Interview with the head of the Digitalization (Building Information Modeling) group at the *Bundesgesellschaft für Endlagerung* (BGE) (August 13, 2024)
Length: 1:25h

PM:

What are your duties and responsibilities at BGE, and how are you positioned in the field of BIM?

Expert:

I am the head of the Digitalization Group, and one aspect of digitalization is the introduction of Building Information Modeling at BGE, which we have been doing for four years now. If you look at it from a traditional textbook perspective, my group is the one that takes care of strategic BIM management.

PM:

What does "strategic BIM management" mean? What are the issues you deal with?

Expert:

We are not involved in the operational aspects of the projects as BIM managers, but are essentially responsible for ensuring that the relevant guidelines and templates are created. At the beginning, however, we were also heavily involved in the projects in order to understand what it was all about. We realized that we, as the BGE, needed to cooperate more closely with the contractors because we recognized that cooperation between the contractor and the client is important. That's why we hired coaches to coach this team in how to work together.

PM:

What does BIM mean to you?

Expert:

BIM is essentially a communication method. It attempts to promote communication between those involved by standardizing activities in the project and standardizing information via file formats, i.e., by enforcing communication through standards. From my perspective, that is the essence of BIM.

PM:

And do you think that this perspective has already been adopted by the BGE?

Expert:

No.

PM:

In what way not?

Expert:

Even though people constantly talk about BIM serving to support communication and that it's all about the parties involved working together effectively, the focus is always on the creation of 3D models. And once something has been created in 3D, everyone is satisfied. Whether this contributes to achieving better quality is not really emphasized.

PM:

You said that you are not the future BIM managers. But where in your area of responsibility is BIM used?

Expert:

Currently, mainly on the Asse project. There, the entire retrieval planning is tendered with BIM, quite classically with AIA and BAP. All contracts concluded there are tendered according to this procedure. In principle, it is a factory building, but we also have conventional structures on the site, such as an office building. And BIM is also used there.

PM:

What about the Konrad repository? Are there already considerations for BIM preliminary planning?

Expert:

The challenge here is that the implementation planning has already been completed. This means that at critical points, the implementation planning is converted to 3D and planned in parallel in order to identify possible quality defects at an early stage before pouring steel and concrete. So the implementation planning has been completed for some time now.

PM:

Wasn't that done with BIM?

Expert:

No, nothing at all was done with BIM. As I said, BIM is used selectively at critical points and also underground, where we do our own planning. So you do 3D planning and coordinate the models with the various parties involved. This is not classic BIM with a contractor-client relationship, AIA and BAP and so on, but rather you work individually between the parties involved according to the principle.

PM:

And that means a "Konrad BIM," both above ground and underground?

Expert:

Neither. Except at these critical points, it is done from time to time both above ground and underground. As BGE, we are responsible for the planning and execution underground. Above ground, it is more or less conventional construction companies that build the facilities there. It occurs to me now that the shaft hoisting system being built by [name of company] uses BIM internally without us having commissioned it. They said it would be a good idea to model it in 3D and coordinate the models with our subcontractors ( ). And in some cases, issue management is also carried out there according to the BIM philosophy.

PM:

So also with BCF?

Expert:

Yes.

PM:

Are there plans to use BIM models for the operational phase as well, under the heading of "digital twin"?

Expert:

There are no concrete plans. Individual participants naturally have ideas about how this could be used further, but there is no overarching strategy or anything that says we will continue to use these models in this way in the future and enrich them with live operating data. I only understand Digital Twin as such if sensor data or active machine data is actually displayed live in a productive manner. And I don't see that happening.

PM:

There are also distinctions. "Digital twin" is really the twin. Then there are terms like "digital shadow," which is, so to speak, the shadow of reality; it can be delayed. How closely do you adhere to standards and norms, or, to ask a counter question, how pragmatic do you have to be and perhaps disregard certain definitions or regulations related to BIM?

Expert:

Basically, we try to adhere to standards and norms, if only for the sake of argument with BIM stakeholders. We have also said that the BIM master plan is binding for us. We want to move beyond the discussion of which use cases we should implement and where, or whether it is worthwhile. That is why the management has decided that we consider the federal government's BIM master plan to be binding, and we will therefore implement all use cases in the new projects that are to be launched. That will put an end to the discussion. As for the standards we adhere to: Ultimately, it's simply a matter of agreeing on IFC, ideally 4.3. Of course, colleagues in ongoing projects will come along and say, "But our program can only do 2.3," but that's just the way it is, and you can work with it.

PM:

There is backward compatibility between IFC 4 and 2, so everything that is in 2 is also in 4.

Expert:

Yes. Now, as the client, you could stand up and say, "No, we agreed on this contractually, so this is how we're going to do it." That doesn't really help, so we're taking a pragmatic approach.

PM:

You've already highlighted IFC. Are there any other standards or other things from the BIM world that are particularly important to you and that you adhere to?

Expert:

Ultimately, DIN 19650 is the one that is always referred to when the question arises, "You haven't defined anything, we don't know any of this." If you look there, it's defined. Or if colleagues say something isn't fixed, you can also look in VDI sheets 2552 to see how to do it. Again, it serves as support for arguments, rather than actually looking at it in practical terms and saying, "This is how it's specified, this is how we do it."

PM:

So it's more for internal communication, so that you can refer to it.

Expert:

Yes.

PM:

When it comes to BIM, many people think it's just 3D, i.e., pure geometry. But there are other dimensions too: 4D with time, 5D with costs, and from 6D onwards it gets a bit nebulous, involving aspects such as sustainability and CO2. Is everything that goes beyond BIM 3D relevant to you?

Expert:

We would like to have the dates included in the buildings. It doesn't have to be at the element level, but rather very roughly: when will which building be completed, when will which area be used for what purpose. That's what's interesting to us. There are always different players who do something individually and then display it in Navisworks, for example. But that's not what the BIM idea is, because then only individuals who have Navisworks installed or who know how to use it can see it. That's why our goal is to have a 4D viewer in the medium term that is accessible to all participants via a web interface. That's actually what causes us the most problems or raises the most questions. That's why we want to do 4D. We haven't addressed the issue of costs yet.

PM:

And what about issues such as sustainability and the environment, which are labeled 6D or 7D?

Expert:

Basically, this is not yet relevant in the service phases we are currently in for the buildings.

PM:

We had already discussed [in a preliminary meeting] that, in your view, it would be desirable to be able to map certain business processes or process knowledge such as logistics, transport, materials, material flows, energy, and knowledge. Can you explain that in more detail? Where does this requirement come from and what is the current status?

Expert:

The current status remains unchanged: we do not have a methodology that enables us to record these requirements in a structured manner in the early project phases and then make them available to all parties involved in a systematically standardized manner in accordance with the BIM methodology, so that all project participants do so in the same way. When I talk about mass flows, what I mean is that as the project progresses, we have different quantities and mass flows on site, and to our knowledge, it is not possible to use a static BIM model to map when which mass flows occur and whether the available capacities are sufficient. The same applies to the actual production process. In principle, we are building a factory with a logistics process. We transport things from A to B. Such dynamic processes cannot be represented or modeled with an IFC model. Other models or languages are better suited for this, and we have not yet figured out how to combine them. This is because BIM can only be used effectively once concepts and system designs are complete and the actual development of the physical components begins. Before that, it is done somehow. Everyone does it individually, the way they have always done it. And this results in corresponding problems in the project when there are different parties involved, each implementing sub-projects.

PM:

Why do you say it would be nice to map this? There are also many who don't use BIM 100%, but just say, "We use BIM to create a model together with other trades, but as soon as it goes to the construction site, paper plans are printed again anyway. You can pull that out of BIM. But the whole logistics side is the domain of the construction company, so we'll just let them get on with it." Why do you say that quantity and mass flows should also be handled by BIM in your company?

Expert:

Because we're not talking about when which concrete mixer is driving around, but we're building a mine and transporting corresponding masses of salt and rock around, which is an essential process and also affects essential resources such as a shaft hoisting system. This means that we have an influence from the construction process to the facilities we are planning and have corresponding interactions. So this is not a classic logistics process, as required for a construction site, but rather something a little broader in scope.

PM:

There are various higher-level management processes that can be mapped with BIM. I'll start with the first point, keyword "design knowledge management." This is also something that is always emphasized by the IAEA in nuclear facilities. Especially when it comes to the later phases such as operation and, even more so, decommissioning. Does it make sense to know what the planner, designer, plant engineer, or whoever else had in mind when creating plans or 3D models? Does it matter to you to not only request the geometry, but also the reasoning behind it, so to speak, "why is the pipe there, why is that particular plant there?"

Expert:

Yes, of course. This is then written up in reports. So for every plan, there is an explanatory report on why something was done in a certain way, what was weighed up against what, and why the decision was made to do it that way.

PM:

What is the scope of these explanatory reports? Are they relatively short and concise and broken down by component, or are they more like prose?

Expert:

It's prose. The explanatory report for the waste treatment plant is 120 pages long. That's the concept, in—I believe—service phase 2, which describes how it's supposed to work. Part of the problem is that it's written in prose, and you have to make sure that it's consistent with what you're planning to do going forward.

PM:

Sure, because as soon as a model is further developed, the explanatory report would also have to be supplemented step by step.

Expert:

Yes, or you have to see if you make changes in the further design and discuss together that this will be changed. The risk is that you assume things that you once conceived are fixed and simply stick with them without double-checking whether this specification is actually as fixed as we assume. To do this, you would have to look at the report and say whether the conditions have changed in the meantime, whether we can make something smaller, larger, or whatever. Then we no longer have to be so strict. As you become smarter and gain new insights as you go along, there are continuous developments that then have repeated interactions between design and requirements. BIM does not reflect this at all.

PM:

Sure, BIM is just geometry and pure semantics, but the reasoning and expertise that went into it cannot be accurately reflected. This is also related to the second point I wrote down: configuration management. There are three sides to this. First: What was required, e.g., based on tenders, what should actually be there? Then you have documents, e.g., explanatory reports, which state or claim what is there. And finally, the physical component: What is actually there? How do you approach this triangle?

Expert:

You manually ensure that this triangle maintains its edges. We do not have any networking of information between each other.

PM:

Does that mean that a person sits down and checks whether the planning fits? It would have to be ensured from time to time that everything is in proportion to each other.

Expert:

In principle, this is the expertise that our colleagues on site have. They need to know what is in the reports and design specifications and what is being planned. This can be done this way, but there are also better methods.

PM:

What would be some better methods?

Expert:

It's called "systems engineering." Not system development, i.e., the development of individual components, but systems engineering, as in the interdisciplinary development of systems. This takes into account that these things fit together. It is described in ISO 15288, and there is also "model-based systems engineering," MBSE. In my opinion, this is actually the appropriate methodology for designing such systems.

PM:

At first glance, that sounds much more overarching than BIM to me.

Expert:

ISO 15288 is called "Systems and Software Engineering" [full title: ISO/IEC 15288 Systems and software engineering — System life cycle processes]. Software has actually been developed according to these principles for a very long time. Software has always been viewed as a system that must be developed in an interdisciplinary manner, taking a holistic approach. Not just a piece of software, but with its entire context and everything that goes with it. And that is described in the processes, first as technical management processes, which include project management, but also the technical processes, which are also familiar from the V-model. And the V-model is described in ISO with the surrounding processes. There is a language for this, "SysML," which previously had the problem that it was based on UML. And if you create a UML model in one modeling tool, you can't use it in another [tool]. That's why the language was further developed, and SysML 2.0 was completely redesigned from scratch and is purely text-based. In the end, text comes out, but you can display the models with the corresponding information in different programs.

PM:

There are a large number of UML diagrams, and the UML definition is several hundred pages long. It specifies what must be included in each UML diagram. Is it similar with SysML? I find it surprising that everything is text-based, because UML relies heavily on pictograms and graphics.

Expert:

Yes, of course. In SysML 2.0, there are nine diagrams that represent the state once, and then you continue to draw as you would in UML. But under the hood, it is defined in such a way that you can open it in another program in exactly the same way. So it's not like Visio, for example, which is object-based . In SysML, you model objects by drawing them. But you can also write them if you want. You can also simply write a class diagram as text. And I see great potential in the combination of SysML 2.0 and IFC, which allows you to link the information together.

PM:

Is that your idea, or is it actually something that is being worked on?

Expert:

Of course, it's my idea, but research is now being done on it. There are various initiatives addressing this. A research program is currently being launched at the University of Applied Sciences in Salzburg, but there are also operational companies using it with the help of INCOSE. INCOSE is an association, the International Committee of Systems Engineering, which is collaborating with Cargo sous terrain [CST] in Switzerland. Switzerland wants to connect its cities with cargo tunnels and has decided to use BIM because it's "cool." Then they realized that it wasn't far-reaching enough and didn't start early enough, so they thought about combining it with systems engineering. To do this, they brought in their colleagues from INCOSE to work on it. They are actively working on it.

PM:

I would like to move on to the third selected management process, namely handover and turnover processes. I don't know to what extent this is relevant to final repositories, but at least in the case of nuclear power plants, it's about the operator receiving information from those who design it. Those who dismantle it are yet another group. There are always turnover processes, which are usually associated with a technological break. How is that in your case? Is this also a risk for final repositories?

Expert:

Exactly the same. In the case of Konrad in particular, there are still a few years to go, but you will have exactly the same problem there.

PM:

Why? Everything is still under the umbrella of the BGE.

Expert:

Yes, but everything is still documented in documents. These are not well suited for transfer to IT systems and structured handling.

PM:

Where do you see a risk of a particularly large amount of information being lost in handover/turnover processes?

Expert:

I don't even think that information is lost. It's just an immense amount of manual effort to transfer the information from the documents to the actual CMMS systems, i.e., "Computerized Maintenance Management Systems." You have to create the assets, components, and systems as corresponding elements—e.g., equipment and functional locations—in SAP. And to do that, you also have to create the corresponding maintenance information. You have to read that out of the manual and transfer it.

PM:

And couldn't that be exported from the BIM model so that you at least have a list of these components?

Expert:

If you had a BIM model, you could at least assign the corresponding components, systems, and objects an operating resource identifier so that you could extract them there. Then you would have the equipment and functional locations. What I don't know is whether maintenance information can be attached to these elements in a structured way, as is attempted in COBie [Construction Operations Building Information Exchange]. This is a facility management format, but it is not sufficient for storing maintenance information for complex or complicated technical systems.

PM:

I understand. So you're saying that when it enters the operational phase, there's a break where this information would have to be mirrored, but it's difficult to do that within BIM, so you also have to involve SAP and CMMS.

Expert:

This then goes further, in that spare parts and the criticality of the systems would also have to be stored somewhere so that you can deduce how many spare parts you need for your systems. What is designed to be redundant? How long does this redundancy last? Where should you perhaps also store spare parts, wear parts, and so on? This can be collected in a structured way. However, I don't see the structure for this in the IFC. Even if the IFC model could do this, I don't know of any software that supports planners in storing and recording this information there.

PM:

That's more in the realm of margin management. But I've never seen that done in combination with BIM either. In the context of nuclear facilities, are there any circumstances arising from nuclear technology, such as radioactive radiation, activation, and safety, that you think are difficult to reconcile or map with BIM?

Expert:

I don't know enough about that, and I haven't seen anyone yet who has said, "Oh, that's cool." We once talked to the Radiation protection people, who, when it came to the operation of Konrad, said that measured information such as dosimetry, local dose rate, or mobile elements could be located in the BIM model. At first, they thought that was pretty cool, but when they thought about it further and considered how it would help them, they couldn't really come to a conclusion. We then prioritized different ideas and that fell by the wayside. The possibility of visualizing such information in an as-built model is no longer being considered because our colleagues didn't find it helpful.

PM:

Is it just about visualization? Or would it be desirable during planning to represent radiation as a BIM object, perhaps in relation to a room?

Expert:

The things we plan don't emit radiation, but the things that are supplied to us do, so Radiation protection has to be taken into account. And as I understand it, this is rather static. We have the requirement that this element may only be permeable to a certain extent and is then constructed accordingly in concrete.

PM:

That sounds logical to me. In the pure building structure, there is nothing at first; it only comes in later. The question only arises later. This ties in with what you said at the beginning, that there are no concrete plans to use BIM for the operational phase as well. And then you would have to think about a lot of things. Because all the waste that comes in emits radiation, but you don't have to deal with that during planning and construction.

Expert:

Yes. Does it help to have an inventory via a BIM model? I don't know. It sounds nice at first, but does it help with anything? Maybe back to the beginning: What is BIM for us? Another very important aspect is that we want to make decisions based on valid information and less on gut feeling. If you visualize the inventory in 3D and have the relevant information accessible there, the question is what decisions you still want to make. Why do you need the information? And how does it help you that it is available in 3D or that it is easy to navigate?

PM:

It may be advantageous, especially when storage is complete and the shaft is sealed, to be able to say where the radioactive inventory is spatially distributed. Of course, there are also documents...

Expert:

Wait a minute, we know exactly where each container is located. We know exactly where it came from, what number it has, and what's inside. But we don't want to take it out again; this isn't a transshipment facility.

PM:

But when it comes to theoretical questions such as retrievability, if you want to do something with BIM again, it might make sense to have this information included.

Expert:

If someone makes the decision to retrieve it, then you can assign three people to transfer this documentation.

PM:

Yes, you can still do that afterwards.

Expert:

Yes, if you have the problem, then you solve it.

PM:

What level of detail are you aiming for? There are different levels of detail, levels of geometry, and levels of information. How detailed does it need to be for you in terms of BIM?

Expert:

We try to use sample images to guide us through these levels of detail. Ultimately, it makes no difference whether I do this in 2D or 3D. The level of detail must always be such that the subsequent service or operating phase has the information it needs. You can try to provide a little guidance, e.g., help the designer not to include too much information. You don't need it in the next service phase, or it will change, so it's better to keep it rough. But sometimes a lot of attributes from standard libraries are included, and then the model is already cluttered. We have taken [the levels of detail] from various documents and consultants. We have not yet looked closely at how level of detail, level of geometry, and level of information could be more helpful. The point is that, as operators and builders, we are not the ones who ultimately have to do the implementation planning and carry out the implementation. We tend not to be interested in quantities, masses, and so on. Of course, having this information in the model helps those who have to do the quantity calculation afterwards, but as builders, we are not interested in that at first.

PM:

What about the integration of legacy data? Especially considering that you are also confronted with conventional plans in BIM processes and, in selected cases, plan redundantly. Are there any efforts to integrate legacy data and, in general, old plans that were not created with BIM into BIM?

Expert:

The goal is to convert the mine layouts, i.e., the floor plans of our mines, into 3D. This has been in the works for ages. Back then, it wasn't called BIM, but that's where we want to go, to have all our facilities available in 3D. For operations, i.e., everything we already have, we want to have this data as as-built data in IFC format. As I said, ongoing planning is only done in specific cases where we think it could get tricky. We then weigh up the costs and benefits to see if it makes sense. We also weighed up the costs and benefits when we started with a guard building and requested the corresponding modeling. And the sums that came out were so absurd that it was decided that it didn't matter what could go wrong on the construction site. We would always be compensated for that, it couldn't be that expensive. So the gain in quality couldn't outweigh that.

PM:

What other legacy data is there besides floor plans and pit plans?

Expert:

DWGs or PDFs of completely normal structures. We have our own internal surveyors who are responsible for the mine. They regularly perform laser scans, record the pit rooms, and transfer [the data] so that it can be used further.

PM:

What do your PDFs contain? The worst case scenario is always scanned 2D plans. Do you have anything like that, for example for Konrad?

Expert:

For Konrad? No, it's been under construction for a long time, but we have it electronically. We also have the other sites, Asse and Morsleben. There we have plans that are around 100 years old, which we are digitizing.

PM:

We've talked a lot about your internal BIM requirements. What about public relations and areas where visualization is involved in general – perhaps also with virtual reality or augmented reality? Do you already have ideas about what you want to do with your BIM models in a larger context?

Expert:

Yes, our corporate communications department frequently commissions visualizations, and when we have the BIM models for this, they are rendered accordingly using various software programs. Sometimes videos are also created using Unity or Unreal Engine to inform the public about what to expect. And I sometimes get the impression that planners do this to show off, because it's so easy. You put an intern on it, they fiddle around for three hours, and then it looks really cool.

PM:

I find it interesting that you also work with Unity and Unreal. Is that still your responsibility, or is it handed over to the marketing department, which has its own expertise?

Expert:

That's also outsourced. We do have colleagues from the surveying department who like to visualize underground structures, so we also have VR and AR glasses. I always find it a bit difficult to see what the actual added value is. If we come back to the point where we want to make decisions...

PM:

Yes, it might even prolong decisions because you bring in more stakeholders when you say, "Here, take a look." That could perhaps be a weakness. Back to the software. You already mentioned Navisworks. What is your software environment, which CDEs and modeling software do you use?

Expert:

DALUX is the only CDE that can be described as such. Konrad also has a document server that would like to be a CDE, but it's just a document management system. Internally, we use Revit or Civil 3D, as well as software from Bentley and GEOVIA Surpac, which is a block modeling tool. That's what comes to mind off the top of my head. We have a whole range of modeling tools, but these are the ones that are mainly used in this environment.

PM:

Is the software used consistently at the individual locations? For example, do you use Civil 3D for both Asse and Konrad?

Expert:

Currently, it still varies. A project is now underway to consolidate and harmonize everything. After all, it doesn't make sense to use different software for the same things. But until 2019, we were also different companies, and it was only then that we were merged. No one really dared to tackle this issue, because you have to take away something that people actually really like. You have to weigh that up. But the project has started, and we will set up an appropriate domain architecture. This should make it clear which applications are needed for which skills or capabilities within the company.

PM:

We've talked a lot about geometry and other systems, but how much do you take advantage of the fact that you can work with semantics in BIM? For example, for design knowledge management, instead of explanatory reports, you could simply write something in the comment field for each object directly in Revit.

Expert:

No one has come up with the idea of doing that in Revit yet, because those who design the details in Revit are not the ones who do the overall system design. They are different people, which is why it is not done. Design knowledge management. No, unfortunately, that does not exist.

PM:

This was a big topic at the ICONE 2024 conference in Prague for small modular reactors. So far, there are only renderings for these, which look nice. But the fact is that for their 3D planning, even if they no longer call it BIM, the people who plan the plants think about it and write it down and label it as design knowledge management. But it must also be said that this is all hypothetical so far, as there are no actual planned projects yet. That's why they're making a kind of blueprint, and it may be easier to incorporate such design knowledge because it's the same person. That's my theory on the matter. In computer science, "single source of truth" is a well-known principle, also in connection with BIM. How do you see it at your company? Do you apply this principle?

Expert:

That is definitely a very important element. The single source of truth in the projects where we use BIM is the CDE, specifically DALUX. Having all the information in one place is also a fundamental part of the BIM- strategy. There is no exchange via shares, email, or other things we have in our portfolio. DALUX is the single source of truth.

PM:

A final repository is a critical infrastructure. What about security, e.g., against cyberattacks? Do you use BIM differently, do you have to build barriers against it, for example, which is not necessary in normal construction projects?

Expert:

We are, of course, subject to very special, high requirements and must comply with all regulations under the German Atomic Energy Act (Atomgesetz, AtG). For documents, we follow the federal government's classification guidelines. Among the levels of confidentiality, VS-NfD (Confidential, For official use only) is the lowest, and documents classified as such may only be transmitted over the Internet in encrypted form. This means that a CDE is out of the question in principle; you cannot upload a plan to DALUX and visualize it. That is not possible. The tools approved by the BSI are used. These are then plant security aspects, e.g., the specific design of fences, doors, and gates for plants. Or, for example, threat scenarios according to which the plant may be designed. I believe that my colleagues drove to an authority together with the planner, looked at the documents there, and then drove home again.

PM:

Because the data is not allowed to be sent?

Expert:

Because it's close to "top secret." It's about what kind of damage the facility is designed to withstand. Typically, for example, plane crashes, where a distinction is made between accidental crashes and deliberate crashes. And you have to see which part is protected against what. That's not BIM-compatible.

PM:

How much do you work with proprietary file formats? You often mentioned IFC, but of course, when working with Revit or Civil 3D, there is a great temptation to use Autodesk formats in the Autodesk world.

Expert:

Basically, we require our contractors to also provide us with native files, but we use IFC for coordination. We also provide Revit templates at the beginning, for example, to specify the structure as much as possible, but also essentially to have the coordinates correct in the system.

PM:

Oh yes, that's always a problem, I know it well.

Expert:

Yes, that's interesting. No matter what you specify, it never works right away. But I don't understand why it's so difficult. The geologists have tried to explain it to me several times.

PM:

Geologists have their elevation and location, and there are different grids for this, and all software programs handle it very differently. In Revit alone, there are three different zero points: the project base point, Survey point, and internal origin. The software developers simply passed on the problems instead of solving them within the software.

Expert:

That's probably what the specialist user wanted, so they could blame the software developer. *Laughs*

PM:

What do you think the future of BIM holds? Konrad will also be around for decades to come. Will BIM still be around in 50 years?

Expert:

I don't see how it could be any other way. If you understand BIM as a methodology and philosophy that enables different parties to bring their information together, there's no way around it. I can also well imagine that IFC will be further developed as such, but will remain basically as it is. Certainly, more and more information will be linked and it will be possible to manage it better. At some point, it will certainly also be possible to generate models based on requirements. There are already various research projects where ideal office spaces or ideal single-family homes can be easily generated based on framework conditions and requirements. I think this will continue to increase and that IFC is simply a good means of mapping this information. Perhaps at some point it will be possible to model directly in IFC. There are already tools that can do this.

PM:

Of course, IFC is good for exchange, but you would need IFC modeling software for direct editing.

Expert:

You can do that with BlenderBIM [note: now BonsaiBIM, add-on for Blender]. It allows you to model and gives you an IFC model right away. I haven't tried it yet, so I don't know where the problems might lie. But it's still in its infancy.

PM:

I also can't imagine that the IFC format will be scrapped with Building Smart in the background. Maybe in 50 years, the question will arise as to whether Autodesk or Revit will still exist, but you also have a degree of flexibility when it comes to software. Many of the questions you are asking yourselves right now have certainly been asked by others, especially in France, Switzerland, and Finland, where final storage projects are more advanced. I know that BIM is being used or has been used in France and Finland. Is there a cross-border exchange?

Expert:

We are actively exchanging information with our colleagues in Switzerland. We started something with ANDRA in France, but it came to nothing. However, we are in contact with our Swiss colleagues, who have set a very specific goal of being able to implement 4D and 5D at any time, for example. They are also much closer to the costs than we are for our high-level radioactive waste repository, which will come at some point. Interestingly, they are not having experiences that are very different from ours. They also only have the software that we know, and that is what we currently have to work with.

PM:

I would like to come back to the aspect of knowledge management. In our preliminary discussion, you said that knowledge management is more of a theoretical concept and you seemed quite reserved. But looking back on our conversation now, I think there are many things that you said cannot be accommodated very well in BIM and that other concepts need to be considered. There's a lot of knowledge involved that you'd really like to incorporate into BIM, but it needs to be expressed differently. Could you perhaps reiterate where you see the opportunities and limitations of linking BIM and knowledge management?

Expert:

Unfortunately, I only know the definition of knowledge management as practiced by our knowledge management department, and therefore I think that this makes no sense at all... It is also extremely important to keep the knowledge of departing employees available to the company. To this end, interviews are conducted, transcribed, and then stored on a platform where they can be searched for later. But I am skeptical that this will work.

PM:

Do you have a counterproposal?

Expert:

No. I can't take care of everything. *Laughs* Last week, we adopted the strategy for applying machine learning at BGE, and one of our labor director's biggest wishes was that we make the knowledge we have in our documentation system available via appropriate large language models with RAG [Retrieval Augmented Generation].

PM:

That's a lofty goal.

Expert:

I said that's a great idea, you should perhaps demand it—you are the management. They then formulated it and included it in the strategy that we want to do this and will do it. That's definitely more appropriate, because the service descriptions and reports of everything we do there also contain a great deal of knowledge. If we could make that available, that would be great.

PM:

The main thing here is extracting information. Do you think AI can also help with interoperability and not just providing information from a process?

PM:

Could AI help you with BIM management tasks, such as communication? Because if you're doing an LLM, you need to have a database in place. My question is, does AI help with the processes themselves?

Expert:

AI can certainly help to describe services or design systems. It can also ensure the consistency of documents or information in general, check them, and build a glossary. It would certainly help to always use the same words to talk about the same things in a report. But it could also help to build taxonomies and ontologies, or to develop the systems as such and provide support for the designer, acting as a catalyst, so to speak. When it comes to communication in the process itself, I don't know where generative machine learning algorithms could help, except in the formulation of a nasty email or something like that.

PM:

That's definitely a very large field, there's a lot behind it.

Expert:

And so much potential, if only there were reasonable tools! For anything beyond 3D, the tooling is extremely difficult. Packing additional information into a Revit model cannot be the way to go. Here, you have to consider separation of concerns again. In the Revit model, you have the geometry, and you need to be able to enrich this geometric information in another tool. Ideally, this should work bidirectionally. With the Revit model, you can also enrich the model natively. The first thing we want to do is assign dates to objects so that we know when which object needs which space resources. Unfortunately, such a tool does not yet exist. We have to have it developed, which is a bit of a shame. I once saw a 4D web viewer in a demo, but it is not available for purchase.

PM:

I'm not aware of anything like that out of the box either. There may be some research approaches, but they are significantly limited in terms of being able to use them on a large scale as you need them.

PM:

In your opinion, are there any other issues to discuss?

Expert:

In conclusion, I would be delighted if the combination of BIM and systems engineering were to gain more traction in the industry and if more people understood the importance of collecting requirements in a machine-readable format in advance. This is not yet widespread.