The power of NID

S. Eisenberger, H. Maurer and B. Zaka

Abstract:

Documents of all kinds are digitized today and then made available in databases, on the web, or via other channels. There is a lot to be said for it: Access is possible at any time, many people can use a document at the same time, but it can be defined who can access a document and under what conditions. Documents can often be searched according to various criteria, and often powerful tools for managing documents are available.

In this paper we show that there are also very powerful possibilities to use digital documents that have hardly been considered so far. We present a system **NID** (**N**etInteractive **D**ocument) [01], which enables many important applications and which is now used in a number of very different environments, e.g. in the area of collections of digital material including libraries of all sizes, in group-internal collections for the exchange of experiences and in learning- and knowledge management applications.

1. Introduction

Note one important point to start with: The terms document and book are used equivalently, but for clearly larger documents we tend to refer to them as books.

Digital documents have become an important area of application of modern information technology. Software systems for setting up and using collections of digital documents have been offered for over 40 years. A wide variety of file formats were used, from PDF to Word, from HTML or HTML-like formats in the WWW, or proprietary such as for Kindle applications, various formats for images, video and audio clips, etc.

Large document management systems, can (and have been) be used independent of the internet in for example in company-internal networks. There is a variety of possibilities available via the Internet. Every WWW server offers information that is stored as digital documents. Of the innumerable areas of application, we limit ourselves to digital libraries, but their applications can be surprisingly diverse: As an electronic version of a "normal" library, as an archive and communication medium for certain groups or as the basis for an e-learning system.

2. The basic ideas behind NID

It should be mentioned in advance that in sections 2 to 6 properties are explained in a general way. In section 7, however, images from existing NID materials provide concrete evidence of many of the previously "abstract" properties. For superficial information, it may be sufficient to skim through the figures in Section 7 to get interested.

The easiest way to understand the basic ideas behind NID is to observe how much material has switched from an analog version to a digital one. Many books are either digitized or are already available in digital form, from which the print version was produced; uncountably many documents are available as PDF files in databases, or are available on Websites usually encoded as HTML or offered in a format derived therefrom that enables also embedding of multimedia material. In addition, much material is offered in Kindle or E-Book format. There is often the option of searching through such digital documents for keywords or in full text, or downloading it on a computer in order to have a good collection of documents available even without internet connection, often in the form of e.g. Kindle books, PDF files or e-books. Many advantages are obvious: Books can be accessed at any time or via the internet from any location, and then the same document can be potentially accessed simultaneously by many users. A library also has the option of introducing charging, possibly in consultation with the organizations that have made the documents available.

Users may be allowed to set personal bookmarks, use certain search algorithms, and more.

An innovative system like NID has to offer all of this, of course. However, in a way such digital collections are just easier to use than printed (analog) documents, but without offering what can be seen as the new obvious main feature of NID: The networking of materials and networking of users with users, experts and providers.

It should not be ignored that some aspects of a NID library can also be available to anonymous users , i.e. even non-registered ones.

By networking materials, we mean that there must be the possibility of referring to other interesting information at every point on every page of a document. This can be a spot in the same or a different book, or a contribution on the WWW (text, image, multimedia clip, ...), a separate contribution, or a piece of special software offering good material, maybe also explaining or supplementing explanations dynamically and possibly according to user specifications.

Conversely, it should be possible, for example, to underpin the content of a WWW page by referring to a detailed section in a document. To put it differently, the linking of any material must be supported.

This naturally raises the question of who is allowed to create such additions (in NID called annotations). The answer is obvious: A hierarchy of rights is needed. Each user A can add any annotation for himself ("private annotation"), or for a group G of users ("group annotation") who have agreed to see A's annotations. Annotations for a broader public are controlled by someone with special rights who can approve them for everyone or set to "only for A" or "only for group G".

It is important to understand that all annotations are not part of the document itself, but additions to it. The book itself cannot be changed after it has been uploaded as a NID document. Of course, it can be deleted by authorized persons or replaced by a new version, but then all the annotations attached to the previous document disappear.

Annotations can be edited, deleted or made accessible to different groups of users than the one initially defined, by authorized persons. Private annotations remain private in any case, so they can only be viewed by the person who created them. However, as a precaution, they are not recommended for very personal or intimate aspects.

Annotations can also be added to a document as late as desired: This also means that a document in an NID collection can get more and more information content over time through annotations. In the case of larger holdings, annotations created manually, such as links from one book to another will only rarely happen. It is therefore an interesting task to automate or semi-automate such linking. Semi-automating means that the system suggests links, but one person decides whether they make sense or not. This process can be carried out through "metadata" added to the books or pages of books.

New developments will increasingly use methods of AI, neural networks and language processing (NPL) to create links, as a continuous improvement of the basis existing in NID right now. At least as important as the mentioned networking of materials is the networking of users with other users, experts and providers. It is obvious that registered users can be notified individually or as a group via short messages (emails) if they have given their consent. It seems particularly important that a user (registered or not) can send feedback on each page to the person responsible for the page / document and can expect a response (in which case the email address must be provided, otherwise the user remains anonymous). A feedback can be: An error message, the suggestion to add the statement so-and-so, a praise, a rebuke, whatever: Observe that an organizational unit that uses NID can thus be easily contacted at any time.

This aspect should not only be considered by organizations using NID, but for all large systems. Have you ever tried to find a contact person at a company with a large website because you had a suggestion or question? There is usually no e-mail address (and if so, it is from a central office that has to forward the request to the right place instead of being able to send it there straight away). If you are lucky you can find a phone number. If you call, you are on hold for minutes, and the person who answers at the end maybe does not understand the problem hence forwards the call (next hold), ...

NID shows all major companies in the world how to proceed: Each area in the website should allow a person responsible to be contacted anonymously, or with the request for feedback [02]. Another possibility that NID offers seems particularly important to us: Every user can start a discussion on every page. In the simplest case, this can just be a question that someone hopefully can answer. It is nice that the question and answer remain visible to all users. On every book page you can get an overview of all the topics that are discussed in the book.

3. Other properties of NID

One of the important properties of multimedia materials that are managed with NID is the possibility of full-text searches. This is not limited to "real" texts, but also includes texts that are parts of images. This is because NID is based on the IIIF standard [03]. This standard assures that book pages are always interpreted as "pictures", even if they are pure text pages.

IIIF is now being looked after and expanded by an international consortium that includes the largest libraries in the world. This means that NID users have particularly easy access to materials in other IIIF-using libraries, be it those of Stanford University, the Bavarian National Library and many others.

It is particularly important to be able to use the full-text search not only on one book but on several books at the same time. E.g. there are often multi-volume books in a library, or in a company application several manuals that deal with a topic. With most full-text search engines, you have to apply the full-text search to each copy one by one. In NID, however, a whole "category" of documents can be searched with one search query.

In addition to the full-text search, it is also possible and useful to search in a NID library or category by author, title or area. The concepts of "category" and "sub-categories" are not only important for the search, but also for the structuring of materials: Documents or books on a topic can be grouped into a category (with its own icon) or a sub-category, and those are in many situations much more manageable than if you had to deal with each element individually. See also learning applications in section 4.

Each NID installation has also automatically assigned a simple wiki system in which, for example, simple Word files (text and multimedia elements) can be stored as "contributions" and revised again and again. Such a document can also be converted into an NID document on request (e.g. when all revisions have been completed).

NID allows several pages from different NID or IIIF compliant servers to be displayed on the screen at the same time. This way you can display descriptions in different documents (also in different languages) side by side with the obvious many advantages.

Via a "console", NID offers a comprehensive list of administrative tools for creating and managing documents and categories, for managing users and their rights (e.g. access rights), for changing user profiles, for determining which annotations should be approved by whom, for creation of quizzes and tests (more on this under learning applications in section 4.3). NID documents have an entry page that contains various parameters for the document: Typically, the names of the authors, title of the document, etc., but also reviews of the document (or abstracts) that may be available.

NID documents can be provided with a table of contents (ToC) that is not only to be found at the beginning of the document like a classic table of contents, but can be opened on every page. NID offers several aids to create such a table of contents, see [10].

All user interfaces are available in any language. English is used in the examples in Section 7 and in the terminology in this paper, but of course German is used in the German version of this document [03].

4. Applications of collections of NID documents

In this section we describe some of the many applications of collections of NID collections that we have come across. We are sure the list is not exhaustive, yet it shows that with a NID-like approach a new way of using digital documents is emerging.

4.1 NID for distributing information

Many organizations (Research institutes, companies, governmental agencies...) are sending out information again and again, if in digital form, then usually as PDF file or in some Wiki-kind system.

In both cases users do not have an easy way to send feedback, and senders are frustrated since they never know if readers are satisfied, or particularly interested in a certain topic, or want to contribute an idea or criticism, etc. If those pieces of information are collected in a NID category, users can not only use all the communicative features of NID, they can also look at early material on topic x with a single search command!

4.2 NID for organizational knowledge management, knowledge sharing and knowledge growth

Similar ideas apply to organizations of all kinds that want to encourage a group to familiarize themselves with certain material by interacting with it and members of the group.

In other cases, the reason to use NID may be topic oriented. One could e.g. imagine a collection of documents and books on the topic of electric cars. Persons with very diverse background are allowed or asked to participate in studying the material, adding their own ideas and viewpoints as annotations or in discussions.

Another important application for some organization or company to use NID documents is the dissemination of PR or even sales information. Consider two typical examples:

4.2.1: Often research organizations or companies provide a monthly, quarterly or yearly report of particularly important developments. Such reports are typically sent to some users in "glossy" printed form, and to a larger group as e.g. PDF file. Unfortunately, feedback is very rare: To write a mail, one has to refer to the part one wants to criticize, ask a question about, add further information, often quite laborious. Also, and in some cases, anonymity is preferred. Well, NID allows anonymity, and when an addition is made, the person responsible for the document is informed automatically of the fact and the spot of change, and can act on it, if deemed necessary or advantageous.

4.2.2: This also applies if the report is really a sales instrument, showing some new product(s). Again, feedback of any kind is very much desired, but rarely obtained.

One other possibility that makes NID particularly interesting for such applications is the fact that questions or discussions can be asked in a document, such as in manuals that only a certain group (e.g. all members of an organizational unit) can see and use and work with. Within such a group, one can also set up sub-groups with special rights.

It is particularly interesting that a NID document can complement communication media such as WebEx [6] or Zoom [7] : These communication platforms--- popular in times of COVID--- have little temporal stability or usability. One can save a long Zoom Meeting as such, but it is hardly possible to find something there later, not to mention asking a question or such!

After such a meeting, it makes sense to put short minutes of the meeting available as a document in the NID system and thus offer the opportunity for further discussions, to ask questions, to provide additional sources, and more.

An organization-internal collection of important documents in NID with corresponding comments on the one hand preserves the knowledge beyond the time of a person's presence in the organization, and on the other hand is particularly valuable for newcomers, because those who do not understand information can get help from others using the question and discussion facility.

4.3 E-learning features

Face-to-face teaching or teaching using communication tools is meaningfully supported by NID documents that allow questions and discussions.

If we are thinking of E-Learning situations, a typical group might be a class where members need access to some material just for one term. In such institutions some of the material might be lecture notes of teachers or of books available under some free (typically Creative Common) license. We are aware of instances where a teacher has made a set of notes and a few supporting books available for a course: Students of the course were not just supposed to extend the material by stuff found or worked out by them, but the grade obtained for participating in the course depended (!) on how much and what each student had contributed.

NID offers the possibility to find for a student and a set of documents all material that has been added by that student to this set, thus making it easy for a teacher to judge the value of what the student has done.

3.4 NID for digital libraries

To offer a collection of documents like books using NID has the advantage that the library can expect some feedback from users, some users may have questions or remarks or will start discussions, or enrich the material by adding textual or multimedia information or linking an entry in a book to another relevant entry in the same or another book, or to some information on the Internet.

Libraries who are already offering digitized versions of some of what they hold can clearly be reluctant to go to the trouble of converting all material to NID format. Also, they may be offering e.g. E-Books under some special license from publishers, or do not have the material as such on their server, but users access - via the library - a database run by a publisher with which the library has some agreement.

Hence such libraries are likely to make only a limited number of documents available via NID, often because of licensing or copyright issues or because the expected benefit will not be sufficient to justify the effort necessary. Rather they might use it like mentioned in 3.2 to announce new books, reviews of books, events, exhibitions, etc.

The situation will be different depending on whether one considers a general public library, a library of a university or research institute, or a library just useful for a certain organization, or some other library (= collection of digitized material).

One main reason why NID is sometimes justified is the fact that groups of users can be defined for whom sharing collective knowledge by feedback, annotations and discussions is very much desirable.

In case of a public library, there might be a reading club that at any time is just interested in examining a few books that all members of the club should read and discuss with other members. In such a case the library may make those books available on NID only for the group involved: Since NID books can be stored so that they can be accessed only by a certain number of users the library will be able to negotiate reasonable conditions with publishers, if necessary.

5. Experiments and plans for the future

- NID is a system that can be used for many tasks and has many possible applications by now. Nevertheless, it is constantly being further developed with innovative features and for new applications, some of which are available for testing purposes.
- Among other things, this includes the extraction of important terms or phrases in pages of documents, which can make it easier to find information, and which are particularly important for semi-automatic linking of book pages. Methods of AI and NPL [12] are used to recognize important words or phrases, see also [10] or the example in Section 7.
- Everyone is familiar with the search for similar images, for example using Google Images [13]. However, one cannot only search for images based on similarity, but also because they fall into a certain category. For example, you could be interested in all pages of a book that show a bottle, no matter how big, what color, etc.

It is currently possible to search for 80 image categories, see the NID book [14] or the examples from it in Section 7.

NID uses a state-of-the-art computer vision method to detect and locate objects in a given image of book or document page. The system identifies the class of object (person, vehicle, animal furniture etc.) and its location specific coordinates in image. The accuracy of found object location and its class name tag determines the performance of used algorithm and associated per-trained knowledge model. The knowledge model and performance of object detection algorithm can be further fine-tuned as per requirement and different use cases. The present NID software uses YOLO (You Only Look Once) [17] algorithms and is deployed with a pretrained general purpose COCO [18] image dataset. The pre-trained model included with standard NID version can detect 80 object classes [19]. When Object detection is applied to a document which is being indexed in NID library, the full-text search results include the detected objects in book images. As an example of this feature the NID demo library showcases a demo document containing random images without description or text. Different objects in book can be searched and located using the pretrained model annotation tags [14].

One of the major projects is to implement semi-automatic linking pages of NID documents with other information (potentially also outside the NID books) and vice versa: Semiautomatic means that based on similar words or phrases (using synonyms, stemming, etc.) links are suggested, which a person then accepts as meaningful or not.

In connection with this, an expansion of the full-text search (from word-oriented to phraseoriented) makes much sense. Even aspects of sentiment analysis [16] could later also be considered. I.e., for example, you might not be looking for "electric cars" but "arguments against electric cars" or "arguments for electric cars".

In addition, there are many aspects, such as the installation of your own chat rooms in addition to the discussions (limited to columns of text), a simplified handling of short documents (because a separate entry page seems excessive for a little-page document), additional functions for administration and much more.

6. Technology behind NID

- NID software is developed using modern programming tools, platform independent frameworks and components. This means that the system can be deployed on all major server operating systems. This includes Windows based server (even Client OS) platforms, and Unix/Linux (Ubuntu, CentOS, Debian servers have already been tested).
- In order to deploy a NID server the following Opensource/Free software, DB and development components are required to be installed.
- 1. Development: Microsoft dotnet (core) 5.0 framework, OpenJDK 11, Python3
- 2. DB: MySQL 8 Community Server
- 3. Support Libraries/Components: ImageMagick, Tesseract, Ghostscript, Python modules.
- 4. Web/Reverse Proxy: Nginx, IIIF Image server

The system can make use of open certificate authority Let's Encrypt.

The NID team offers installation support via SSH/RDP access besides provision of detailed installation guide for few common server platforms. For proper online operations of the server, it is recommended that the server has a stable internet connection, live IP address and associated fully qualified domain name (FQDN). The minimum hardware needed to run a moderately used NID server includes a modern generation Core-i5/i7 processor system with +16 GB of RAM and preferably high speed I/O storage (SSD in case of standard system) of +1 TB. RAM, Processing and storage needs to be enhanced in case of very large document collections or an strong increase in the number of system users.

Details can be found in the Installation Manual [15], available for anyone seriously interested in installing NID.

7. Examples

In this section a number of issues discussed in previous sections are explained by showing (parts of) screen dumps, each with a brief description. Observe that when working with **N**etInteractive **D**ocuments (NID) one is either in Simple Mode (as is the case here), allowing to switch to Full Mode by clicking at the Button "Full Menu" in upper right corner, or when in Full Mode returning to simple mode selecting "Short Menu". Note further that much can be done fully anonymously, but for some applications a log-in is required, and others require special editorial privileges (like for uploading a document, changing some parameters, etc.).

First, all important options in Simple Mode are discussed, followed by some of the interesting options in Full Mode, mixed a bit with some of the still further options one has with e.g. editorial privileges. If work with two windows is easy, go to https://austria-forum.org/af/AEIOU/NID and open it in a further window W. In the current window look at the following pages of this document. Try to follow step by step what is described next, by actually doing it in window W.

We recommend to do this for at least 15 or so pages to get the "hang of it".

Explaining the many possibilities of NID starts by using a book in one of the collections. To do this, check the lower English part of "Netinteraktive Dokumente" (Fig. 7.01) and click on the Graz University of Technology entry there which will yield something like Fig 7.02 on the next page.

English version of information on NID and pointers to some typical books.

NID is the abbreviation of **N**etInteractive **D**ocuments. Such documents provide many interactive elements. NID is therefore also a powerful tool for Information and Communication for companies and organisations, as explained in the two leaflets below:

- 4 page leaflet 🔑
- 3 page leaflet on NID as Information and Communication toool

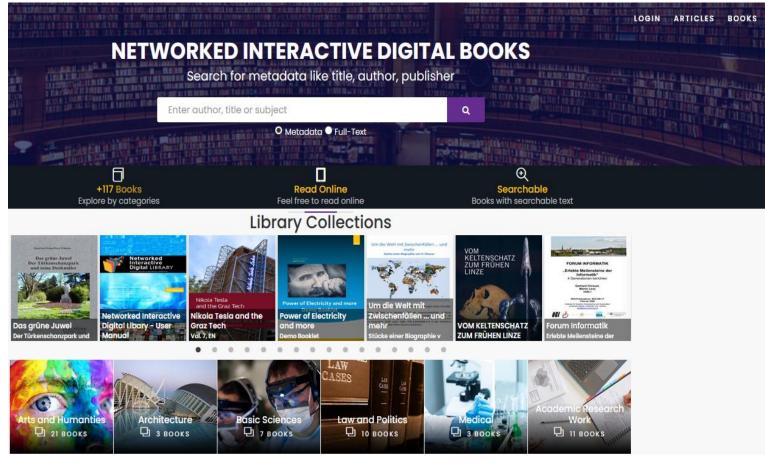
NID's current main collection::

- Graz University of Technology Open access , Contact:hmaurer@iicm.edu
- NID and applications [] (7 pp.)
- Working with NID- First Steps (5 pp.)
- Passively acquiring information must end (13 pp.)
- The power of interactive digital documents
- User Manual 🍑 (in English)
- Administrator Manual 🍑 (in English)

Experimental NID Installations (more in preparation):

- Austrian Center of Philosophy with Children and Youth Contact: https://kinderphilosophie-gesellschaft.uni-graz.at/decontection
- Books of Graz University of Technology Libary Contact:hmaurer@iicm.edu

←Fig.7.01



Note: If something like Fig. 7.02 but a "German version" appeared, change the language to English by clicking at the uppermost rightmost icon on the page next to "Bücher". Now choose the language English. After closing that window (click at the X on right corner) there will be the English version similar to the one shown in Fig 7.02.

Fig. 7.02

On the page where a part is shown in Fig 7.02, 15 books rotate in the top bar. A click on the book about Nikola Tesla and the Graz Tech gets Fig 7.03 with various information about the book and a review, of which the first lines can be seen. Reading the book gives Fig. 7.04. (One can also search for books using the categories below and additional ones, or using the search field by entering author, title of the book and other parameters).

Following the link "Read in the book" as shown in Fig.7.03 yields a page as shown in Fig. 7.04.

Nikola Tesla and the Graz Tech Author(s) : Author(s) : Author(s) : Publisher : Graz University of Technology Volume : Country : Austria Date : Date : Jan-2019 Language : English ISBN : 1978-3-85125-688-1 Size : Date : Pages : Iternee : Occeer : Download : Iternee : Download :	Nikola Tesla Develope of the optical of the optica	←Fig. 7.03	<image/> <text></text>
In Fig.7.04, there are blue rectan the building, Nikola Tesla, Graz a	-		Edited by Uwe Schichler and Josef W. Wohinz

annotations. Moving the mouse e.g. to Graz shows the

first frame of a movie on Graz (Fig.7.05) which can be

viewed. Mouse-over Nikola Tesla gives Fig.7.06.



Fig. 7.04

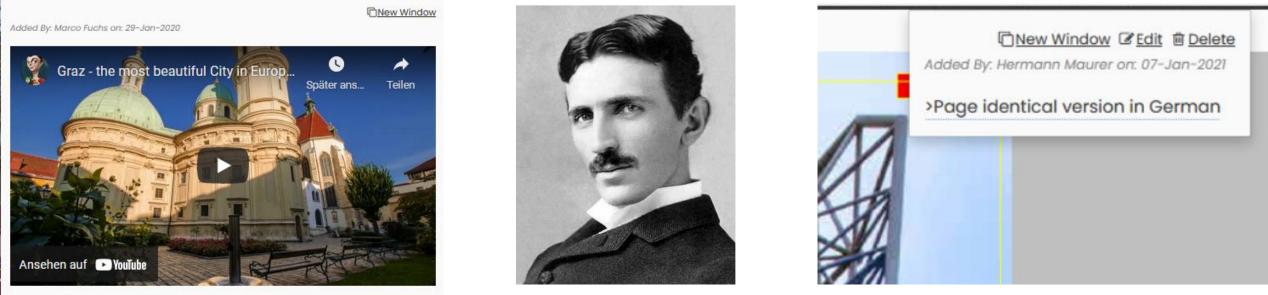


Fig. 7.05

Fig. 7.06



Moving the mouse over the large blue rectangle (upper part of Fig.7.04 as shown in Figure7.07), a box appears that can redirect to the German version of the book: The same happens by a click on the upper right red rectangle (see Figure 7.07).

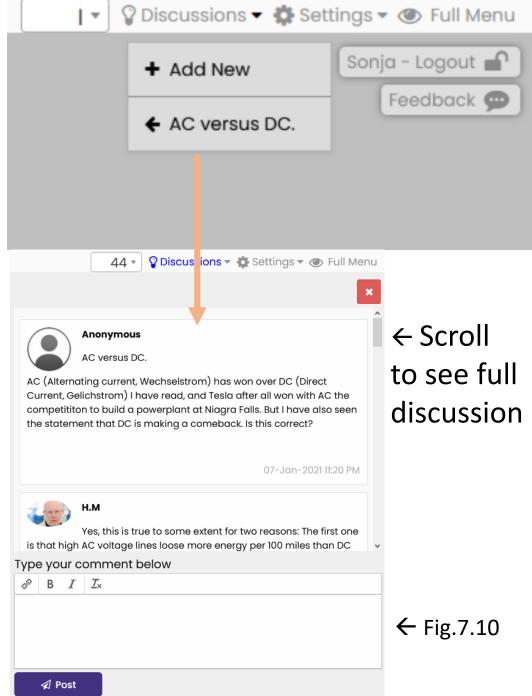
As soon as the mouse moves inside the blue rectangle, the rectangle is outlined in yellow. This indicates that one is inside an annotation. In a later chapter there will be more details about Annotations.

We now turn to explain menu options available in Simple Mode ("Short Menu")



Fig.7.08

Here are the menu options of the Short Menu, i.e. the options available in Simple Mode as shown in the right upper part of each page. The "Discussions" field is shown to the right of the current page number in Fig.7.08. Clicking on this option gives a list of all discussions as they currently exist in the document: In this book at the present time there is one discussions, see the list in Fig. 7.09. Selecting "AC versus DC" leads to the discussion as shown in Fig. 7.10. The discussion here is only a question, which then triggered a discussion. One can scroll to the end of this discussion in this window. Everyone can contribute to the discussion by typing a comment in field provided.



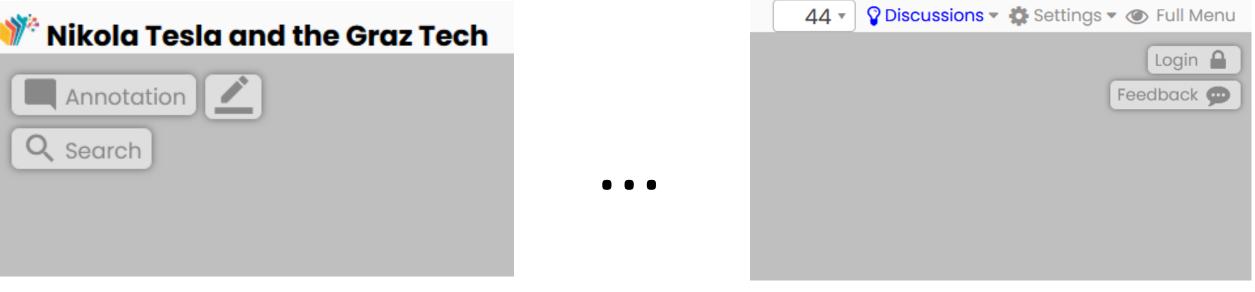


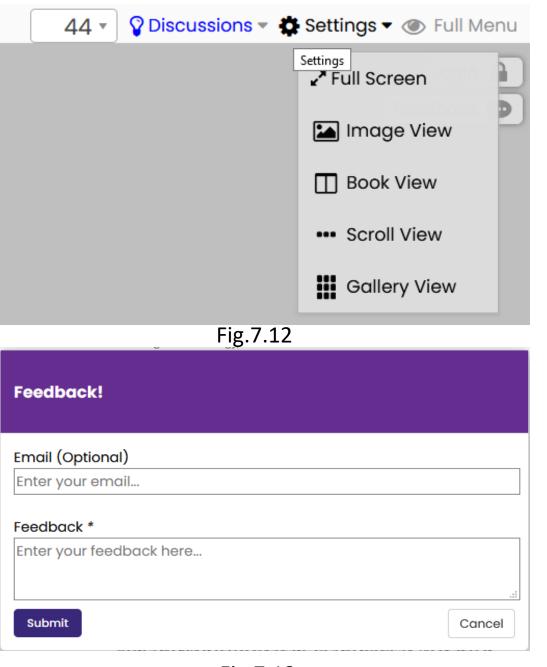
Fig.7.11

In Fig.7.11 both left and right menus on the top of each page are shown. Note that the word "Discussions" is colored blue. The word "Discussions" is present on every page in the list of options at the top right (see Fig.7.09) but it is blue only if a discussion exists on that page. Such a discussion can also be started anonymously, as Fig. 7.10 shows. (However, non-anonymity can be enforced when uploading the book)

Note that in Simple Mode the Menu options provided are few to have a simple user interface restricted to the most important issues. When switching to Full Menu that we will discuss later many more options are provided.

Clicking at the menu option "Settings" as e.g. seen in Fig.7.11 shows a selection of 5 viewing modes, see Fig. 7.12. The main mode used in NID is the "Image View" (single page) mode: Some of the other modes do not show the usual menu selections or annotations. Hence, after possibly trying out some options, better switch back to Image View!

Note that in the Menu options on the right side of any page (see e.g. Fig.7.08) there is the option "Feedback". Selecting it opens a window like in Fig. 7.13. This allows to send any text anonymously to a person responsible for the book, or to ask for an answer by giving an email address (in this case clearly anonymity is lost). To close the window, click at "Submit" or at "Cancel" if you don't want to send what you typed.



Consider now the two menu options on the left side of each page in Simple Mode, as shown in Fig. 7.14



The Search menu item allows a full text search within the selected document.

If you search for Tesla in the book in question, the first search results are shown in Fig. 7.15.

Fig.7.15 \rightarrow

ሾ Nikola Tesla and the Graz Tech		
	3	Annotation Q Search
Search in book	~	
Tesla		
Q Search		
Search results for: Tesla		
Showing 1 - 198 out of 198		
INikola Tesla	^	
2Nikola Tesla and the Graz Tech	ч	
2 Tesla Nikola(us) und die Technik in Graz		
3Nikola Tesla		
6Nikola Tesla and the Graz Tech		
6Nikola Tesla and the Graz Tech		
6Nikola Tesla: Milestones in his life		
6Nikola Tesla: Student at the Graz Tech		

Choosing the first contribution which a link to page 14, Fig. 7.16 is obtained as part of that page. Note that Tesla is surrounded by a red rectangle, showing that this is where "Tesla" was found. As it happens, there is also the outline of a blue rectangle showing that there is an annotation, in this case a link to Main achievements of Nikola Tesla, see Fig.7.17.

Fig.7.16 \rightarrow

Nikola TeslaNikola Tesla was born at Smiljan, in the Lika border region (in today's Croatia)Milestones in his lifeon 10 July 1856. At the time of his birth, this region was part of the Austro-
Hungarian monarchy. Accordingly, the following formulation is to be found in
his later patent applications (in the USA):

New Window

Added By: Marco Fuchs on: 27-Jan-2020

Nikola Tesla: Main achievments →

← Fig.7.17

Now some details on how annotations work:

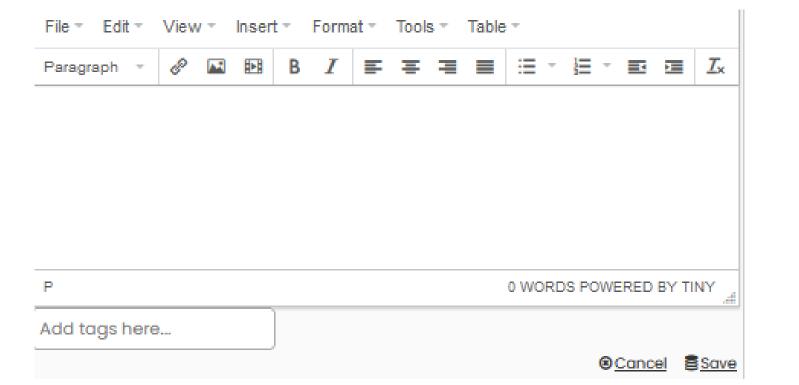
Fig. 7.14 shows the word "Annotation" and a pencil-icon on the left upper part of each page. To insert an annotation one clicks on the pencil symbol and draws the outline of a blue rectangle around the area to which one wants to add an annotation, see Fig. 7.18.

 Solidarity with the young people who studied at this school of higher learning, and among whom Nikola Tesla counted from 1875 to 1878.

He is today, justifiably, seen as one of the most brilliant and imaginative inventors of our age. On account of his achievements, he was awarded a honorary doctorate in technical sciences from the Technical University in 1937.

← Fig. 7.18

This causes a form to be presented as shown in Fig. 7.19 with textual explanation. Its explanation is reinforced in Fig.7.20 with a symbolic version of the explanation, and examples in Fig. 7.21 to 7.25.



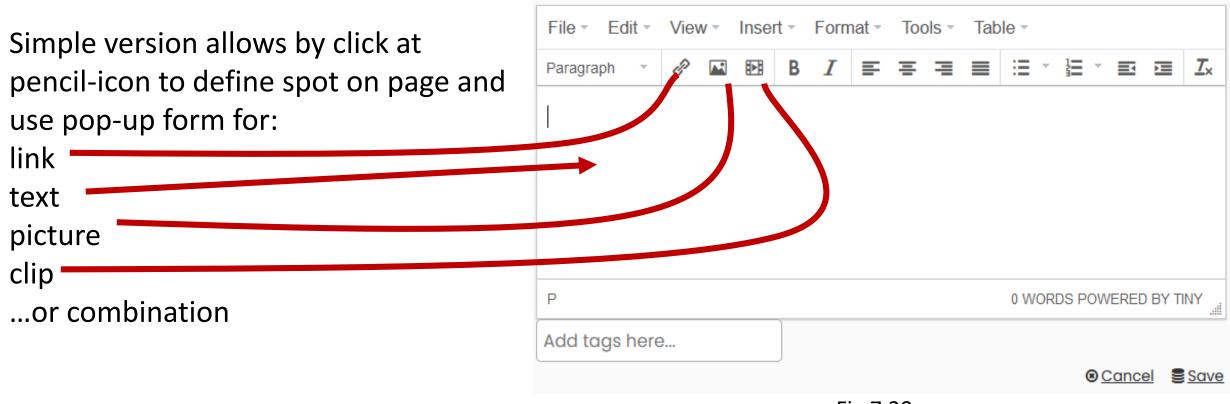
←Fig. 7.19

There are now several alternatives for using this form to create annotations:

--- For just a text annotation, type it (or copy previously created file). Finish by click on Save. --- To make a link, click on the link-icon and copy the URL into the URL field. It will also appear automatically in the text field. It is useful to replace that text by indicating to users what they can expect when following the link

--- To insert a picture select the picture-icon and either enter the graphic address of a picture or load an image directly. (Fig.7.23 – Fig.7.25) This is similar for videos. Combinations of above are also possible.

Annotations, i.e. text or multimedia material or links can be added to a page in various forms as explained on previous page and with Fig. 7.19. Fig. 7.20 just shows an alternative symbolic explanation.



Note that annotations and contributions to discussions can be done anonymously by default, but when a document is uploaded, it can be specified that only registered users can make annotations or contributions to discussions. Whenever any such additions are made, the owner of the document is notified and can check the changes and edit them. In particular, the changes can be deleted, or made available only to a group of users, or only to the one who made the changes (only possible if the user was logged-in).

Returning to the process of making an annotation, it has been made clear that one can just type in or copy text and one has even a simple text editor available, or one chooses one of the icons for link, picture or multimedia clip shown below and gets a "link form", a "picture form" or a "multimedia form".

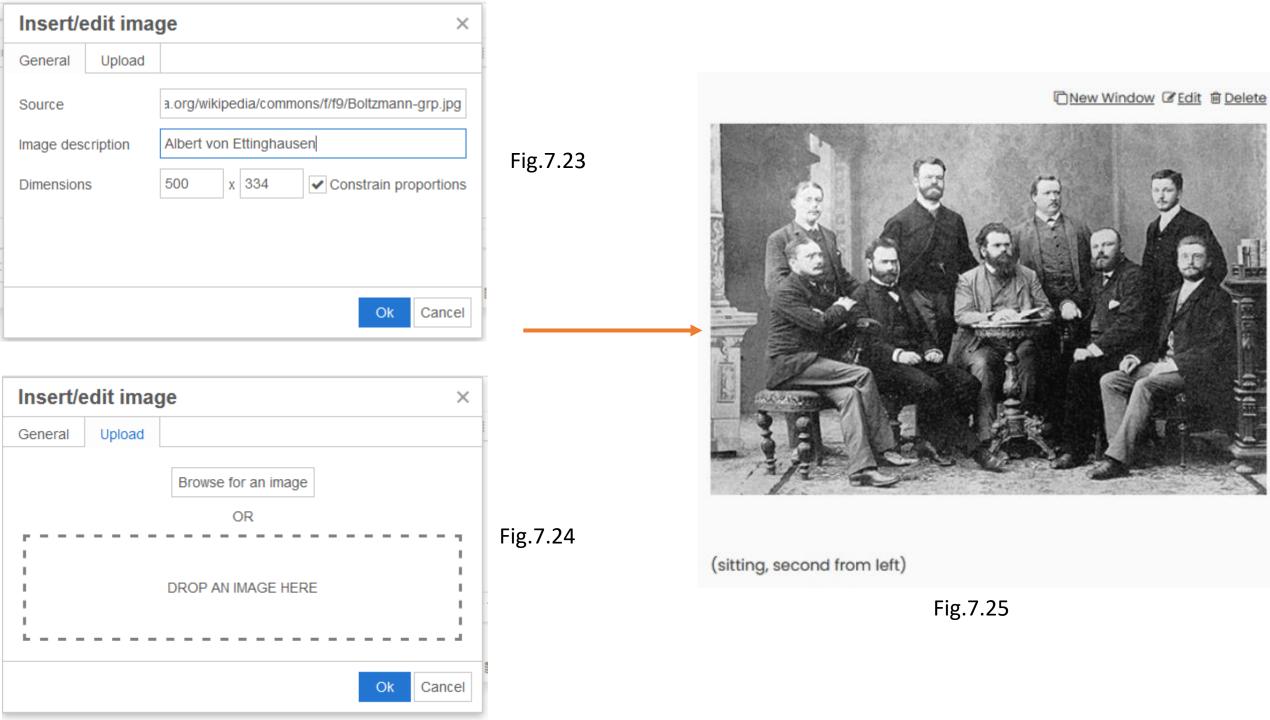
Those are explained a bit more in Fig. 7.21 to Fig. 7.25 on the following pages.

Fig. 7.21 shows the "link form" with a link to the Wiener Zeitung in the URL field, but in the "Text to display" information for users of what the link would show. The creation of the annotation is completed by clicking "OK" and then "Save". If the link is actually followed, the result is a window, whose beginning can be seen in Fig. 7.22. By closing that window one is back on the page with the link.

Insert link	×
Url	https://www.wienerzeitung.at/nachrichten/k
Text to display	Der Erfinder des 20. Jahrhunderts
Title	
Target	New window -
-	Ok Cancel
	E: 7 04

Fig.7.21





It is also possible to add videos so that they can be played directly in the new window that appears. See Figure 7.72. If the user wants to get a more detailed overview of a landscape, this can be done by adding a panoramic image, see Figure 7.71.

Both examples are taken from the book "Global Mapping"

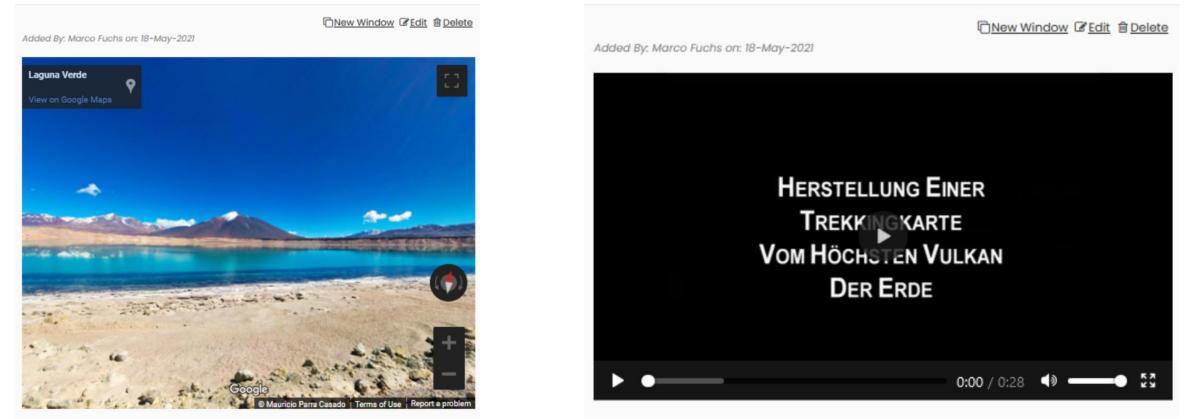
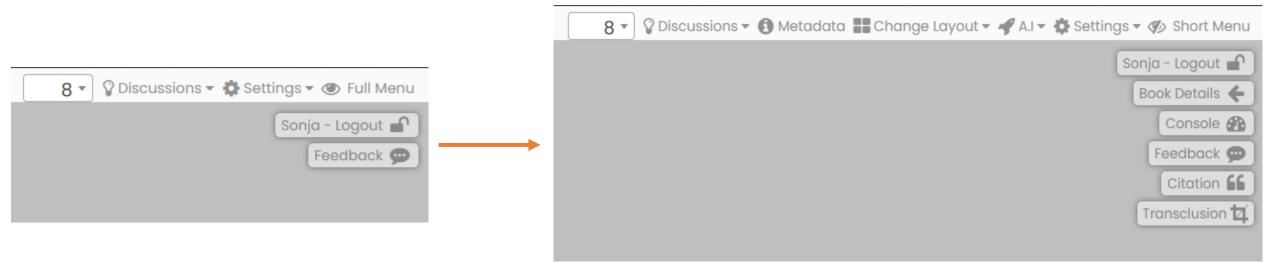


Fig.7.71

The Simple Mode discussed so far is easy to understand and is ideal for people who want to get used to NID. But for more complex applications the Full Menu (Full Mode) is necessary.

We will discuss some of the additional aspects in what follows. The difference between Simple Mode and Full Mode can be seen by how menus get larger. The menus in Simple Mode are shown on the left in Fig. 7.26, Fig. 7.28 and Fig.7.30, the menus in Full Mode in Fig. 7.27 and Fig.7.29 and Fig.7.31. Also, the options in the top line expands as is seen in the following discussion of the Full Mode and Fig. 7.27 and the optiona under Settings increase as is shown in Fig. 28 vs. Fig. 29.



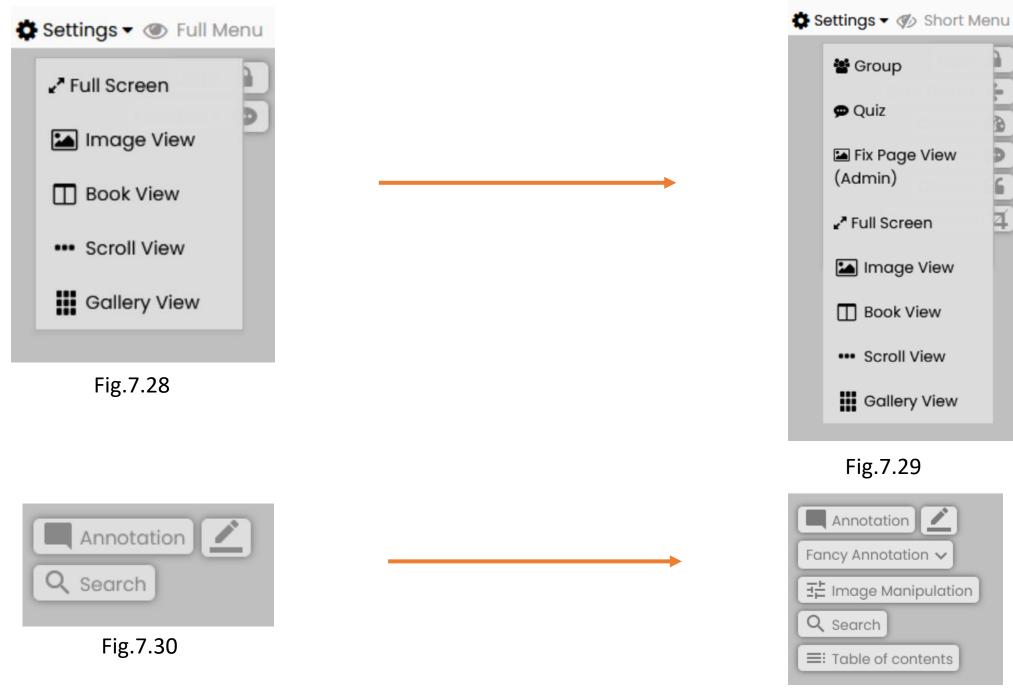


Fig.7.31

Nikola Tesla and the Graz Tech Front Cover Last Page Editor's foreword Nikola Tesla and the Graz Tech The Graz Tech: A tradition of innovation

– Nikola Tesla: Milestones in his life

- Nikola Tesla: Student at the Graz Tech
- Nikola Tesla: Honorary doctor of technical sciences
- People shape the development of the Tech
- References
- Nikola Tesla: Visionary and Inventor
- Development of electrical engineering from 1850 to 1950
- The problem of the commutator
- The rotating magnetic field: Polyphase alternating current system
- The Niagara Falls power station: Direct current or alternating current?
- High frequency, the Tesla transformer and Wardenclyffe Tower

Figure 7.32 shows the table of contents of the Tesla book. This opens when you click on Table of Contents in Figure 7.31. Each chapter is nicely arranged here. Seelcting select one of them gives the desired page, see Fig. 7.33. The table of contents has the further advantage that one can access it on any page, so no need always to go to the first page to see the table of contents, as in conventional books.

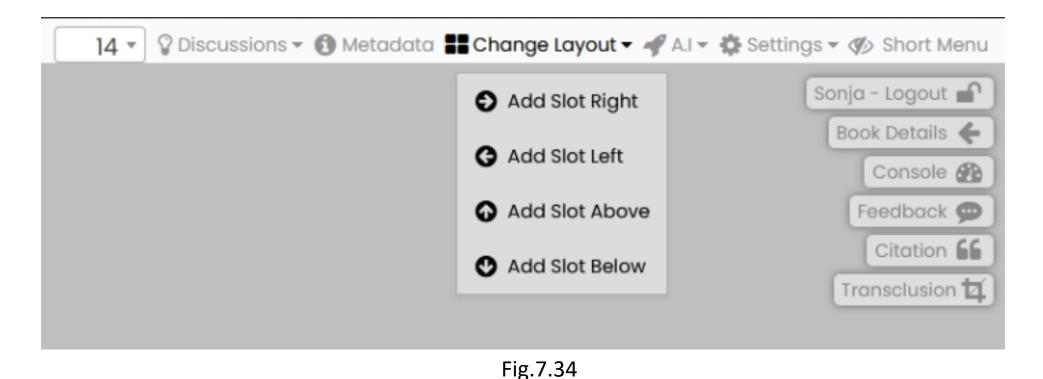
However, the table of contents needs an extra effort when uploading a document, hence is not done for all documents.

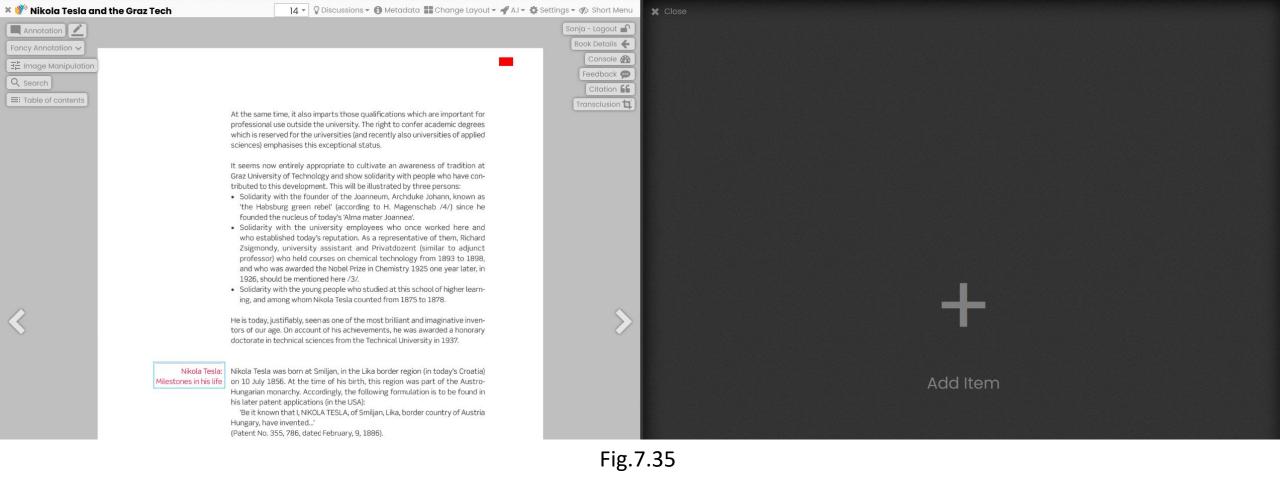
At the same time, it also imparts those qualifications which are important for professional use outside the university. The right to confer academic degrees which is reserved for the universities (and recently also universities of applied sciences) emphasises this exceptional status.

It seems now entirely appropriate to cultivate an awareness of tradition at Graz University of Technology and show solidarity with people who have contributed to this development. This will be illustrated by three persons:

- Solidarity with the founder of the Joanneum, Archduke Johann, known as 'the Habsburg green rebel' (according to H. Magenschab /4/) since he founded the nucleus of today's 'Alma mater Joannea'.
- Solidarity with the university employees who once worked here and who established today's reputation. As a representative of them, Richard Zsigmondy, university assistant and Privatdozent (similar to adjunct professor) who held courses on chemical technology from 1893 to 1898, and who was awarded the Nobel Prize in Chemistry 1925 one year later, in 1926, should be mentioned here /3/.
- Solidarity with the young people who studied at this school of higher learning, and among whom Nikola Tesla counted from 1875 to 1878.

He is today, justifiably, seen as one of the most brilliant and imaginative inventors of our age. On account of his achievements, he was awarded a honorary doctorate in technical sciences from the Technical University in 1937. Have another look at page 14 of the English book on Nikola Tesla, of which the upper right part is shown in Fig. 7.34. Note here the menu item "Change Layout", one of the most innovative options of NID, allowing to arrange the pages of various documents on one screen page and to edit them. This menu item allows for example to add to the page on the right a separate area coming from a NID document of any (!) IIIF compatible library. A click on "Add Slot Right" results in Fig.7.35.





A click on the + in the Add Item field offers to add a page from the same book or book category, and then to manipulate it as desired (zoom, edit, scroll,...) or get it from some other IIIF compliable source. In the present case, you will get the offer in Fig. 7.36, i.e. more pages from the book "Nikola Tesla and the Graz Tech".

NID manifest

Nikola Tesla and the Graz Tech

Load

Fig.7.36

Searching the NID collections for more books by Nikola Tesla yields further results. Five more NID books are displayed, see Fig.7.37. Select any page from e.g. the first book and add it. The result can be seen in Fig.7.38

If the search does not return any results, you can search in the Bavarian State Library, which contains over 2 million IIIF-compatible works (**Munich Digitization Center**) to expand the search--- or use an object from any other IIIF compatible library. To do this, simply insert the link at "Add new object from URL".



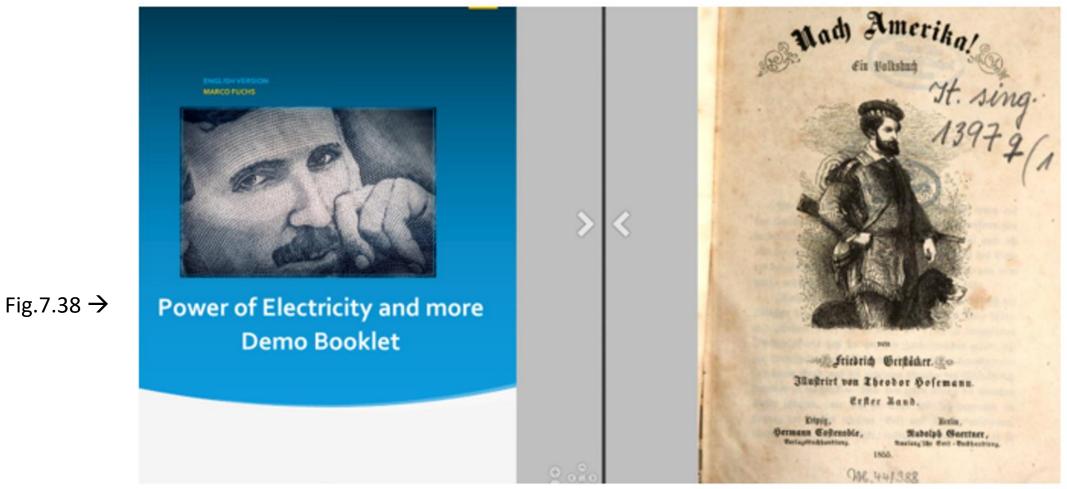


Fig.7: Two pages of two different NID libraries (Graz and Munich)

Fig.7 shows Nikola Tesla on the first page of book [21] who went to America to continue to work there, and next to it a page of the book "Nach Amerika!" (i.e. "Let's go to America!) from the State-Library Bavaria [20]: It is now possible to turn pages in both books, or change them in any other way NID allows, the two sides completely independent of each other.

The two books now placed next to each other can be browsed independently of each other, the pages can be shifted or zoomed, etc. In this way, one can compare different editions, or read a book in a language one does not understand well in one's own language in parallel, examine pictures for imitations or similarities, and so on. It is obvious that there are many possible applications, especially in educational and research settings.

In section 4.3 it is mentioned that NID has two types of quizzes. Those that are used for testing, and those that provide information. A typical quiz question with information is shown in Figs. 27.41 - 7.43 below: Fig. 27.41 as a question, Fig 27.42 a user answer (Franklin Leonard Pope). After "Submit" NID provides the information in Fig. 27.43 that the second option is not correct.

Tesla as employee Tesla as employee Tesla as employee Q. Who was Tesla a direct employee of? Q. Who was Tesla a direct employee of? Q. Who was Tesla a direct employee of? Thomas Alva Edison Thomas Alva Edison Thomas Alva Edison Franklin Leonard Pope Franklin Leonard Pope Franklin Leonard Pope Alexander Graham Bell Alexander Graham Bell Alexander Graham Bell Option 2: That' incorrect! Hint: He invented the light bulb. 🐽 Submit 🐽 Submit 🖕 Submit Fig.7.41 Fig.7.42 Fig.7.43

Now let's take a closer look at the Settings option which can be seen in Fig.7.29. As one can see, new subcategories have been added in Full Mode. In addition to the view options discussed a few pages earlier, the "Group", "Quiz" and "Fix Page View" options have also been added. The first subitem "Group" is for selecting the type of annotations to display. This feature is only available for users who are logged in. Take a look at Figure 7.39 and 7.40 for a better understanding. In Fig.7.39 one recognizes that one selects as group "All", this view is for all users. You can see an annotation and a red rectangle in the upper right corner, which is the reference to the German version. If one select "Test Gruppe 1" as group, one can see the view which is only visible for the members of this group(see Fig.7.40). In this view, there are neither annotations nor the links in the upper right corner. 'Rector, Allow me to offer you and the Professorial Council my warmest thanks

> as Tesla's representative. By conferring a doctorate on Tesla today, you have accorded him a great honour and given him a special pleasure. I know that

Fig.7.40	he is present here at this time in his thoughts, and that he is thinking of the wonderful time as he studied at your university and spent time in this pleas- ant city. I therefore ask you once again, on behalf of Tesla, to accept my most sincere thanks.'
Fig.7.39	Two other persons were awarded honorary doctorates in technical sciences at the same time as Tesla on 23 January 1937. They were: • Hofrat em.o.ö. Professor Friedrich Emich.
	Dr. phil. h.c., Dr. Ing. e.h.
	Dr. techn. Emil Flatz,
	director and member of the management board of Humboldt-Deutz-
	Motoren AG.
	hotoren no.
	On the occasion of this academic ceremony, all those present were invited to
	a festive dinner. The order of courses is known to posterity:
	Mayonna'
	Hunter's Test Gruppe 1 ~
	Mixed sa
	5

- In the general description of NID many points were pointed out, of which only two will also be illustrated with examples.
- First, it is possible to extract meaningful terms from document pages using AI methods if it was processed for this purpose. This will be used in the future to "semi-automatically" link document pages that e.g. offer similar information. This aspect is illustrated with page 7 of an issue of IIASA's **"Options"** shown in Fig. 7.44, where by applying option AI in the list of options at the top right (see Fig.7.27), information of interest is extracted from the subject page and shown in Fig. 7.45, and an analogous list from page 20 is shown in Fig. 7.46.

Second, if a book was also processed with the tools that determine image categories one can find with the search for e.g. "tie" all images with people wearing a tie. The result of the search for pages with images of the category tie can be seen on 7.47, excerpts of the two found images on Fig. 7.48 and 7.49.

NID Object Detection Test

For more extensive testing, a **NID Object Detection Test** [14] has been compiled, where one can search for any of the 80 image categories available so far:

sofa, bottle, remote, aeroplane, kite, person, diningtable, bowl, cake, microwave, refrigerator, backpack, knife, giraffe, spoon, chair, pottedplant, handbag, umbrella, traffic light, vase, tie, backpack, cell phone, car, bicycle, fork, frisbee, toilet, sports ball, laptop, oven

INSTITUTE News

Transcending the boundaries of science and policy

Written by: Ansa Heyl

In February, IIASA Director General and CEO Albert van Jaarsveld led a delegation from the institute to participate at the annual conference of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society. The focus of this year's event was on how science can bring together people, ideas, and solutions from across borders, disciplines, and ideologies to address the most pressing problems of our time. IIASA is uniquely positioned to provide extensive expertise on these topics, as they are fundamental to the institute's multidisciplinary approach and its commitment to the promotion of scientific cooperation at the local, regional, and global level.

IIASA organized two conference sessions as part of the proceedings, the first of which focused on cross-disciplinary science, while the second addressed science diplomacy. Delegates from the institute also presented a career



The session on science diplomacy looked at the role that IIASA science has played in building bridges across political divides since its establishment in 1972, and highlighted the institute's increasingly important role in the international discourse about sustainable development, particularly in terms of the SDGs. In light of rising tensions between East and West in contemporary geopolitics, speakers also reflected on how facilitating scientific training across borders through platforms like the IIASA Young Scientists Summer Program can aid in easing tensions between countries with troubled relations. Science advice to government is a rapidly avolving field, but the number <u>Page Tags</u>: science, agricultural, development, sustainable, policies, advice, land, scientific, global, systems

Fig.7.45

<u>Page Tags</u>: energy, electricity, africa, hydropower, sustainable, study, morocco, renewable, potential, assessment

Fig.7.46

Fig. 7.44: The upper part of page 7 of "**Options Summer 2019"** where interesting terms ("tags") are extracted with option AI, which can be seen in Fig. 7.33, in Fig. 7.34 of page 20 of the same book.

Search in book
tie
Q Search
Search results for: tie
Showing 1 - 2 out of 2
24tie ^
25 <u>tie</u>

Fig.7.47

It is remarkable that even with the very small objects, the algorithm recognizes them as a "tie"!



Embrapa visiting scholar Mauricio Antonio Lopes writes about how policies informed by science are contributing to advances in Brazil's agricultural sector.



A new approach to agriculture is emerging in the world's tropical belt

Fig.7.48

Bringing climate change and economics together

Q&A with William Nordhaus, recipient of the 2018 Nobel Prize in Economics.



way, the penalty to our living standards will be small. That's the main lesson. We need to find the right instruments and apply them in a gradual, appropriate way, with very high participation from different countries.

The second lesson is about international cooperation. We've basically made no progress in devising mechanisms to bring nations together. I think we have the wrong model in mind and we are going down the wrong road on international agreements.

Fig.7.49

Fig.7.50

+ Add Quiz Question

Fig.7.52

Image Quiz Question

8 Dashboard	Dashboard / My Dashboard							
Articles >	0 My Articles	*	10 Total Articles	E.	1564 Annotations		8 Groups	2
❷ Quiz >	View Details	>	View Details	>	View Details	•	View Details	•
Annotations	10 Total Quiz	?	117 Books	E	40 Active Users			
⊠ Broadcast Message ೨ NID Users	View Details	>	View Details	•	View Details	>	😧 Quiz	~
🖿 File System							+ Add Quiz	
≗ My Profile								

To create a new quiz you should select the console in the upper right corner of the bar, see Fig. 7.51. You will get to the dashboard where you can see all the books, articles, quizzes, annotations, active users and groups which exists. You can see that there are 10 quizzes in total at the moment. If you take a look at the sidebar (see Fig. 7.50), you will see several categories. If you select the Quiz category, the subcategories will pop up, as you can see in Fig.7.52. If you now want to add a quiz, simply click on the first sub-item "Add Quiz".

Dashboard / Add Quiz	Dashboard / Add Quiz
 Quiz 	Ouiz
Quiz Title *	Quiz Title *
Quiz Title	The emperor's mausoleum Quiz
Group *	Group *
Please select group	public
Book *	Book *
Please select book	CROATIA - In words and pictures- Volume 10
Save	Save
Fig.7.53	Fig.7.54
Fig.7.55	Quiz Created!

Now you can create the quiz. You just have to fill in the quiz title, the group of users who can do the quiz and of course in what kind of book the quiz should be created. Please note that all fields with an asterisk must be filled in. In this case these are all fields. After filling everything with the desired data, click on save (Fig.7.54). If the creation of the quiz was successful, a green window pops up, see Figure 7.55. Note that you can select a specific user group, but if you want every user to see the quiz, select "public".

Quiz Question

Quiz *

The emperor's mausoleum Quiz -- CROATIA - In words and pictures -- Test Group

Book Pages *

20

Question *

The emperor's mausoleum is surrounded by an open corridor of how many Corinthian columns?

Option 1

23

Hint Text

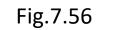
Option 2

24

Hint Text

Option 3

25



Diocletian's Palace - Cathedral



v

Diocletian's Palace - Cathedral, July 2016, © Gerhard Huber, under CC BY-NC 4.0 +Edu

If you now want to add answer options to the quiz, you should select the "Add Quiz Question" subcategory in the bar on the left, see Fig.7.52. After that you will get to the page which you can see in Figure 7.56. In the first field you should select the quiz to which you want to add a question. It is also important to specify the page in the book where the quiz should appear. And, of course, the question. In the next fields you will see Options 1- 10. These are the choices for the user that will be available in the final quiz. You can specify from none to a maximum of 10 choices. See Figure 7.57. When this is done you can click on the Save button.

Correct Option *

```
□ Option 1 ☑ Option 2 □ Option 3 □ Option 4 □ Option 5 □ Option 6 □ Option 7 □ Option 8 □ Option 9 □
Option 10 Fig. 7.57
```

To make subsequent changes to the quiz you must select the subcategory "Manage Quiz Question" (see Figure 7.52). There you should select the name of the quiz you want to change. In our case the name is "The emperor's mausoleum Quiz -- CROATIA-In words an picture -- Test Group". After that you click on "Load Question" (Fig. 7.58). After that you will see all the questions that have the title of this question. In this case it is only our previously created quiz (Fig. 7.59). On the right of this question you can see the field "Actions", with a blue and red icon. The blue icon with the pencil means that you can edit the question.

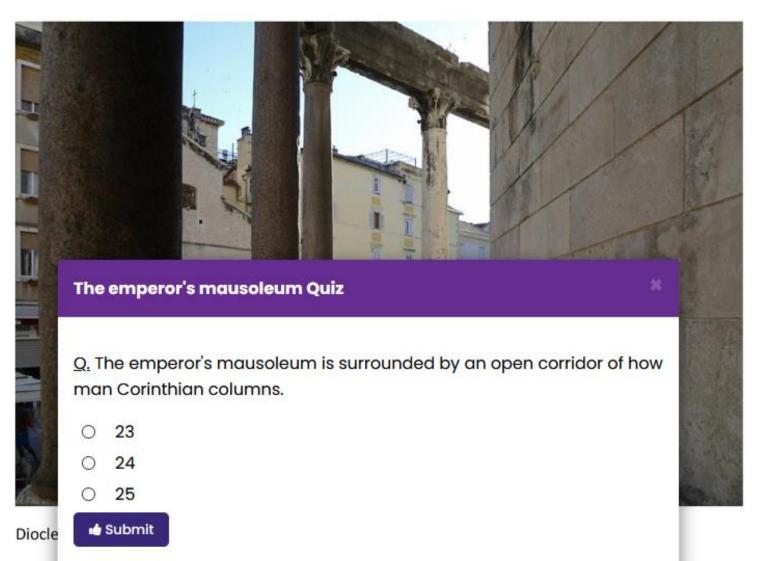
Quiz

Quiz *

The emperor's mausoleum Quiz CROATIA - In words and pictures Test Group					
		Fig.7.58			
Load Questions					
Quiz Questions					
S#	Quiz Name	Question Text	Page No	Actions	
1	The emperor's mausoleum Quiz	The emperor's mausoleum is surrounded by an open corridor of how many Corinthian columns?	22	 ✓ ✓ 	

The red field with the trash can means that you can delete the question. Clicking on the blue icon takes you again to Fig. 7.56, where you can change the entire quiz.

Diocletian's Palace - Cathedral



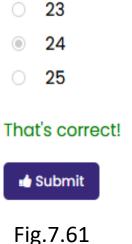
Now let's look at the quiz we created in our NID book. To do this, we will look for the title: "CROATIA - In words and pictures Part 10 -Split" and go to page 20. After we have reached page 20, our previously created quiz pops up immediately.

Fig.7.48

<u>Q.</u> The emperor's mausoleum is surrounded by an open corridor of how man Corinthian columns.

۲	23	
0	24	
\bigcirc	25	
	t: No, try larger number Submit	1
Fig.7	7.60	

<u>Q.</u> The emperor's mausoleum is surrounded by an open corridor of how man Corinthian columns.



The emperor's mausoleum Quiz

If we click on the first answer option (23), which is wrong, the red text will appear that the selected answer is wrong. See Figure 7.60. However, if we choose the second answer (24), a green text will appear indicating that the answer is correct.

ishboard / Quiz Results							
1 Quiz	Quiz						
Quiz *							
The emperor's mausoleum Quiz C	CROATIA - In words and pictures public						
Load							
Result							
User	Email	т/q	A/Q	C/A	P/M		

Fig.7.62

If you now want to view the results of the quiz, either because you want to check the answers of a school class or for self-checking of individual learning, all you have to do is click on "Quiz Results" in Figure 7.62. After that, you simply select the quiz from which you want to see the results. In this case, you will not yet see any results from a user, since no one has taken the quiz yet.

The use of groups

NID allows privileged users to create (user)- groups. Groups serve a number of purposes:

> They can be used to make sure that certain annotations,
discussions or quizzes are only seen by members of specific groups
> They allow to send messages to only members of a group
> They can be used to restrict reading a document only by users of certain groups

& Groups
Add Group
Manage Groups
Add Book Group
Manage Book Groups

Fig.7.63

To create a specific group one can click on the console (Fig.7.51) and then in Fig.7.50 on "Groups" (Fig.7.63). This opens a subcategory where one can click on "Add Group", see Figure 7.63.

Groups have three mandatory fields. The first field is the group name. The second field the group administrator, and the third field the users that should be in this group. Of course, only users who have an NID account can be added. See Figure 7.64 and Figure 7.65 for a filled version.

Dashboard / Add Group	Dashboard / Add Group
Group	 Group
Group Name *	Group Name *
Group Name	Test Group
Group Admin *	Group Admin *
Please select group admin	 Sonja Eisenberger
Group Users *	Group Users *
	* Hermann Maurer * Test User Account * Gast Konto * Sonja Eisenberger
Save	Save
Fig.7.64	Fig.7.65

👕 Groups

thow 10 v entries Search:				
s# ↑↓	Group Name	Group Admin	Created By	Actions
1	Test Group	Aqib Malik	Aqib Malik	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2	Reader-Group	Bilal Zaka	Bilal Zaka	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3	new group1	Hermann Maurer	Hermann Maurer	1
4	isds group	Marco Fuchs	Marco Fuchs	1
5	public	Bilal Zaka	Bilal Zaka	1
6	red	Marco Fuchs	Marco Fuchs	1
7	green	Marco Fuchs	Marco Fuchs	1
8	Namik-GRP	Namik Delilovic	Namik Delilovic	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
9	Test Group	Sonja Eisenberger	Sonja Eisenberger	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
nowing 1 to 9 of 9 ent	ries			Previous 1 Next

If one wants to change a group, whether it is its name or members, one has to click on the field "Manage Groups" in Fig. 7.63. After this one gets something like in Fig. 7.66. Now if one wants to change something of this group (name,

group members, the group admin,..) one clicks the blue icon. Now a page like in Fig. 7.65 is shown. Now one can add or remove group members, change the group name or even change the group admin. With the red icon you can delete the group completely. If one clicks the green icon, one can see which members are in this group.

Groups are a complicated issue and important concept.

Here, only a few issues have been explained.

Please consult for details and many other points the June 2021 version of the user Manual [09] or the Administrator manual [10], as mentioned in the following list of references.

Enjoy NID!

NID and Austria-Forum Team, June 2021

8. Literature:

- [01] An Introduction to Interactive Books; N. Delilovic, H. Maurer, B. Zaka , Proc. ED-MEDIA 2019, Amsterdam, 1353-1359 (2019) (https://bit.ly/3yY1wby)
- [02] A Note concerning Feedback and Queries for Web pages; N. Delilovic, H. Maurer, JUCS vol.25, no. 7, 733-739 (2020) (https://bit.ly/3vWnWZ7)
- [03] IIIF-Konsortium Homepage (<u>https://iiif.io/</u>)
- [04] Die Vergrößerung des Wertes digitaler Dokumente (German version of current paper)
- [05] CC BY NC ND (<u>https://creativecommons.org/</u>)
- [06] Webex (https://www.webex.com/)
- [07] Zoom (<u>https://zoom.us/</u>)
- [08] Investigating the interaction activities in digital libraries: The Networked Interactive Digital Books Project. (H. Maurer, B. Zaka, N.Delilovic), IPSI Transactions on Internet Research, vol. 16, no. 1 (Jan. 2020), 75- 82 (<u>https://austria-forum.org/web-books/tir1601en2020isds/000070</u>)
- [09] NID User Manual (<u>https://nid.iicm.tugraz.at/Home/BookDetail/189</u>)
 [10] NID Administration Manual (<u>https://nid.iicm.tugraz.at/Home/BookDetail/204</u>)

[11] Can the web turn into a Digital Library; H. Maurer, H. Mueller, Intl. Journal of Digital Libraries, Springer Pub. Co. 13(2), 65-75, (2013); (<u>https://dl.acm.org/citation.cfm?id=2064065</u>)

[12] NPL (<u>https://en.wikipedia.org/wiki/Natural_language_processing</u>).

[13] Google Images (<u>https://images.google.com/</u>)

[14] Testbook for Categories of Pictures (<u>https://nid.iicm.tugraz.at/Home/BookDetail/305</u>)[15] NID Installation Manual. In Preparation.

[16] Sentiment Analysis (<u>https://en.wikipedia.org/wiki/Sentiment_analysis</u>)

[17] You Only Look Once: Unified, Real-Time Object Detection; J. Redmon, S. K. Divvala, R. B. Girshick, A. Farhadi (2015); CoRR (<u>https://arxiv.org/abs/1506.02640</u>)

[18] COCO Dataset (<u>https://cocodataset.org/</u>)

[19] Object Classes available in Pre-Trained dataset included with NID;

(https://tech.amikelive.com/node-718/what-object-categories-labels-are-in-coco-dataset/)

[21] Demo Book (<u>https://nid.iicm.tugraz.at/Home/BookDetail/199</u>)[20] IIIF Bibliothek in München (<u>https://app.digitale-sammlungen.de/bookshelf</u>)