

Overview of Our Digital Brain

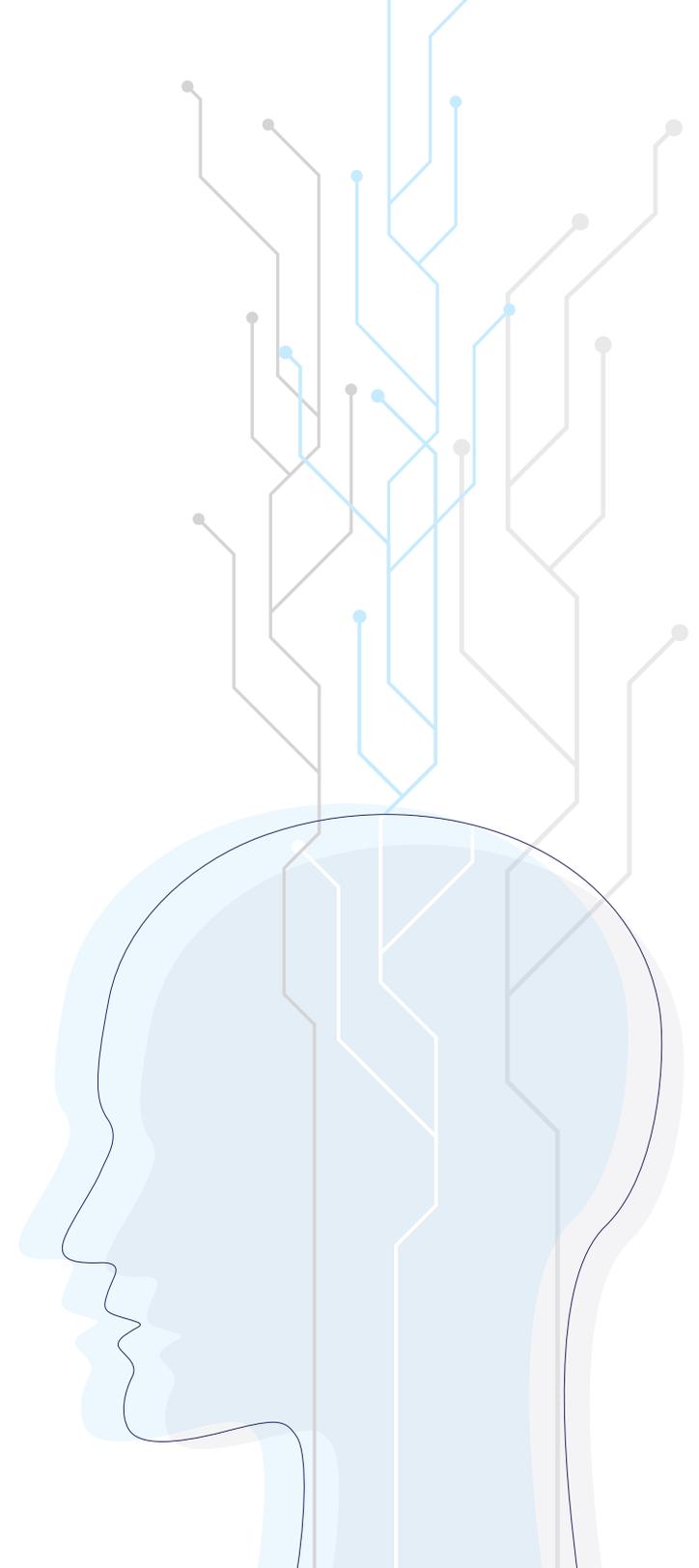
How the Soul Machines Digital Brain is
autonomously animating Digital People™

soul
machines™
Astonishing Digital People



Contents

Introduction	3
Summary	4
Key Differentiators	7
Levels of Autonomous Animation	9
About Soul Machines	12

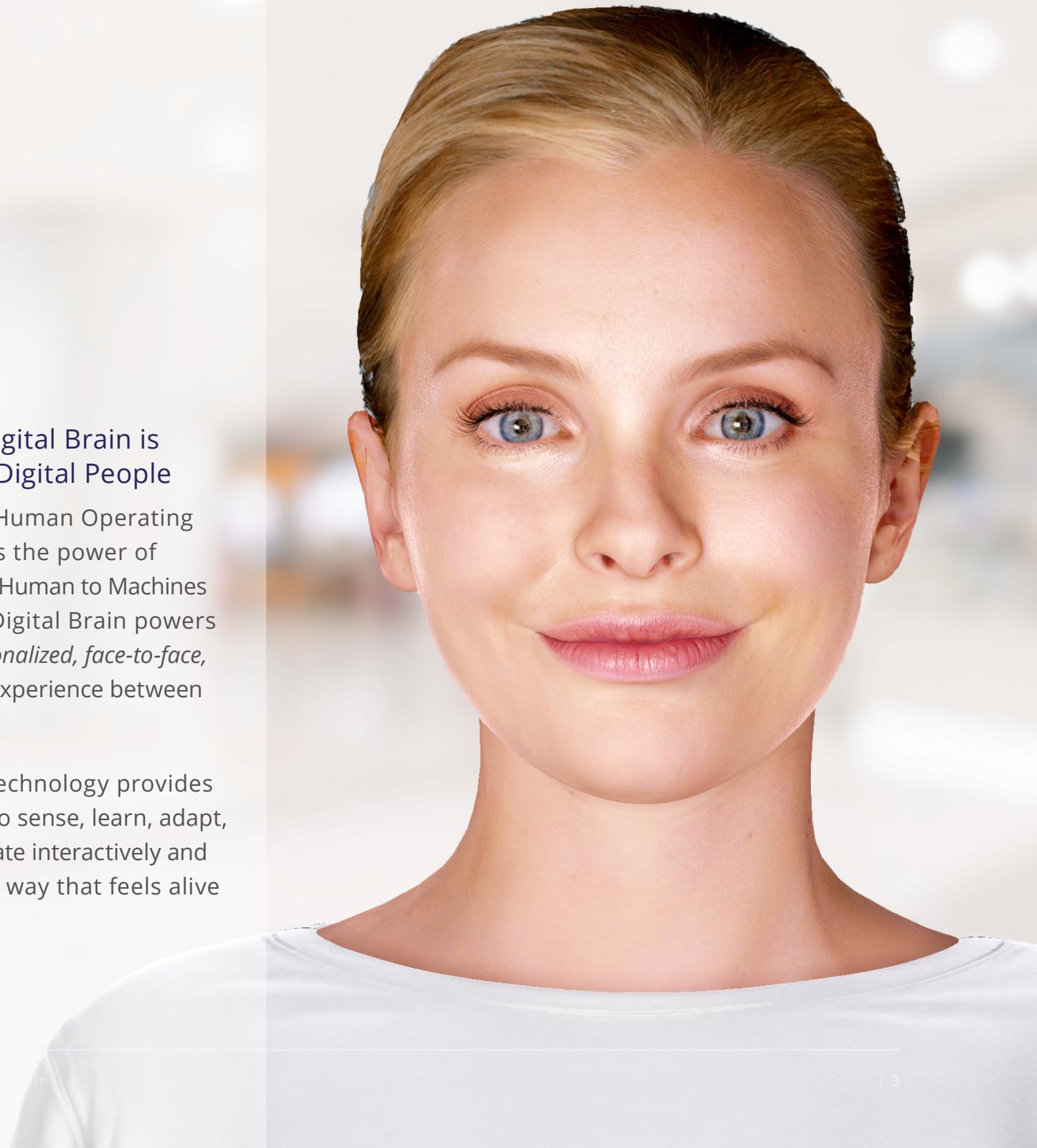


Introduction

How the Soul Machines Digital Brain is autonomously animating Digital People

Soul Machines has created a Human Operating System (HumanOS) to express the power of Artificial Intelligence and power Human to Machines Interactions. Soul Machines' Digital Brain powers the HumanOS to deliver a *personalized, face-to-face, collaborative, and autonomous* experience between machines and humans.

Soul Machines' Digital Brain technology provides Digital People with the ability to sense, learn, adapt, make decisions and communicate interactively and in real-time with the user in a way that feels alive and engaging.



Summary

Human cooperation is one of the most important forces in history. It has helped humanity reach the moon and sequence the entire human genome. As the world becomes more virtual, human cooperation with machines will undoubtedly unlock new innovations and milestones for humanity. In order to unlock that potential, machines need to upskill and have more natural interactions with humans at scale. The paradigm needs to flip so humans are no longer forced to do unnatural activities in order to work with machines. The system needs to be able to create 1:1 personalized interactions with humans at scale. This is the promise of Artificial Intelligence (AI).

The current AI iteration has been impressive in its ability to showcase specific outcomes. There is a lot of promise that these advancements will further society in its pursuits. Machine learning algorithms

have enabled computers to understand spoken language, and recognize visually presented objects at near-human levels. Other models are demonstrating some idea of creativity and imagination by creating new content based on other works of art, literature, and music. However, what is happening with all this activity is that the original promise of AI is being diluted or misconstrued to focus on specific tasks rather than the more ambitious goals of creating a collaborative system that co-creates with humans.

Soul Machines is focused on unlocking the human potential by evolving the relationship between machines and humans from transactional to interactional. Soul Machines has created a system that allows for hyper-real face-to-face communication and interaction, making the machine feel alive and personal. Soul Machines' technology



is rooted in neuroscience and is inspired by how humans naturally process information, learn, interact, and create memories. The human brain is naturally able to process multiple inputs (light, sound, touch, etc.), prioritize its attention, learn through experience, create and store memories, and coordinate actions and behaviors based on rewards and intricate emotional systems. This is a guiding force for our brain model development and as the system evolves the relationship and cooperation between people and machines, it will lay the necessary foundation for Artificial General Intelligence (AGI).

Creating a HumanOS & Digital Brain

Soul Machines is building a HumanOS for AI to enable humans and AI based machines to collaborate in a trusted manner. Soul Machines' HumanOS is delivered through a CGI interface regulated by a Digital Brain. The Digital Brain is on the leading edge of the nascent research field of Experiential Learning which integrates artificial

intelligence with psychology and neuroscience to generate automatic learning and autonomous behaviors. The Digital Brain is a multi-modal, extensible system that coherently integrates a comprehensive suite of proprietary neural network models which perform brain-like functions ranging from sensing and perception to action and decision making. It can be flexibly integrated with third-party algorithms and technologies to leverage the latest from the A.I. community. As shown in our test scenarios, Soul Machines' Digital Brain can contextualize and adapt in real-time to situations, similar to the way in which humans interact today, and autonomously animate human-like behaviors. It is not restricted to large training data, feature engineering, nor bound by a set of specific rules. The Digital Brain enables interactions with users and content in a face-to-face human-like way because it can sense in real-time and adapt to engage. This results in a system that is measured by its ability to interact collaboratively and drive engagement by scaling the levels of Autonomous Animation.

In addition to the Digital Brain, Soul Machines has created hyper-real technologies around Facial Animation & Body Movements to engender a natural interaction between people and Digital People.

A face is central to life-like interactions because it provides context and feedback interactions through emotions and expression and is a basis of trust. Soul Machines has created facial animation technology that establishes a core relationship between people and Digital People. In addition, Soul Machines has pioneered real-time collaborative user experiences (CUE) through the use of body language and gestures to provide additional context to the content and drive mutual understanding. Soul Machines' unique combination of biologically inspired R&D, architecture, and animation position it as the leader in the pursuit of Autonomous Animation and its human-machine collaborative approach to AGI. This system will drive higher customer engagement, understanding, and connection between machines and humans.



Key Differentiators

Soul Machines' unique position as leader of Autonomous Animation technology has resulted in key elements that differentiate the Soul Machines experience from other A.I. research systems, technologies, and companies.

Soul Machines has developed the most sophisticated model of face-to-face interaction combining hyper-realistic CGI faces with a teachable Digital Brain resulting in a more natural interaction with a 'face' on A.I.

The result is a system that has the ability to sense its world, learn, adapt, make decisions, act, and communicate interactively through both non-verbal and spoken language, as demonstrated in our test scenarios. The Digital Brain is designed to be able to adaptively process contextually relevant information

including User Interface content and user emotion and respond with both actions and reactions.

1. Results:

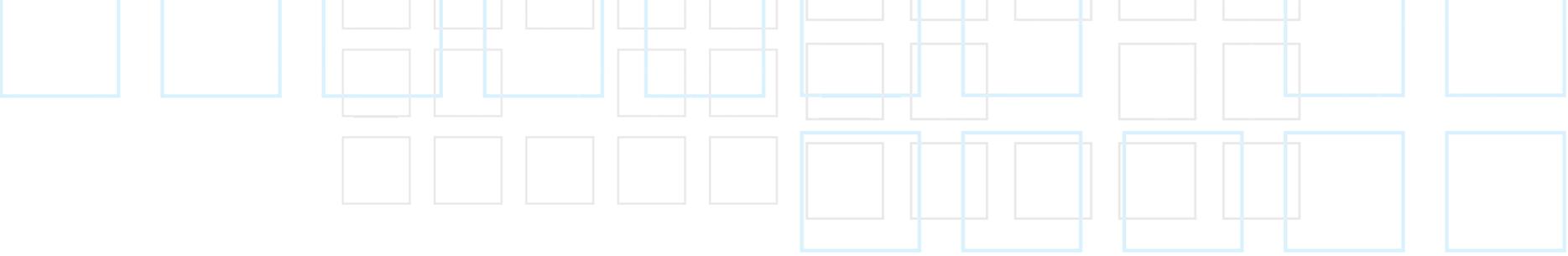
The system creates higher engagement because it is structured at its core to work in tandem with the end user to create a collaborative working environment and interactions.

2. Relatability:

Digital People are built to think and feel with low level biological processes analogous to real humans, creating subtleties in interaction that make them more relatable to humans, increasing connection and engagement.

3. Experiential Learning:

Soul Machines' Digital People will learn about tasks in a human-like way, through 'experiences' that they integrate into their wider memory of the world. This learning will be richer than the



learning done by stand-alone deep networks. It can also be faster and transferable.

4. Hyper-realistic look:

State-of-the-art 3D graphic and brain models that present a life-like experience rooted in biology and the brain help the technology create authentic connections between humans and machines. The faces and bodies are uniquely designed to work with the digital brain signals.

5. Authorable:

Soul Machines' Digital People will support learned behaviors and tasks by enabling the Digital Person to be directly programmed and naturally trained by a face-to-face 'training conversation' between the author and the Digital Person.

6. Adaptive Architecture:

The design of the system is modular and future-proof, which allows it to leverage the state-of-the-art models and to evolve as the fields of A.I. and cognitive science advance.

7. Emotional and cognitive processing:

Current scientific thinking considers

cognition and emotion to be inseparable and interdependent. The tight integration of cognitive and emotional processing is a fundamental feature in the Soul Machines brain architecture, which enables life-like behavior.

8. Ambiguity:

The system will support the ability to cope with ambiguity given the ability to engage in the world through multiple senses and to react to events differently in different contexts. It will also be able to recall relevant situations from memory and simulate possible actions using imagination to help decide what is the next action.

9. Explainability:

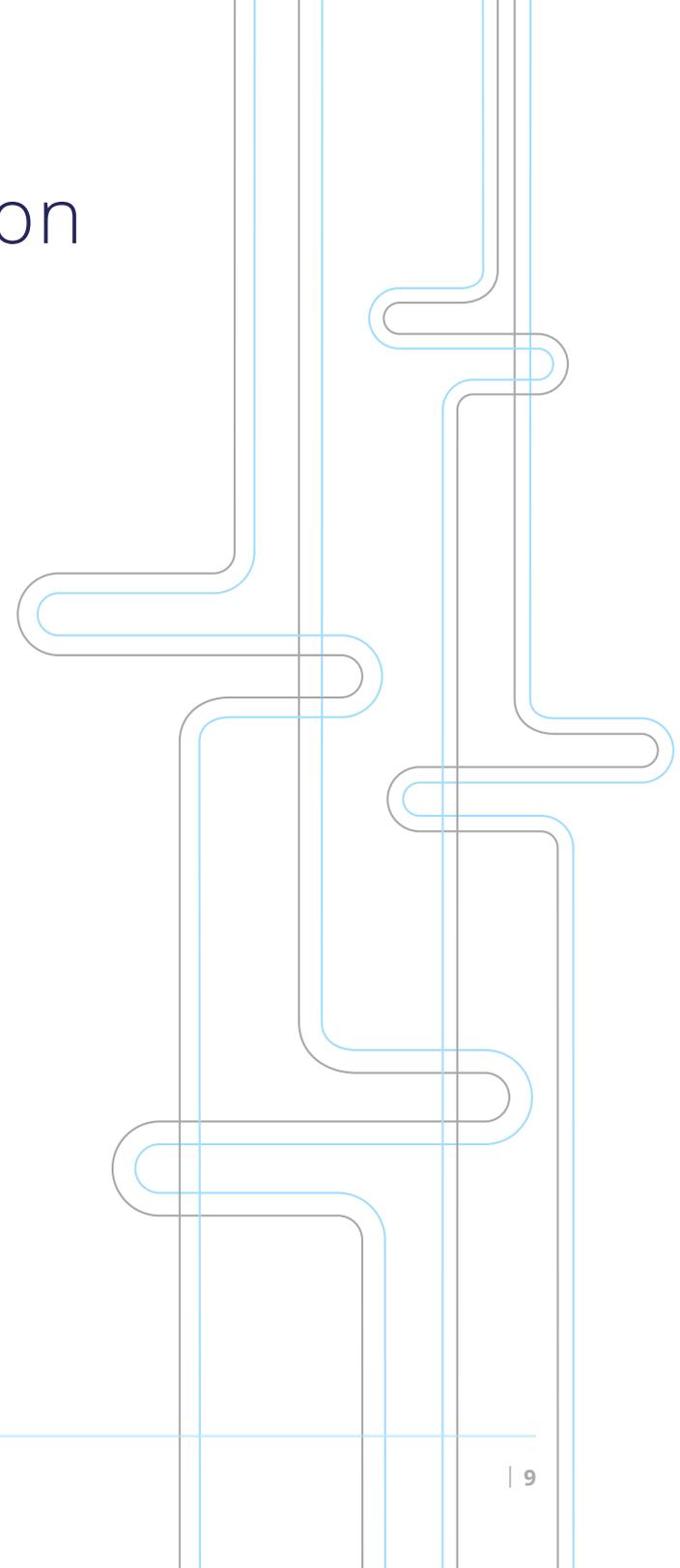
The use of experiential learning by Soul Machines' Digital People will support new, humanlike mechanisms for generating explanations of their behavior, increasing the transparency of the system.

Levels of Autonomous Animation

Autonomous Animation is the ability for an A.I. based system to demonstrate collaborative intelligence through its ability to generate realistic and contextually relevant behaviors and content through its learned experiences and creative independence.

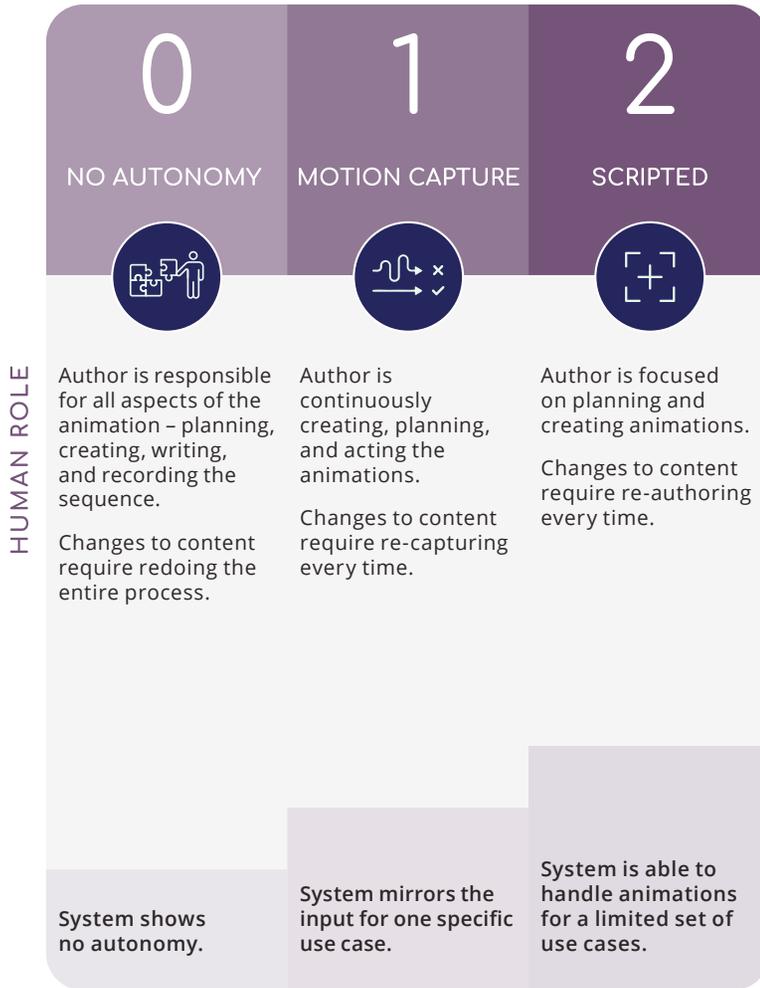
Human interactions are intricate in their simple delivery of deep, contextual knowledge in a manner that creates a connection between participants. Not only is the content discussed important to establishing a rapport, but the manner in which it is shared and the way in which new ideas are created between the parties furthers the dialogue from a mere transaction to well-trusted connection.

Defining the levels of Autonomous Animation draws parallels with the Levels of Autonomy for Vehicles. The purpose is to create a standard to measure innovation in this nascent field.



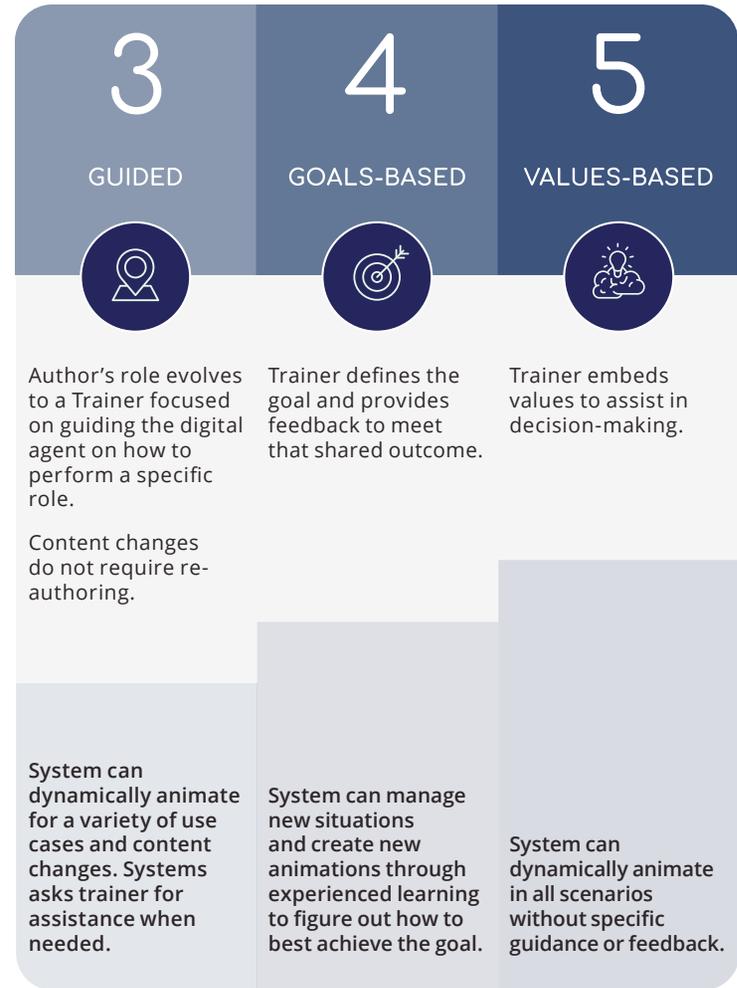
PRE-RECORDED ANIMATION

HUMAN AUTHORED ANIMATION



REAL-TIME DYNAMICALLY-GENERATED ANIMATION

CONTENT-AWARE ANIMATION



SYSTEM ROLE

MUTUAL TRUST BETWEEN AUTHOR AND SYSTEM WILL BE IMPORTANT FOR COLLABORATION

Scaling the Levels of Autonomous Animation requires a step change in technology innovation to deliver the complexity and intricacies of a high-quality interaction. This requires the ability to not only process audio and visual signals from the interaction, but the ability to contextually place the information being discussed, to emotionally resonate, and to creatively generate new ideas and actions together.

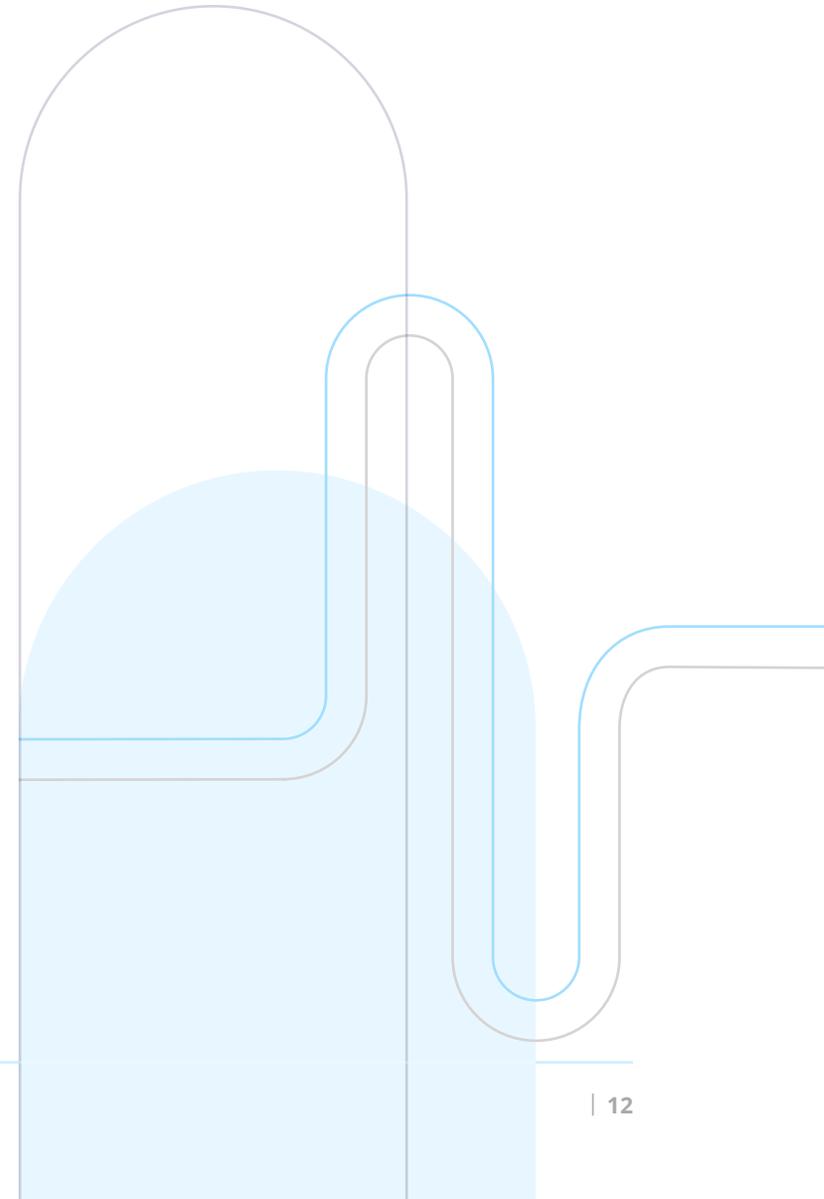
Soul Machines' industry-leading R&D effort is directed towards a Digital Person that achieves Level 5 Autonomous Animation due to its Digital Brain, expertise in realistic animation for life-like interaction, and its robust proprietary research pipeline. Advancements in Natural Language Generation, in computing efficiency, in decision-optimization, and network transmission latency will be important for further innovations.

Soul Machines technology sits at Level 3 and its investment in R&D has shown progress at Level 4 Autonomous Animation. In the following sections, Soul Machines outlines architectures, algorithms, designs, and technologies that it believes will elevate the system beyond Level 3.



About Soul Machines™

Soul Machines is a global pioneer in humanizing AI, dedicated to delivering the full capabilities and goodness of human and machine collaboration in a responsive, relatable and unprecedented way. Composed of some of the world's best AI researchers, neuroscientists, psychologists and innovative thinkers the company's unparalleled autonomous animation – featuring its patented Digital Brain – brings technology to life by creating dynamically interactive and emotionally responsive Digital People with personality and character that allow machines to talk to us face-to-face. Soul Machines has deployed the world's first Digital People with some of the biggest corporate brands in the world in Financial Services, Technology, Automotive, Healthcare, Entertainment, and Education industries. Soul Machines currently has over 200 employees with offices in San Francisco, Los Angeles, New York City, London, Tokyo, Melbourne and Auckland. For more about Soul Machines, visit soulmachines.com



Interested in how we can help you revolutionize your customer relationships? Request a Demo ▶