from the bank or other institutions due to their legal character and formal language, especially when these documents deal with legal issues, which use a distinctive vocabulary. Therefore, sending paper printouts of these documents to many people does not help to resolve issues or to inform them, but lead to confusion and uncertainty. ‘Smart Informiert’ tackles this issue and provides a tool for people for self-empowerment and independence. A person only needs a smart device to install an easy-to-use app. This app can be used to scan in documents and display translations to users at a more appropriate language level. The user only needs to identify the specific instance of the document. There are two alternatives to do that:

- The application provides a QR-code-scanner, which facilitates the back-facing camera of the smartphone or

Fig. 5 QR-code reader

tablet. The user just needs to hold the device and focus this QR-code.

- The second option is to enter a code, which can be used by people who have problems using a camera or do not own a device with a working camera. This code consists of letters and digits. It is written next to the QR-code on the printout of the document (Fig. 5).

Once the code is recognized, translations are loaded to the mobile device. This requires a working Internet connection during the data transfer. Apart from these exceptions, the application works offline as well. The translations of the document including personalized data get stored locally on the device and are still available without internet connection, depending on the privacy settings of the user.

8.2 Presentation of documents

After successful identification of the document, either via QR-code or manual code input, the document is presented to the user in the preferred language level. The first time a new document is scanned in by the user, the document gets translated to the predefined language level, which can be set in the profile settings. The text displayed in Fig. 6 is a

Fig. 6 Document at easier language level

fictional notification reminding the recipient to pay 250 Euro in an easy to understand language level.

However, it can always be modified and adjusted to the users' preferences. This adjustment of the language level is applied across the whole document and stored on the device as well. This means that documents saved in the users' history have attached the last used language level which gets applied after reopening them.

- A1: very easy
- A2: easy
- B1: moderate
- B2: difficult
- Original Text
- Original Document

Language levels A1 to B2 were explained earlier. The option 'Original Text' fetches the same level and wording as on the paper printout. However, it splits the text into snippets, each separately displayed on one page. The text appearance equals the system settings of operating system. The option 'Original Document' applies the style of the paper printout, including header, footers and other cooperate identity-related design elements, and displays it on a single page. At this language level, the user can

Fig. 7 Document with style 'original document'

use pinch-to-zoom gestures to change the zoom level and drag-to-pan gestures to perform scrolling of the viewport. Figure 7 shows the original document sent without any language level or style modifications.

As mentioned above, all other presentations of language levels split the content into snippets each displayed on one page. Users can scroll from one page to the next either via buttons, which is especially useful for screenreader users or people using alternative input devices, or via swipe gestures.

8.3 Rating

In addition, each snippet can be rated separately. This is supposed to ensure the quality of the translations. Users can rate translations for each snippet. This rating gets transferred to the server, and translators can monitor the results and improve poor translations according to the user feedback. Users can always change the rating for a snippet, in case they changed their minds or the rating was set unintentionally (Fig. 8).

8.4 Privacy

In general, the application also works offline, without a working Internet connection as well. This means that once a

Fig. 8 Rating of a snippet

translation for a specific instance of an official document has been fetched from the servers, the user can have a look at the document at all available language levels on the smart device even without being connected to the internet. The application allows storing the history of scanned documents too. As these translations do not only include translated text phrases but also personal data and possibly legal decisions, privacy is an important concern. The user might lose the smartphone or it might get stolen, which could give access to sensitive information to an unauthorized person, if the user does not protect the mobile device with some kind of locking mechanism like a code or via fingerprint reader. Therefore, the application allows working in an ‘incognito’ mode, where no history is stored. Also, the user has the option to wipe the whole history. In addition, data are stored using Android’s shared preference in private mode. This ensures that no other app can access the data, and no other user logged in on the same device has access to this data as well. Therefore, multi-user systems on Android do not cause problems either.

8.5 Accessibility

The Android app is designed and tested to be accessible. This means that it is fully operable by screenreader users. However, the operation of the QR-code scanner might be

tricky for some users. Still, the majority should be able to scan in QR-codes successfully. The reason is that QR-codes are always placed on the top-right corner of a document. In the future, a tactile hint on document printouts would make it trivial to identify the right corner. Then, the user just needs to place the camera over the right corner. The app continuously searches the camera output of the back-facing camera for QR-codes. If a QR-code is found a notification informs the user, including screenreader users. This means the user can simply place the camera approximately where he or she suspects the QR-code to be and slightly change the orientation until the code is found.

Also the app is aware of font appearance preferences defined in the system setting and applies the same font size and font type to the user interface.

8.6 Technology and compatibility

The app requires Android 4.0+. This means that it is compatible to the majority of smart devices. Smartphones and tablets are supported and the app scales, respectively. Also devices without cameras are supported, but instead of using the QR-code scanner, an alphanumeric code needs to be entered, as explained earlier in this paper.

9 Backend

The backend of the system was implemented in Drupal. Drupal is an open source content management system which is based on a flexible data structure allowing to extend the database structure without breaking the system. This allowed an agile approach to implement the backend, as the requirements of functionality as well as the different roles of the users were not defined at the start of the project. Besides that, Drupal offers by default many accessibility features empowering developers to build accessible systems without too much effort. Accessibility of software used by official institutions and the government is a key requirement and therefore has always been the focus during the development of the system. As mentioned in Sect. 6, the users of the backend are regarded in three different roles: document manager, document translator and issuer.

9.1 Document manager

The document manager controls every document and each revision of the document in the system. Document managers therefore have to be members of governmental institutions that creates the notifications.

Figure 9 shows the view of the document manager on the documents currently in the test system. The manager is able to create new documents, to edit basic information of

Assign Snippets: Beitragsbescheid Wohnen - Revision 4

Assign snippets to text elements:

SPRUCH:

Sie haben für die Dauer der mit Bescheid vom ###DatumBescheidHauptleistung### gewährten Hauptleistung in einem Wohnheim gemäß § 12 Abs. 2 Z. 2 Oö. ChG folgenden Beitrag zu leisten:

- 80% des Einkommens (exkl. Sonderzahlungen)

Auto Assigned:
Baustein 5

RECHTSMITTELBELEHRUNG:

Sie haben das Recht, gegen diesen RECHTSMITTEL innerhalb von zwei Wochen ab seiner Zustellung bei der bescheiderlassenden Behörde schriftlich das Rechtsmittel der Berufung einzubringen. Die Einbringung kann auch per Telefax oder Mail erfolgen.

Damit ihre Berufung inhaltlich bearbeitet werden kann, muss sie diesen Bescheid bezeichnen (geben Sie bitte Bescheiddatum, Geschäftszeichen und die erlassende Behörde an) einen Antrag auf Abänderung oder Aufhebung des Bescheides sowie eine Begründung dieses Antrages enthalten.

☐ I have finished the assignment of snippets

Fig. 11 Assignment of snippets

snippets or assign existing snippets to text by selecting the corresponding paragraphs marked with a red boarder in the figure. When the snippets used in the revision are translated, the revision can be finalized. By this, they are unable to perform changes to assignments or snippets used in the revision and document issuers are able to create new notifications based on the revision.

9.3 Issuer

The document issuer creates new government notifications based on finalized revision in the system for individual users. Based on the values in the database, the system tries to auto-fill the placeholders with the corresponding values.

If no values are found in the system, a form is created (see Fig. 12) where document issuers are able to enter the missing values, so that finally the notification is created. The values

collected in this form are the German words for location, department, amount to pay and the date.

10 Limitations

While working with the prototype, some potential issues were identified that would be problematic when using the system in real life. One of these issues is the so-called WYSIWYG JavaScript editor that is used for entering text and translations into the system. Because the app uses a Web-View to display content of the notification, text entered with the WYSIWYG editor needs to be accessible. If people do not create accessible content and snippets, then the content displayed in the app is also not accessible for blind people, for example. Other limitations are dynamic elements like lists or tables. Only top-level elements like paragraphs

Create Document Instance

empfaengeradresseort *

BeitragEuro *

Abteilung *

DatumBescheidHauptleistung *

abteilung *

Back Submit

Fig. 12 Creation of a personalized notification

or headings are considered and not the siblings of such elements such as the child elements of a list or the rows of a table. A list of purchases of customers would be an example for that as the number of products differs from customer to customer. To support such scenarios, we would have to expand our database.

11 Current status and other fields of application

At the moment, the prototype of the app and the online system is being evaluated. As the whole workflow involves a lot of stakeholders, holistic testing of this approach is of crucial importance. Particularly, the online system is supposed to be operated by multiple authorities, responsible for different tasks, which makes it harder to ensure, that their efforts smoothly gear into each other.

The evaluation of the Android application does not need to consider a sequential workflow involving different parties, and it is supposed to be accessible to manifold target groups including people with disabilities. As capabilities and limitations are fundamentally individual across human beings, testing and evaluations need to cover a widespread spectrum of potential users.

The evaluation is conducted within the ‘capito’-Network, with focus on involving all decisive stakeholders. First results confirmed majoritarian acceptance by the test users and were already included in this prototype. However, more tests will be conducted.

Even though the application was originally designed to display official documents, other scenarios were found for

which it had proven to be extremely useful to effectively provide information on different language level to users. The application is at the time of writing put into operation in museums to offer information at an adjustable level of detail and complexity to the visitors. Exhibits as well as general information are covered. Another use case is the presentation of the electoral platform of major political parties in Austria during the election campaign for the general elections in 2017.

In addition, it is used to appropriately show terms and conditions as well as explanations regarding contract details on several occasions. Also electricity providers use the application to adaptively present electricity bills and other documents to their customers.

12 Further applications scenarios

The application is not only limited to this use case, but can also be transferred to other scenarios. One possibility could be the fusion with a location-based service. Instead of using QR-codes to identify objects of interest, the location could be used as well. For instance, an accessible museum tour using location-based data could be implemented. Paintings, sculptures or other pieces of art could be tagged, or rather their location. Then, the user could use the smart device to retrieve information about a specific object at the preferred language level. Furthermore, this idea is not limited to the target group of people with intellectual disabilities. A tourist would also benefit not only from translations to easier language levels, but also from actual translations to other languages. In addition to translation, complementary information, as text, images, audio or video could be used to enrich the experience for visitors without taking up space in the museum.

However, one prerequisite is either working indoor positioning or beacons, which can provide proximity measures. The previous projects [22, 23] at the Institute Integriert Studieren already considered this topic in the context of public transportation and could reuse this as solid basis for further work.

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