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Digital.Trend.Impulse

# Digital Humans

The human side of artificial intelligence



DB System GmbH | Digital Foresight | November 2024 | DB Extern



## Welcome

The term "digital human" is fascinating and can be interpreted in many different ways. But what makes a digital human? In our impulse, we shed light on models and possible applications that are relevant today and in the future. Digital humans are already taking on tasks in companies, whether as virtual customer service employees or in assistance functions. They play a central role in education and are increasingly acting as digital assistants - the possibilities seem limitless.



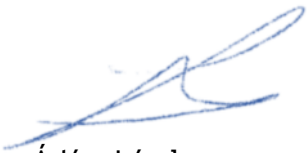
At a time when digital technologies are fundamentally changing our everyday lives, we see that technology is evolving in the direction of the digital human. But what you make of it is up to you. Digital Humans are taking on an increasingly important role, and this Impulse explores the many uses of these virtual, AI-driven representations that are creating a new form of human interaction. We invite you to explore together how this technology affects our working world, social structures and ethical considerations.

The social and cultural dimensions are crucial here. How will digital humans change our interactions? What new forms of collaboration will emerge? What ethical questions need to be answered to ensure that this technology serves the common good? We will address these and other topics at our impulse to provide you with a sound basis for future decisions.

A look into the year 2030 shows how digital humans not only make work processes more efficient but could also play an important role in social interaction and emotional support. Practical examples, such as virtual assistants or AI-supported companions, illustrate the potential and challenges of this technology.

Finally, we would like to thank everyone who contributed to this impulse. Share your thoughts and perspectives with us! We hope that this impulse offers you valuable insights for your work and for shaping a viable working world for the future.

Have fun reading and discovering!

A handwritten signature in blue ink, appearing to be 'Ádám László', written in a cursive style.

Ádám László

Digital Foresight Team

## Disclaimer

This impulse describes possible developments and potential applications of Digital Humans. The application examples presented illustrate potential future scenarios but are not binding recommendations and do not necessarily reflect the strategy of DB or other organizations. It is important to emphasize that not everything that is technologically possible is automatically the right way forward. Any technological application should be carefully considered and introduced responsibly - especially in areas that involve sensitive human interactions. Our aim is to create awareness so that we can minimize, ideally even eliminate, risks in upcoming technological developments, while at the same time shedding light on the opportunities these developments offer.

### Focus on people

People are at the forefront of all considerations. The technologies described in this impulse are not intended to replace people, but to complement them. Especially in areas that require empathy, judgment and interpersonal trust, human skills are indispensable. Digital Humans are designed to support human contribution and facilitate certain tasks without displacing the central role of humans.

### Protection of employees and customers

We attach great importance to ensuring that the technological developments described here respect the rights and well-being of employees and customers. To ensure trust in such technologies, it is essential that ethical guidelines and data protection regulations are strictly adhered to. Therefore, any application under consideration should ensure the protection of privacy and personal integrity.

### Ethical considerations

This impulse also takes digital ethical aspects into account. Every technology should be evaluated not only in terms of its functionality, but also in terms of its compliance with ethical principles. In this impulse, we present scenarios that show how technologies could be introduced responsibly, taking into account fairness, transparency and the well-being of all those involved. The actual introduction of new technologies requires comprehensive and coordinated support from all relevant stakeholders. This impulse merely serves as a guide and outlines potential developments that must be examined individually and evaluated in the respective context.

Please note that this impulse does not represent any conclusive recommendations for action and serves exclusively as a source of information.

# What is a digital human?

## Definition

Digital humans are virtual representations that are controlled by artificial intelligence. They simulate cognitive, social and emotional abilities as well as the outward appearance of humans with varying degrees of autonomy and interactivity. These entities interact with human users or other digital beings and are able to exhibit human-like experiences, reactions and behaviors.

## Digital Human: Between vision and reality

Digital Human is a colorful term. Do a little field experiment: At the start of the next meeting, you attend, or at the next meal with family or friends, ask everyone to take a moment. Has anyone written down a short definition: What is a Digital Human? It's not about perfection, but simply about the current association that everyone has for themselves. What do you think: How many have a clear idea? How different are they?

The fantasies of Digital Humans are manifold. In fact, the development of digital humans opens up a wide range of design and application possibilities. They offer numerous opportunities and harbor various risks. It is therefore important for all of us - as a society, as companies and as citizens - to set a well-considered framework. What do we want to use digital humans for and what not? This is not just about the technical possibilities, but also about how people accept and embrace these technologies. To ensure that the discussion on these technological, cultural, ethical and legal decisions does not compare apples with oranges, this impulse will start with a basic definition and three basic models with specific potential applications.

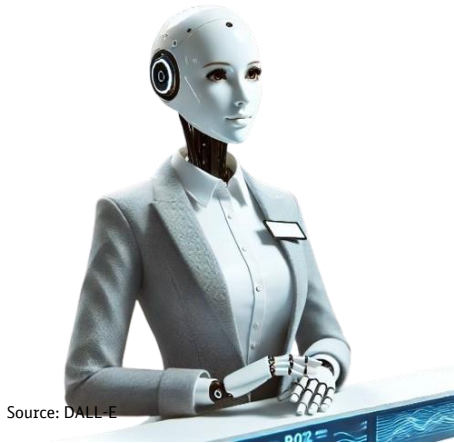
## The digital Swiss army knife: flexible and versatile

Digital Humans are virtual representations with the external appearance of humans. They are controlled by artificial intelligence and simulate the cognitive, social and emotional abilities of humans. They interact with human users and other digital humans. They have different degrees of interactivity and autonomy defined by humans. They have an understanding of language and culture, interpersonal skills, a high level of competence in adaptive learning and an ethical behavioral compass. In addition, they will have variable features, similar to a Swiss army knife, which offers different tools depending on the intended use. These features may or may not be part of the "equipment". The decision is in people's hands. These include, for example, the ability not only to read emotions, but to express them themselves, to simulate a personality and to make autonomous decisions.

Let's dive into the year 2030 together for a moment. There we will encounter three examples of digital humans who take on concrete tasks in specific work contexts. What they all have in common is that they support and relieve employees in their work and, if necessary, customers in their concerns. These three deployment models will be repeatedly highlighted as basic use cases in the context of this impulse.

## 2030 - A digital human as a representative of the company:

### Customer service of the future: a whole new level of trust



My goodness, she's been on hold in call centers for 75 years. Lifetime that I won't get back either, she mumbles to herself. But as soon as she presses "Call", he smiles back at her on his smart device. This is the third time this week alone. "Mrs. Schmidt, that makes me happy! Everything ready for your choir trip to Zurich tomorrow?" He could be her grandson. I'd love to have a grandson like that! - she thinks bright, well-groomed, courteous, very patient and: always an answer for her that gives her clarity.

"I'm sorry, Mr. Fischer, but of the 12 in our group, two have now had to cancel today. Will we get a refund? ... Yes, and then I wanted to ask if you could move us from the large room into two compartments if there are only 10 of us?... And before I forget: You still remember my friend Helga?" He looks at her attentively and kindly. "You know, the one with the hip operation three weeks ago?" He nods. "She wants a boarding aid after all. Can never make up her mind. Do you need my booking number?" - "Thank you, I have everything here in front of me: then let's see how we can change one thing at a time to suit you." She looks at him. It reassures her that he is her contact person every time. It's really special, she thinks.

### 24/7 availability and empathy: the advantages of being a digital representative of the company

The customer service employee Mr. Fischer is an example of the possible basic use of Digital Humans as a representative of the company. In this role, they represent the company internally and externally. They provide general company information and updates internally and externally.

In customer service, the majority of standard inquiries will be handled proactively and digitally by AI systems in the future. More specific concerns that require a differentiated approach will continue to require personal interaction. In such cases, advanced digital assistants could also be used. This enables continuous 24/7 availability without waiting times, which increases customer satisfaction. At the same time, human input remains key for more complex cases.

Instead of human call centers, customers are served by the same appropriately assigned service persona, whose knowledge and solutions are always up-to-date and free from silos of responsibility. Not only hearing the service employee, but also seeing them, being able to read their facial expressions and gestures increases customer trust and is the decisive advantage of a digital human over other AI-supported programs. The smallest proportion of concerns reach a level of responsibility in the necessary decisions that require human support. This makes their tasks more demanding, less routine-tiring and more enriching thanks to their decision-making responsibility.

### **Other examples of possible uses of digital humans in the role of company representative include**

- Digital humans offer interactive tours and presentations to give investors and stakeholders insights into the company and its vision for the future. Their added value lies in their ability to respond to questions and comments in real time in a human-like way and create a more personal, trusting atmosphere than traditional virtual presentation tools.
- They moderate discussion forums and Q&A sessions with customers, stakeholders and the public, promoting transparency and gathering direct feedback. The added value of Digital Humans can be seen here in their ability to dynamically and empathically steer conversations, addressing emotional undertones and thus creating deeper understanding and stronger bonds.
- If human employees are not available to conduct webinars due to dwindling resources, digital people can take over this task. They offer an efficient solution without compromising the quality or interactive nature of the webinar. Nevertheless, the use of human employees always remains an important option, especially for more complex topics or when more personal support is required.
- They support talent acquisition by presenting the company at career fairs and on social networks and addressing potential applicants. The added value lies in the fact that they can personalize the candidate approach, respond to individual interests and thus enable appealing and effective communication.
- Digital humans support crisis communication by responding quickly and consistently to critical requests. Their added value is demonstrated by their ability to incorporate emotional intelligence into their responses, which helps to protect the corporate image and build trust in challenging situations.
- They act as an interface for internal communication, promote exchange between departments and support the dissemination of corporate culture and values. Their particular value lies in their ability not only to convey information, but also to respond to the moods and needs of employees.

## 2030 - A digital human as a subject area expert:in:

### The digital mentor: boundless expertise meets cultural sensitivity



Source: DALL-E

*"Right guys, let's go!" Yassin startles briefly. He hadn't realized that their instructor had walked into the virtual meeting at that very moment. They are now complete for today's lesson. He, a Syrian, a Spanish woman, an Austrian and a digital human: Dilek. His father couldn't imagine it at first. "What the hell is a digital human? In vehicle maintenance?"*

Yassin has no idea who chose Dilek as a digital human for this group. But he thinks so: It fits. Dilek is only 10 years older. She is Muslim. She knows what "migration background" will feel like in Germany in 2030. In many ways, she speaks exactly the same language as all three of them. "Any more questions about the last time?" - Yassin looks at Dilek's face. Her gaze is friendly but energetic. She is not an old-school instructor. When she explains, she has enormous patience. She never runs out of practical examples and visualizations. Her knowledge seems inexhaustible and goes far beyond her area of expertise. She teaches in such and such a way until it "clicks" with each individual.

She is both a mentor and a coach for everyone. In one-on-one meetings or when giving explanations, she switches to the native language of the individual if necessary. But she also makes sure that everyone gives their best. Yassin thinks that with her as a coach, we would be at the top of the league in football. "Making jokes or dreaming, how about paying attention for a change, Yassin?" He sees her eyes. He knows that she is not human. But absolute authority, both professionally and personally.

### From all-rounder to super teacher: digital humans are revolutionizing education

The trainer Dilek is an example of the possible basic use of Digital Humans as subject matter experts. In this role, they support individuals and teams in their work by performing high-precision tasks such as analysis, coding, bug fixing, messaging, research and training. These are task-specific agents who can take on a whole range of time-consuming, detailed tasks.

The added value of a digital human in this role goes beyond the mere provision of information. The human interface, i.e. the visual and interactive component, creates a trusting relationship between learner and teacher. The ability to read the facial expressions and gestures of a digital instructor promotes trust in the learning process and increases trainee motivation. In contrast to other AI learning systems, this human component enables a deeper connection and a more intensive learning experience. In addition, the Digital Human can efficiently respond to the needs of learners through continuous feedback and automated adjustments to learning progress, enabling flexible and sustainable knowledge transfer. It complements human employees, who continue to play a central role in more complex topics

### Other examples of possible uses of digital humans in the function of subject area experts are

- Digital humans create predictive analyses for maintenance tasks, not only evaluating data, but also proactively suggesting maintenance measures that minimize downtimes and extend the service life of systems through their human-like decision-making ability.
- They support the creation and optimization of algorithms in various programming languages to increase the efficiency of software development. Their added value lies in their ability not only to optimize code, but also to understand and adapt complex algorithms in a human-like manner, which speeds up and improves the development process.
- Digital humans perform market and competitive analysis to support strategic decisions in business processes and identify current industry trends. The difference to conventional analysis tools lies in their ability to make strategic recommendations based on a human-like understanding of market conditions and competitive dynamics.
- They analyse and optimize workflows within organizations by identifying bottlenecks and increasing process efficiency. The added value here comes from their ability to not only identify technical bottlenecks, but also to consider human interactions in order to suggest holistic process improvements.

Digital people support data visualization and the creation of complex reports by not only visually preparing data but also creating narrative connections that serve the decision-making processes through clearly prepared and easily understandable information.

- They act as consultants in the implementation of new technologies and systems by providing recommendations based on best practices and measures of success. Their added value is demonstrated by their ability to provide human-like advice that takes into account both technical and cultural aspects of implementation, resulting in higher adoption and better integration into the organization.



## 2030 - Digital Human as a digital assistant:

### From fairy godmother to digital assistance



Source: DALL-E

**I like farewell parties when colleagues leave the company. It's one of those special occasions when everyone from the team is together in one room, without exception. Nobody joins virtually or is represented by a digital human. An unspoken rule. A sign of appreciation. Rüdiger is retiring today. He started in 1990. Now he's 68. I'm in training and have only been with him for 9 months. There are almost 50 years between us. It sometimes feels like two different worlds. "My very special thanks also go to Noa! For organizing the party for me today!" Rüdiger toasts Noa, our digital team assistant in the large screen on the wall. "I was very happy to do that, Herbert!" Noa smiles warmly in return.**

**I enjoy talking and working with Noa. There is always something balancing, understanding and encouraging about Noa. Noa is neither female nor male. To avoid reinforcing gender stereotypes in supportive roles, someone once explained to me. Noa is something like our fairy godmother: she coordinates appointments, promotes communication within the team and also provides support in terms of content.**

### Digital Human as an effective assistant in everyday working life

The team assistant Noa is an example of the possible basic use of Digital Humans as digital assistants. In this role, they provide support by orchestrating and mediating between people and Digital Humans. They help with all tasks by collecting & bundling resources. They remind us of appointments, deadlines and process compliance. Employees interact with the digital assistant to optimize their daily tasks and cross-departmental communication. The digital assistance organizes and initiates meetings, trainings, informs about news, connects with other departments for joint projects, supports task delegation and facilitates approval processes for various requests. They optimize workflows by predicting and prioritizing upcoming tasks based on urgency and personal work patterns.

### **Other examples of relief and support services offered by digital humans in their role as digital assistants include**

- It can generate reports and take the administrative burden away from humans by not only carrying out automated processes but also responding to individual requirements.
- The Digital Human communicates with the company's internal systems by integrating seamlessly into the existing IT infrastructure and processing data in real time.
- Simple, regular decisions can be delegated to the digital human, as it is able to make human-like decisions and act autonomously.
- It analyzes the workload and suggests efficient time management strategies to promote a work-life balance by understanding and taking into account the user's needs and preferences.
- The Digital Human provides personalized messages and updates based on the employee's individual interests and professional needs, responding to emotional and social cues.
- He helps with conflict resolution and mediation by opening channels of communication between team members and, when needed, making neutral suggestions to resolve disagreements based on a deep understanding of interpersonal skills.

Digital Human captures and analyzes feedback from team members and customers to promote continuous improvement processes and increase service quality, taking into account human emotions and reactions.

## Examples already today



➤ [Replika](#) is an AI-based chat app that provides users with a personalized virtual companion who can act as a friend, partner or mentor. The app allows users to chat about their everyday lives, immerse themselves in augmented realities, make video calls and receive emotional support to improve their emotional well-being.



➤ [D-ID](#) is an AI-generated video creation platform that enables users to create digital avatars and interactive agents that can communicate in natural language. The technology includes advanced features such as emotional intelligence and customizable user interfaces to enable human-like interactions and is used in various industries such as education, marketing and customer service.



➤ [YOVO](#) offers an advanced AI platform that allows digital versions of people to be created to maintain relationships with them even after their death. These digital representations, called "Versonas", can capture and perpetuate the unique dynamics and essence of a relationship by integrating them into everyday communication channels.



➤ [MAVE](#) are virtual K-Pop stars, created with the Unreal Engine and MetaHuman, using modern technologies, to create impressively realistic digital characters. They combine K-Pop with elements of virtual entertainment, to deliver unique music and performance experiences presented in both digital and real-world environments.



➤ [Soul Machines](#) develops sophisticated, digitally human-like avatars equipped with advanced emotional intelligence. These avatars can mimic human facial expressions and emotions in real time, making them particularly suitable use in areas such as customer service, healthcare and education. Their ability to interact naturally with people makes them an innovative solution for companies looking to personalize and improve the customer experience.



➤ [NeosVR](#) is an advanced social VR platform that offers users an immersive environment in which they can create, explore and design virtual worlds. The platform enables users to interact, collaborate and create unique experiences in real time, ranging from social gatherings to complex virtual projects.



➤ [Ziva Dynamics](#) is a leading software solution that uses artificial intelligence and physics simulation to create extremely realistic digital characters and animations. The technology is used in the film, gaming and VR industries to create stunning visual effects and detailed CGI characters that are almost indistinguishable from real beings in their depiction of movement and emotion. Ziva Dynamics sets new standards in the creation of digital simulations and is an indispensable tool for creative professionals in the entertainment industry.

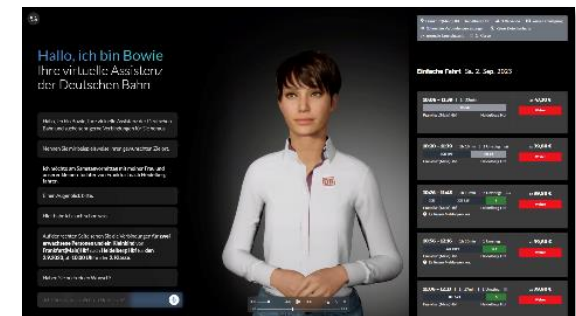
## Activities at Deutsche Bahn



Source: InfoGate Information Systems GmbH

Digital Humans give technology a human face. They are characterized by a sense of empathy, using facial expressions and gestures to signal to us and understand our mood as well as our individual questions and suggestions. The first steps towards the implementation of digital humans at Deutsche Bahn were taken in the passenger information system by giving an information AI a human appearance. With the **SEMMI** (Socio-Empathic Human-Machine Interaction) team, DB Systel laid the foundations for Digital Human back in 2018. In this context, socio-emphatic means the facial expressions and gestures that characterize Digital Humans in dialogue with passengers. The first pilots at Frankfurt Airport, JR East in Japan and Berlin Central Station still used hardware in the form of a robot head. Due to better scalability, this special hardware was replaced by a digital avatar on a stand display in further pilot projects at Hamburger Hochbahn and in Newcastle for London Northeastern Railway. Compared to the level of maturity of AI, especially emotional AI today, the technical possibilities were not yet very advanced in 2018. Some of the first prototypes were viewed critically due to their limited performance. Nevertheless, an impressive prototype was created for multilingual traveler information and information services. The prototypes in Germany, Japan and England are thus an essential basis for the further development of [digital characters](#) in DB Systel's HMI team and thus for the implementation of Digital Humans at the human-machine interface.

The **KIANA** virtual assistant from DB Vertrieb and DB Regio, which works via voice control and chat, could support customers in local and long-distance transport along the travel chain in future. KIANA is intended to enable 24/7 advice and sales for travelers in travel centers and also on platforms, especially in rural regions. It can also be used as a voice control system for the navigator. The innovative solution brings service, advice and sales to areas where it is not economically feasible to deploy staff. It relieves the burden on travel consultants in the DB travel centers and helps to compensate for the staff shortage while offering customers the best possible service. Through voice control in combination with multilingualism, it lowers access barriers and thus simplifies access to public transport. KIANA is a flagship project that aims to illustrate the diverse possibilities in the field of artificial intelligence (AI) and virtual assistance. The aim is to encourage users to try out and discuss this technology. To this end, the avatar has basic facial expressions and gestures. Currently, virtual assistance is mainly focused on timetable information and ticket sales, but further development towards travel assistance and after-sales is already possible on the basis of current technology.



KIANA and FRAnny, a SEMMI avatar, are the first prototypical forms of digital humans as company representatives that are being implemented on the basis of the Group-wide [Conversational AI platform](#).

## What else awaits you

The forthcoming major study on Digital Humans examines the far-reaching changes brought about by the use of Digital Humans and how they will affect our working world, social structures and ethical standards. It takes a close look at the following three key areas:

### **New world of work**

Digital Humans will fundamentally change the way we work. They will create hybrid teams in which digital and human employees work together seamlessly. This will automate routine tasks while freeing up human workers to focus on more demanding tasks. Flexibility, efficiency and a new dynamic in collaboration across time zones are shaping the working world of the future. Especially in the context of staff shortages, the use of digital humans offers new opportunities to optimize work processes and future-proof companies.

### **Social and cultural impact**

Digital humans will not only influence the world of work, but also our social interaction and cultural norms. Their human-like interactions shape our expectations of communication and behavior in teams. Through their presence in hybrid teams, they could help to break down cultural barriers and promote an inclusive working environment. At the same time, they pose new challenges as they have the potential to create similar misunderstandings and conflicts in social dynamics as humans. Their influence on the culture of the working environment could be formative in the long term.

### **Ethical aspects**

The use of digital humans raises important ethical questions. The study examines how companies can ensure that these technologies are used responsibly. Data protection, transparency and the explainability of decisions are at the heart of ethical considerations. Clear guidelines need to be developed to ensure that digital humans act in an authentic and trustworthy manner.

These topics illustrate the far-reaching implications of digital humans for the future world of work, social coexistence and the ethical challenges that these technologies bring with them.

## Contact person

In addition to the "core team" listed here, numerous other colleagues and external partner organizations have also contributed to this impulse, contributed their expertise, provided impetus and support. We would like to take this opportunity to thank them once again for their valuable input and constructive feedback. Even a short conversation can reveal new perspectives and inspire.

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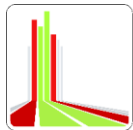


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**DIGITALE TRENDS  
& INNOVATIONEN**  
Für eine starke Schiene.