Exchange with the Knowledge Management group of the *Bundesgesellschaft für Endlagerung* (BGE)

Part 1: Presentation of iFinder (July 17, 2024)
Length: 0:55h

Expert 1:

Great. Yes, let's just start with iFinder. As I said, I'll give a short demo. Regarding knowledge management itself—we already briefly discussed this at the last meeting—the first stirrings within the BGE came at the end of 2018, when consideration was given to setting up a corresponding knowledge management system. And the very first step taken in this direction is what we are now seeing, namely the establishment of a digital information base. Saying, "OK, let's start by collecting written knowledge" is perhaps a very good approach, because I believe that is the easiest step. This is information that is ultimately available. The only difficulty is finding out where it is and how to access it. Yes, we'll come back to that in a moment. That's the database we're working with now. And iFinder is really just a tool for making this flood of information searchable. I'll just give a quick presentation now [expert shares screen]. You should now be able to see the iFinder home page.

The home page can be accessed via our intranet. Unfortunately, it's a bit hidden, and I think that's something that could be improved in terms of visibility. It's quite difficult to point out where the system can be found. We do have events where we point this out, but it's not immediately obvious at first glance. And when I think back to my early days at BGE—the intranet looked a little different back then—you're a little overwhelmed at first by everything it has to offer. It's not always self-explanatory what's there. That's probably another step we need to take and think about how we can communicate it better. But that's just an aside. This is the iFinder interface. There's a search bar, and we'll take a look at the system in a moment. What we see here is the current status of sources connected to iFinder. Here on the left is our digital information base. There's also an explanation of what it is. And this is precisely the written knowledge that we have painstakingly compiled from various archives and data sources, with a focus on reports of a scientific and technical nature. It is a very limited data pool, but that was the task we were given to fulfill and, of course, must continue to fulfill, because new reports are added and these must be maintained accordingly.

In total, we have around 15,000 documents from our own sources, and the number is rising. So that's the first step, the digital information base. The intranet is also connected – which is now a duplication, of course, because we have a search function on the intranet itself, but it's not quite as convenient as what iFinder can do. That's why we decided to simply connect the intranet to the system as well. And then we have a kind of phone book. There is also a phone book in the actual intranet, but as I said, it's not very easy to use. In the past, lists were actually stored there, but now you can do everything digitally. You get a reference to a person with a working link to Skype and so on, or even Outlook. So that's quite convenient, and those are the three data sources that are currently connected t . And of course, we're interested in connecting even more. Within the BGE, there are one or more document management systems, where documents that are subject to archiving and come from ongoing operations are actually stored. This differs significantly from what is connected to iFinder here. And that would, of course, be another step to connect to the system, because the software is ultimately an enterprise search solution, which means I can access or link to different data sources with a single access point. But since this document management system is still under construction, we don't have that option yet. We are then basically the last ones in the chain to say, "OK, we can connect to it." So that's where the journey should ultimately lead.

PM:

Since you mention documents from ongoing operations: Does that mean that each of your locations has its own document management system where these documents from ongoing operations are entered?

Expert 1:

Well, I wouldn't say for every location, it's actually across the entire BGE. I can't really say that much about it because I don't work with the system at all.

Expert 2:

We have several systems in place. First, there is the classic ELO file storage system, where a collection of documents is essentially created across all locations. For the documents relevant to the procedures, i.e., approval documents in our procedures, i.e., Morsleben, Konrad, Asse, we also have a Case and Documentation Information System called VDIS, in which the data relevant to the procedures, i.e., data that is used in the corresponding mining or nuclear law procedures or created for this purpose, is stored. It is planned, and the system should actually already have been up and running, but it has been delayed for internal reasons. This system should already have been transferred to a new system that we can or want to connect to. The general storage system, which is still located in ELO, is also to be replaced by another system. There are still various internal issues that need to be clarified there as well. However, we are optimistic that this will be completed by the end of the year at the latest and that we will then have the opportunity to set up these systems with our iFinder.

This is not possible with the current system. Firstly, because the old VDIS has been in the process of being replaced for some time now, and secondly, because of the structures that have grown up around this old system, which was brought in by the DBE [German Society for the Construction and Operation of Final Storage Facilities for Waste Materials], one of the predecessor organizations... The works council has objections because the permissions are, let's say, poorly maintained, and there is a risk that if colleagues use an intelligent search engine such as iFinder to access ELO, they will find things they shouldn't find when it comes to personal data or similar information. That's why the works council is involved – I don't think without good reason – and that's why we are waiting for this old ELO system to be replaced by BGE-Connect or whatever it may be called, so that we can also connect iFinder there. Technically, this is not a problem. We are now making do by building on the data collection that our colleagues brought back from Asse at the time, which we have been constantly expanding here, our digital information base on final storage knowledge, where we have extracted the relevant documents again, and then connected and supplemented them in the international area. Incidentally, I don't think this is a bad thing, because it also ensures a certain degree of redundancy. In other words, we are securing the available final storage knowledge known to us separately. And I think that, from a perspective point of view, it is not wrong to think in a slightly redundant and diverse way.

PM:

But that means that if a document is updated in one place, this redundancy means that the update does not automatically appear here in iFinder?

Expert 2:

When documents relating to final storage, i.e., those relevant to the process, are updated, they are automatically assigned a revision index. We regularly check whether new documents with a different revision status have been stored in the old systems, in this case the VDIS. We then automatically transfer these to the digital information base, as long as this cannot yet be done automatically.

PM:

Yes, interesting.

Expert 2:

So, modified documents that are relevant to the process are marked with a revision index in a marker bar. The old documents then become invalid, so to speak, and the digital information base contains not only the invalid documents, which are marked with a small revision index, but also the current documents. Relatively promptly—every three months, I believe—we then carry out a check and transfer the new data records to be obtained.

Expert 1:

Yes, it's still a bit of manual work, so to speak, but that will all be resolved once a general system or a comprehensive system is in place, this digital information base. We now have the advantage of being able to collect these reports in one place, which is... I don't know if you can call it a concentrate, given the amount of data. We've really condensed it, and this data pool naturally allows us to extract relevant findings on what has been done in the field of final storage research. And that's basically the advantage we have here. People really get a defined data pool, and that's something that should be carried forward into the future, because it's basically the written knowledge about final storage and should then be archived for the long term if possible. But it's not actually our job to take care of this long-term archiving. We have prepared it to the extent that we have at least set this PDF-A long-term archiving format as standard. But everything else is more of a hardware issue that IT has to take care of, such as how the systems are set up and how they will be permanently updated.

PM:

What does data storage look like? Do you host a server yourself where the documents are located, or where are they stored?

Expert 2:

The documents in the digital information base are stored on a file share, which is then regularly backed up by IT.

Expert 1:

Exactly. Okay, so we've at least briefly explained the data sources that are connected here. Based on this start page and the explanation, it should be clear that we're not at the end yet, of course, that's...

PM:

... a process, and you have to start somewhere, and it will probably never be finished, yes.

Expert 1:

Exactly. And another aspect that may or may not play a role, it's all still a bit up in the air, is all these developments with machine learning and so on. You can't mention Chat-GPT here, but that's always the example that sticks in everyone's mind: dialog-driven search, creating text summaries, and so on. That would also be technically possible with the system we see here. Of course, we now have to figure out internally how we can implement this in the test system—it doesn't have to be activated for everyone right away. But at least we can continue to monitor and evaluate the technical developments that are currently taking place. And if we decide it's good, then we can roll it out across the entire BGE.

PM:

Can you name one or two specific use cases where you see added value in the use of AI?

Expert 1:

Well, we only have a limited view of the matter. What I see now, this digital information base, is really just text. You can ask specific questions and find relevant sources that you might not be able to access directly with a keyword search. That would be one point. Or these text summaries. Of course, when we look at site selection, they work with columns of data and figures, and something like this can also be used there. So I think the field is broad. I also think we have many use cases within the BGE, but we are not yet at the point where we have simply compiled them all.

Expert 2:

So it does add value when it comes to summarizing certain facts. We have several documents on different sites that deal with the topic of "backfill materials," for example. And then there would be the approach, for example, when new colleagues join the company, that they would have the option of requesting, via a dialog-driven process, for example at , that a summary be created of what sealing materials or backfill materials are used in the company and for what purposes. Such a system could actually summarize this well. It would have the advantage of being based on a secure, valid database. We are not on the World Wide Web, where we would be working with invalid data. So here we would have AI—I don't want to say Chat-GPT or Copilot or whatever it's called...

PM:

...any large language model, exactly.

Expert 2:

But with such a large language model, you could actually extract content from multiple documents from multiple locations and have it summarized. And then you would get the corresponding extract as a result, so to speak, which I could then use to educate myself. This is particularly useful during onboarding, when I have to familiarize myself with new topics. If I want to know certain things, such as: "Please explain the options for shaft sinking" or "What sinking methods are there?" So there are certain applications, even in the technical field, that I believe would be well suited to being accessed via such a system. And you can't ignore progress. I'm not entirely positive about it either. My concern is that if you use such systems, large language models, and I have an invalid database, then of course the result I get may also be dubious. So it depends on what questions I ask and how I ask them. To a certain extent, I can rule this out if I actually have access to a closed, secure data pool. I think that's the crux of the matter. And that's what we're working on.

PM:

I was at the LEARNTEC trade fair in Karlsruhe last year. AI was the big topic there. And now it's also very present in schools. There, people are asking similar questions about the database. How can you ensure that the data is valid and correct? And what is usually suggested there is to use so-called curator tools. This can be a person or it can also be done to a certain extent technically. This is an intermediate instance that checks whether what is compiled or aggregated is also appropriate. Technical tools are also becoming more common. Especially when you have a very large database, as you do, you naturally want to use only that as the basis for your own model. As far as I can tell from the last few months, the issue is acute, but a lot has already been done.

Expert 2:

And if the system or the curator then also automatically detects contradictions and presents or discloses them, then this is of course also, to a certain extent, a subject of further discussion, which is then made possible. But I don't think we're there yet. And we certainly aren't, because we are currently working on introducing these models... So, in addition to the hardware requirements that need to be met, we will of course also have to... I come from the public sector, have now been assigned to the BGE, and have to say that what we currently have in terms of co-determination in the workplace is much more pronounced here in this private company than what I have come to know in the public sector. So we still have to create the right conditions to ensure that the works councils follow us when we introduce such a system. But I think that's more of a social element in this whole story.

Expert 1:

Yes, you need to be patient. But that's perhaps not such a bad thing, because then you don't jump straight in at the start of the development, but can learn a little from the mistakes of others. I think it's important to keep an eye on this development and evaluate it.

Since we've just touched on it a little, now that we're still on the home page: this digital information base really consists of reports with corresponding authors. And on the far right, we have a people search. So, if possible, you can also link these together somehow. So that you can say, "OK, this person appears there, they deal with this or that topic." The individual building blocks are already there. Now we just have to see how we can interlink them a little and put them together to form a big picture.

PM:

What does the document search look like in concrete terms? What search and filter options do you have?

Expert 1:

Right, let's just go there now. So, let's take a look. Right, I've just entered a term: "Long-term safety analysis." What you've seen, of course, is the auto-complete feature. That's obvious; many systems do that. But we have another option here—it looks a bit inconspicuous, but it can be helpful for colleagues: we can store corresponding lists of synonyms here. Synonym is quite a broad term. It refers to words with the same meaning, but also abbreviations. You can easily add them here. I would then have to click on the box on the right. Then, of course, the list of results will be longer. On the other hand, the person working on it might get some kind of incentive. You're looking for this, you might also be interested in that. So, it's a way of pointing out some of the hidden knowledge.

PM:

Suggestions, yes.

Expert 1:

Exactly. Translations are also included, of course. That's limited to English here. But the system can actually handle all languages. I don't know if that makes sense within the BGE. But theoretically, you could also search in Russian or whatever else is available. Or have documents played back. Right, so that's the normal way to get started. I enter a term and press Enter once. Since we were just talking about the specialist knowledge we can link to, we can see that again here on the right-hand side. So, in addition to abbreviations or synonyms, we can also import term definitions. This means that when I enter the term, I get a corresponding definition from the field of final repository, radioactivity, mining. This can be expanded as desired. It simply provides additional assistance to people who are unfamiliar with the term. This is available at for terms or acronyms, i.e., artificial words from the field of research and development. You can also add corresponding links so that your colleagues have access to additional information. And if you don't need it, you can simply click it away.

PM:

Is this short summary generated automatically or is it entered manually?

Expert 1:

It's basically copied and pasted from existing content. So every report, or many of them, actually have a section with abbreviations or explanations of terms, and you can extract that information from there. Now we've entered the term and hidden all unnecessary information. And what we see here now is the actual work interface. At the top is the search field, which is very clear. Here you can now see where you want to search. There are different search areas: Global – I always search everything. Then there's the digital information base, our own reports, and web content. We have also linked the homepages of the key players involved in the Final repository. This means that you can also select this again. Our own intranet and the people search. This is actually what appears on the home page. You can search for this again accordingly. So that's the first step.

In the second step, you now look here on the left-hand side. There you will see various filters and facets. There are quite a lot of them. But that's also because we are currently in the administration interface. In the actual production system, there are significantly fewer because we always say we don't want to overwhelm people. If they are now shown a page with 1000 options, they will switch off relatively quickly. This means that we actually want to reduce the filters to the essentials. We have done that. Here, of course, there are now significantly more to be seen, but they are not visible to the public.

PM:

What are some frequently used filters?

Expert 1:

Oh, that actually depends on the person searching. It always depends on the search query. The question is: Do I know what I'm looking for, or do I just want to get some information? If I know exactly what I'm looking for, I use the filters completely differently than if I'm looking for inspiration—which is also a possibility with these facets. Ultimately, these reflect the content of the documents, as we will see in a moment. Let's take another look and go through at least the essentials of what lies behind the facets. That's basically step 2. And step 3, which is the area in the middle here, is the actual results list. Let's take a quick look at that. We have a small number here at the top. And we now see 3,000 hits for the term "Long-term safety analysis."

That's of no use to me as a user because it's simply too much. That means I have to narrow it down. And that's also what you always have to tell your colleagues. When you enter a search term, the results are of course still relatively vague. So either let the facets inspire you with what else there is on the topic. Or you have a specific idea and enter that. What search facets do we have now? First, there is the semantic search. This is not generated automatically. It is a suggestion of terms or concepts that appear very frequently with my actual search term in the documents. It is a kind of topic filter. I'm interested in long-term safety analysis, and the [system] says, "OK, barriers, sorption, and so on play a role here." I can now click on that. A new search is performed and a new list of results is created. Ultimately, this is an exploratory search. I start with a term and then see what else there is. And I can work my way into the depths relatively quickly. This is a system that does not exist in ELO or the other document management systems we have. There, you always have to enter exactly what you are looking for: author, title, date.

What else do we have? Search area data source. This may not be quite as exciting. Here, I can now select which websites are linked. Or do I only search in the BGE's own documents? Locations and topics naturally play a role. If I now say that I only want documents from the Asse or Morsleben area, then I can select that here. This is not generated automatically, but this information comes from the digital information base, from the reports that we compile manually. This is information that we have to add by hand, so to speak. There's no other way. You could certainly do it automatically, but then you would still have to check it again to see if it's correct. And then you would have to rework it accordingly. That's definitely the clean way to do it. It was a lot of work in the beginning. But now we're at the point where we're collecting less and just maintaining or adding new documents as they come in. That's why the amount of work here is relatively low.

Then we have a person filter here. These are names of people who appear in the texts. This is also generated automatically. It's a standard facet, so we don't have to set anything up. It doesn't have to be the author of the work, but, as I said, these are names of people who appear in the documents. These can also be names from other fields. I don't know, I think I read something about Beethoven here once, or something like that, I'm not sure. Of course, this is because we have linked to relevant websites, and if this name appears somewhere, it is naturally included here. So, you could clean this up and say, don't show me that. But the question is: is it worth the effort for three entries out of 10,000?

What we have for individuals also exists for organizations. These are the actual authors of reports or actors in the field who deal with final repository. An important point, which we ourselves have not used very often, is labeling. Anyone who works with the system can tag the document for themselves. This is then always visible to everyone. I don't really work with it myself. The question is: does it make sense to make this visible to everyone, or should it be restricted to a certain group of people? We haven't actually had to deal with this question yet. "Language" is self-explanatory. German, English, everything else... "Unknown" refers to documents that are very old and can no longer be read by the machine. Humans can do it, but the machine or OCR [Optical Character Recognition] can't. "File format" is very clear for us because we mainly work with PDFs, but of course CAD programs or files, e-mails, and so on can now also be processed. There are connectors for 600 file formats.

PM:

I assume you could also incorporate things like videos and audio.

Expert 1:

That's quite a lot, but we've spared ourselves that here because we're basically only working with text at the moment. But it can be expanded as needed...

PM:

Technically, it's possible, OK.

Expert 1:

OK [Scrolls through other facets/filters]. None of that is important – "page number" isn't usually visible anyway. When you go to a library or something, you always search for titles. That's included here too. So a title search is also possible, at least for our core database, where we maintain the metadata ourselves. And the same applies to authors. So that is also maintained manually. And what else might be relevant – and here you can see again what our core database refers to – reports, lectures, publications, statements, expert reports. Sometimes interim reports, too, because they sometimes contain more information than a final report. And that actually gives a pretty good picture of the documents we have collected here. Exactly, what else is worth mentioning? Perhaps the three or four [facets] down here, which we ultimately had generated ourselves. That means we can search for an ISBN (International Standard Book Number), which is a simple search using pattern recognition. The ISBN (International Standard Book Number) always has the same structure. The software company then created a corresponding filter that searches for this pattern within the first 2000 characters. So that all the entries that are in bibliographies, for example, are as far as possible...

PM:

...are not included, yes.

Expert 1:

That would be an ISBN search that is possible here. Via Citavi Picker, you can now see it in red, transferred directly. But that comes from Citavi itself, so we didn't have to do it ourselves; Citavi Picker recognizes it automatically.

PM:

Yes, I know that, the WebPicker.

Expert 1:

Exactly. You can do the same for the ISSN (International Standard Serial Number) or the DOI. What can play a role are the funding codes in the reports we have collected here. And now we've just experimented a bit and added a filter where you can search for images. It doesn't look for the images themselves, but rather searches for the image captions, extracts the text behind them, and thus takes you to the corresponding image in the text. This is relatively new in the system. These are the main filters you can work with here.

PM:

Very comprehensive, yes. Lots of possibilities.

Expert 1:

Those are the things we came up with. Of course, we always rely on feedback. What do people work with? That's why—well, I couldn't really answer your question because I myself only search in the search area at the top, I usually let myself be inspired or I know exactly what I'm looking for. Then I don't need that many filters. But everyone does it differently. We rely on feedback, and the feedback is...Well, let's just say it could be more. That means we try to develop a lot ourselves and make it public in some way. The things are accepted, but it would of course help if there was also feedback on what else is needed, what could be done differently and better.

PM:

When you find a single document and look at it, is it possible to comment on it? I'm not entirely clear yet on what the pure document level is and what the knowledge level is.

Expert 1:

Yes, the knowledge is ultimately what is displayed here, what is in the documents. And now I have the option here—well, I can't comment, but I can inform myself accordingly. I can generate lists, which means I could also export a corresponding list to Excel for my further work, so that I can compile a document inventory. And of course, I can then download it to my own computer. That's what we can do with the system here. For now, just researching and compiling information.

Of course, you can also look at the preview. I would like to mention two or three more features. We have a preview mode here. Regardless of the original file format, a preview is generated here, which is ultimately searchable, meaning I can copy out passages. I can see the corresponding hit counts at the top, where I can always navigate directly to my actual hit. This means I don't always have to go through the entire document. It's actually relatively easy to work with. This is new; it used to be different. Now, as I said, it's much more manageable, the loading times are faster, and you can also extract passages here.

PM:

Extracting passages: Is that only possible with original PDF documents or also with those that have been run through this OCR reader internally? Can you also copy text from those?

Expert 1:

I hope so [laughs]. Since we mostly only have PDFs here, I don't know about other file formats... I couldn't answer that question right now. But it should work, because the files are scanned using OCR, then an index is created, and this preview is generated in parallel. That means if it's an email or something like that, it should work just as well as a TIFF file that's stored somewhere. Now I have to check—no, I don't think commenting is possible.

Expert 3:

No, commenting is generally not possible. I'll jump in here for a moment. This is a tool where documents are really meant to be searched for deliberately. So in our company, we simply have documents that are relevant to the work of the respective colleagues. We are not in the academic or research field like ResearchGate. So it's completely different. Let's put it this way: we have very clear, fixed tasks. We don't have time to go into the field of university research and say, "Yes, OK, let's discuss that." That's something you do on a smaller scale, discussing problems, but not in the sense that we produce articles that are then discussed. There are certainly colleagues who publish or have the opportunity to publish something in specialist magazines, even when selecting a location. We take the document, but this discussion would then take place on traditional portals such as ResearchGate or in the research community, wherever they happen to be. But we are not... If you were to comment here now, it would be very, very difficult, because there would have to be some kind of alert system in place.

And it's always the case that we have this functional address if colleagues notice something and say, "Look, there's a mistake in there, because I have a more recent document or the older document is missing." So these options work via this functional address, where colleagues can then contact us via [email address]. And that's also more effective. Just as an example, we also have a catalog of methods for Wikipedia, i.e., a docu-wiki. There, too, we said: No comment function, because it's much more targeted via these email addresses and we can handle it better, so to speak. So that's also to explain why there is no comment function.

PM:

I understand. So your use case is more that you view your documents as a whole and don't really want to delve into the content in detail with the aim of discussing it with other people in a technical context.

Expert 1:

No, we can't do that. Our job is to find information, compile it, and make it available. But what's in there, i.e., knowledge assessment or similar... The field is so broad here that the specialist departments actually have to do that themselves.

Expert 3:

Or rather, they discuss it. And that brings us back to where we started. [Expert 1] also mentioned that at the very beginning. That would be an option if you had AI in a controlled environment. We are always talking about controlled AI here. Then it would not just be the classic option of "I'll just get an overview of the documents, what is the content," but also specifically saying, "Analyze it for me." So if I, as an individual user, would like to have that at some point in the future, perhaps artificial intelligence could do it. There is then no exchange between them. So our tasks are simply different. In that sense, we assign research tasks. We ourselves have... Let me put it this way, we work in foreign underground laboratories because we don't have our own. But in the sense of a classic research department where articles are also discussed? Please correct me if I'm wrong, but I don't think so.

Expert 1:

No, I can't think of anything either.

Expert 3:

Well, we do have a research and development department, but it's more like: "Where do we need to do research for our questions, where can we get answers, where do we initiate participation and research concepts, where do we then discuss the results?" But I wouldn't say we do proactive research ourselves in that sense.

PM:

So it's more about identifying and formulating the need for research, but not carrying it out ourselves.

Expert 4:

Exactly. We already identify the needs ourselves, especially when it comes to site selection and such.

Expert 3:

That's what our research department does...

Expert 4:

...which cooperates with universities and such.

Expert 3:

Exactly. But we ourselves are not hired for that. There are other institutions for that, research institutions. Let's take our colleagues at the Helmholtz Center in Dresden as an example. They do specific task-oriented research and receive third-party funding for this. So if we were to give them money for certain issues, for example, they would carry out the tasks for us.

Expert 1:

Exactly. I would like to mention two more points, and then I think we'll be done with iFinder. What perhaps distinguishes it from other systems is the way it processes texts, the semantics. What else can you do with it? Of course, you can also search for similar documents, i.e., those with similar content. This can be helpful if I have found a reference document for myself and want to look in the data pool to see which documents deal with a similar topic or with a topic that is similar in nature. This is where you can compile these literature lists relatively quickly. I compile them here, then look at the documents themselves and, as a human being, have to evaluate whether they are relevant to me or not. We always have to say that, just like with this AI story: in the end, it's always up to the person working with it to evaluate: do I trust this or not? No machine can do that for you.

It's the same with these results lists. You really have to look at them and say, "OK, is this important to me – yes or no?" That would be the function, and what's also relatively charming here is if we look at the area in the middle. As a user, I have the option of entering my search terms... As I said earlier, I don't get very far with just one, but I always have to enter quite a lot to get hits that are useful to me. I can decide how far apart these search terms can be from each other, which allows me to put them into context in terms of content . This has a very clear effect on the length of the results lists. If I enter three terms and specify that they should appear in the same sentence, then—as I said—this is very effective. This function is a bit hidden. It's our job to constantly point this out, but it can, of course, significantly reduce research time.

So that's basically the iFinder system. I would actually still describe it as a special application, because the data pool is very specific. The BGE has an estimated 2,000 employees, and perhaps 300 or 400 of them actually deal with this type of document. No more than that. That's why it's a small system under construction.

PM:

Okay, yes.

Expert 1:

Okay, that's it for now. I'll turn off the presentation for a moment. Any questions, comments, additions?

Expert 3:

No, you explained everything perfectly. I don't have anything to add.

PM:

I think what I find exciting is to have another insight when these documents are actually entered from ongoing operations. I think that will raise other questions regarding filtering. The working theory of my dissertation project is that knowledge should be anchored spatially. The only spatial filter you had was the location, which is a relatively rough criterion. Now, of course, one can imagine that for documents from ongoing operations, a more precise spatial classification would be desirable, e.g., by building sections or plant components. I think it would be interesting to learn more about how you enter such documents once you are in the process. At the moment, the focus is—as you yourself said—on comprehensive scientific and technical reports. That's a relatively high level without any direct spatial reference.

Expert 1:

Yes. Especially since the locations we have here are mostly salt anyway. So unless you're looking for something specific for a particular location, it doesn't really play a role in an overarching question, such as: How does salt behave under these and those conditions? It becomes more relevant when it comes to operations or, as you mentioned, building sections. So that's also a point to consider when thinking about the whole BIM system and so on. These are data sources that we don't have yet, but they are out there somewhere. And I assume they are also stored in a structured way, for example, by building components. And this information can then be used to build a corresponding filter. There are many possibilities, but as I said, we're not there yet. We still have to do a lot manually when it comes to these new scientific reports. And when this comprehensive document management system is finally up and running, I think we'll first have to figure out for ourselves: What does it look like, what can it do, what kind of information is stored there? And how could it be integrated into in some way? But I think that's a really big field again. But as I said, there's no land in sight yet. From my point of view, it would be nice if all the available data sources could be linked together via a single interface. And then you could access the information accordingly.

PM:

[Another date is set for the preliminary creation of the Knowledge maps] All right, great. Yes, thank you very much for the insight so far, and we'll see you again soon.

Part 2: Presentation of the Knowledge maps (August 12, 2024)
Length: 0:35h

Expert 1:

This is our intranet, BGE Intranet [expert shares screen]. This is our area, which is accessible to all colleagues. Here you can see the important knowledge management tools that are active here at BGE. There are various ways to access this toolbox, and today we want to talk about the Knowledge maps. And here they are.

I noticed earlier that it has been almost four weeks since we last met. On the subject of knowledge maps—you are surely familiar with them, i.e., mind maps. They are made up of various, sometimes quite complex pieces of information. They can be visualized well here and can make them more accessible, especially for new colleagues. That is why we chose this method of presentation. And I would like to start here with the most general [Knowledge map] we have.

This is the so-called Who-How-What-Where knowledge map. It always includes a short informational text: What is it actually about, what is the status of the knowledge map? And it is aimed at new employees at the BGE. They have access to the intranet, but they have an incredible amount of input when they arrive. And here you can easily ask questions and find out, for example: How do I apply for vacation? Where do I report sick? How do I get business cards? So it's a very practical tool for onboarding.

PM:

So it's not just specialist knowledge, but also process knowledge.

Expert 1:

Process knowledge, exactly. There are many different ways for new employees to obtain information. But we decided to go this route because we simply realized that this topic is so big that we want to give them this tool or this assistance. And there's also a networking reason for this. It makes us more visible than if we only addressed the scientists.

Expert 2:

Yes. But that only applies to this Knowledge map, [Expert 1]. That's the process knowledge story. Of course, we have also included specialist knowledge in other Knowledge maps.

Expert 1:

I wanted to go into that a little more. I wanted to use the [Knowledge maps] to show that it has practical uses... We don't need to go into detail, but you can see how it's broken down here, and you can simply ask a question in MindManager. So let's take "business trip" [types in the word]. There you can see, I'll start [with these search results]. And then I go to company cars and then book a company vehicle in Salzgitter, book Konrad, book Asse [BGE locations], and so on. And that's the structure of the knowledge map. Our knowledge maps are all structured the same way.

PM:

What kind of IT is behind this? Did you set it up yourself or are you using an existing framework?

Expert 1:

We use MindManager for this. The great thing about MindManager is that it is very intuitive to use. If you take a look, you can find some really good tutorials online for free. Because you can also use it for yourself. For time management, project management. It's a great tool that you can learn very quickly.

Expert 2:

The MindManager maps, i.e., the Knowledge maps created using MindManager, are stored in HTML format and then integrated into our intranet publication, which is hosted by our IT department. And the pages created via TYPO3 are then integrated, so to speak. This means that the framework itself is presented on the server side in such a way that we publish our intranet presentations via TYPO3. This puts us within the general framework of the company. This is provided by our IT department and, thankfully, regularly maintained and expanded with appropriate presentations by [Expert 1], so that the editorial team's work lies in the creation of the Knowledge maps. This is quite differentiated within our organizational unit. It is done by one or the other colleague. They are published via our intranet page, and the editorial team for this intranet page is [Expert 1].

PM:

All right, thank you very much.

Expert 1:

Thank you, [Expert 2]. [Expert 3] is particularly involved in the Knowledge maps here. We have this digital information base. As you may remember, this is the most important data basis for iFinder. And there is a database behind it. We have listed all creators who are historically relevant and their predecessors. And from that, something else has emerged, as a by-product, so to speak. So we actually use everything multiple times. It's really exciting— —and it works quite well. And I would now like to move on to the online knowledge sources. [Expert 3], if you have anything to add, please feel free to jump in.

Expert 3:

I don't want to interrupt you here. If I have something to say, I'll just say it.

Expert 1:

Okay, good. So now I'll go to this Knowledge map. As you can see, the structure is similar. It's a bit older. This is especially for our scientific colleagues who are also new here. There's quite a lot in the background that can be used for everyday work. Is there anything in particular that interests you here, or shall I just go through it?

PM:

Well, I'm seeing it for the first time now. Feel free to explain it in general terms. I don't know what's behind each point yet.

Expert 1:

This knowledge map shows all online knowledge sources for sources dealing with the topics of Nuclear technology and the final repository of nuclear residual waste. We also have some colleagues who are not from our field. They first have to familiarize themselves completely with the subject matter. It's a world of its own. Let's go in here. Then you'll see these entries with everything we can gather about the subject. Then click here and you'll go straight to the Archive.

All entries are linked as far as possible. The Lower Saxony State Archive is particularly interesting for many people who want to work with historical documents. Funnily enough, many people are not even aware that it exists and that you can search for information using the Arcinsys program. The Technical Information Library in Hanover is also quite well known. Here, too, you have direct access to everything on one page.

Expert 3:

I can briefly interject here. As I said, [Expert 1] mentioned it. It's a Knowledge map that was created as a result of our work. We did our own research to find out where the relevant documents were located. And we simply compiled that information here. There's quite a lot of content in there. That's why the approach here was to work with as few hierarchical or sub-levels as possible. So you see the first main topic here and behind it you have access to the relevant libraries and so on. And the good thing about the software is that you can enrich it. You can also attach Word or PDF documents to it. The links are very helpful, and you can also tag them if you want. You can display quite complex relationships relatively easily and intuitively. And the knowledge maps we have have a specific focus. Either very scientific or this who-how-what-where knowledge map, which covers the entire BGE. But beyond that, every department that has this software can also create specific Knowledge maps for itself. We can't do that anymore, but as a general service provider, we have only worked through and filed general topics for the time being.

Expert 1:

I always do the welcome event for our new colleagues. And this always goes down really well. I often get questions about it afterwards. The topic of acronyms is important in the world of final repository.

PM:

Oh yes, I can well imagine that.

Expert 1:

Exactly. I search for an acronym and here it is. And I always get a translation first. I know roughly what it's about. And if it works, I might end up here in the project description that refers to the project. That's helpful for familiarizing yourself with the subject matter. So, I don't know, are you familiar with EnArgus?

PM:

No.

Expert 1:

It's always good to know. If you're looking for research projects, you can find all the important information here. And here you can see that you always get a reference to the published final report. Then I'll go back. Yes, so you can see from the headings what else is exciting, namely the BGE's research/development/demonstration projects. This is one of the latest to be published. I can also show you MindManager again, because here you always see the HTML version, which cannot be changed, and we then change it in the background with MindManager and upload it again as HTML.

PM:

Yes, we can take another quick look at it.

Expert 1:

Here's the content—as you can see, the structure is always the same. And this is about the most important research projects at the sites over the last 50 years. This is particularly exciting internally, of course, with regard to Asse. Because of the current situation at Asse. I don't know if you saw these headlines six weeks ago. Der Spiegel ran the headline: "Asse is flooding." Pretty bad.

PM:

Yes, it was discussed in some newspapers, and as a result, the topic of interim storage and the final repository has come up again in public discourse.

Expert 1:

Exactly. Yes, and for anyone who wants to get an idea of the situation, just to get an overview, the Knowledge maps are really helpful because it's a very broad field. And here you can see this structure again and again. You have a chronicle here, i.e., the most important information about the facilities and the corresponding work related to the facilities. And here again is the EnArgus link. And now I would like to switch over and show you the backend, so to speak.

This is what the backend of MindManager looks like. You really get a solution for everything. [The selection] is huge. And we have a template. [Expert 3] created a template so that we can work consistently. That's important, because otherwise you get bogged down in what you want to show at the front. That's why it was a great, great thing. And if you want to set up a new one now... Well, I can only recommend that if you have the time and inclination, go to the MindManager website and maybe take a look at a tutorial to get an idea of how it works. [A new page is set up] And here you can just write in it, then upload images, links, contact cards. It also has an interface to Outlook. It's really very versatile for individuals and for project groups.

PM:

Is the software from Microsoft, because the whole user interface looks so much like Office?

Expert 1:

Exactly, it looks like Office, but I can't think of anything right now...

Expert 3:

Corel—but isn't that all Microsoft too, in a way?

Expert 1:

It's Microsoft, but they're pretty old. They've just changed, but I can't remember what it is right now. In any case, it's absolutely intuitive. For anyone who works with Microsoft, who works with Word, it's really easy to learn. It's important to think about what you actually want to present beforehand. If you just jump in, you might end up getting completely bogged down. But it's nice to take a look at it. We can highly recommend it. I just remembered, [Expert 3], regarding knowledge maps, could I show you the micro-learnings again?

Expert 3:

Yes, of course, exactly. And since you just mentioned it: Of course, one aspect of the maps was the visual appearance. How familiar is the interface? That was also one aspect that led us to say: OK, we'll go with this software. There are various others, but this one somehow grabs you at first glance and you can find your way around it reasonably well. That's the point, and the other thing [Expert 1] just mentioned: the good thing about the maps is that you can move everything around however you want. That means you start, then realize, "Ah, somehow I've gone the wrong way," and then you can reorganize everything again. So it's a good tool for organizing your thoughts or brainstorming or developing ideas. It works really well in that regard.

Expert 1:

We have just launched the micro-learning section. [Expert 3] started it because we were getting more and more questions about how to use iFinder, and they were all quite similar, so he thought he would put together something that would allow people to learn how to use iFinder more easily in about three minutes. And he did that using MindManager [a new Knowledge map is shown]. As you can see, it looks completely different. It's basically structured like a puzzle. How do you find better hits?

PM:

That's nicely done. Yes, nice idea.

Expert 1:

Yes, I wanted to show that again. And that's also possible with MindManager, which is really exciting.

Expert 3:

Yes, or project planning. What's it called—Gantt, is that the right term I'm looking for?

PM:

Yes, Gantt charts.

Expert 3:

Exactly. You can also enter everything with deadlines and resources, i.e. when you're talking about people. Or how time-consuming is it? Well, it's a great thing, you can get to grips with it quite quickly. And yes, I think it's relatively new at BGE. I don't know who else at BGE is working with it. There are probably a few, but we don't have an overview of that. But we always promote it ourselves, of course. And even when we show up somewhere and present it, we always get good feedback that it's a great tool for presenting complex content.

PM:

I have a question about Knowledge maps. They refer to documents, for example. So ultimately, they are a kind of collection where you can find the right links. I have looked at research approaches where Knowledge maps are also created in a very person-specific way. Let me give you an example. This is the only practical example I know of. I don't know if this also plays a role in your field. In many consulting firms, for example, each employee has a kind of personal Knowledge map about themselves, where they show the areas in which they have knowledge and what they have worked on. This is available for every employee, so to speak, and is stored in a large database, giving the consulting firms a very large pool of knowledge. When new projects come up, they can do a targeted search using the profiles of individual employees. If they are interested in, I don't know, perhaps the automotive industry in China, then the two or three people who are at the top of the list will be contacted. And they know that if they ask them, they are the experts in this field. Does something like this also play a role for you, i.e., breaking down this Knowledge maps concept to an individual person?

Expert 1:

We have something here called "Experience Exchange Building Materials." It's a kind of interest group within the BGE. It's a kind of microform. We are currently developing a competence database with exactly this background. And Knowledge maps are basically nothing more than databases—relational data that is linked together. We want to do it via a graph database at the moment because there are so many people involved. The competence database is a demonstrator. I could show you something there. So thank you for the suggestion with the Knowledge maps. It's basically very similar. The graph then forms clusters, i.e., it shows clusters in the BGE of competence in a specific area. That is our goal, so that it is easy to find out: Where are things here? Where are we lacking competence, or where do we have a lot of it? That is exactly the direction we are heading in right now.

PM:

When it comes to maintaining such a competence database, every employee would have to do it for themselves. Who provides the incentives for this to happen? Because otherwise, as an employee, I have no way of knowing whether the overall competence database is complete or not. So how do you want to ensure that when you provide such a tool, it is actually maintained? Let's compare it to iFinder – that's a service that anyone can easily access. But you feed the platform with data or integrate this data. With skills databases, it would be exactly the opposite principle, because these can only be maintained by the employees themselves.

Expert 1:

That would be part of the onboarding process. It's a fundamental part of hiring and onboarding at BGE. Basically, this demand for perfection can sometimes be very hindering. Everyone can fill in the most important data from Active Directory, the rest—i.e., this central data—and the competencies in consultation with others. It simply has to be voluntary, otherwise it will never work. Some people want to disclose information, others prefer not to. Then you have to...

Expert 4:

Yes, sorry to interrupt. We saw in the survey and also in the workshop that there is a real need among employees. We do it this way: all the basic data is imported from Active Directory. We conducted a survey at BGE to find out what we should focus on in order to have a practical work assignment. Afterwards, we held this workshop again. And this skills database was a very, very big topic. That's why we think it's really interesting. Of course, we'll never be able to get all employees on board.

PM:

Yes, that sounds logical. It has to be voluntary. If you try to impose it somehow, it won't work...

Expert 1:

... and also diversity. If you look at this, you can see the diversity of our more than 2,000 people here with very different backgrounds. They work underground, above ground, they are electricians, engineers, geoscientists, social scientists, psychologists. Getting all of that under one roof... You just have to try to build a foundation. And then, over time, knowledge management as such develops from that. It's not something that can simply be imposed on people. It takes years for it to gain acceptance. And it always has to be supported by management. That's really fundamental. And with this skills database, we will be able to firmly establish knowledge management in the medium term, so that people realize it benefits them. For example, I recently met someone by chance—it turned out that we both like working with databases. We're meeting up soon and I'll give him a little introduction. With the skills database, you could have simply asked, "Who here in the company knows Access, can I talk to them?" And that would be real added value for the employee. This facilitates knowledge exchange, which is precisely our core task.

PM:

Yes, that's a great example. Especially because it enables knowledge exchange on a very individual level. As an employee, you can decide for yourself and find someone else with low barriers to entry.

Expert 1:

Right. Yes, that's the background. Are there any other questions, including from colleagues, or any suggestions for what else I should show? Can I offer you anything else, Mr. Mosler?

PM:

Let me think about that. I think I have a good understanding of MindManager as a technology. I find the development of this skills database very interesting. My research is also moving in this direction. Conceptually, you can distinguish between an employee-related knowledge map and an organizational knowledge map, even if the primary focus here is on skills. Of course, it is a bit simplistic to say that this organizational knowledge map is simply the sum of the employees' knowledge maps. But the differences between these knowledge maps alone give rise to exciting use cases. An organization could identify what knowledge individual employees have that others do not yet have. Conversely, employees themselves would have the opportunity to identify knowledge gaps by comparing their individual knowledge maps with the organizational knowledge map. These are also thoughts that go through my mind a lot. What you just presented with the skills database is exactly along these lines. And with graph databases, you are of course at the cutting edge.

Expert 1:

Yes, because you can map these data sets in a completely different way. If you look [shows a new Knowledge map]... the BGE's participation in committees. Basically, this is really just a database, only fancy. And if you take that as a basis—you can create graphs from this data. So, because you said you still needed to think about it. I can tell you that you have to delve a little into this world, because you have to visualize the information somehow and make it visible in an accessible way. That's a very important consideration. If we can exchange ideas while you're working on it, that will certainly be beneficial for us as well.

PM:

OK, great.

Expert 1:

Well, I guess that's it for me.

PM:

Yes, thank you for what you've shown me so far. And I think it's back to me now.

Expert 3:

And [Expert 1], thank you for your very stimulating and informative presentation of the documents. I think we've already given Mr. Mosler quite a bit to work with. And I agree with Mr. Mosler that the professional competence database and its future development will certainly continue to be a focus of our work in the future.