Building Blocks for Digital Transformation

2020 Yearbook

cross business architecture lab

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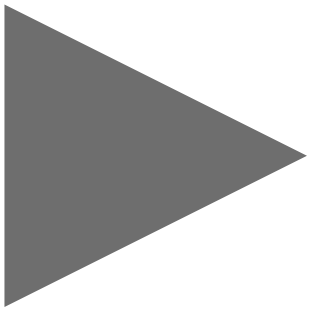
Introduction



Dear Readers,

Welcome to our CBA Lab e. V. Yearbook – 2020! We are now entering the third decade of the new millennium – and half of the Fortune 500 companies from the year 2000 are no longer on the Fortune 500 list. Digitalization is a polarizing force: It strengthens those organizations that are already strong and exposes the weaknesses of those that are weak. Software *is* eating the world. While it's true that structural errors have always been costly to those who make them, the price one pays for them today is much higher. It's a winner-take-all game – and speed holds the key to victory.

To be fast, you need to have flexible structures, which is why the demand for enterprise architecture solutions has increased dramatically, whereby the role played by enterprise architecture itself is changing. For example, enterprise architects no longer sit around waiting for centralized approval while serving as guardians of static organizational development plans. Instead, they have become navigators of transformation who set out with their plans and charts to join decentralized product teams and tribes. At the same time, the use of enterprise architecture solutions is spreading to more and more business sectors and becoming more common in various areas of our lives as digitalization continues unabated. *"EAM is the answer"*, writes Dr. Karsten Schweichhart from Deutsche Telekom in an article of the same name.

Together with our member companies (as demand for enterprise architecture has increased, so too has CBA Lab grown significantly over the last two years), we are shaping and further developing the new role to be played by EAM. The *Next-Level Enterprise Architecture Plan* workstream under the direction of Joachim Schmider from Schaeffler AG is refining the traditional enterprise architecture plan by transforming it into a dynamic tool – a conceptual depiction of a company that can be used by all stakeholders, and

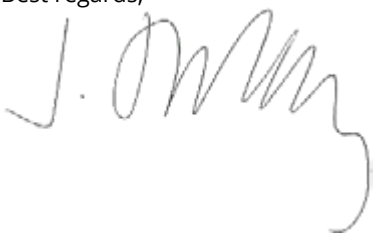
not just IT units, and which can also be effectively applied to the agile management of acceleration and complexity. Our already second workstream on the topic of *Accessible EA*, which was headed by Christian Schwaiger from KUKA, examined the issue of accessibility of structural information and the concept of "architectural thinking" in greater detail, and also developed new approaches that were implemented prototypically within the framework of hackathons. Thomas Schreiner from Fresenius Netcare is using the recently launched *EA Repository Integrations* workstream to examine how a next-level enterprise architecture management system actually interacts in practice with management systems used for other business functions.

Four other workstreams that are also now under way are embedding current digital technologies in their architecture and business contexts. Within the framework of the *Cloud III* workstream, Björn Oestrich from Deutsche Telekom has produced a white paper that focuses on the strategic management of multi-cloud environments. The digital depiction of objects, processes, and interactions plays a decisive role in digital business systems – and the *Digital Twin* workstream led by Dr. Verena Schmidtmann from Detecon has, among other things, designed a reference architecture for such depictions. The *Digital Real Estate* workstream under the direction of Uwe Weber from Detecon demonstrates the practical application of this approach in a sector that began the digital transformation at a relatively late stage of the game. Finally, our *AI* workstream led by Alexander Hauswald from BSH will be producing a white paper that describes the reference architectures, data strategies, and management processes that will help ensure the effective utilization of rapidly expanding AI technologies in business environments.

At the end of this Yearbook, we present to you our current *EAM Training Curriculum* and provide you with information on our annual conference: *EAM – Richtungsgeber für die Digitale Transformation* (*EAM – Pointing the Way Forward for the Digital Transformation)*.

I hope you enjoy reading our Yearbook, and that it provides you with both useful information and valuable ideas.

Best regards,



Dr. Johannes Helbig
Chairman of the Board
Cross-Business-Architecture Lab e. V.

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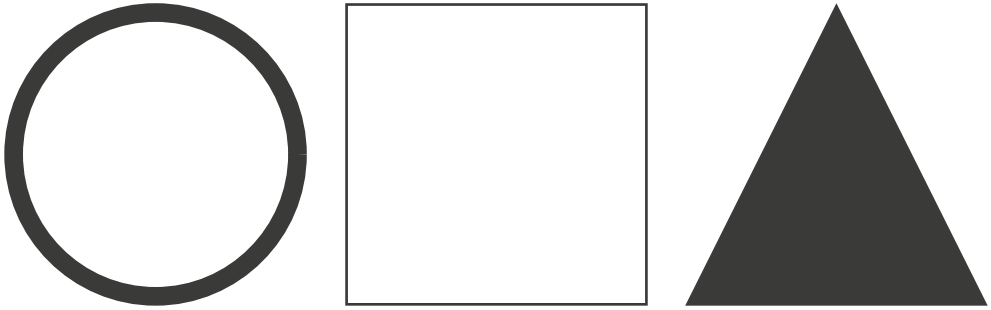


EAM is the answer

Dr. Karsten Schweichhart

EAM is the answer – but what is the question? "42" was stated to be the answer by Douglas Adams in his famous book, "The Hitchhiker's Guide to the Galaxy" – but this no longer applies. The megatrend of digitalization has now truly penetrated into all areas of business and society, and even nature and the environment. It is becoming increasingly difficult to find any exceptions to this development, now that the Internet of Things (IoT) and artificial intelligence (AI) have made their way into environments that had previously remained "undigitalized."

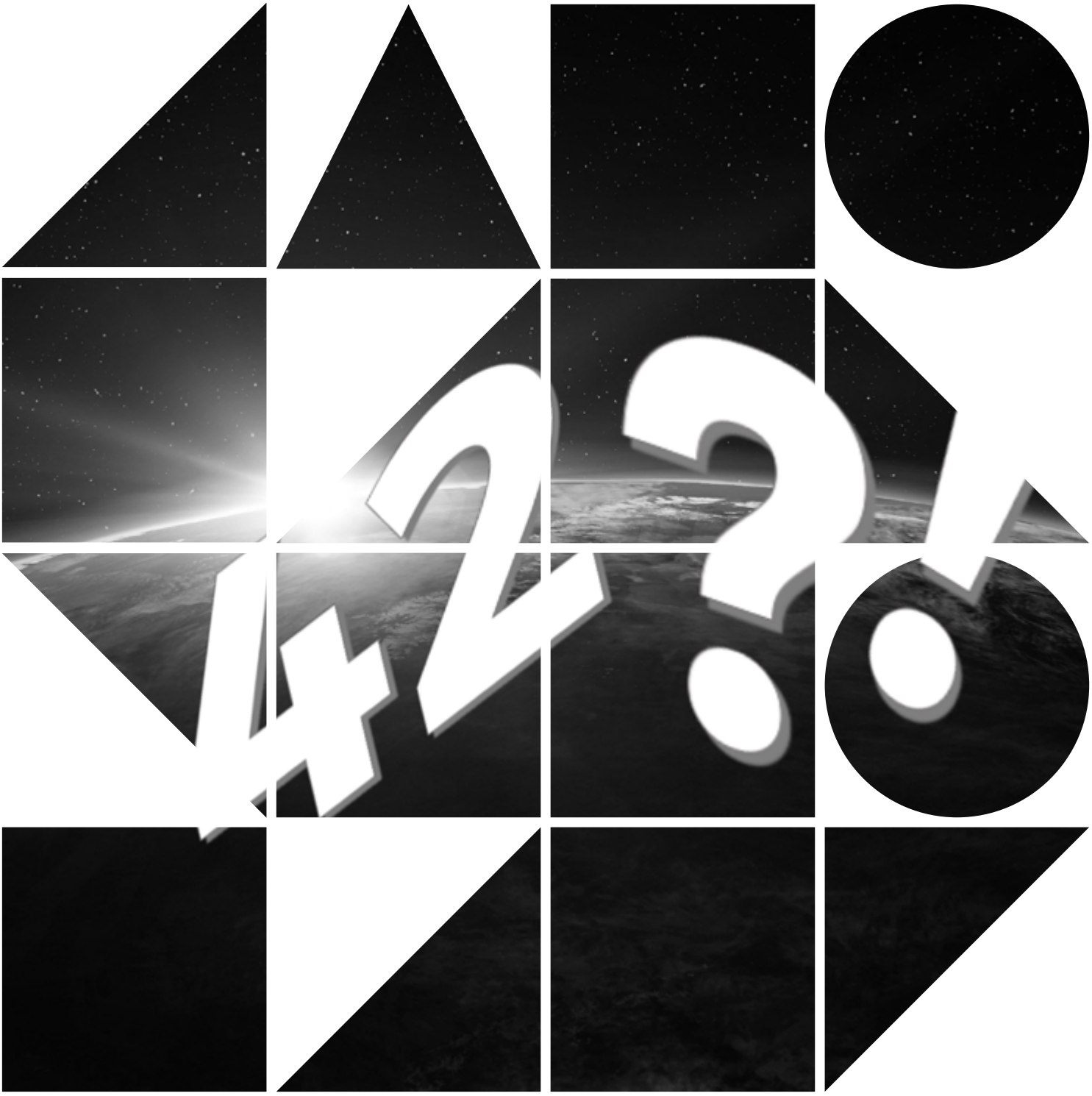
So again, what is the question? Well, there is another question from popular culture: This one is "What is the matrix," and it does in fact take us much closer to the truth. The digitalization of virtually all areas of life stratifies complex relationships that increasingly seem difficult to manage, while at the same time necessitating structures in places where none existed before, or in areas where such structures never needed to be considered. Examples here include factories, buildings, and the Gaia-X project.

Factories, Industry 4.0: Germany's "Plattform Industrie 4.0" brings together the mechanical engineering, automation, and electrical industries in an effort to exploit IT and data as a means of shaping the creation of digital ecosystems. Here, the deterministic levels of design utilized by operation technology engineers are linked with the loosely coupled design levels used by information technology specialists. Enterprise architecture levels have in fact already been incorporated into the RAMI 4.0 common reference architecture model. In addition, more and more manufacturing companies are now creating new EA departments. Industry is well on its way to establishing enterprise architecture as an additional engineering discipline.

Buildings and smart buildings: The creation of digital twins for buildings has now become a reality in some cases, and this trend is growing. Building planning, construction, operation, and demolition – all of these activities can now be performed with, and mirrored by, digital systems. Applications here are often limited to specific trades at the moment, but interconnections are increasing. Data is being created nearly everywhere and you could almost say that today's buildings are two parts cement and one part sensors. The EA data level focuses on building information modeling (BIM). However, a unifying general overview – an EA reference architecture specifically for buildings themselves – still does not exist.

Cities and smart cities: If you take a group of buildings and add the factories from the first example, you end up with a city. Municipal authorities then provide infrastructure, roads, public transport, energy, and water. All of these things are digitalized – and even the people who live in cities are "digital" because of the smartphones they use. In addition, all cities continue to move ahead with digital projects. Various types of associations exist in which people exchange information and ideas, and a range of overarching initiatives have been launched for specific issues, one example being Germany's National Platform Future of Mobility. Still, no typical EA solution (such as a reference architecture for cities) exists that would allow things to get off to a flying start. And do cities even have enterprise architects?

Schools, Germany's "Digital Pact" for schools: Funding is being made available for the official purpose of "the digitalization of schools." Forgetting the educational side of the equation for a moment, the fact is that each school is left to itself to manage the technical implementation itself. Devices? Networks?


42

Dr. Karsten Schweichhart
Member of the Board, Press and Communications

Applied EAM is the answer to all questions relating to structure, focus, and guidance in the realm of digitalization.

The cloud? ID management? Security? There is no EA framework architecture here, which also means no guide exists as to how funds can be utilized quickly and efficiently in order to ensure that suitable technologies are “easily” made available for educational purposes. Some associations, including CBA Lab, are addressing these problems at the local level. In any case, we plan to develop and present a reference architecture for schools.

Gaia-X: This initiative launched by the German Federal Government and German industry to establish “European digital sovereignty” can only be welcomed by those who view data and digitalization as the key factors for economic success in this century. The establishment of such digital sovereignty can perhaps be compared to the electrification of all aspects of life in the 20th century. Along with the various political and economic issues that need to be considered, the key question here is how is all of this to work? Providing the answer to this question will be the defining moment for experienced enterprise architects – the five-star chefs of enterprise management, so to speak. In other words, Gaia-X needs EA.

It should be clear by now that all of these digitalization activities do in fact raise questions that can actually be answered using EAM methods and structures, or at the very least EAM can help answer these questions in a more simplified and structured manner. It is also clear that EAM as a discipline is generally utilized only to a limited extent in most areas.

CBA Lab is strongly committed to pointing the way toward new applications for enterprise architecture – with this Yearbook and its content, and with training programs that develop the EA skills that are still so rarely found these days. Applied EAM is the answer to all questions relating to structure, focus, and guidance in the realm of digitalization. It is also worth noting that one of the hallmarks of CBA Lab is that it not only brings together the most diverse business sectors but also continues to attract new members and move ahead with the restructuring of EAM systems, whereby our focus in 2019 was on industrial production. Why not become part of the answer as well – by joining us

as a new member!

Workstream:
"Next-Level Enterprise Architecture Plan"

Dynamic tool for the companies of the future

Enterprise architecture is now playing a much more important role in supporting innovation at digitalized companies by providing valuable input and advice. At the same time, new instruments are needed in order to ensure the continued effectiveness of enterprise architecture approaches. The Next-Level Enterprise Architecture Plan presented here represents such a dynamic and collaborative instrument that can be used by both business stakeholders and enterprise IT departments. The Next-Level Enterprise Architecture Plan offers a complete conceptual depiction of the context within which a business organization operates. In other words, it involves a lot more than just IT. Among other things, it describes the essential connections and relationships between a company's business, its organization, its IT systems, and its data.

"The purpose of the Next-Level Enterprise Architecture Plan is to offer all relevant stakeholders – for example the CIO, CEO, and the portfolio manager – a common knowledge and information platform that reflects their respective points of view and can be clearly understood by everyone," says Joachim Schmider, Coordinator of the Next-Level Enterprise Architecture Plan workstream and also Head of Enterprise Architecture at the automotive supplier Schaeffler AG. To make things a little clearer, Schmider uses the analogy of an architectural drawing of a residential building: The bricklayer looks at the plans in order to find out which bricks need to be laid where, the electrician needs to know the setup for the cable and wiring ducts, and the client looks at the drawing to decide which rooms he or she would like to use for which purposes. "Nevertheless, everyone looks at the same drawing, or at a certain section of the same drawing," Schmider explains.

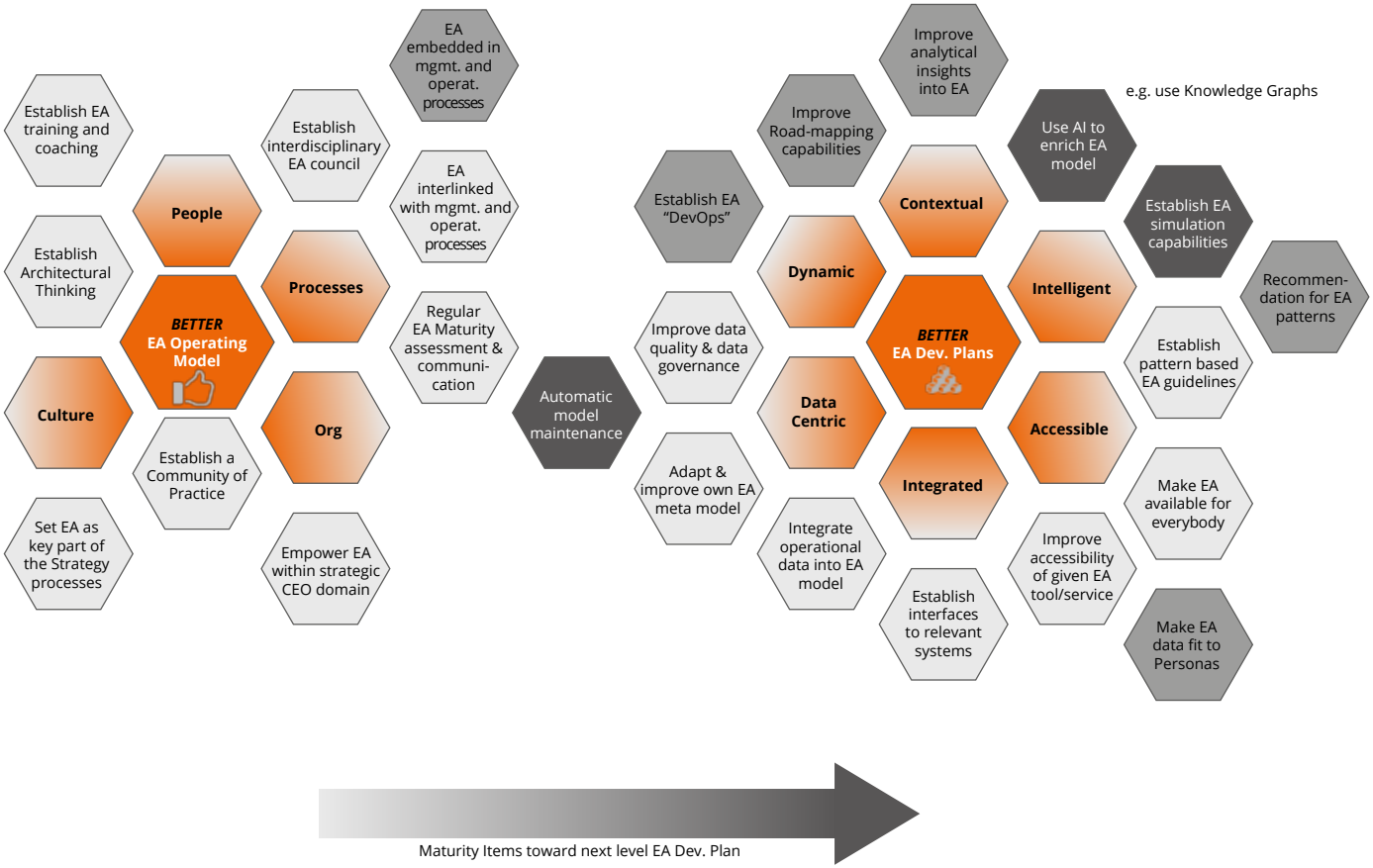
Looked at like this, an architectural drawing – or an enterprise architecture plan – no longer seems to be a static depiction of isolated elements. In the case of an enterprise architecture plan, the various business and IT stakeholders who contribute their expertise make the plan collaborative and dynamic. In other words, such an enterprise architecture plan can offer added value in different forms to the various stakeholders involved, while also helping to ensure:

- The effective management of complexity – by making clear the connections between various components of the "conceptual depiction of the company" and therefore revealing modes of action and dependencies as well.
- Harmonization and optimization – by pointing out interdependencies between the organization, processes, IT systems, and data in a manner that enables the development of fact-based arguments and decisions.
- An agile operating model and culture – by promoting cross-functional collaboration and improving communication between the business organization and IT units, thereby making EA a component of virtually every business discussion.
- The acceleration of the digital transformation – by highlighting changes and their effects, which in turn promotes the creation of new digital skills and establishes data-driven and/or data model-driven thinking.
- Cost and value optimization – by increasing transparency and development speed, which reduces process and technical debt and complexity, while at the same time increasing the value contribution achieved.
- Risk minimization – by creating a basis of facts regarding interconnections and modes of action, which

Joachim Schmider
Workstream Coordinator

The goal is to offer all relevant stakeholders a common knowledge and information platform that reflects their respective points of view and can be clearly understood by everyone.

The roadmap



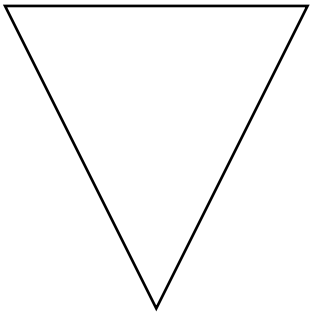
Several challenges still need to be overcome before companies can actually begin using a next-level enterprise architecture plan. The darker the gray shade of the "honeycombs," the longer it will take to achieve the corresponding capabilities.

helps make it possible to correctly prioritize changes and, for example, consider and incorporate security and compliance aspects from the early stages of conceptualization. With its greater transparency and broader cross-functional utilization, the Next-Level Enterprise Architecture Plan enables the implementation of proactive changes that increase business flexibility.

In order to generate the aforementioned added value, progress must be achieved with visualization technology, and a new EA metamodel needs to be created that includes process, business capability, business object, strategy, and application elements. According to the workstream, this metamodel should display the following attributes:

- Integrity – Connections between all EA data objects from their sources (PPM, CMDB, SAM, ERP…);
- Data centricity – Business data (objects) are a central element of the EA metamodel, and EA models utilize available operational data wherever possible.
- Context sensitivity – The visual structure of the enterprise architecture plan is target-group focused and based on the requirements of the respective target groups.
- Accessibility – Barrier-free access to EA information for all interested stakeholders; ideally with self-service systems. Everyone can use EA knowledge, and also contribute to knowledge growth.
- Dynamism – The enterprise architecture plan reflects changes and interdependencies. It also allows for the simulation of future target states in accordance with various contexts.
- Intelligence – The creation and refinement of the enterprise architecture plan is supported by recommendations, forecasts, and context-based viewpoints that are made possible by new IT capabilities (AI, graphs, visualizations, etc.).

In order to implement the Next-Level Enterprise Architecture Plan, enterprise architecture as a whole, but also artifact architecture plans, must develop new skills. According to the workstream, EA should be used not only in operational IT applications but also as a strategic and cross-functional planning and management tool. To this end, next-level enterprise architecture plans need to include expanded tools that can process EA data from a persona point of view, integrate operational data into EA models, allow for simulations, and use AI to expand EA models and make them more simplified and automated.



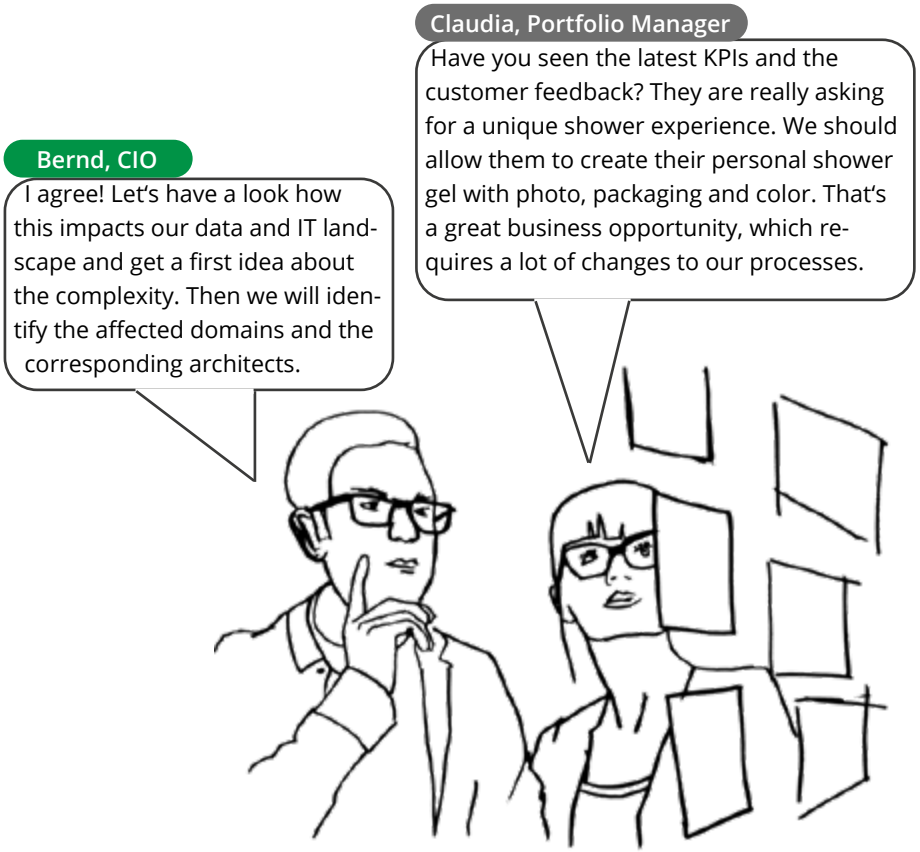
Schmider acknowledges that it will definitely take some time until companies implement and actively utilize the ideas and concepts described in the Next-Level Enterprise Architecture Plan. The process has already begun, however and “we’ve taken a major step forward with our precise description of the objective we’re trying to achieve, the strategic added value it will result in, and the roadmap that will help us get to where we want to go.”

Vision Story

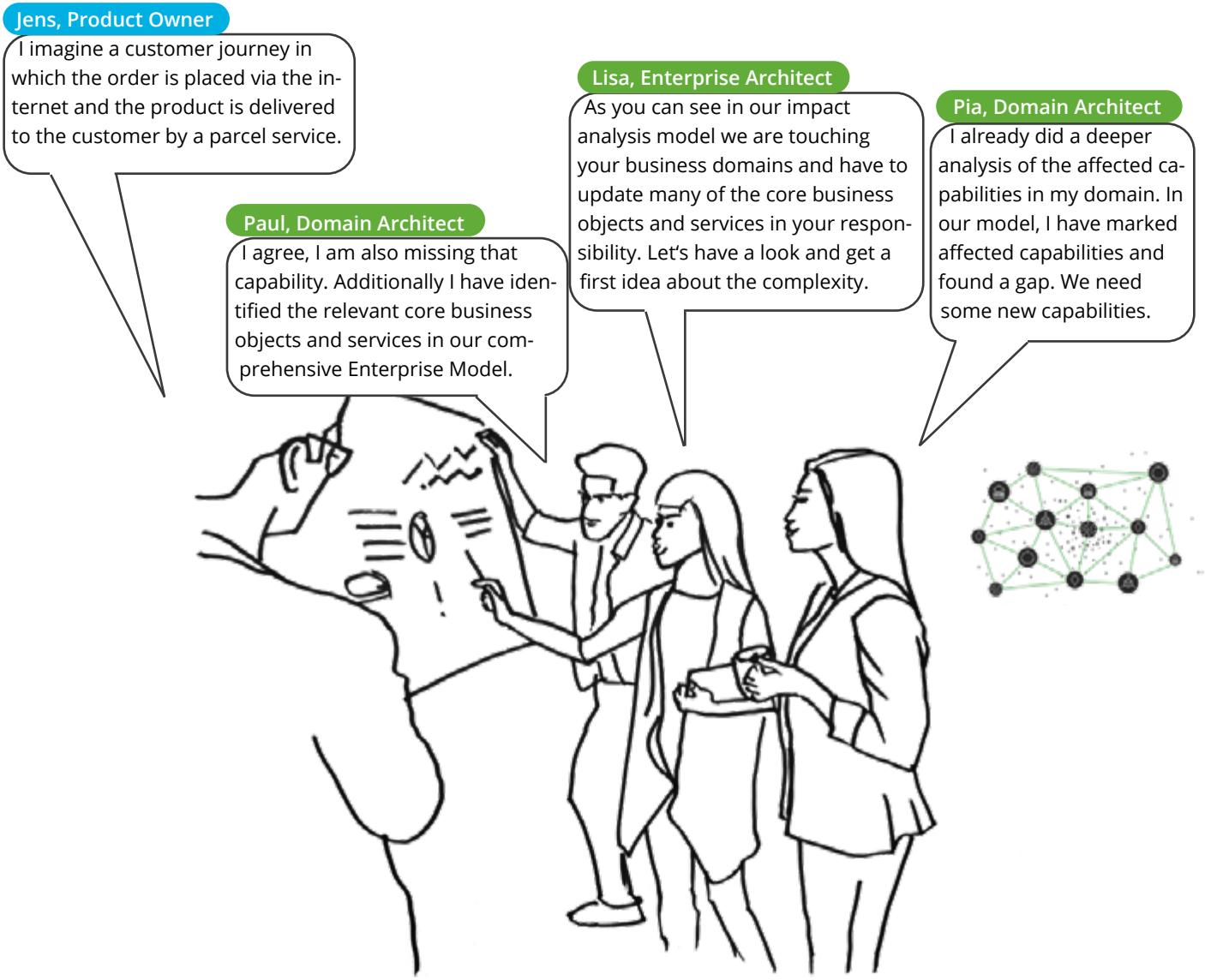
EAM dialog in new roles

"The purpose of the Next-Level Enterprise Architecture Plan is to offer all relevant stakeholders – for example the CIO, CEO, and the portfolio manager – a common knowledge and information platform that reflects their respective points of view and can be clearly understood by everyone" – this is the stated mission of the "Next-Level Enterprise Architecture Plan" workstream. In this Vision Story, the workstream team shows how collaboration here might work in practice.

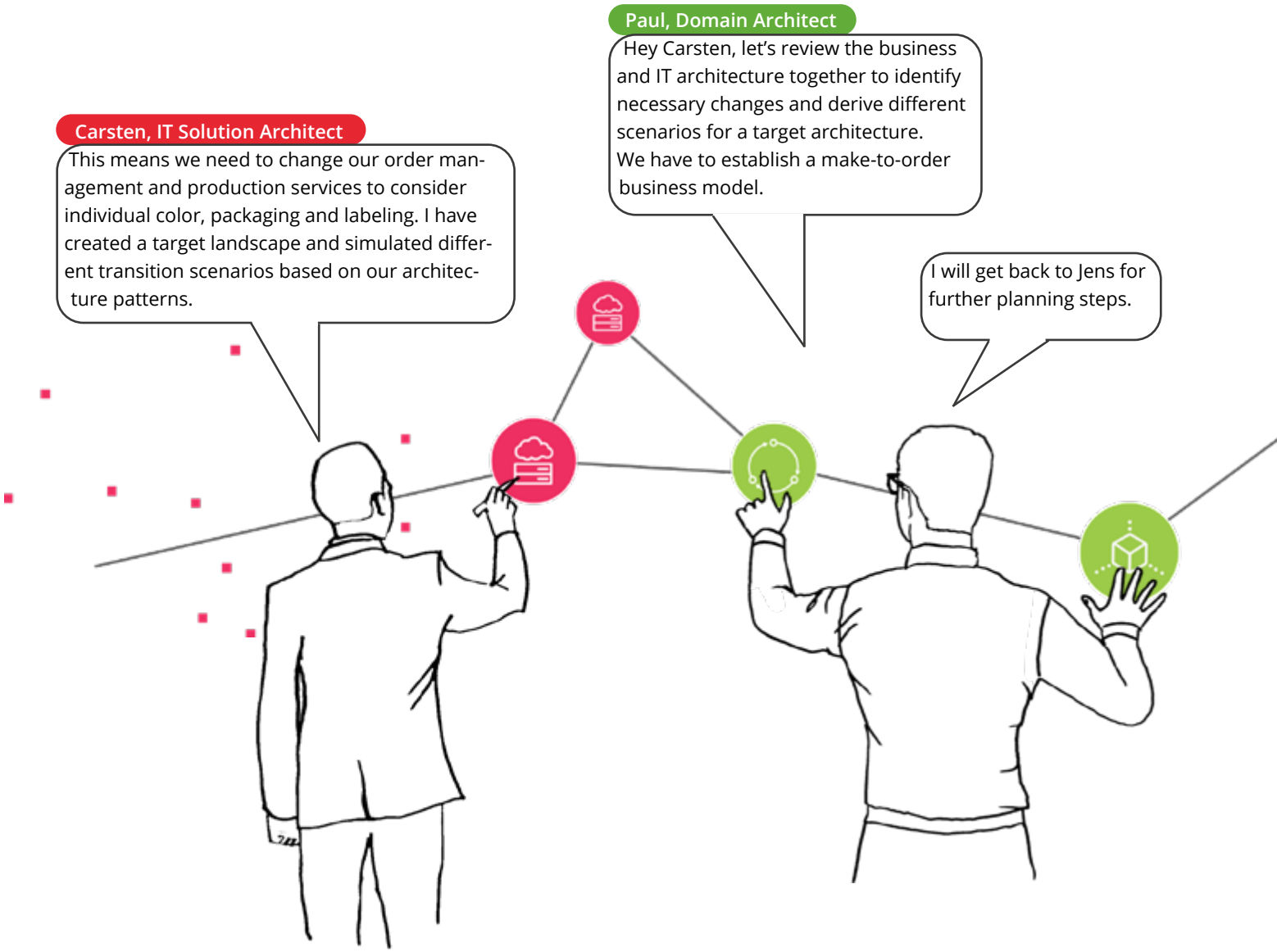
Personalized product strategy session



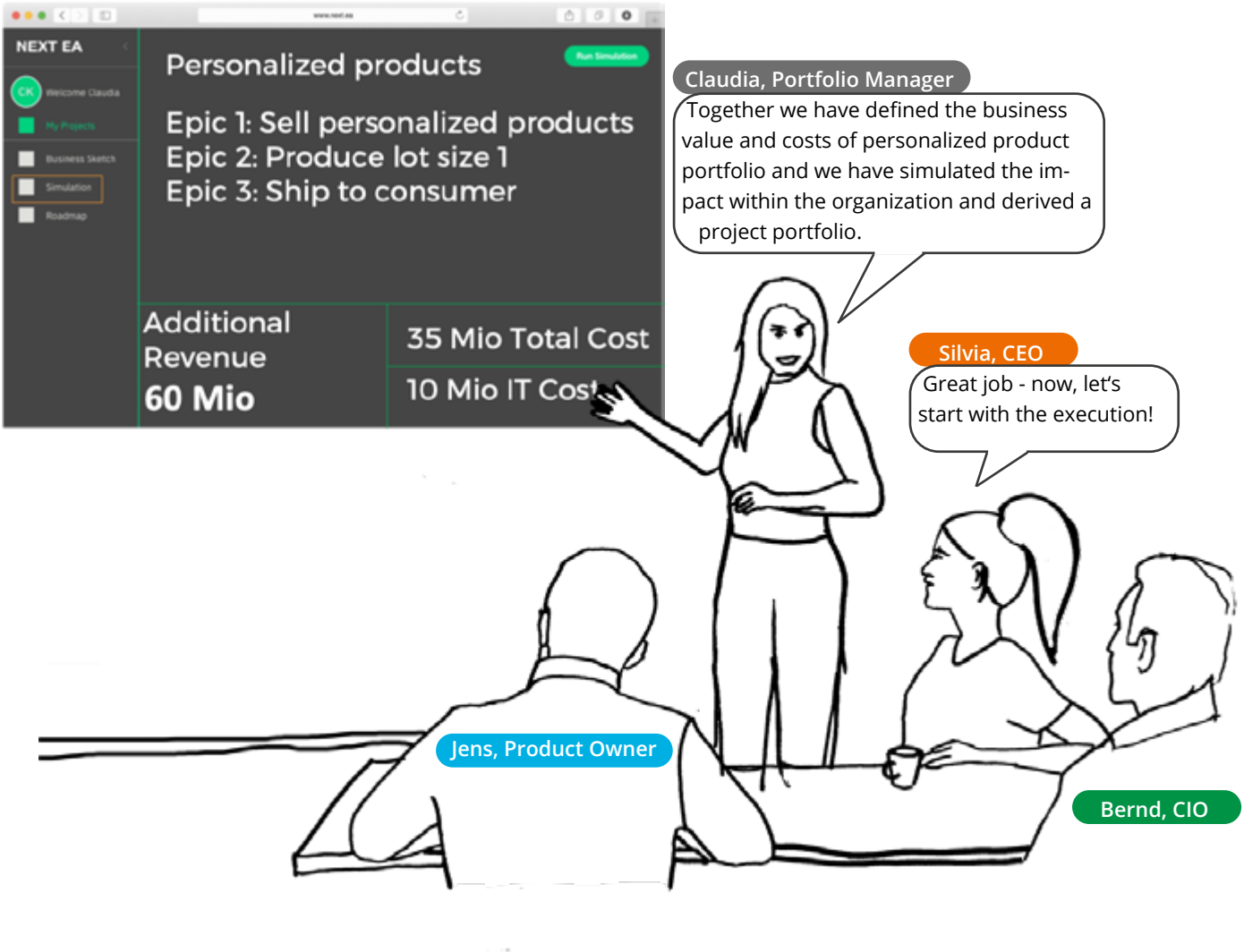
Business Architecture analysis



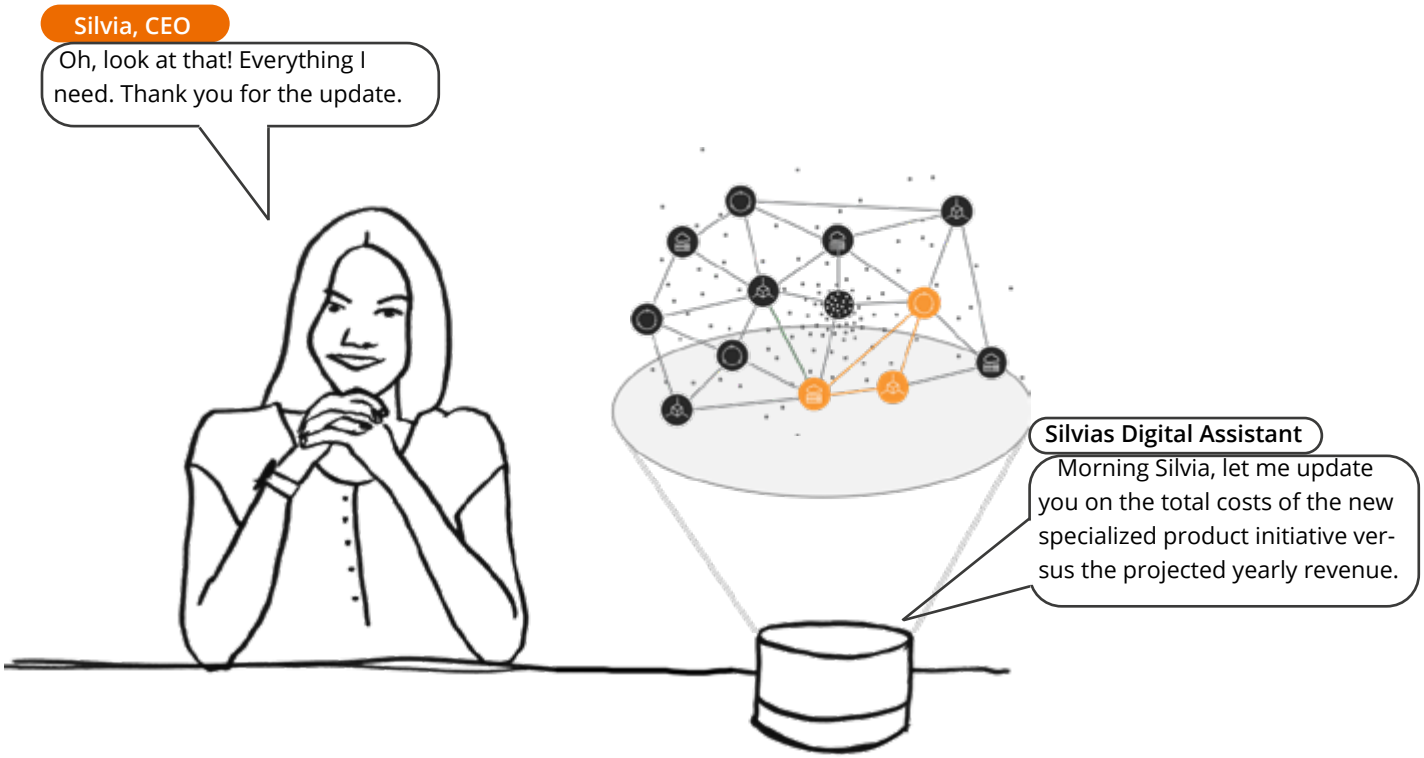
Architecture Design



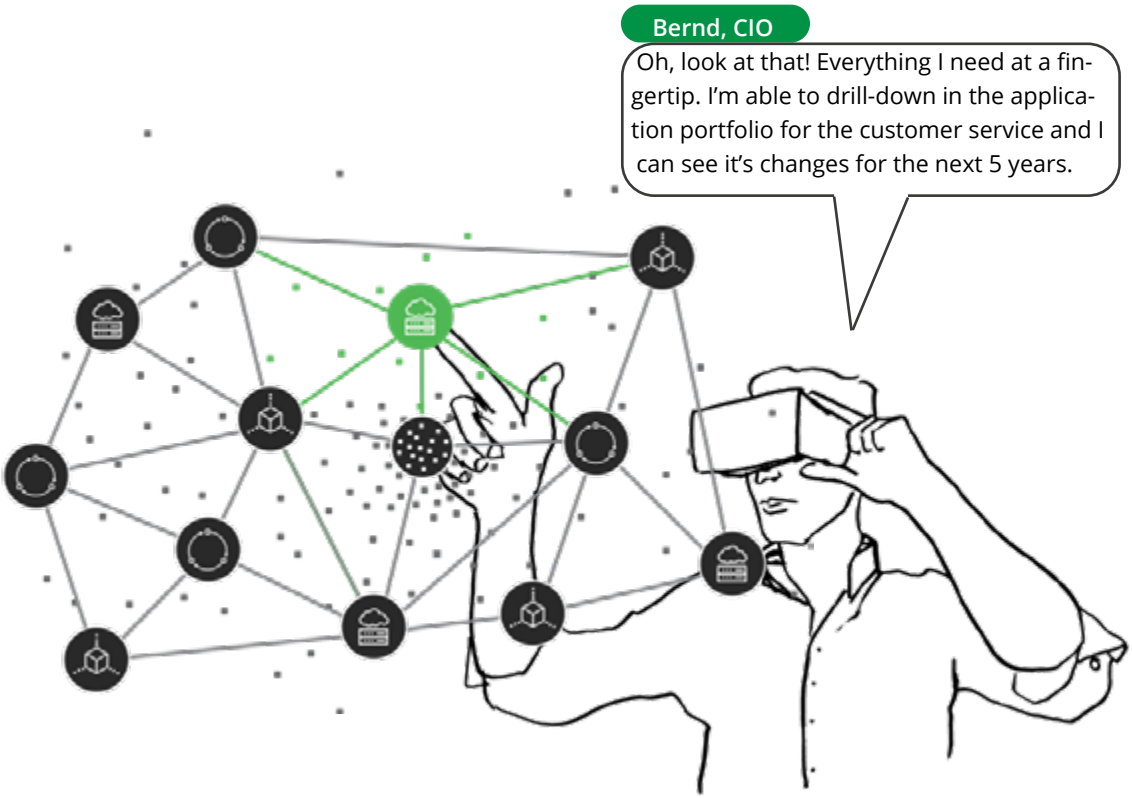
Portfolio Board



Think Beyond: simple consumption of EA context in a daily work and questions to be answered



Think Beyond: simulation of changes and impact to the EA used for fact based decision-making



Workstream
“Accessible EA in a Digital Age 2.0”

Architectural thinking for everyone

The fact that the second workstream on the topic of accessible enterprise architecture was conducted in 2019, and that a third workstream is being considered for 2020, shows just how important accessibility and the lucidity of architecture information is to CBA Lab. A pronounced sensitivity with regard to enterprise architecture and a correspondingly appropriate attitude on the part of the workforce can eliminate non value-generating activities and thus reduce costs. The results achieved by CBA Lab indicate that the path forward here requires the automation of EA information access, intelligent guidance, and architectural thinking. Transparency and heightened awareness help ensure that enterprise architecture can generate direct added value for business organizations.

The individuals responsible for EAM at the companies that participated in the workstream repeatedly face the same problem, namely that only the enterprise architects themselves are aware of the results achieved by enterprise architecture – results that are actually needed by employees in various roles and in a wide variety of business units at a given company. “We produce many different kinds of results – starting with current architectures and details on the complete hardware and software landscape at a company and extending to governance rules, preferred systems, and options for aligning the IT landscape with business requirements,” says Christian Schwaiger, an enterprise architect at the KUKA robot manufacturing company and Head of the “Accessible EA in a Digital Age 2.0” workstream. “We answer 600 different questions with our reports, but unfortunately no one besides the architects is aware of this.”

The objective of the workstream is to change this situation through the use of automation, self-service tools, and nudging. “Our goal is to be able to offer as much barrier-free access to our results as possible,” Schwaiger explains. “This can be done using chatbots or self-service dashboards, for example.” The lucidity of the information

Christian Schwaiger
Workstream Coordinator

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provided is also important, of course, as everyone who is interested in the information also needs to be able to understand it. Not all information should be given to all staff members, however. Instead, a clearly defined authorization concept needs to be used to ensure information is made available in line with an individual's roles and responsibilities. This setup also makes it possible to issue recommendations to specific individuals on how and where to find further useful information. The workstream team refers to this as "predictive guidance." It works a little like the familiar Amazon bookshop feature: "Customers who bought this item also bought..."

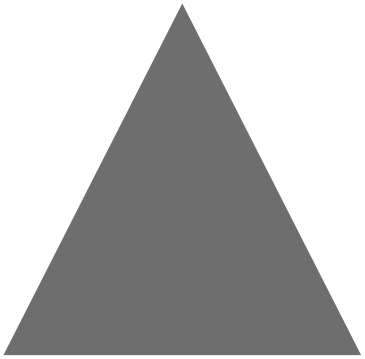
Overview of the most important results of the workstream

- Automated provision of EA information for all employees – The provision of clear and understandable information from EA repositories via self-service dashboards or chatbots strongly supports the dissemination of EA knowledge and promotes transparency. It also helps make visible and noticeable the impact EA has on a company, and it increases awareness of the value of EA as a source of advice and support.
- Predictive guidance – Role-based recommendations accelerate the retrieval of relevant information.
- Architectural thinking – Greater awareness and a higher degree of EA sensitivity among the workforce promotes architecture-based behavior and thus increases the positive impact EA has on the entire company.
- Automated visualization – Still not feasible without metadata.

At the same time, automation represents only half of the equation. While it does lighten the load on EA in terms of inquiries that previously had to be answered manually and individually, it's also just as important to establish greater awareness of enterprise architecture among the workforce in order to achieve more extensive and constructive collaboration between the business organization and EA. This is especially true in view of the fact that studies have shown that investment in traditional EAM areas only increases the degree of EAM sophistication to a limited extent and that such investment also can only influence ten percent of an entire company. "What we want is for project managers not to approach an enterprise architecture department only because they can obtain software approval from us but also because they want us to quickly provide them with an affordable and sustainable solution for their software challenges," Schwaiger explains.

In order to achieve this goal, the workstream proposed, among other things, that nudging should be used to get employees moving in the right direction. One nudge developed by the workstream focuses attention on an alliance between the business organization and EA, whereby here the EA side makes clear to the business organization the advantages offered by collaboration and offers the business organization a toolbox that is well stocked with tools, methods, and solutions.

Nudging is only one of many instruments that can be used, however. The workstream presented and explained numerous other instruments in the white paper it released as one of the results of its work. Another "incidental" result was the creation of a hackathon guide. "We used a hackathon to develop our chatbot and create prototypes of self-service user interfaces," Schwaiger explains. "Moreover, because everyone really loved the hackathon method, we also produced a guide that can be used by other CBA Lab members to design their own hackathons."



The nudge developed by the workstream focuses attention on an alliance between the business organization and EA: The EA side makes clear to the business organization the advantages offered by collaboration and offers the business organization a toolbox that is well stocked with tools, methods, and solutions.

Workstream
“Cloud Guide III”

Multi-cloud as viewed from a strategic perspective

The right cloud service for every use scenario, no vendor lock-ins, a high degree of reliably at the best possible level of performance – companies undergoing the digital transformation are increasingly recognizing the benefits of heterogeneous cloud environments. A white paper produced by the Cross-Business-Architecture Lab explains how EAM can help with the effective planning and management of such environments.

The introduction of cloud solutions is often accompanied by a paradigm shift: Instead of defining long-term target architectures, enterprise architectures are adapted over time on the basis of expanding knowledge and experience and through the use of iterative approaches. Traditional project organizations and hierarchical structures are pushed to their limits in such a setup, which means a new organization needs to be established.

“In the past, enterprise architecture focused on controlling risks through ever more precise planning,” says Björn Oestrich, Coordinator of the Cloud Guide III workstream, which produced the aforementioned white paper. “However, in the future, the decisive factor for ensuring the viability of a company will no longer be risk avoidance or risk prevention but instead adaptability – and adaptability also requires rules and guidelines. Enterprise architecture management will be expanded to include cloud management elements, which means it will have to become more agile. In addition, EAM will need to be able to effectively address uncertainties.” Nevertheless, the main tasks of enterprise architects will not change – i.e. they will still mainly be responsible for the transparent planning and implementation of the business and IT strategy, as well as the provision of a corresponding architecture.

Björn Oestrich
Workstream Coordinator

In the future, the decisive factor for ensuring the viability of a company will no longer be risk avoidance or risk prevention but instead adaptability.

Key messages in the white paper

- The introduction of cloud solutions necessitates the reorganization of processes and hierarchies.
- When choosing cloud services, you should initially identify the one that offers your company the most added value.
- Multi-cloud strategies ensure the most effective exploitation of the innovative capability of each provider and also make it possible for the company using the cloud services to diversify its risks.
- However, a multi-cloud approach also increases technical complexity, makes data integration more difficult, leads to additional security requirements, and makes accounting models more complicated.
- The services offered by cloud providers are becoming more and more similar, which is why a company should choose providers that best suit its strategy.

Even though the multi-cloud approach involves using the services of various selected cloud service providers, planning should not initially focus on being able to shift around applications easily. What's more important is the ability to choose from among all selected CSPs the cloud services that offer your company the most added value. For example, a digital e-commerce initiative might require the use of a cloud platform designed for maximum scalability, while another initiative could involve transferring an extremely heavy analysis workload to a cloud platform developed especially to accommodate large storage pools.
The advantage offered by this multi-cloud or "best of the best" approach is that companies can utilize the innovative capability of each provider while also diversifying their risks. At the same time, the decision to use multiple providers should never be made on the basis of a single project. "Project-related decisions lead to a situation in which there is no structured incorporation of the CSP into the required cloud

management processes, which in turn results in the creation of an uncontrolled component of the company's IT system," Oestrich explains.
Indeed, (multi-) cloud environments do have certain pitfalls which in particular can affect the management of technological complexity, as well as data integration, accounting models, and data security, and this presents enterprise architects with new challenges. Consider DevOps, which require agile project management – i.e. efficient and close cooperation between development, operational, quality assurance, and security units.

Because many companies now face the challenge of incorporating the services of various cloud providers into their IT systems in an ordered and scalable manner, it makes sense to compare how CBA Lab member companies are addressing these integration issues. The Cloud Guide III workstream white paper therefore examines the network and communication level, the application and service level, and the data level.

In the area of network security, for example, the majority of the member companies utilize one of two approaches – on-premises control or cloud control, whereby the choice depends on their IT strategy, their goals, and the capabilities of their cloud provider. Integration with large providers such as Azure from Microsoft or AWS is usually implemented using the cloud control approach, since not doing so would lead to too much network-automation potential being left unused.

With regard to the data level, the choice of the integration approach depends heavily on the degree of protection the data requires. By definition, there is of course no approach that can be used with data that absolutely may not leave the company. In terms of data with lower protection requirements, the options are full integration into the cloud, partial integration, and encrypted integration.

Conclusion reached in the white paper

Cloud providers are becoming more and more interchangeable in terms of the basic services they offer. Companies should therefore first define their strategy and then look for two cloud service providers whose strengths best fit that strategy. Proceeding in this manner also limits the number of integration approaches to be considered and used. Once again, the company strategy must be defined in advance if such a procedure is to be used successfully.

You can find the "Multi-Cloud" white paper here (German):

https://www.cba-lab.de/custom/attachments/1000366/cba_lab_white-paper_multi_cloud_public.pdf

Workstream
“Digital Twin”

Practical digital twin reference architecture

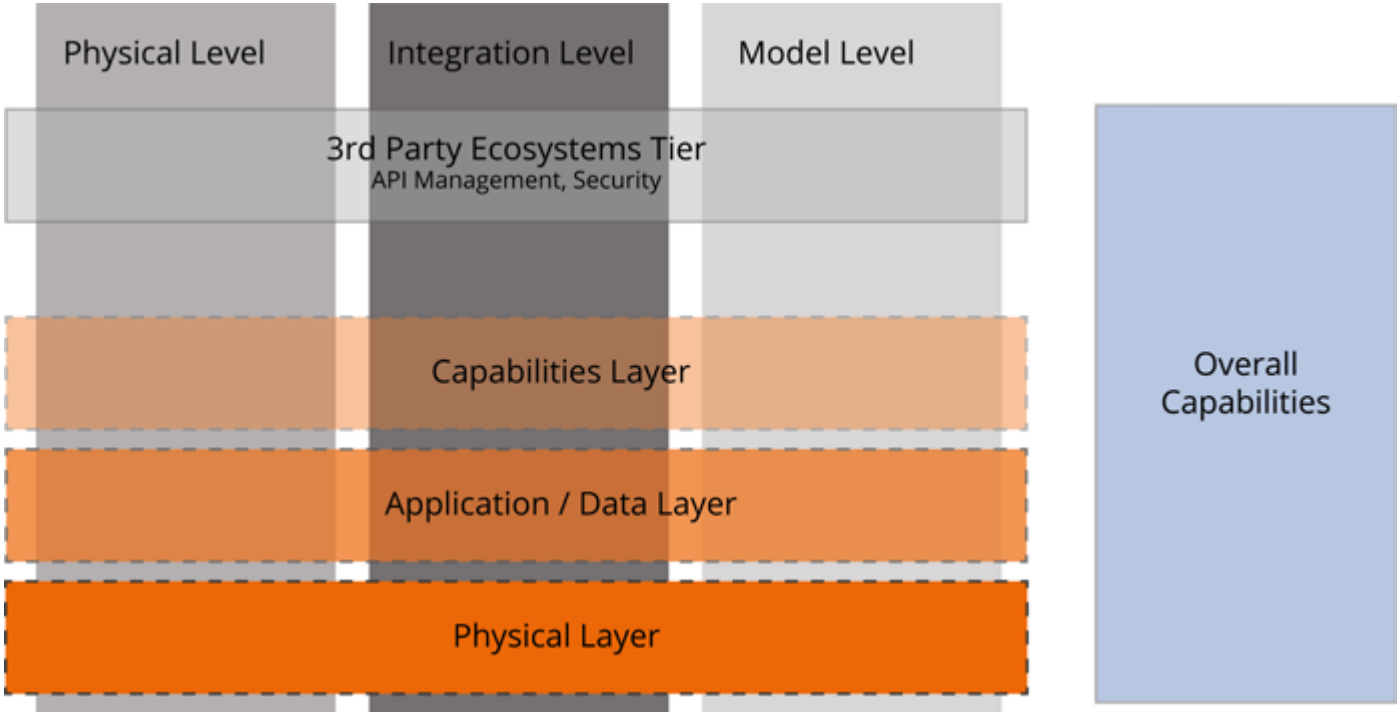
The Digital Twin workstream gave members of CBA Lab a digital twin reference architecture that can be used in all industrial sectors. The ability to achieve such a multi-sector solution was due to the fact that companies from diverse sectors, such as the automotive, household appliances, and optics industries, participated in the workstream. All of these industries can work with the reference architecture, as is confirmed by Britta Boldt, an enterprise architect from Volkswagen Konzernlogistik GmbH & Co. OHG who participated in the workstream. “We are going to use this reference architecture,” says Boldt, adding that if not for CBA Lab’s cross-industrial approach and the effective cross-industrial collaboration among the workstream participants, the Digital Twin workstream would never have been able to achieve such a good result.

The reference architecture that was developed (see the chart on the next page) consists of three vertical levels (Physical, Integration, and Model) and a special separate level (Overall Capabilities). This level includes capabilities such as lifecycle management, mobile device management, AI, machine and deep learning, big data, and other overlapping functionalities, whereby the latter are available to the entire IT organization at a company – and not just to the digital twin.

The Capabilities, Application/Data, and Physical layers are arranged across the vertical levels. The Physical-level section of the Capabilities layer includes diagnostics, lifecycle status, and edge logic / analytics, for example. These react on the Integration level with / are monitored using capabilities such as data management, workflow management, and API management. A fourth layer – the 3rd Party Ecosystem tier – ensures security and API management across all levels.

“The exceptional quality of the reference architecture is due to the fact that

Digital twin reference architecture – high-level view



The reference architecture consists of three vertical levels (Physical, Integration, and Model) and a special separate level (Overall Capabilities). The Capabilities, Application/Data, and Physical layers are arranged across the vertical levels. A fourth layer – the 3rd Party Ecosystem tier – ensures security and API management across all levels.

Dr. Verena Schmidtmann
Workstream Coordinator

The reference architecture serves as a neutral coordination framework that simplifies the integration of digital twins into their environment.

it can be used within a company not only to develop digital twins and compare solution components from different providers but also as a basis for collaboration in a partner ecosystem," says Dr. Verena Schmidtmann, who managed the Digital Twin workstream and is also a partner at Detecon. For example, if a company purchases a machine for a production line, this machine is usually now delivered with a digital twin and needs to be integrated into the existing digital twin landscape. In such a situation, Schmidtmann explains, the reference architecture serves as a neutral coordination framework that simplifies the integration of digital twins into their environment. "However, the results of the workstream don't solve all integration issues, of course," says Schmidtmann. "In terms of semantics in particular, some pieces of the puzzle are still missing – especially standards from protocol providers such as the OPC Foundation and semantics providers like eClass, umati, and the Administration Shell of Plattform Industrie 4.0. Nevertheless, it's already clear that enterprise architecture is the discipline that will provide the structure for these integration tasks."

Along with the reference architecture, the workstream also developed a demonstrator. The demonstrator made it possible to examine the reference architecture's benefits and drawbacks not only from a theoretical perspective but also in practical terms. The demonstrator also made it possible to explain the benefits of the architecture to those who know little about such systems.

The demonstrator was created with the help of two Raspberry PI single circuit boards and the IoT Cloud from Bosch. It shows how the digital twin of a refrigerator installed in an electric camper van improves the energy management of the overall system. An integrated dashboard also makes it possible to monitor and control actuators and control loops. “This demonstrator helped us a lot in terms of moving away from an abstraction because it enables haptic perception of the digital twin and its effects,” Boldt explains.

In other words, the activities conducted in the workstream made it possible for workstream participants and CBA Lab members to physically experience and thus clearly understand the digital twin concept.

Boldt believes the workstream resulted in three key takeaways:

- The reference architecture – makes it possible to use the digital twin in different industrial sectors.
- The demonstrator – presents the benefits offered by the digital twin in a clear and understandable manner.
- Cross-industrial collaboration – works perfectly at CBA Lab because workstream participants focus intensely on workstream tasks and are extremely committed to achieving good results.

Britta Boldt
Workstream participant

CBA Lab’s cross-industrial approach and the effective cross-industrial collaboration among the workstream participants are what enabled the achievement of such a good result.

Workstream
“AI”“

AI reference architecture, roles, and life-cycle

AI, or artificial intelligence, is probably the leading megatrend at the moment – and across all industries as well. Algorithms unleashed by huge amounts of data and seemingly unlimited processing power promise the creation of new knowledge, features, and services, and are already delivering on this promise in many application areas. In other words, AI is a megatrend that actually does what its proponents claim it can do.

That’s a good reason not to miss out on AI developments. Still, what’s the best way to keep up with this megatrend? Whenever there’s hype, it’s advisable to keep a cool head and not do anything rash – which is why the best thing to do is to talk to an enterprise architect. In order to ensure that enterprise architects are able to come up with the best possible answers, we established a cross-industry workstream at CBA Lab.

“AI is already playing a key role at BSH Hausgeräte GmbH when it comes to increasing efficiency and quality with regard to products, service, or the company’s own enterprise IT system,” says Alexander Hauswald, who manages the AI workstream and is also Head of Architecture Management at BSH. “AI-supported forecasts of servicing calls optimize the loading of tools and equipment into vehicles during the pre-prepping process and significantly reduce the number of trips that need to be taken to customers. “In order to expand this capability and make it more readily available throughout our company, we are working with the

Alexander Hauswald
Workstream Coordinator

CBA Lab wants to identify the specific potential AI can offer in enterprise and industrial environments.

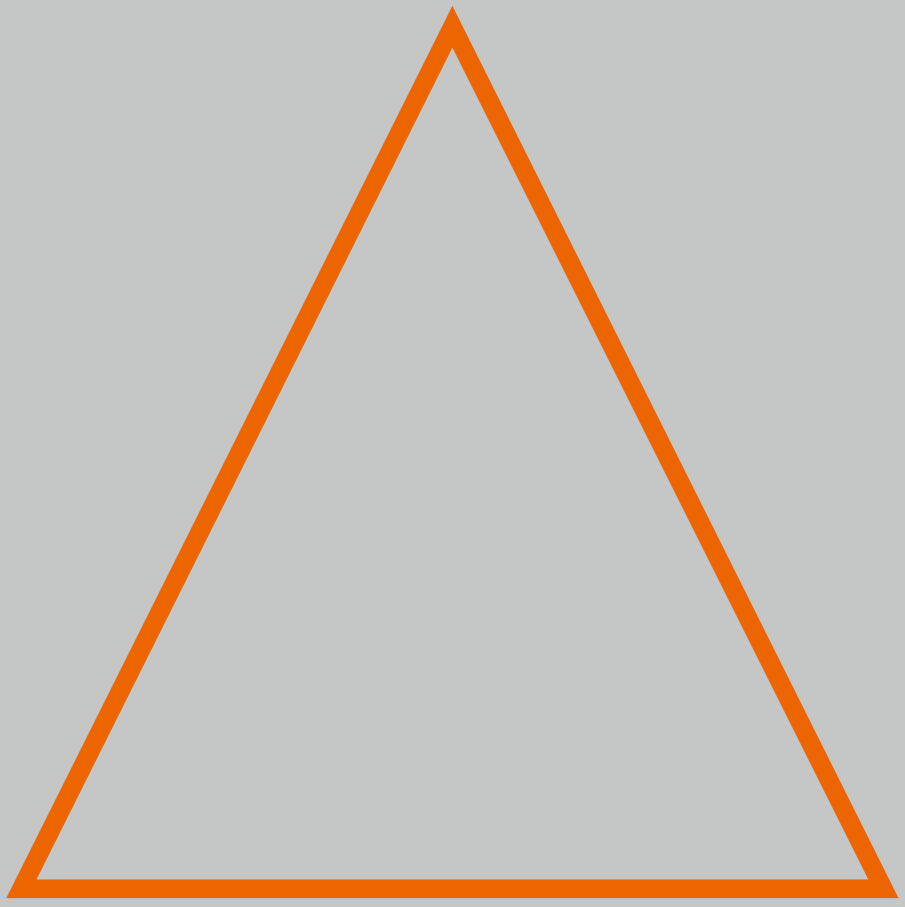
other companies in the AI workstream to generate ideas and develop new architectures and methods. Our goal here is clear: CBA Lab wants to identify the specific potential AI can offer in enterprise and industrial environments. Among other things, we are working to determine the areas in which AI can theoretically be employed. We also plan to develop a catalog of criteria that will serve as a basis for deciding whether it makes sense to use AI in specific application scenarios."

Here, Hauswald is focusing on the expectations relating to a complete catalog of criteria. "The first thing we want to do is to demystify AI terminology," he explains. "While doing so is the first step to producing a catalog, it remains to be seen whether the process will actually end with the creation of a complete catalog."

The following results have the highest priority:

- Development of a useful reference architecture for AI – Such an architecture should be as specific and applicable as possible; ideally, it should be based on specific technologies.
- Lifecycle management of AI models and applications – How should a process be designed to ensure that AI models and applications are always suitable for processing the data at hand and do not produce erroneous results? The workstream seeks to utilize lifecycle management approaches as a means of ensuring that companies can trust their AI models and applications.
- Development of a data strategy – The results obtained with AI systems depend on the quality and quantity of the data used. However, the greater the amount of data processed, the more difficult it is to ensure data quality. Here, the workstream is looking to determine the quality and quantities that are actually needed to obtain useful results with AI systems.
- Description of the roles played by employees in the area of AI – What type of skills do companies that wish to use AI systems need? Will data brokers or data stewards be used? In what ways should the jobs of data engineers and data scientists be separate or overlap? What tasks should be assigned to each role? How are the various roles to be delineated? What type of qualifications will employees need in order to fill the various roles?

All of the results will be summarized in a white paper that will be presented over the year 2020.



Workstream
Digital Real Estate Lifecycle Management

A digital twin for properties

Digitalization is having an impact on all industries – and the construction and real estate sectors are no exception here. Nevertheless, these sectors still find themselves at the beginning of the digitalization process, and they are also very fragmented when you consider their various sub-sectors. There are hardly any dominant players that have been able to successfully implement major digitalization initiatives in a relatively short period of time, or establish international standards. At the same time, the pressure to digitalize continues to increase because everyone is now aware of how digital systems can make construction planning and execution much more effective and can also be used throughout the entire lifecycle of a building. Factories, warehouses, maintenance facilities – industrial processes are being carried out in buildings that are becoming increasingly digitalized and operated in accordance with extremely precise building management systems.

Uwe Weber
Workstream Coordinator

We want to create a heat map that shows where companies are noticing the greatest deficiencies.

This situation harbors extensive untapped efficiency potential, which is why the Digital Real Estate Lifecycle Management workstream is examining ways to digitally depict various types of properties.

Overview of the workstream's goals:

- Creation of the basis for a digital twin for properties
- Creation of a capability map that includes all information functions for a property
- Monitoring of the software market in order to identify new developments in building information modeling (BIM) and suitable alternatives that would allow the creation of a "system of systems"
- Creation of an overview of the degree of standardization in this field

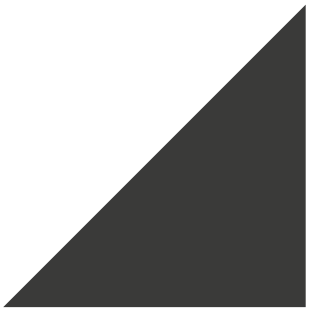
As a first step, the workstream plans to create the basis for a digital twin. To this end, the workstream participants will provide answers to technical questions relating to the information requirements of relevant companies. "We want to create a heat map that shows where companies are noticing the greatest deficiencies," says Uwe Weber, who manages the Digital Real Estate Lifecycle Management workstream

that was launched in February. Weber is also a CBA Lab Ambassador and a Managing Partner at Detecon. The heat map will be used to create a capability map that will include all information functions that relate to a property and also take into account all key stakeholders. The workstream will also monitor the market in this area and analyze emerging trends in order to determine whether these can help the workstream with its efforts to create a system of systems for the construction and real estate sector.

The latter aspect also includes monitoring the corresponding software market. Important issues here include the further development of approaches such as building information modeling and the use of associated standards, and the examination of alternative approaches from the area of product lifecycle management (PLM), for example. The workshop participants then plan to create an overview of the various standards that need to be involved in the creation of a digital twin that will act as a system of systems and which therefore must take various information requirements into account.

While a digital approach does already exist today in the form of building information modeling, the latter is often not used throughout the entire lifecycle of a property. “In most cases, BIM is only utilized today in the short planning and constructions phases,” Weber explains. “It generally takes around three years to complete these phases, whereby the new airport in Berlin represents a major anomaly here, of course.” If one assumes that a building will be used for around 100 years, one can quickly run into problems with analog analyses. The Digital Real Estate Lifecycle Management workstream was created specifically for the purpose of significantly improving such analyses through the use of digital systems. Properties often account for a large proportion of the assets of major companies in particular, which means they account for a large share of total costs as well. The establishment of more effective work processes through the use of digitalization can reduce these costs by as much as 20 percent.

So what does all of this have to do with enterprise architecture management? “EAM can be used to get all of this complexity under control,” Weber explains. This is also one of the reasons Weber intentionally uses the word properties rather than buildings – i.e. at issue here is the planning, construction, and complete use of a property throughout its entire lifecycle. By definition, this also includes the construction phase – but commercial buildings in particular (e.g. factories) also contain equipment and systems whose energy consumption, temperature control, waste management systems, etc. need to be taken into account as well. Also not to be forgotten is the fact that a property usually has many stakeholders who often require very different types of information. A real estate agent, for example, views a building differently than a company that wishes to operate a factory inside of it, while a maintenance technician or facility manager will have another and completely different point of view. All the information needed by these various stakeholders can be ideally depicted in a digital twin that presents the entire ecosystem of the property in question – i.e. the digital twin as a system of systems.



Workstream
EA Repository Integrations

The exchange of data between management systems promotes inter-disciplinary collaboration

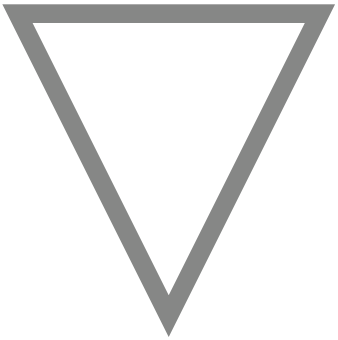
The EA Repository Integrations workstream launched in February 2020 addresses the question of how an EAM system can enable the various management systems at a company to benefit from one another. Like several other workstreams currently under way at CBA Lab, this workstream also focuses on interdisciplinary cooperation between various organizational units – between IT and non-IT domains. The workstream participants want to find out on the one hand how data from an EA repository can be used by other management systems and, on the other hand, how a repository of architecture components and EA rules can benefit from data provided by these other management systems.

The second major task of the workstream is to actually implement such an integration approach into an already existing EAM tool. "CBA Lab calls itself a lab for a reason," says Thomas Schreiner, who manages the workstream and is also Head of Enterprise Architecture Management at Fresenius Netcare. "We want to show what such integration might look like in practice and create a corresponding demonstration environment."

Schreiner offers an example of how useful the exchange of data between different management systems can be: "A risk management unit, for example, can use data from an EA repository that shows how old specific applications are. This makes it easier to identify risks more precisely – things like missing patches, manufacturer support

Thomas Schreiner
Workstream Coordinator

CBA Lab calls itself a lab for a reason. We want to show what such integration might look like in practice.



agreements that will soon expire, and insufficient compliance with legal provisions." Such an exchange of data can lead to benefits in the areas of cyber security and portfolio management as well. "A company has to know which capabilities it needs in order to be able to implement certain business ideas and models," Schreiner explains, "and "nobody has to reinvent the wheel if the EA repository's capability map can be used for this."

Overview of the questions addressed by the workstream:

- Which challenges can data from an EA repository help other management systems overcome?
- What type of information generated in other management systems might be of interest for an EA repository?
- Which specific (architecture) data should be exchanged?
- Can the specific value contributions generated for EA and the other participating management systems be measured (in the form of KPIs / financial information)?
- What type of quality does the data need to have in order to make linkage worthwhile to all parties involved?

All of the results will be summarized in a white paper that will be presented by the end of 2020.

Training

Our training programs: Always in tune with the times!

The content of CBA Lab's EAM training programs is continuously adjusted and updated in line with the current needs of various companies. The most recent update of content was completed in June 2019.

The various training programs can be booked individually as in-house or on-site courses. Courses with participants from several different companies are especially interesting. Here, the exchange of information and ideas opens up a new dimension of learning and experience.

The five programs cover everything from an initial description of digitalization and its effects to an introduction to IT transformations and service-focused architectures, and their planning and implementation. The courses provide both experienced managers and newcomers with information on the benefits EAM offers as a method for achieving business success. All elements of the curriculum have already been successfully tested in real situations.

Miriam Suchet, Head of Enterprise/IT Architecture Management at Wacker Chemie AG, has had positive experiences with the use of CBA Lab training content at her company: "Both advanced EAM specialists and novices have benefited from the courses. The basic courses give participants a solid overview of the advantages and possibilities offered by EAM, and the positive effect it can have. The advanced courses provide architects with detailed information and bring them up to date on the latest developments."

Christian Schwaiger, an enterprise architect at the robotics and automation specialist KUKA, has a similar view: "The training courses have an outstanding structure and they made it possible for us to ensure that a new team of architects could achieve a uniform standard of knowledge very quickly. We especially like the flexibility and broad range of expertise of the instructors, who are able to adapt their teaching approach to the level of knowledge of a given group of participants."

Miriam Suchet
Enterprise architect

The basic courses give participants a solid overview of the advantages and possibilities offered by EAM, and the positive effect it can have. The advanced courses provide architects with detailed information and bring them up to date on the latest developments.

The individual elements of the CBA Lab training curriculum

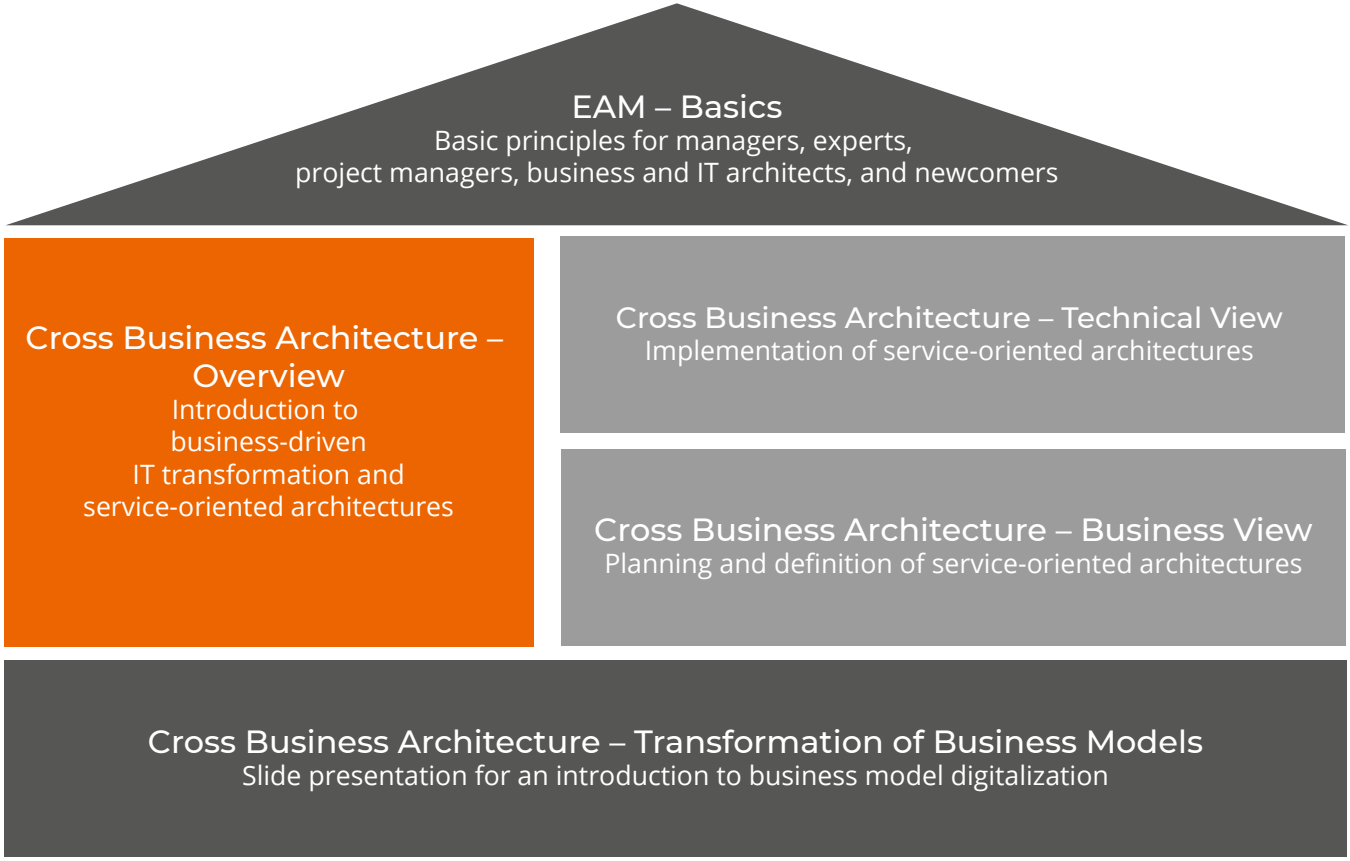
The half-day course on "Cross Business Architecture – Transformation of Business Models" offers an initial description of digitalization and its effects. The idea is for participants to get a feeling for how digitalization is changing their everyday lives and work environments and how they can continue to make an effective contribution in these new environments. This course is suitable for all employees at a company.

The objective of the one-day training course on "Cross Business Architecture Overview" is to provide basic information on SOA (**s**ervice-**o**riented **a**rchitecture) as an enabler of business-driven IT transformation, and to place the topic of SOA within an EAM context. For this course as well, participants do not need to have any specialized knowledge. They learn about the goals and challenges of enterprise architecture on the one hand, and the interaction between enterprise architecture management and service-oriented architectures on the other.

The two-day course on "Cross Business Architecture – Business View" builds upon the content of the "Overview" course. The IT architects, business analysts, system architects, and solution designers the course was designed for are provided with detailed information on the various steps of the "technical SOA process," which they can then apply on their own after they complete the course. In terms of content, the course offers more detailed information on the topics addressed in the "Overview."

The course on "Cross Business Architecture – Technical View" provides detailed information on the implementation of SOA services and the associ-

The CBA Lab training curriculum



The five programs cover everything from an initial description of digitalization and its effects to an introduction to IT transformations and service-focused architectures, and their planning and implementation. The courses provide both experienced managers and newcomers with information on the benefits EAM offers as a method for achieving business success.

Stefanie Fleischer
Coordinator of the Training Lifecycles

From the real business world and for the real business world: Our training program is built upon expert knowledge and the experience gained by our member companies.

ated technical aspects needed for this. This two-day course builds upon the content of the "Business View" course. Its objective is to teach participants the methods, techniques, procedures, and requirements for ensuring the successful implementation of services.

The half-day course on "Enterprise Architecture Management – Basics" enables participants to develop an understanding of architectural work and to support such work in order to ensure business success. This course is designed for anyone who deals in any way with enterprise architecture. The course is suitable for managers, experts, project managers, business and IT architects, and newcomers. Its content can be adapted to accommodate different groups of participants.

Along with its training courses, CBA Lab also offers EAM workshops that help participants prepare for their own EAM conferences and thematically related third-party conferences. The content of the workshops is derived from the five training courses, whereby content is adjusted in line with information on the topics and procedures for each conference as provided by the individual conference organizers.

For example, on the day before its own EAM Conference, CBA Lab conducts a half-day workshop on the "Value of Business Architecture in a Modern and Customer-Oriented Ecosystem." The workshop presents ideas, concepts, and approaches for forward-looking business architecture solutions that are then discussed with all participants in order to increase their understanding of the importance of enterprise architecture. One of the most important aspects here is to obtain a clear overview of the interaction between IT departments and various technical units when business architectures are developed, and to provide information on how such architectures can be firmly established at a company.

You can request detailed information on our training programs and workshops by sending an e-mail to info@cba-lab.de.

#EAMdigital2020

The CBA Lab EAM Conference

CBA Lab is staging its „EAM – Richtungsgeber für die Digitale Transformation“ (“EAM – Pointing the Way Forward for the Digital Transformation”) conference for the third time in 2020.

Feedback from the two previous conferences shows that participants especially appreciate the professional quality of the event and the open discussion of key topics it enables.

The conference, which is organized by CBA Lab in cooperation with the Inside Business event agency, emphasizes the role played by enterprise architecture as a communicative interface between business organizations and their IT departments. “EAM is the binding discipline for digitalization and communication and is therefore one of the core elements of both,” says Dr. Karsten Schweichhart from the CBA Lab Board.

The role played by enterprise architecture in the digital transformation is a very important topic for all those involved in organizing the conference. “In this environment, enterprise architects act as guides in treacherous waters, so to speak,” says Dr. Johannes Helbig, Chairman of the CBA Lab Board.

The future will be digital and fast-paced. Data, platforms, and the ability to quickly bring new ideas to market will determine whether or not companies can be successful – even if their products are not manufactured with the help of bits and bytes today. Everything has to be carefully orchestrated – data and data analysis, knowledge of interconnections, and transparency are all needed here in order to obtain an overview that enables sound decisions to be made. This is the only way to ensure that business ideas can be rapidly implemented and that organizational and IT-specific aspects can be adapted to new business models. The potential impact of EAM is increasing as these developments continue.

The conference’s objective of drawing attention to relevant EAM topics at an early stage is reflected by the highlights of this year’s conference program: The 2020 conference will focus on ecosystems and their platforms from the EAM

perspective, as well as data strategies, the reduction of complexity, efficient work methods, the architecture-oriented analysis of cloud services and microservices, and new trends such as "architecture as code." The agenda also includes the examination of several case studies from companies such as Lufthansa, Datev, RWE, and the Swiss railway company SBB.

"Our EAM Conference will always maintain high standards when it comes to addressing important topics – but that doesn't mean we won't have a lot of fun at the conference as well," says Schweichhart.

2020 EAM Conference

September 15-16, 2020
Hotel Bristol, Berlin

Major topics from the business world

- What a good guide needs to be able to do: New roles, new points of view, and new skills for EAM
- Ecosystems and platforms as business models – viewed from the EAM perspective
- Development of a data strategy: Approach, determining factors, and intended outcomes
- EAM: Organizing and structuring cloud technologies, microservices, and agile methods
- EAM at small and medium-sized businesses

Workshop

September 14, 1:00 p.m.

"Value of Business Architecture in a Modern and Customer-Oriented Ecosystem"– from CBA Lab Training Lifecycles

Program and information:

https://cba-lab.de/english/conference.html

About Us

What we do at CBA Lab

Clouds above and a cloud below: Round Table at the Deutsche Telekom Data Center in the city of Biere, September 2019

EAM is like a rare earth element: It can't be found in all places and it's not very widespread – yet it's a critical ingredient for the success of virtually any type of digitalization activity. So where does one obtain such rare expertise and the associated methods and best practices – and in truly good quality?

CBA Lab e. V. is a plentiful source for all of that, and more. All members of CBA Lab benefit in many ways by being able to use our expertise as a valuable raw material. But how does our CBA Lab work? And how is its expertise put into practice?

We are first and foremost a user association created by application users for other application users. Knowledge obtained through experience is what counts for us. No one at our lab is looking to make a profit with what they contribute; no one is trying to sell something to someone else. Of course we all want to profit, but we want to do so by making use of the experiences of others – by learning about both their best practices and the pitfalls they encounter.

We create an environment of trust in which people can openly exchange ideas and information. Our Charter clearly stipulates that common knowledge and content are to remain within our member companies and that joint decisions are to be made regarding the publication of such knowledge and content. Guests who are not yet members of CBA Lab acknowledge their acceptance of our Charter by signing an NDA. Our environment of trust leads to very open discussions – our "Tour de Table" is truly legendary. It goes without saying that our member companies do not conclude agreements with one another that restrict competition, nor do they share information with the aim of doing

Visiting the German Ministry of the Interior: Round Table, September 2018

the same. This means that our member companies also include enterprises that are in competition with one another.

We act in accordance with common guiding principles. “We all face the same challenges!” is a popular phrase among our members. All of us firmly believe in the creative power of enterprise architecture, and we are convinced that we can make EA better and faster by sharing our knowledge and experience in an association and by working together in key areas.

We utilize pragmatic forms of collaboration. We meet three or four times a year for two days at one of our member companies for a Round Table that addresses specific topics in an open exchange of ideas and information. Through these meetings at member sites, we are able to gain overall impressions and insights that are not limited to one industry or economic sector. For example, it’s unlikely that many people know why Zeiss is considered the birthplace of digital miniaturization – but we do.

We conduct joint projects known as workstreams in which several companies address a specific topic that they agree upon in advance. Our Coyo social intranet platform makes content available to all of our members and allows them to directly communicate with one another.

We stand for the open exchange of ideas and information and an inspiring atmosphere – one in which we also have a lot of fun. There’s a lot of laughter at CBA Lab; everyone is relaxed and open-minded, and we all appreciate one another and trust each other across all company boundaries. Vibrant networks are created as a result, not to mention lasting friendships. Nevertheless, there is actually one thing you can’t experience at CBA Lab – and that’s boredom.

Impressions from our Round Table events

The Board: In their own words

Dr. Johannes Helbig
Chairman of the Board

> In the digitalized world, EAM separates the winners from the rest of the field – plain and simple. While it is not by itself a sufficient condition for success, it is a necessary one.

My job focuses on various aspects of the digital transformation. In my capacity as a business angel and advisor, I help shape innovation and change by utilizing the knowledge and experience I've gained in IT management at major companies. The economic and social policy challenges posed by digitalization are becoming an increasingly important component of my work, whereby this is largely due to the things I learned through my involvement in the German government's High-Tech Strategy and the Industry 4.0 project.

The CBA Lab has been something of a godsend from the very beginning in terms of its membership structure. The level of energy in our organization, the expertise of all participants, and the open exchange of ideas and information are a constant source of inspiration for me. Cross-business approaches are a characteristic feature of the digital economy, which is why we plan to take measures that will increase the contribution we make to the success of our member companies.

In terms of my private life, my family definitely keeps me on my toes – how could that not be the case with four young children? We like to take walks and travel, and I personally also love mountain climbing, skiing, and sailing.

Christian Schwaiger
Deputy Chairman and Association Secretary

> Enterprise architecture is creating added value for companies by acting as an optimizer and information broker, as well as an influencer that initiates a positive change of attitude and behavior among the workforce.

My job is to manage and further develop the discipline of enterprise architecture at the KUKA Group. In my capacity as an IT architect, I act as a partner, a guide, a consultant, and a facilitator – and sometimes even an arbitrator as well. I am driven by a passionate desire to help shape the path we will take in the future. Here, a collaborative and lean approach forms the foundation for optimization, effective guidelines, and innovation.

The **CBA Lab** is a place I appreciate for its open-mindedness and the willingness of all its members to share the results of their work and address new topics together. This also makes it possible for small EA teams to quickly raise their level of sophistication and take on new challenges in a very efficient manner. It is remarkable to see time and again how current topics and issues are reflected in the work of one's own company, other member companies, and entire industries and business sectors. This shows me just how much synergy potential is available to us at CBA Lab.

In terms of my private life, I like to spend time with my wife and son, and other family and friends. I'm very interested in technical innovation and new trends. I also like to travel and cook. Besides that, I have a motorcycle that I like to ride and I enjoy playing basketball, watching movies, and spending time in the sun, especially near or on the water.

Dr. Jürgen Klein
Treasurer

> It's all about data – enterprise architecture should be judged by how well it succeeds in making a company's valuable data available to those who need it – and by how well the data can be put to use to increase a company's success.

My job at ZEISS is to shape our digital technology portfolio that it is suitable and valuable for our digital product teams. My leading portfolio design principle is finding the right balance between innovativeness and operational stability and robustness. This task reminds me in many ways of the first few years of my career as an IT consultant at CSC and Siemens. Back then, we faced the similar challenge of attempting to exploit the potential offered by the fast-growing realm of the Internet in a sustainable manner.

The CBA Lab is a place I appreciate for the motivated and constructive manner in which we address and answer cross-company questions and challenges. Along with my work in the CBA Lab Board, I also really enjoy participating in our workstreams. One recent example is the design of a "next-generation EAM" system that can be successfully employed in practice.

In terms of my private life, I especially like to work off steam physically and mentally by jogging, biking, and hiking in the nature. Sometimes also under the water surface (when diving). I also occasionally like to end the day with a Mediterranean meal and a fine wine.

Dr. Karsten Schweichhart
Responsible for R&D,
Press and Communications

> EAM is the only discipline I know of that can advance digitalization in a truly structured and carefully managed manner.

My job as an IT specialist involves building bridges to technical departments and engineers. Now that EAM has been firmly established at the Telekom Group, my passion has turned to Industry 4.0, IoT, and data economy for applications in the industrial sector, other business sectors, and the public sector. After all, Gaia-X also needs EAM.

The CBA Lab is a place I appreciate for its open exchange of ideas in an environment in which I help shape forms of communication that inspire our members. It's fascinating to see how digitalization is creating a situation in which extremely diverse business sectors and companies face the same challenges and are working together to find a common language and effective solutions. It's a very impressive example of the establishment and expansion of industrial and business expertise.

In terms of my private life, I'm raising six children and it's really exciting to see how they're developing in different ways. I also work as a coach for managers and employees. I like reading crime novels, and I also enjoy archery and dancing the Argentine tango – preferably with my wife and on a beach.

Joachim Schmider
Responsible for External Partners

> EAM combines, structures, and orchestrates all aspects of the digital transformation. EAM methods enable communication in line with needs and stakeholder interests – the ideal foundation for informed decision making.

My job is to manage enterprise architecture at Schaeffler as we increasingly make use of EAM systems as the basis for the transformation of our company. More specifically, we are defining, integrating, and structuring our business, data, and IT architectures and establishing the necessary conditions and decision-making processes for their implementation, which will then be safeguarded by next-level enterprise architecture plans and collaborative governance systems.

The CBA Lab is a place I appreciate for its open exchange of ideas among various experts, which is a process I help manage in my capacity as the Board member responsible for external partners. I also appreciate how we are able to channel the inspiration, energy, and experience of the participants in our workstreams in order to further develop our EA discipline both conceptually and strategically.

In terms of my private life, I find my family, my passion for sports (jogging, fitness training, golf, and dancing), my love of travel and fine cuisine, and my insatiable thirst for new knowledge to be great sources of relaxation – and inspiration – when I'm not at work.

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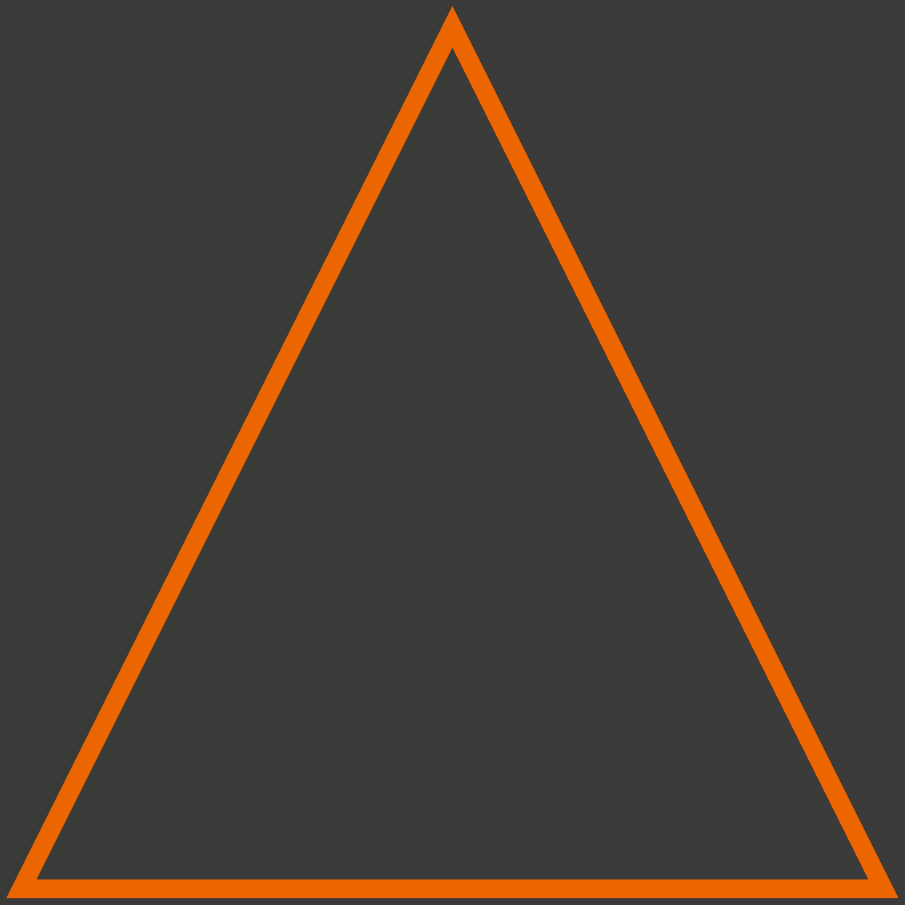


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