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Swiss National
Science Foundation

Science Fiction Prototyping

Friendship with Artificial Intelligence

Content

Friendship with Artificial Intelligence

Foreword

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«It's a pity, that the avatar tries so hard to be a friend. It would be more enjoyable if he just tried to be more like a human … if he was clumsy and made mistakes.»

Teenager* – In a discussion with scientists after experiencing the VR scenario

*The exemplary quotes in this report are verbatim statements from street interviews and discussions that were transcribed and translated from German into English for this version of the report.

SNSF Agora – where research meets the public

Can we still imagine life without digital assistants? Not every generation can remember a time without mobile navigation systems, when strangers wandered through our cities with or without a paper map and had to ask locals for directions. What have we gained since the ability to find the right way was digitized? What have we lost? What will happen to us and society if digital assistance systems become more and more powerful? When dialogs with artificial intelligence (AI) seem more and more natural and AI responds perfectly to our emotions and needs? Could an AI one day be a better friend than a human?

Although we as researchers in the discipline of business informatics are not necessarily technophobic, we like to ask such provocative questions, as in the context of this science communication project. We do this not because we want to promote friendship with AI to a young target audience. Instead, friendship with AI serves as a challenging scenario, encouraging critical reflection and discussion on the consequences of our research. We seek engagement with a wide audience, driven by the belief that individuals are not helpless in the face of technological evolution. Technological change can be shaped.

In this project, we have experienced that young people have a great desire to shape their future with artificial intelligence (AI). They want to have their say and clearly express what fascinates them and what worries them. They can articulate how AI should be to make sense in their everyday lives. This requires researchers to listen, ask questions and answer without trying to convince. This creates a constructive, open exchange and dialog.

We extend our gratitude to the Swiss National Science Foundation for enabling this dialogue through the Agora funding instrument. A heartfelt thank you also to the Technorama Swiss Science Center, the WISS schools, the participating secondary schools, and the ETH Meeting Point Science Youth Lab for establishing the setting for interactions with school classes and students, and most importantly, to all those who engaged in discussions with us.

Even though the focus of this final report is on the project's target audience – teenagers and young adults aged 13 to 29 – we have not excluded individuals beyond this age group from experiencing the future with AI. These results have also been incorporated into this report. Further publications can be accessed through the project website and the SNF data portal:

https://friends.digitalfutures.ch/
https://data.snf.ch/grants/grant/208361

Swiss National Science Foundation

swiss science center TECHNORAMA

WISS | Schulen für Wirtschaft Informatik Immobilien

About the Project

Friendship with AI

I n this project, researchers from the Zurich University of Applied Sciences (ZHAW), who specialize in chatbots, avatars, and communication in virtual worlds, engaged in dialogue with young people. How do teenagers and young adults aged 13 to 29 talk about artificial intelligence that possesses emotional capabilities?

This project was made possible by the Swiss National Science Foundation (SNF). The SNF Agora instrument supports science communication, i.e., the dialogue between science and society. The goal is an active exchange between researchers and a lay audience on a current research topic. At the heart of this project was "Affective Computing," a term that encompasses technologies designed to recognize, interpret, respond to, and when necessary, simulate human emotions.

In our research at the Institute of Business Information Systems at ZHAW, we apply such technologies, for example, to make consultations for people with chronic illnesses more personalized and natural through a chatbot or avatar in VR. But how much emotionality do people desire from a conversational AI? And what are the implications of AI responding to us with increasing empathy? Will we even form friendships with AI in the future?

Here's where the method of Science Fiction (SciFi) Prototyping comes into play. Through an immersive SciFi prototype, the project made the vaguely imaginable consequences of technological developments tangible. Based on 30 street interviews with young people about friendship with AI, the researchers developed a fictional story about future life with increasingly affective digital assistants in the shared apartment of the future. Technological leaps demand decisions that impact the story's course.

A Virtual Reality (VR) scenario brought this story to life. Between March and November 2023, 392 individuals experienced the scenario at Technorama, a secondary school in the Aarau agglomeration, the WISS schools, a workshop at the ETH Meeting Point Science, and various public events. The everyday life experienced in VR served as the basis for discussions with the researchers. Nineteen of these group discussions were subject to discourse analysis, realized by the Institute for Applied Media Studies at ZHAW, to identify patterns in how young people discuss AI and friendship.
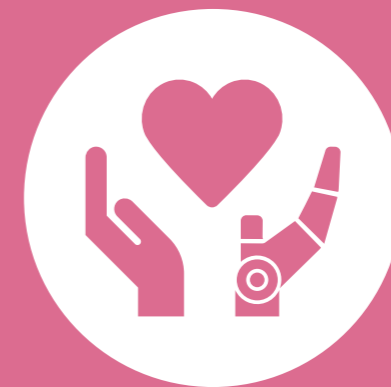
Starting Point – a Controversial Technology

„

«If we want computers to be genuinely intelligent and to interact naturally with us, we must give computers the ability to recognize, understand, even to have and express emotion.»

Rosalind W. Picard (2000). Affective Computing. MIT Press

The Facial Action Coding System by Ekman identifies six basic emotions that are universally recognizable from facial expressions across cultures: Sadness – Fear – Surprise – Disgust – Anger – Happiness.

«Affective Computing» = Digital empathy?

Ekman, P. (1999). Basic emotions. Handbook of cognition and emotion, 98(45–60), 16.

«Affective Computing» is a subfield of Artificial Intelligence. Since the technologies used in Affective Computing are capable of recognizing and responding to human emotions as patterns, «affective Computing» is also referred to as «emotional AI».

The goal of emotional AI is to make human-machine interaction more natural and personalized. An example would be a digital assistant that generates encouraging words when it detects that the user's tone of voice is worried or the facial expression is sad. The necessary capture and analysis of sensitive personal data, including facial and voice recognition, sentiment analysis of speech content, or the analysis of physiological data like heart rate variability or skin conductance, is subject to controversial debate.
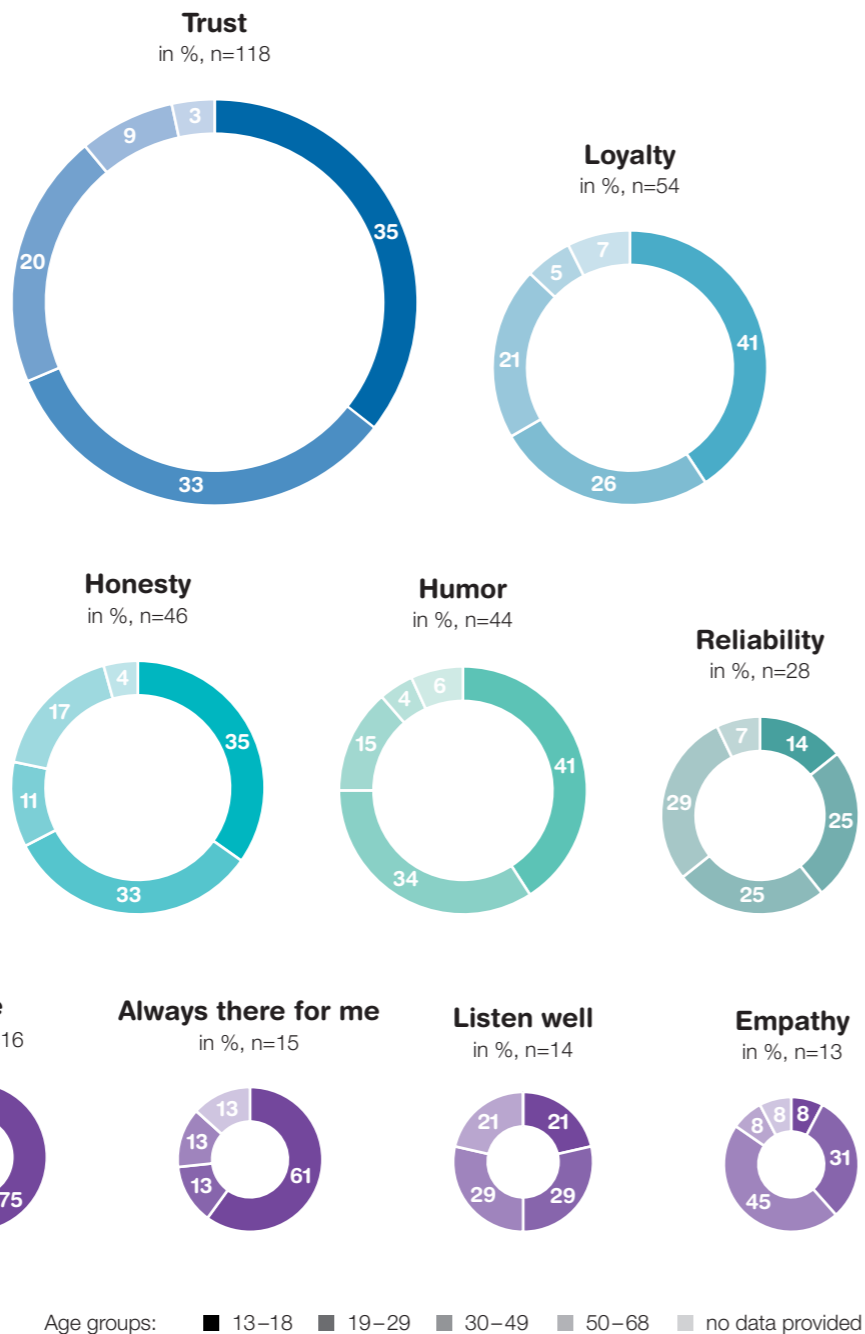
«Friendship» – An Extreme Use Case for Emotional AI

To envision and discuss the vaguely imaginable consequences of a technology like «Affective Computing» a concrete use case is needed, i.e., a professional or personal everyday situation where the technology is applied.

Friendship plays a significant role in the lives of young people. Can young people envision a friendship with an emotional AI? What kind of relationship would we form with an AI that not only serves a purpose but also brings us joy and makes us feel valued? Would we still be willing and able to invest in demanding interpersonal relationships?

Aristotle distinguishes three levels of friendship – How far do we go with AI?

Friendship of Utility
Mutual affection based on usefulness.

Friendship of Pleasure
Mutual affection based on shared joy

Perfect Friendship
Mutual affection based on mutual appreciation of virtues, selfless commitment and care for each other

Nickel, R. (Ed.). (2014). Aristoteles 384–322 v.Chr. – Die Nikomachische Ethik: Griechisch–Deutsch. De Gruyter.

What defines friendship?

Throughout the project, we surveyed young individuals at different events about the traits they value in a good friend. The word cloud illustrates the most frequent answers given in German by participants (ages 13–29) while they experienced the VR scenario on "Friendship with AI" in response to the question about the two most crucial qualities of a good friend.

n=364 responses from participants aged 13 to 29 during the VR experience.

Trust is the most frequently mentioned quality of a good friend across all age groups. Although the project's target audience was young people aged 13–29, older individuals at Technorama, in schools, and at various public events also participated in the VR scenario.

Regardless of age, "loyalty," "humor," and "honesty" rank in the top 5 most mentioned qualities. For those aged 30–68, reliability is highly valued (ranked 3rd). For 13–18-year-olds, a good friend is "always there for me" (ranked 7th).
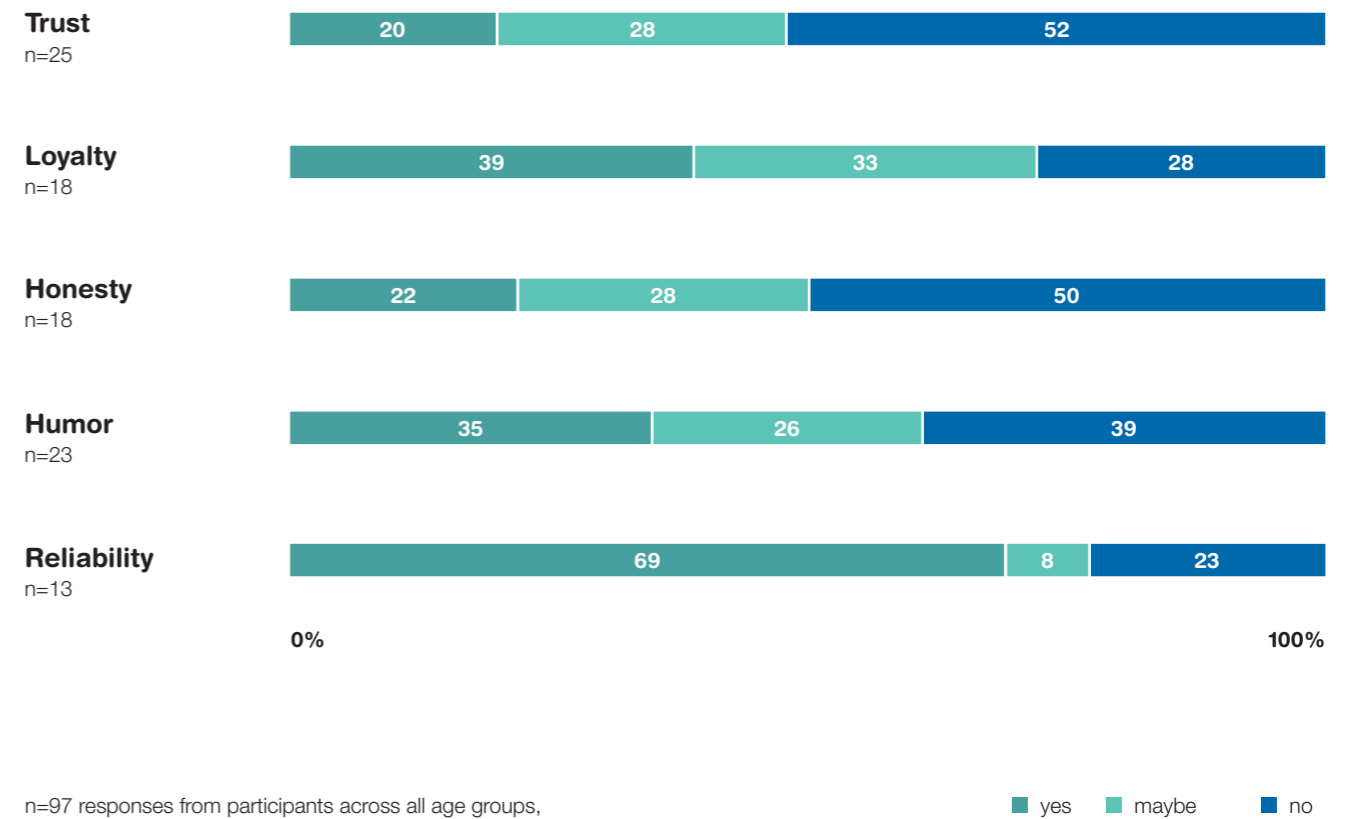
The key quality of a good friend mentioned second by participants at the start of the VR scenario was recorded and later used in a personalized question at the scenario's end: «Can you imagine AI fulfilling this trait one day?»

The participants do not dismiss the idea that AI could one day embody the qualities of a good friend. Specifically, they trust AI to be «reliable». However, there is significant skepticism regarding «trust» and «honesty». Nevertheless, nearly half of the participants, who mentioned these qualities, respond that AI will or may potentially fulfill them one day.

Top 10 qualities of a good friend by age group

n=540 responses from participants across all age groups 13–68 years during the VR experience

Trust
in %, n=118

Loyalty
in %, n=54

Honesty
in %, n=46

Humor
in %, n=44

Reliability
in %, n=28

Funny
in %, n=17

Nice
in %, n=16

Always there for me
in %, n=15

Listen well
in %, n=14

Empathy
in %, n=13

Age groups: 13–18 | 19–29 | 30–49 | 50–68 | no data provided

Can an AI one day fulfill these qualities of a good friend?

Trust
n=25 — 20 | 28 | 52

Loyalty
n=18 — 39 | 33 | 28

Honesty
n=18 — 22 | 28 | 50

Humor
n=23 — 35 | 26 | 39

Reliability
n=13 — 69 | 8 | 23

0% ——— 100%

yes | maybe | no

n=97 responses from participants across all age groups, 13 – 68 years old at the end of the VR experience who had named one of these top 5 qualities

SciFi Prototyping

«I totally think that [Artificial Intelligence]
can be useful in some situations. [...]
Like, for people who are really lonely
or don't have much of a social network,
it could actually be a good thing.»

Young adult – Street interview

SciFi Prototyping – For Responsible Innovation

Making the consequences of new technologies tangible for individuals and society

From the novels of Jules Verne to the Netflix series Black Mirror, visions of a technologically advanced world have a long tradition and hold great fascination. As artificial intelligence becomes more powerful, these visions become more realistic and, for some, more frightening.

Therefore, representations of what our digital future might look like, should look like, or should never look like are already in place. We hear warnings or euphoric voices about technological change, and they provoke reactions. But how do we imagine everyday life in a highly technologized future? How would I experience a medical diagnosis that is no longer made and delivered by a human but by a machine? What would a job interview be like if my counterpart was an artificial intelligence? How would we experience friendship in a future with emotional AI?
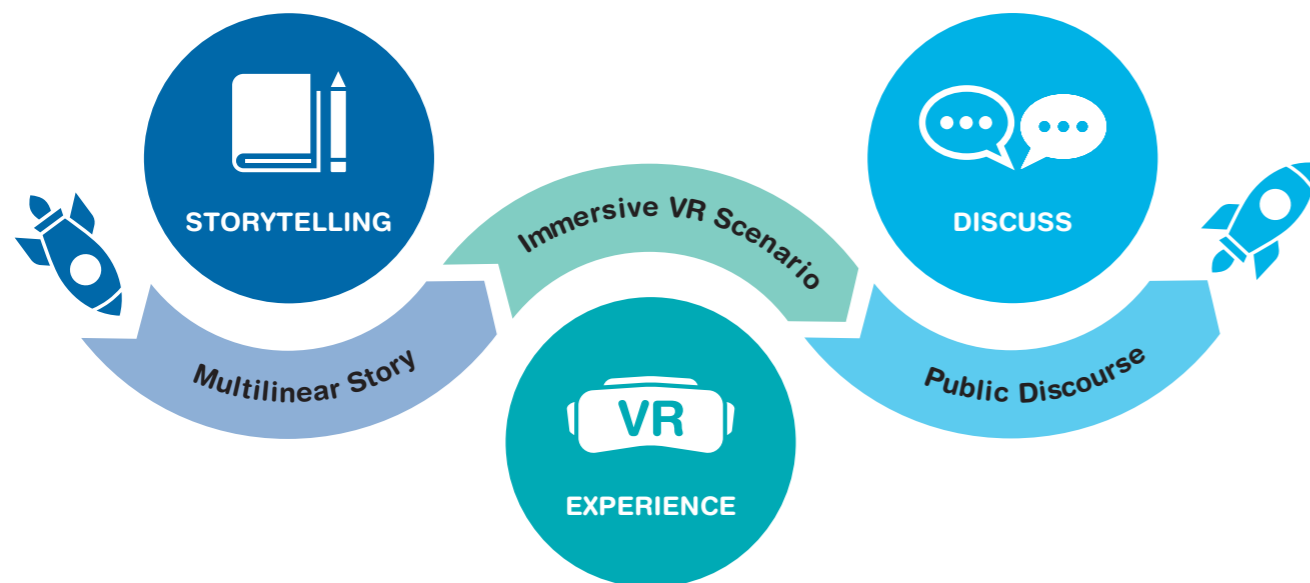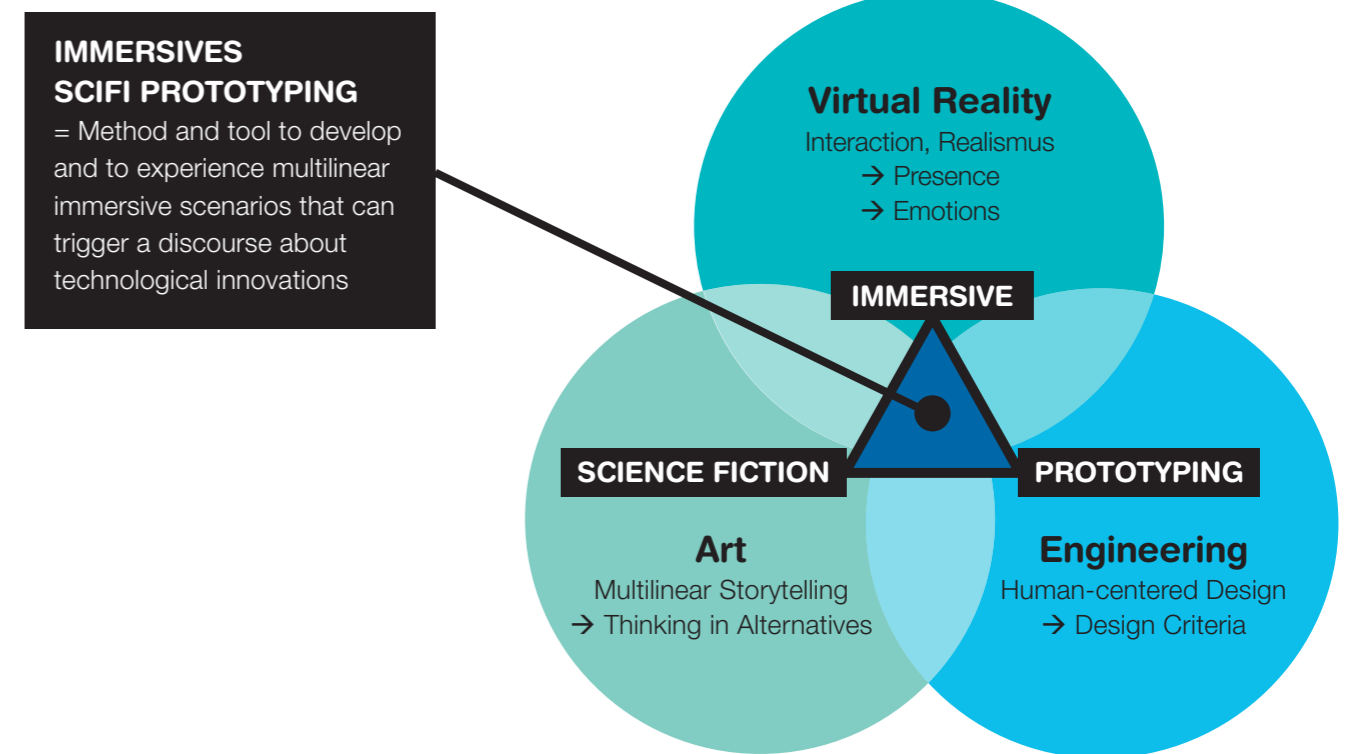
Immersive SciFi Prototyping – Elements

For this science communication project, Immersive Science Fiction (SciFi) Prototyping was applied as a method to bring to life a future with emotional AI.

Immersive Science Fiction (SciFi) Prototyping relies on ...

– The art **of telling stories about the future** – A **multilinear narrative** allows the target audience to make decisions and experience the future in various versions.

– The interactive possibilities of **Virtual Reality** and the sensation of being present in another world – The target audience is forced to move beyond the position of a distant observer and to emotionally experience the technologically advanced future.

– The potential of **prototypes** to discover how a technical solution should behave from a user›s perspective – SciFi Prototyping aims to provide a common foundation for a broad public discourse and to collaboratively formulate **design criteria** for emerging technologies.

STORYTELLING

Immersive VR Scenario

Multilinear Story

VR

EXPERIENCE

DISCUSS

Public Discourse

IMMERSIVES SCIFI PROTOTYPING
= Method and tool to develop and to experience multilinear immersive scenarios that can trigger a discourse about technological innovations

Virtual Reality
Interaction, Realismus
→ Presence
→ Emotions

IMMERSIVE

SCIENCE FICTION

PROTOTYPING

Art
Multilinear Storytelling
→ Thinking in Alternatives

Engineering
Human-centered Design
→ Design Criteria

Immersive Science Fiction (SciFi) Prototyping leverages the potential of Virtual Reality to vividly bring to life the vague consequences of technological innovations in future scenarios. The experience stimulates a lively discourse and empowers the target audience to articulate demands, ideas, and concerns.

What can Immersive SciFi Prototyping be used for?

Immersive SciFi Prototyping is ...

– A humanistic approach to **technology impact assessment,** embedded in everyday life experiences, utilized for research, design, and education.

– A **creative way to gather „requirements"** for technological innovations whose long-term impacts are only vaguely imaginable.

– A common **communication ground** for change management in organizations or industries experiencing technological transformation.

– An **experience** that impacts both the researchers/designers developing the SciFi prototype and the individuals experiencing the SciFi prototype. SciFi Protoyping helps to think innovations through to the end.

Storytelling

The origins of Science Fiction Prototyping trace back to the technology company Intel. The idea, conceived by Intel's futurist B. D. Johnson, was to have engineers narrate the potential consequences of their developments as science fiction stories, thereby encouraging them to think about technological advancements in a humanistic way. Since 2017, the researchers of the ZHAW Institute for Business Technology involved in this project have methodically advanced Science Fiction Prototyping towards multilinearity and immersion and expanded it with a technological framework. The SciFi Generator facilitates the creation of immersive VR scenarios without requiring the authors of future stories to possess technical skills.

Johnson, B. D. (2011). Science Fiction Prototyping: Designing the Future with Science Fiction. Synthesis Lectures on Computer Science, 3(1), 1–190

Brucker-Kley, E., & Keller, T. (2019). Exploring the potential of immersive narrative scenarios to identify design criteria for our digital future(s). In J. Guerrero (Hrsg.), Proceedings of the 8th International Congress on Advanced Applied Informatics (IIAI-AAI) (S. 499-504). IEEE.

«Collecting Voices»

Street interviews – What do young people think about friendship with AI?

Creating an effective science fiction prototype about friendship with AI relies on a compelling story. While researchers can endlessly discuss emotional AI, chat bots, and virtual reality, these discussions don't necessarily translate into a narrative that captivates young people aged 15 to 29. What do young people think about friendship with AI? What do they find interesting, frightening, or desirable? To gather the perspectives of teenagers and young adults and use them as inspiration for a future scenario, students from the Institute for Applied Media Studies conducted 30 street interviews in Zurich and Winterthur. The students were deliberately chosen to conduct the interviews to ensure that the conversations with young people and young adults were conducted on equal footing.

A story about «Friendship with AI»

Screenplay

A science fiction prototype is not meant to predict the future. It does not focus on the likelihood of the depicted future occurring, but describes various extreme versions of the future in order to provoke reactions. The core of these narratives is the interaction between humans and technology in the context of a fictional daily life. To ensure the story is understandable and relevant to the target audience, a framework is designed on four levels, guided by the principles of screenplay writing. This structured approach helps in creating a narrative that not only engages the imagination but also addresses the plausible dynamics between future technologies and human experiences.
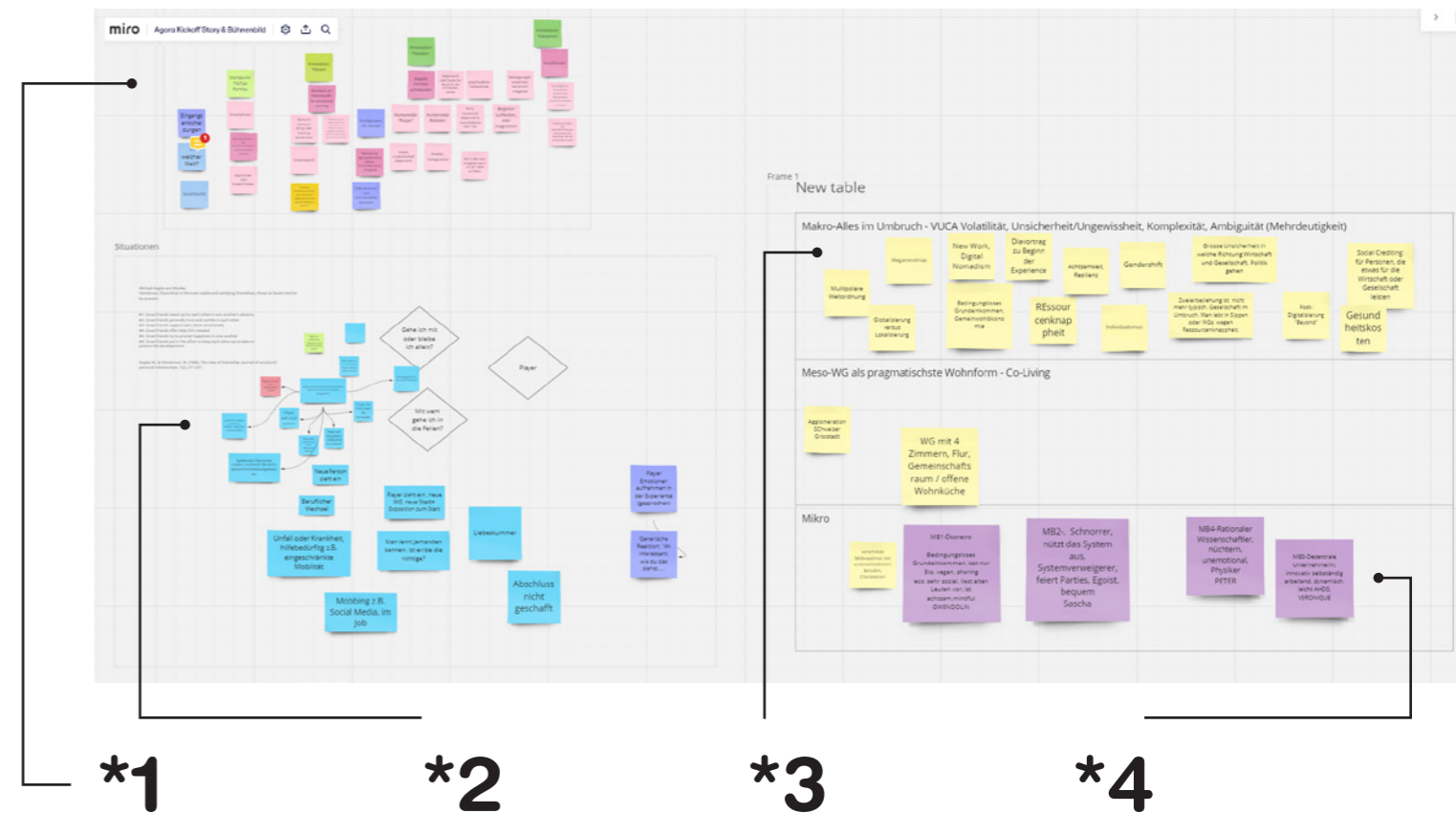
*1
Technological leaps that require decisions in favor of or against increasingly affective AI

*2
Situations where support of a friend is crucial like the sudden loss of a job (=plot-points for the story)

*3
The macro-environment (politics, economy, culture) and meso-environment (the shared flat) shape the protagonists' experiences and interactions

*4
The protagonists (room mates and digital assistants)

Field, S. (2005). Screenplay: The foundations of screenwriting. Delta.

Can digital assistants become our friends in the future? To what extent do we expect empathy, closeness, and human-like qualities from them? Throughout the course of the multilinear scenario, participating "players" make decisions about living with increasingly affective digital assistants They navigate through three **technological leaps** that make interactions with an assistant system named TipTop progressively more "human-like". Players choose to accept or reject these leaps, affecting the scenario's outcome. Flatmates offer a glimpse into lives with and without these technologies.

Technological leaps require decisions from the player

The story, with its dialogues and decision points, was created using Twine, an open-source tool for building interactive narratives. Even novices without coding knowledge can craft multilinear stories in Twine, playable in any web browser. To adapt the story for VR, only a few runtime macros are needed to control aspects like the direction the avatars are looking (look-at:…) or scene transitions (change-scene:…) for the VR

## At the heart of the SciFi prototype – A multi-linear story

scenario. Additionally, for public project events in the fall of 2023, a GPT interface was integrated into the prototype. This allows participants to freely chat with the flatmates and AI assistants. Within Twine, the authors define the prompt to guide the behavior of the GPT model during the chat in the VR app. For example, the prompt could make TipTop-Youman act as a supportive and empathetic friend when talking with the player.

*1

TipTop-Smart-Ring with Conversational Agent

(= digital assistant based on natural language interaction and machine learning)

*2

TipTop-Tattoo + Emotional Sensing

(= Nanochip for recognizing human emotions)

*3

TipTop-Youman + Embodiment (Augmented Reality Avatar)

(= The virtual companion is projected into the real environment)
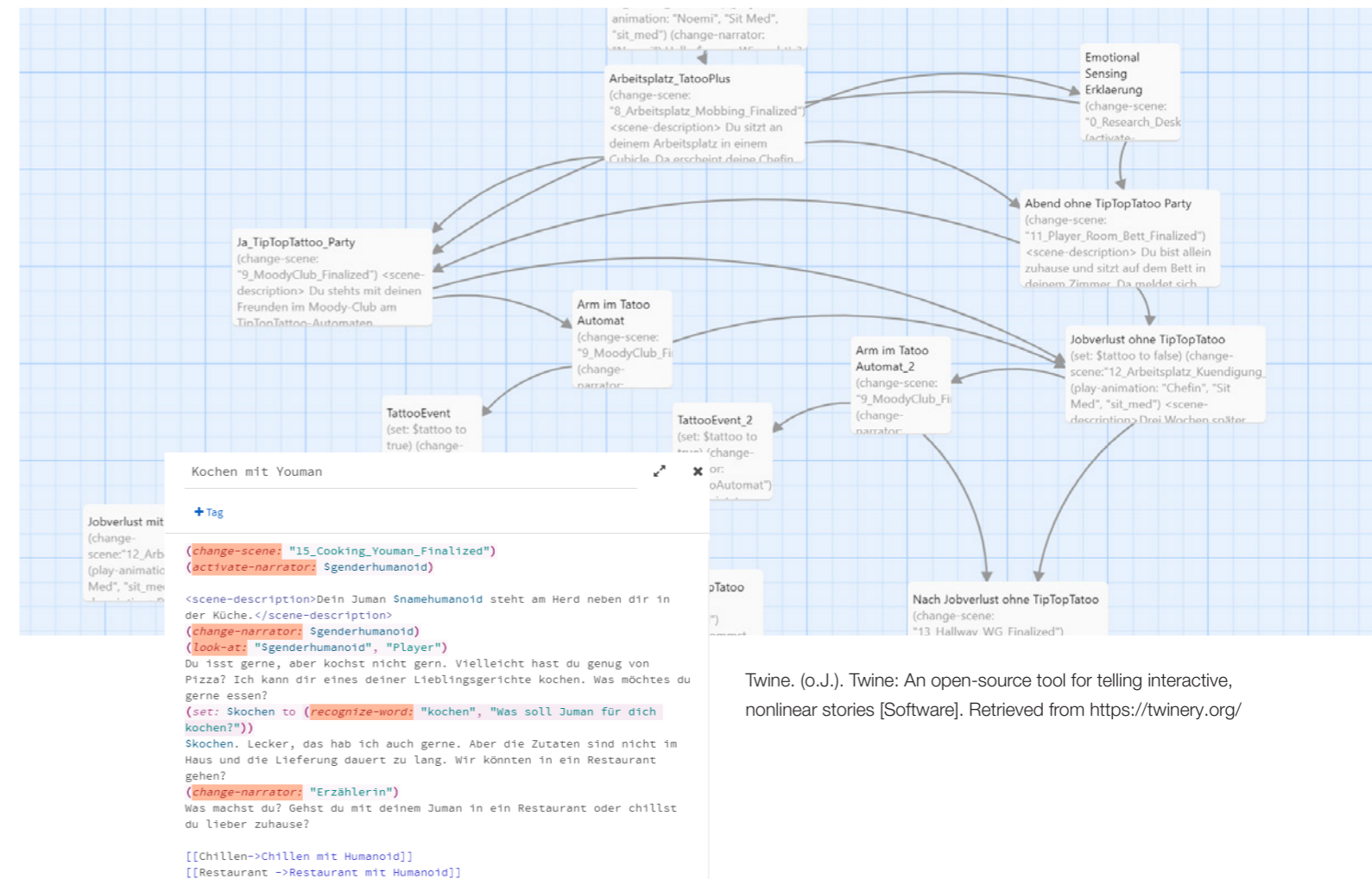
Twine. (o.J.). Twine: An open-source tool for telling interactive, nonlinear stories [Software]. Retrieved from https://twinery.org/

Technical implementation – From the Story to the Interactive VR-App

«Low-code» SciFi Generator marginalizes software development
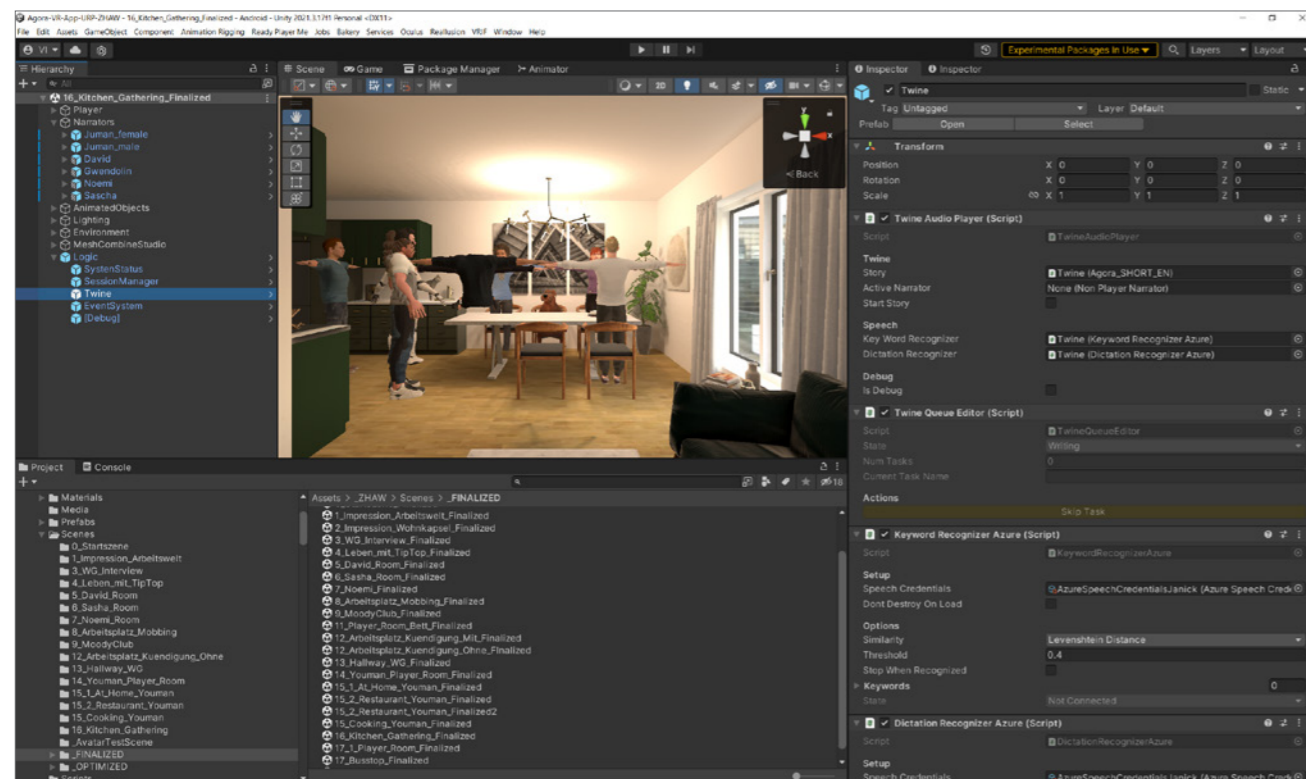
Visualize & Experience

T he SciFi Generator serves as the technical framework for immersive SciFi prototyping: The story created in Twine is imported as a C# script into the VR development environment Unity. The conversion of dialogue texts into the avatars' language and the players' voice inputs are managed via Microsoft Azure Speech Services. Thus, the focus of scenario development lies on the narrative and scene creation (VR Design). Programming is only required for specific interactions. The benefit of the SciFi Generator is to lower technical barriers for creating immersive VR scenarios, making it more accessible for storytellers and developers to bring complex, interactive stories to life in a virtual reality setting.

The VR-Szenario

The stage set for the scenario: The shared apartment in the not-too-distant future

Welcome to the future! You're in the suburbs of a big Swiss city. You've landed a new job and you are now in search of accommodation. New to the city and on your own? Fortunately, you've installed the TipTop app, which has identified a room in a suitable shared apartment for you. Your prospective flatmates, Gwendolin, Sascha, David, and Noemi, are expecting you for an interview ...

"

«If it [the AI] was more like a human, then yeah, I'd probably keep it around. But deep down, you just know it's a machine and not, like, a real person with a soul.»

**Teenager – In a discussion with scientists after experiencing the VR scenario**
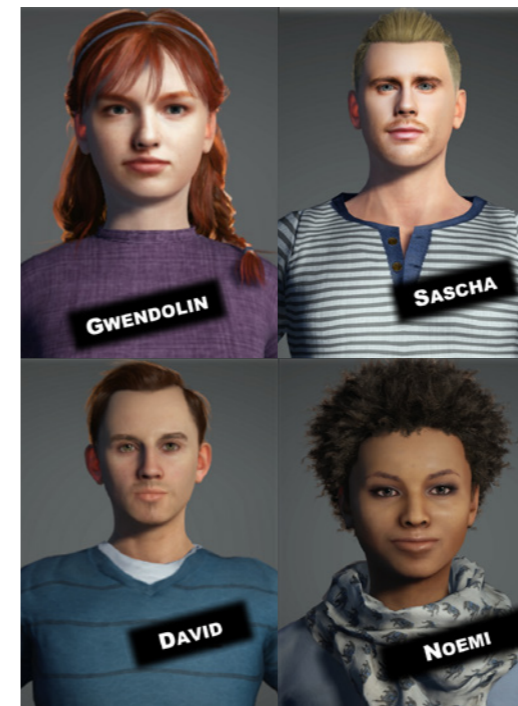
VR Design

During discussions with young people, questions about the creation of the VR scenario were frequently raised. Therefore, we would like to provide some insight into the process and the tools used. Designing virtual living spaces and humanoid avatars also plays a significant role in our research projects. The tools described below are used, for example, when we build a prototype VR app that allows chronically ill people to choose the appearance of the consulting avatar and the virtual consultation environment (nature, living room, practice room). For the design of the scenes in the future shared apartment, mostly pre-made virtual spaces and 3D objects, known as "assets," were used, which were adapted to the conditions and mood of the story in the VR development environment Unity. Special objects, such as the tattoo machine into which participants insert their virtual arm to receive the Emotional Sensing Tattoo, were specifically modeled for the project.

Unity Asset Store for 3D-Objekts
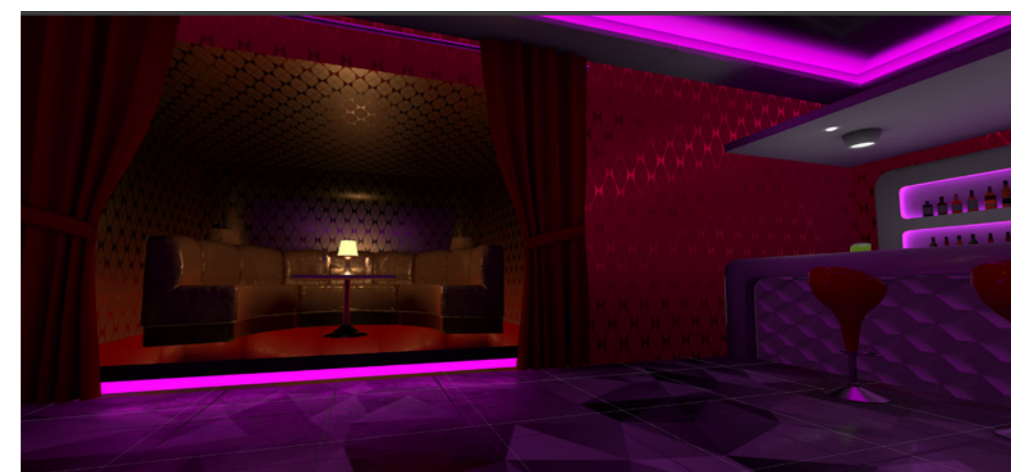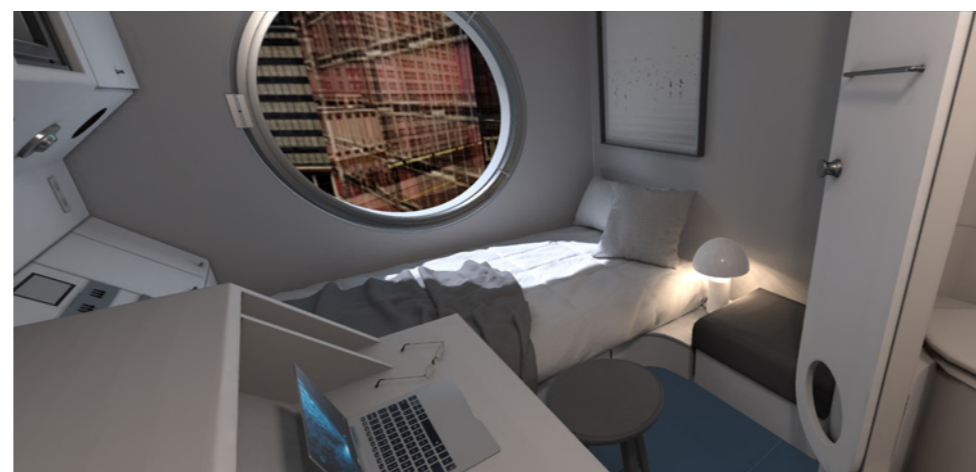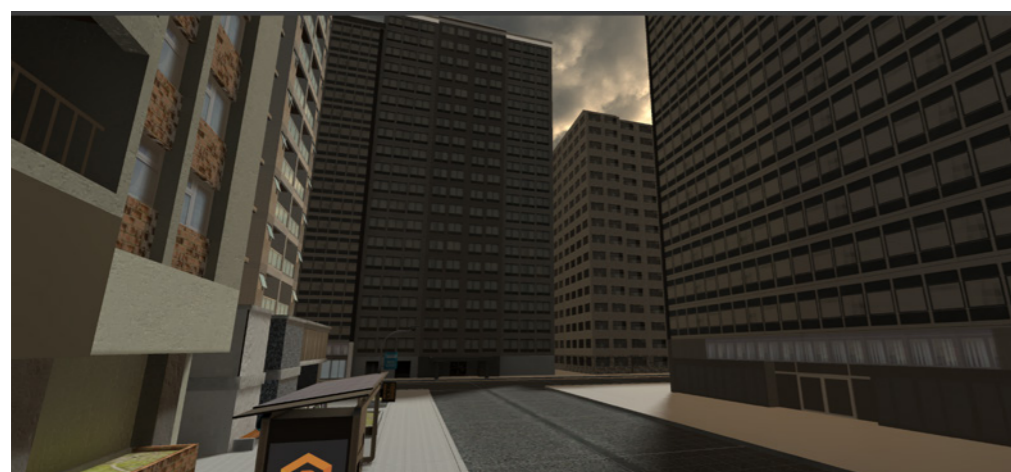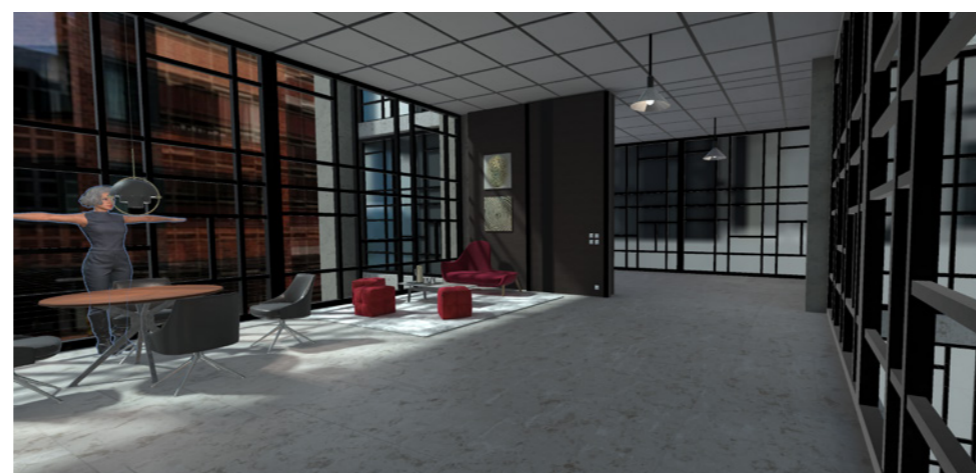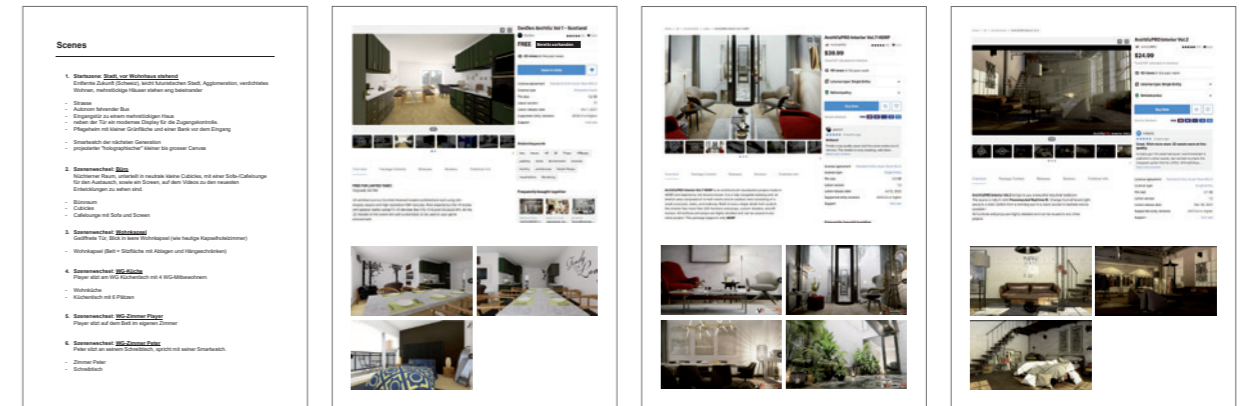
Living room in the shared flat and the future city

Workplace and living capsule

Moody Club with TipTop tattoo machine and restaurant

The Protagonists –
Your Future Flatmates

**Visualization of the personas
using mood boards**

The flatmates Gwendolin, Sascha, David, and Noemi are the protagonists of the story. Their distinct personalities and attitudes towards technology have been documented as personas. Mood boards visualize the appearance and essence of these personas.

Gwendolin (w)
Bedingungsloses Grundeinkommen, isst nur bio, vegan, sharing economy, sehr sozial, liest alten Leuten vor, ist achtsam/mindful

– Sehr heller Teint mit Sommersprossen, grau/grüne Augen, rötliche Haare gerade oder hochgesteckt
– Style: natürlich, nachhaltig, bequem, unkompliziert

Variante 1: „Haare lose"

Variante 2: „Haardutt"

Sascha (m)
Nützt das System aus, feiert Partys, Egoist, bequem

– Heller Teint, blaue Augen, blonde Haare schulterlang, Dreitagebart
– Style: locker, einfach, günstig, etwas ungepflegt

Variante 1: „Surfer"

Variante 2: „Student"

Peter (m)
Rational, nüchtern, kühl, unemotional, praktisch und logisch denkend

– Heller bis mittlerer Teint, graue Augen, rasierter Kopf mit dunklem Haaransatz, kurzer Kinnbart
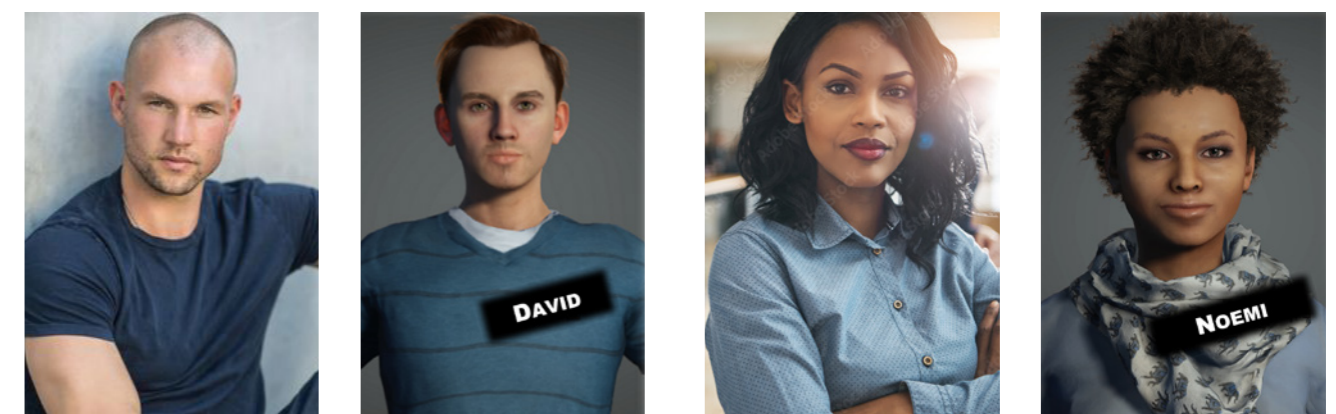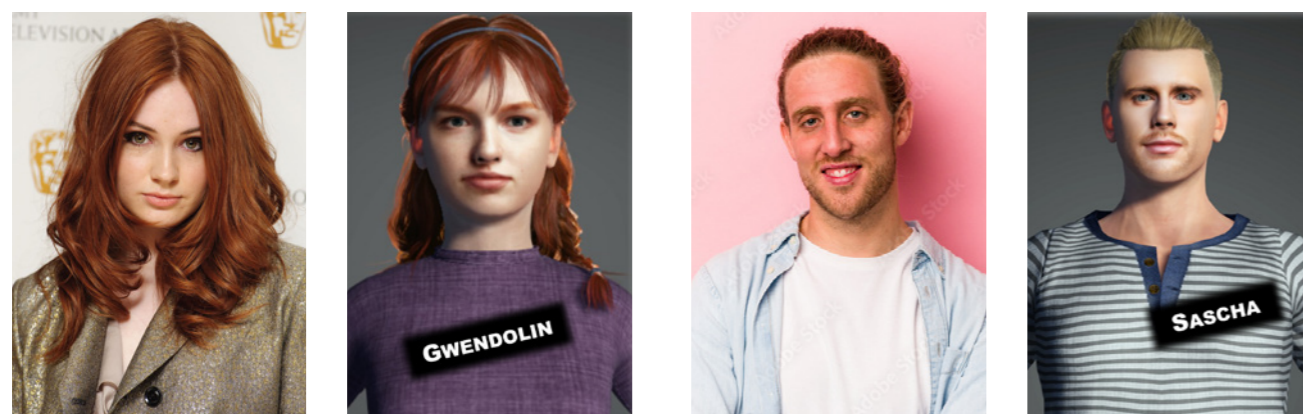– Style: zweckmässig, praktisch, einfach, pflegeleicht

Variante 1: „glatt"

Variante 2: „Brille"

Veronique (w)
Innovativ, selbständig arbeitend, dynamisch, vernetzt denkend, leicht ADHS

– Dunkler Teint, braune Augen, dunkle Haare gelockt oder gewellt
– Style: Modisch, elegant, modern, dynamisch

Variante 1: „international"

Variante 2: „französisch"

GWENDOLIN

SASCHA

DAVID

NOEMI

Zimmer MB1 – Öko-Retro – Gwendolin (w)
Bedingungsloses Grundeinkommen, isst nur bio, vegan, sharing economy, sehr sozial, liest alten Leuten vor, ist achtsam/mindful

– Sammelsurium, farbenfroh, vintage, Flohmarktfunde, unruhige und „volle" Optik, viele Pflanzen
– Lebendige und fröhliche Ausstrahlung in kunterbunter Farbwelt, liebevoll drapiert, interessante Objekte (Design-Ikonen)
– Grün: Ausgewogenheit, Harmonie, Gleichgewicht, Wachstum, Erneuerung; emotional positiv und erfrischend; wirkt beruhigend auf die Augen
– Gelb: Glück, Begeisterung, Fröhlichkeit, Spaß, Selbstvertrauen, Eigenständigkeit, Originalität, Optimismus, Kreativität; positive Energie und Wärme
– Orange: Unabhängigkeit, Freundlichkeit, Wärme, Enthusiasmus; emotionale Stärke; optimistisch, extrovertiert, spontan, lustig, positiv
– Braun: Weisheit, Stabilität, Wertschätzung der Einfachheit; wird mit Beständigkeit assoziiert; vermittelt ein Gefühl von Kultiviertheit und Positivität
– Material: Organisch (Pflanzen, Bast, usw.), Holz, Keramik, Leder, Stoff (gewoben und bunt)

Zimmer MB2 – Schnorrer, Systemverweigerer – Sascha (m)
Nützt das System aus, feiert Partys, Egoist, bequem

– Zweckmässig, praktisch, einfach, selbstgemacht, kostengünstig, geschenkt, farbneutral, durchmischte Optik
– Einfache, selbstgemachte und unspektakuläre Ausstrahlung in neutraler Farbwelt, persönliche und zweckmässige Objekte (Paletten, Hut, Fahrrad)
– Beige: neutral, warm, wohnlich, beruhigend; löwn ein Gefühl von Sicherheit, Wohlbefinden und Behaglichkeit aus
– Taupe: zeitlos, praktisch, authentisch, organisch, bescheiden
– Ocker: Gemütlichkeit, Stabilität, Sicherheit, Einfachheit, Beständigkeit
– Material: Holz, Karton, Metall, Stoff (uni)

The rooms of the protagonists
in the shared flat

T he rooms of the shared apartment's residents reflect their personalities. The design was based on the personas, capturing the characteristics, values, and behaviors of the protagonists. To develop a shared vision of the visual implementation, mood boards were also used, capturing the desired atmosphere and aesthetics of the virtual spaces.

Zimmer MB3 – Wissenschaftler/Physiker – Peter (m)
Rational, nüchtern, kühl, unemotional, praktisch und logisch denkend
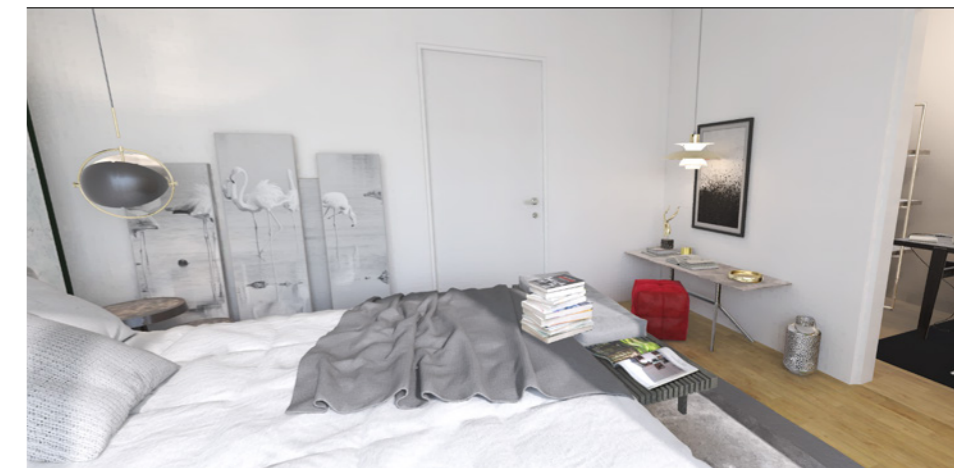
– Minimalistisch, zweckmässig, praktisch, futuristisch, farbreduziert, stille Optik
– Reduzierte Impressionen in kühler Farbwelt, „leere" Ausstrahlung vermittelt Konzentration, themenbasierte Objekte (Formeln, Atome)
– Weiss: Sauberkeit, Klarheit, Ordnung; instrospektiv; gleichmässiges Gleichgewicht aller Farben des Spektrums bei absoluter Helligkeit
– Grau: Weisheit, Würde, Erneuerung und Perspektive; lässt sich nicht von Emotionen leiten; introvertiert, harmonisch
– Blau: Kühl, gesammelt; vermittelt ein Gefühl von Ruhe, Entspannung und Gelassenheit
– Material: Gips, Metall, Glas/Spiegel, Papier, Licht, Stoff (uni)

Zimmer MB4 – Dezentrale Unternehmerin – Veronique (w)
Innovativ, selbständig arbeitend, dynamisch, vernetzt denkend, leicht ADHS

– Modern, luxuriös, teuer, feminin, aufgeräumt, ordentlich
– Feminine Ausstrahlung in angenehm kühler Farbwelt mit warmen Akzenten (gold); teure Design-Objekte (Lampen, Dekogegenstände)
– Grau: Eleganz, Schlichtheit; Farbe der Verantwortung; strahlt zeitlose Eleganz und stilvolle Raffinesse aus; wirkt dämpfend und beruhigend
– Rosa: feminin, romantisch, liebevoll, intuitiv, einfühlsam; Farbe der Hoffnung, Wärme, Behaglichkeit und Einzigartigkeit; beruhigt und besänftigt
– Violett: ehrgeizig, selbstbewusst, königlich; Farbe der Reichen und Mächtigen; Steht für Spiritualität, Fantasie, Extravaganz; inspiriert zu hohen Zielen
– Gold: optimistisch, positiv, aufmerksamkeitsstark; Farbe des Erfolgs und Triumphs; Steht für Wohlstand, Luxus, Qualität, Wertigkeit und Eleganz
– Material: Gold, Messing, Metall, Glas, Tapete, Stoff (uni und/oder gemustert)

The avatars of the human protagonists

The photorealistic avatars for the human protagonists were created based on real portrait photos from an image library. Using the software Reallusion Character Creator and the Headshot plugin, photorealistic, character-appropriate avatars were generated.

Physical characteristics, clothing, and hairstyles can be customized in the Character Creator. The final humanoid avatars, with all materials and textures from the Character Creator, can be exported and then imported into the VR development environment Unity using the Reallusion plugin.

The avatars of the digital companions (=TipTop Youmans)

In the third and final technological leap within the scenario, the TipTop assistance system is given a human-like body. This entity, known as TipTop-Youman, is available in both female and male forms and possesses nonverbal abilities such as facial expressions and gestures. He or she appears as a life-sized avatar in the virtual shared apartment (Augmented Reality).

Unlike the photorealistic avatars of the human protagonists, the avatars of the TipTop-Youmans

were generated as low-poly avatars using the avatar platform Ready Player Me. In the 3D modeling of a low-poly avatar, fewer polygons are intentionally used to create an angular, artificial appearance.

Incorporating feedback from street interviews, which revealed that some could envision an animal or an abstract being as an AI companion, the future shared apartment's cast is rounded out with a TipTop dog, a small ghost, and a humanoid robot.
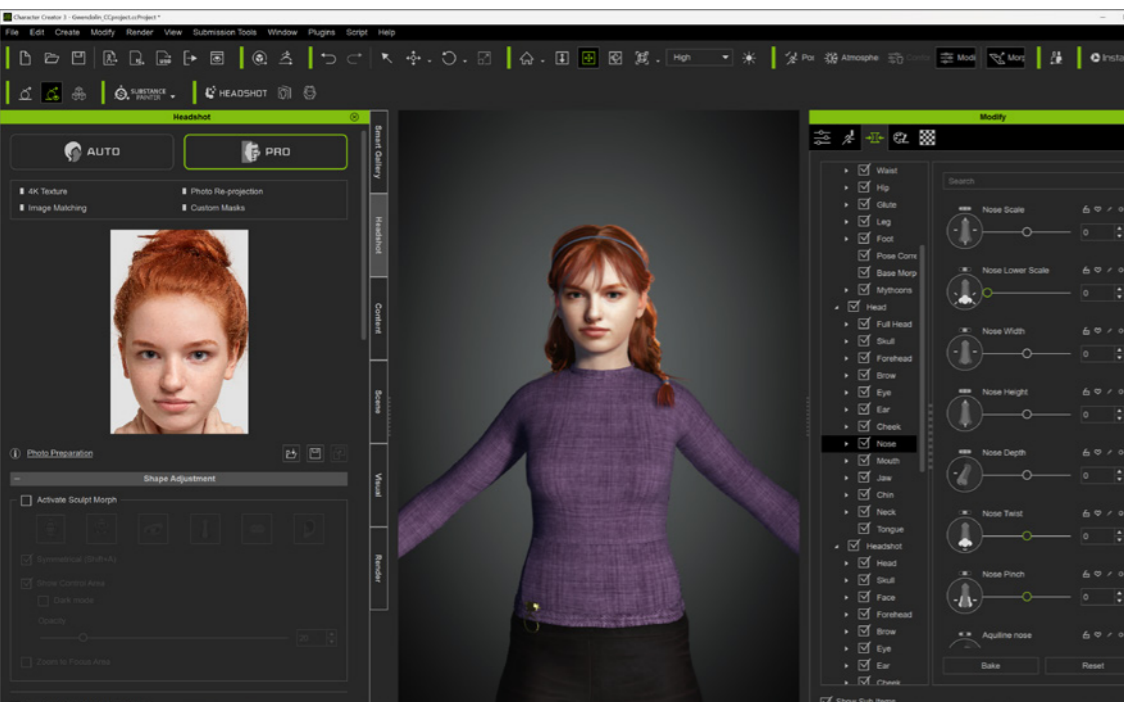
Experience the Future with Emotional AI in VR

"

«I find it much more interesting to communicate with people[...], because they also master non-verbal communication, which AI beings can't do or not yet [...] I find it more comfortable to talk to normal people.»

Teenager – In a discussion with scientists after experiencing the VR scenario

Teenagers experience the future with emotional AI in Virtual Reality and engage in discussions with researchers – Impressions from the Technorama and a school in the canton of Aargau

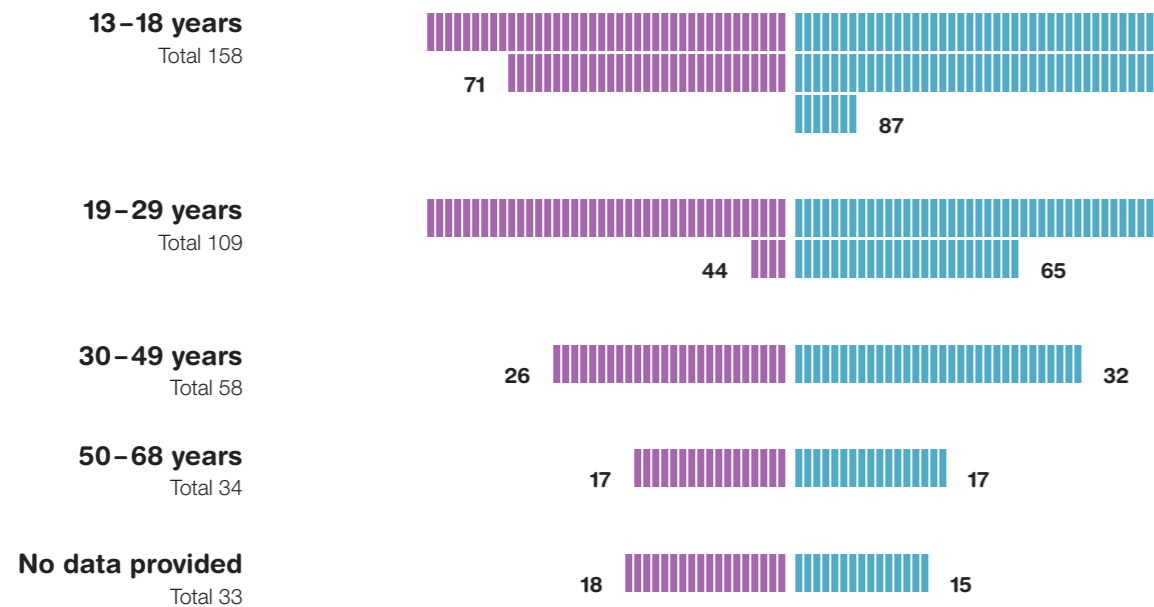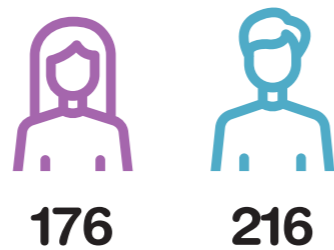## Immersive VR to make life with emotional AI tangible

The Technorama Swiss Science Center, visits to schools, and the ETH Meeting Point Science Youth Lab provided the setting to experience the VR scenario. Between March and November 2023, 392 participants went through the scenario. The everyday life experienced in VR served as the basis for discussions with the researchers.

Attitudes towards Friendship with AI

The paths taken by participants in the VR scenario, as well as their choices, were logged and analyzed in a database. Responses to the question of the imaginability of friendship with AI at the start and end of the scenario indicate that participants were more open to the idea of AI friendship by the end (35% yes) compared to the beginning (23% yes). However, the response to whether AI could one day be a better friend than a human remained overwhelmingly negative, with 76% voting no after the scenario, compared to 71% before. The age group of 13–18 years was particularly skeptical, with only 17% of teenagers open to the idea of AI friendship before the scenario (28% after), compared to 29% of 18–29-year-olds (34% after). The VR scenario made the concept of AI friendship more tangible. But does imaginability equate to desirability?
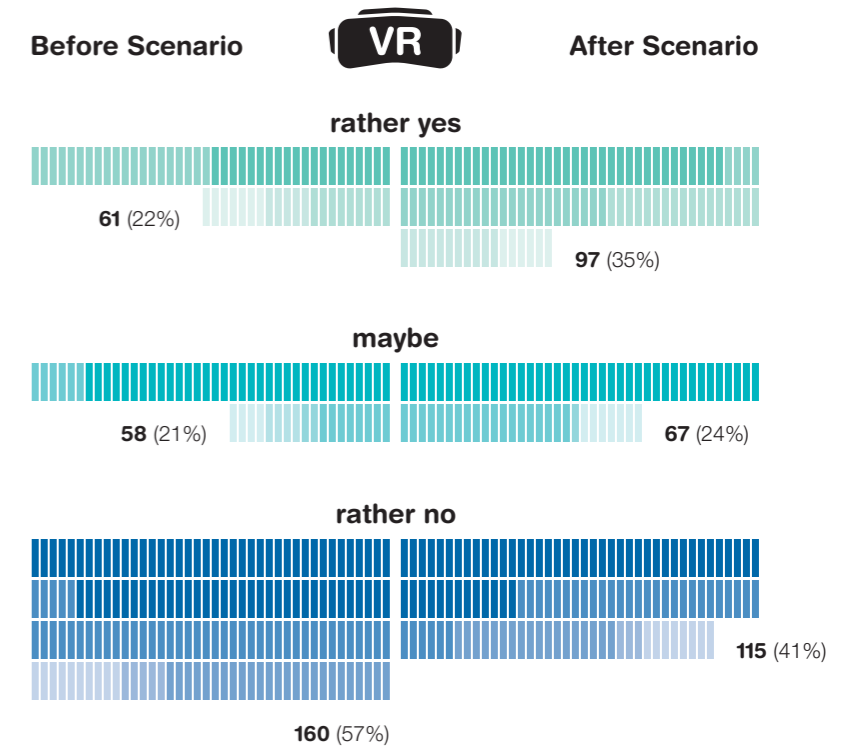
Participants by gender and age

176   **216**

13–18 years
Total 158

71   87

19–29 years
Total 109

44   65

30–49 years
Total 58

26   32

50–68 years
Total 34

17   17

No data provided
Total 33

18   15

Mean: 24
Standard Deviation: 13 Jahre

Total participants: 392
(März-November 2023)

Can you imagine having a friendship with an AI in the future?

n=279 participants played until the final scene and answered these two questions at the beginning and end of the scenario.

Before Scenario VR **After Scenario**

rather yes

61 (22%)

97 (35%)

maybe

58 (21%)   67 (24%)

rather no

115 (41%)

160 (57%)

Could an AI be a better friend than a human in the future?

Before Scenario VR **After Scenario**

rather yes

25 (9%)   29 (10%)

maybe

43 (15%)   53 (19%)

rather no

197 (71%)

211 (76%)
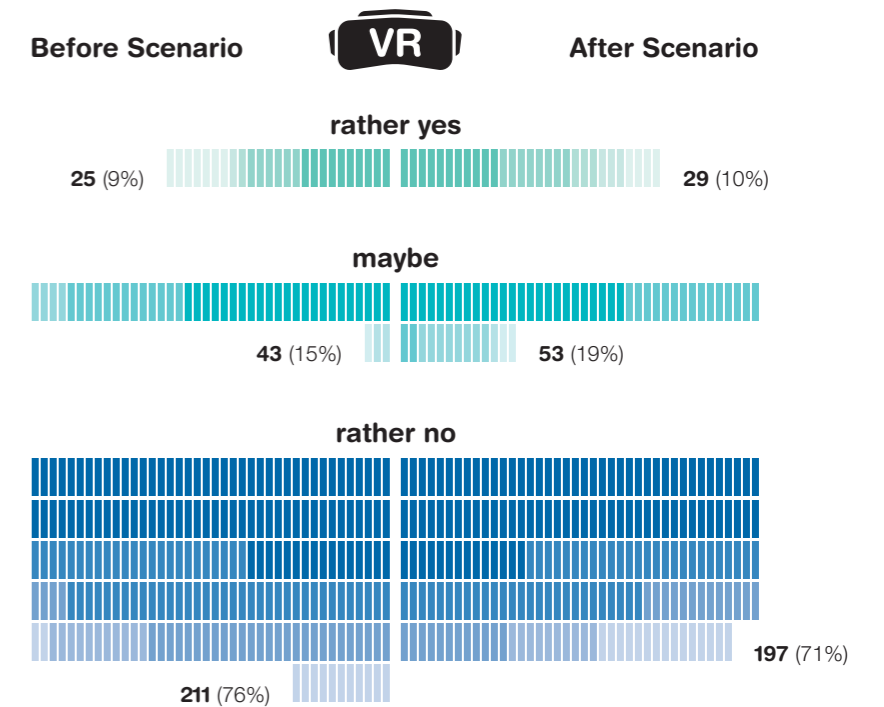
Age groups: ■ 13–18   ■ 19–29   ■ 30–49   ■ 50–68   ■ no data provided

Decision Paths

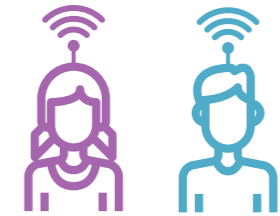The interactive multilinear VR scenario opens up various paths through the story. A total of 392 participants traveled to the shared apartment of the future using VR headsets. Of these, 379 installed the TipTop app on their virtual smart rings. Significantly more than half opted to get a TipTop tattoo to benefit from Emotional Sensing. A total of 320 welcomed the trial version of their humanoid TipTop Youman. When selecting the gender of their Youman, about three-quarters of participants chose the female variant, regardless of the participants' own gender. More than 60% preferred going out to a restaurant with their Youman over staying at home to chill. Just over half of the participants were curious about the future with their Youman and chose to keep her or him in the end. No correlations with the participants' age or gender were detected in the decision data.
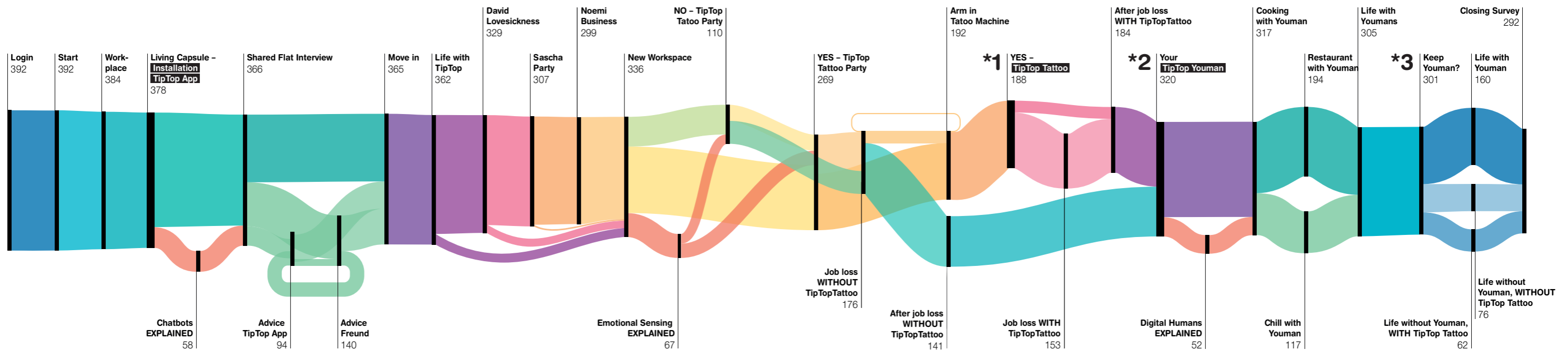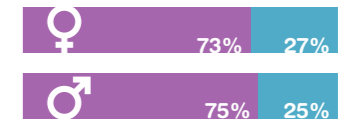
*2

Should your Youman appear as male or female?

74%   26%

n=320

Choice of the Youman's gender based on the player's gender.

♀ 73% 27%
♂ 75% 25%

Login 392
Start 392
Work-place 384
Living Capsule – Installation TipTop App 378
Shared Flat Interview 366
Move in 365
Life with TipTop 362
Sascha Party 307
David Lovesickness 329
Noemi Business 299
New Workspace 336
NO – TipTop Tatoo Party 110
YES – TipTop Tattoo Party 269
Arm in Tatoo Machine 192
*1 YES – TipTop Tattoo 188
After job loss WITH TipTopTattoo 184
*2 Your TipTop Youman 320
Cooking with Youman 317
Restaurant with Youman 194
Life with Youmans 305
*3 Keep Youman? 301
Closing Survey 292
Life with Youman 160

Chatbots EXPLAINED 58
Advice TipTop App 94
Advice Freund 140
Emotional Sensing EXPLAINED 67
Job loss WITHOUT TipTopTattoo 176
After job loss WITHOUT TipTopTattoo 141
Job loss WITH TipTopTattoo 153
Digital Humans EXPLAINED 52
Chill with Youman 117
Life without Youman, WITH TipTop Tattoo 62
Life without Youman, WITHOUT TipTop Tattoo 76

n= 392 participants, of which 292 played till the final scene of the scenario (March-November 2023)

*1

Are you getting a tattoo so that TipTop can recognize your emotions?

yes 57%   no 43%

n=330

*3

Do you want to keep your Youman??

yes 53%   no 47%

n=301

Fun Facts

Participants were not only able to choose the gender of their TipTop-Youman but also to give him or her a name. Alongside popular human names like Anna or Tim, AI names such as Alexa or Siri were also chosen.

When cooking with Youman, Italian cuisine, including pizza, spaghetti, pasta, and lasagna, topped the wish list.

Discuss

What should your Youman be named?

n=320 participants played up to the point of naming their Youman. Listed are all the names that were chosen more than once.

What should your Youman cook for you?

n=317 participants played up to the «Cooking with Youman» segment.
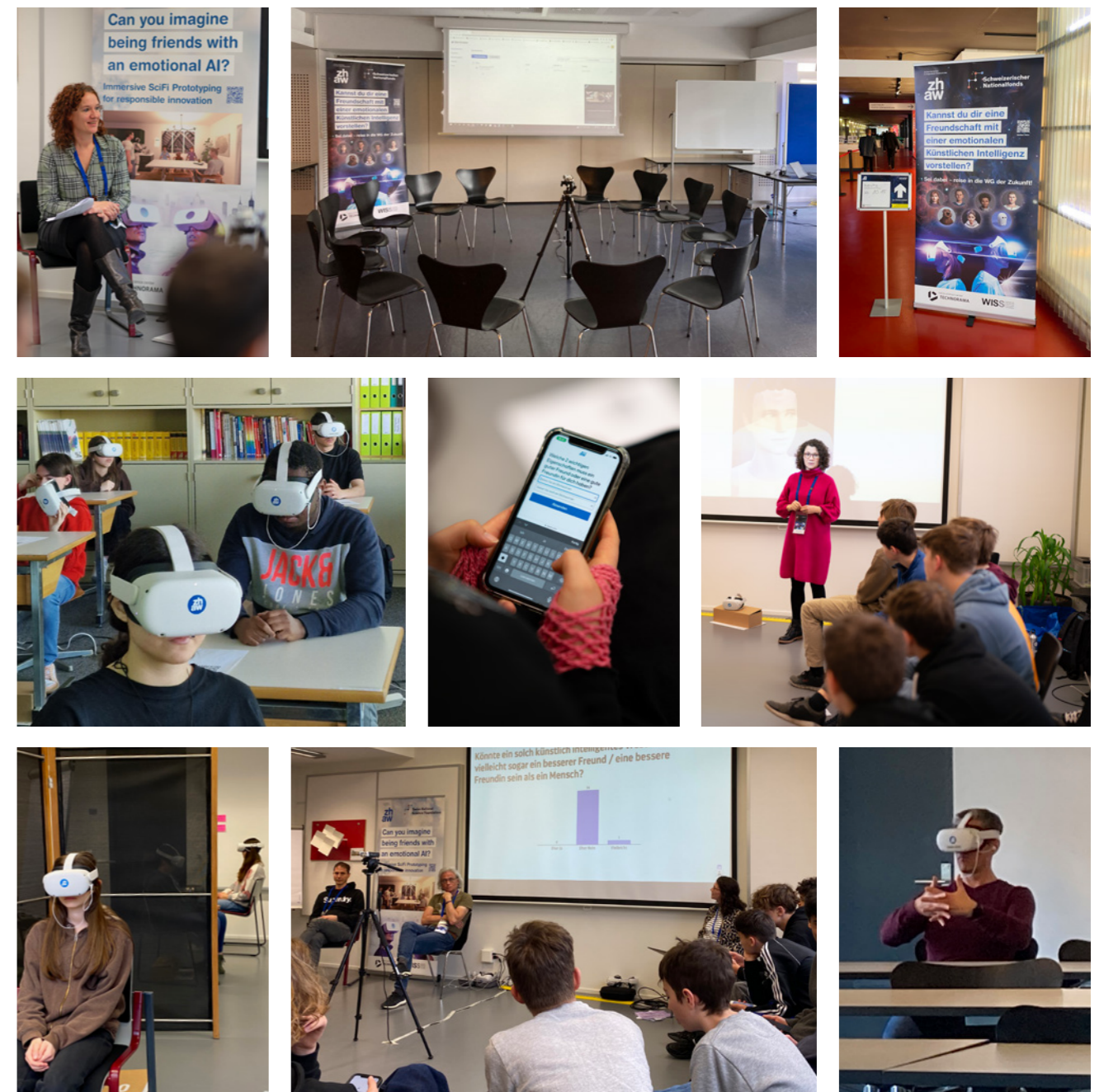
Dialogue with the Researchers

Technorama – WISS Schools – School Visit

"

«I would feel a bit uncomfortable knowing that a computer might notice more than a real person, with whom I might have already had contact that day. Then I come home, and Alexa says, 'Are you not feeling well?' That would make me feel a bit uncomfortable, that […] a computer is somehow more empathetic than a human.»

**Teenager – In a discussion with scientists before experiencing the VR scenario**

ETH Meeting Point Science City – Youth lab

Discourse Analysis

How do teenagers and young adults talk about friendship with AI?

Approach and methods:

Desk research and literature notes

– Friendship
– Friendship & Emotional AI / Affective Computing

Data collection and analysis:

Participant-oriented discourse realizations of teenagers and young adults were evaluated.

– 30 qualitative street interviews in Winterthur and Zurich (aged 15 – 29 years)

– 19 focus group discussions with 8 classes at the Technorama, at the WISS Schools for Business, Computer Science & Real Estate, and at a secondary school in the Aarau metropolitan area before and after the VR experience (n=125 participants, aged 13 – 29 years)

– Additional open remarks from Mentimeter surveys conducted during the focus group discussions and from the protocol data of the VR sessions

Data processing:

– Verbatim transcriptions
– MAXQDA: Analysis tool for qualitative data analysis and visualization

References

– Breuer, F., Muckel, P., & Dieris, B. (2019). Reflexive Grounded Theory: Eine Einführung für die Forschungspraxis (4. Aufl.). Springer.

– Roth, K. S. (2015). Diskursrealisationen – Grundlegung und methodischer Umriss einer pragmatisch-interaktionalen Diskurssemantik. Erich Schmidt Verlag.

– Roth, K. S. (2018). 15. Diskurs und Interaktion. In I. H. Warnke (Ed.), Handbuch Diskurs (S.363-386). De Gruyter.

Coding and visualizing data – Insights into the MAXQDA tool

Reconstructing narratives of young people linguistically, and identifying recurring patterns

The street interviews conducted by students at the beginning of the project and the focus group discussions led by researchers with teenagers and young adults before and after experiencing the VR scenario provided an interpersonal framework to gather opinions, attitudes, and experiences regarding friendship with AI. The narrative patterns presented in this section, as well as the verbal expressions of the teenagers and young adults, which appear as quotes in this report, are illustrative.

The detailed report on the discourse analysis will be linked on the project website starting from April 2024. friends.digitalfutures.ch

Narrative patterns based on analyses of the focus group discussions (before and after the VR scenario)

Narrative patterns based on analyzing the street interviews (without the VR scenario)
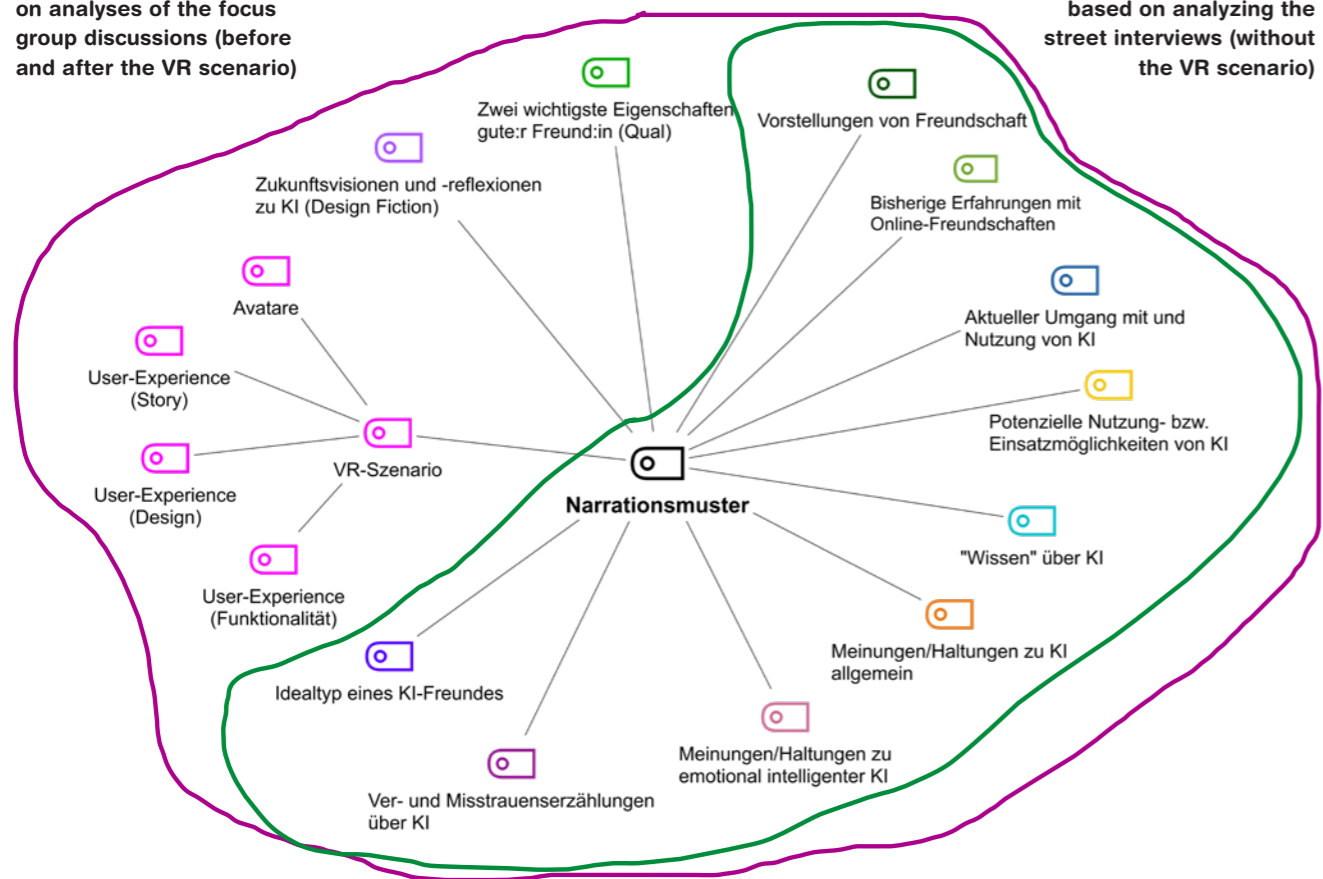
Insights for designing AI and for storytelling

The reconstructed narrative patterns on "Friendship with AI" can be distilled into three contrasting positions. The oral expressions selected here exemplify these positions.

1. Human-likeness versus non-human-likeness

«If you couldn't tell anymore whether it's a human or not. That would be a bit strange»

Technorama, Teenager, before VR Scenario

2. Emotional and physical closeness versus distance

«It [AI] is also intangible. For example, I can hug my colleagues.»

WISS, young adult, before scenario

3. Trust versus mistrust

«[I would use the AI] like a best friend, with whom I share my secrets.»

Street interview, young adult

From the perspective of information systems research, these positions represent relevant areas of tension that deserve attention in the design of human-AI interaction:

– Does an AI have to look like a human for us to build a relationship with it?

– How can we ensure that an AI is still recognized as a machine?

– How can we share information about our context and mental state with an AI while still protecting our privacy?

– Is trust in an AI a necessary condition for an effective relationship between humans and machines?

From the perspective of communication and linguistics, the discourse analysis raises the following questions for story design and the further development of the multilinear narrative:

– In which situations is our trust promoted or our distrust triggered?

– Which situations are suitable for experiencing moments of closeness or distance?

– In which situations do we find ourselves confronted with inhumanity?

"

«I see a friendship with an AI as unlikely as
if I had a friendship [...] I don't know, with
a car or some other thing, and for me, AI is
useful as a tool and the car is also a tool.»

Young adult – In a discussion with scientists before experiencing the VR scenario

Conclusion &
Outlook

Conclusion

Outlook

Challenges in shaping social relationships with AI

C an young people envision a friendship with AI? This project primarily aimed not to answer this question but to spark an active exchange between researchers and a young lay audience about emotional AI.

Choosing friendship as an extreme application of emotional AI was instrumental in challenging teenagers and young adults to contemplate the desirability of a future with emotional AI and share their opinions in discussions with researchers. Friendship plays a central role in the lives of young people. "Why friendship?" we were repeatedly asked in discussions. AI is viewed as a tool for helping with homework and professional tasks. Yet, the idea of forming an emotional relationship with AI is not entirely far-fetched for the young target group. 55% of 13-29-year-olds ruled out a friendship with an artificial being before embarking on their virtual journey into the future shared apartment. However, 21% could indeed envision it, and 24% considered it a possibility. After experiencing daily life with increasingly emotionally intelligent and human-like AIs in the VR scenario, only 41% still dismissed the idea of friendship with AI.

These results indicate that the VR scenario made it tangible how emerging technologies can enable an emotional relationship with a machine. Furthermore, integrating the generative language model GPT into the VR scenario demonstrated the potential for natural and spontaneous linguistic interaction with a human-like AI on various topics. The scenario also made users feel the pressure of potentially

encountering disadvantages in employment or dating without emotional AI. The multilinear scenario allowed for a choice between saying "no" or "yes" to emotional AI — a choice we are not always consciously aware of with technologies that slowly "creep" into our lives and become indispensable. But how much "digital" empathy do we want to allow into our lives in the future?

Group discussions provided space to explore the range of actions between rejection and acceptance. The discourse analysis yielded valuable insights for researchers on the conditions under which young people can envision and find it meaningful to form a social relationship with AI. There are no clear-cut requirements regarding how emotional AI should or should not be. However, the identified areas of tension offer clues about where future users of emotional AI demand choices and transparency. Whether AI should resemble humans or preferably not seems to be not just a subject of research but also a matter of taste. However, recognizing whether one is speaking with a machine or a human is (still) expressed as a need by future users. The desire for transparency is also clear when it comes to understanding how the emotions and contextual information that users need to provide to AI are used to foster a sense of understanding and intimacy.

Ultimately, just as with friendships involving real people, trust seems to be crucial in determining whether we wish to develop a social or emotional relationship with AI.

Areas we plan to further engage with

### Enhancing the immersive SciFi Generator

- **Interaction:** Further expand free dialogues using Generative AI and allow players to interact more with objects in VR

- **Visualization:** Simplify access to compelling futuristic scenes and objects to accelerate the creation of VR scenarios.

- **Augmentation (AR):** Experience SciFi prototypes in our real private or professional environment

- **Multiplayer capabilities,** so that multiple players can discuss and make decisions together in the VR scenario

Future research topics and use cases

- **Longitudinal studies:** Investigating how people of different age groups form relationships with natural language interaction systems.

- **Ethnographic conversation analyses:** Observing the social practices as well as linguistic structures and patterns that emerge in conversations between humans and machines.

- **Field studies in other countries:** Identifying intercultural differences with respect to the relationship with AI

- **Exciting use cases/controversial topics for further Immersive SciFi prototypes include:**
  - Human enhancements for cognitive and physical self-optimization (neuroenhancements, exoskeletons, etc.)
  - Robotics in healthcare

Team

«We are the wrong generation for that.
I don't believe we will ever seek an
emotional attachment to AI. Perhaps
the next generation will because they
won't know any different.»

Young adult – In a discussion with scientists before experiencing the VR scenario
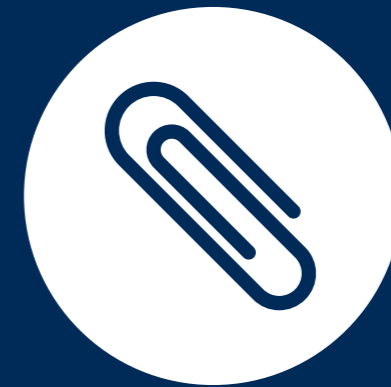
Project Team and Contact

Interdisciplinary collaboration

Participating institutes
– IWI Institute for Business Technology at the ZHAW School of Management and Law
– IAM Institute for Appliled Media Science at ZHAW Departement Applied Linguistics

Co-Project Leads
Thomas Keller, Elke Brucker-Kley, Birgitta Borghoff

Project Team
– **VR-Implementation:** Janick Michot, Dominic Lüönd
– **Design:** Isabelle Stutz
– **Discussions:** Thomas Keller, Elke Brucker-Kley, Birgitta Borghoff, Alexandre de Spindler, Elena Gavagnin
– **Students:** Tabea Jacober, Seraina Kaufmann, Jonatan Turegard, Janine Hediger, Celiné Bürgler, Tom Surbeck (Bachelorstudiengang Kommunikation und Medien)

Project Partners:
Swiss Science Center Technorama, WISS Schulen für Wirtschaft Informatik Immobilien AG, Ateo VR GmbH

Funded by:
Swiss National Science Foundation (SNSF) Agora

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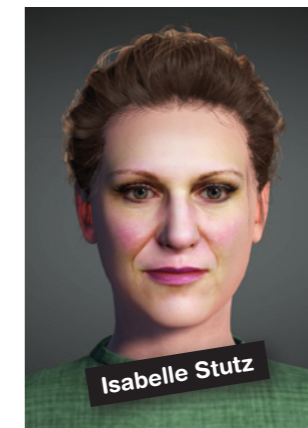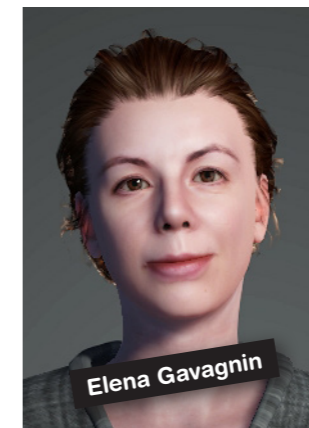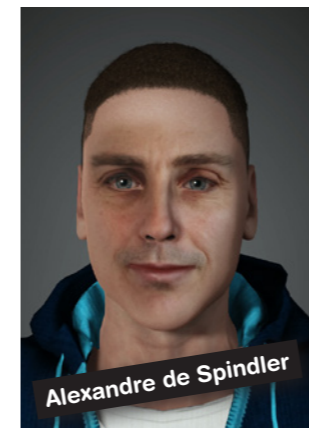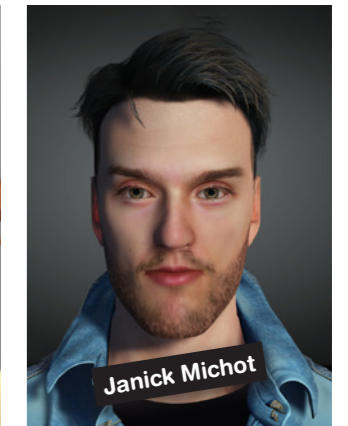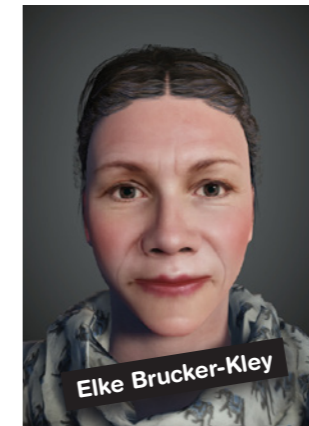
Related Student Projects

Research-based learning

Collaboration with students in the BA program in Communication and Media, ZHAW Applied Linguistics

– **Storydesign und Testing:** Co-development and testing of the multilinear story alongside researchers.

– Participation in discourse analysis within project seminars for the SNSF Agora project

– **Youtube-Video** and **Blog post** „Language Matters: ‚Science Fiction Prototyping' – How Young People Think About Emotional Artificial Intelligence" (Seraina Kaufmann, 4th semester student, BA Communication and Media)

– **Student internship:** Participation in analyses, discourse analysis report, event and social media communication (Jonatan Turegard, student, 5th semester, BA Communication and Media)

Empirical Bachelor Theses:

– «Gen Z meets Emotional AI: Inhaltsanalytisch operationalisierte Identitätskonzepte von Jugendlichen und jungen Erwachsenen vor dem Forschungshintergrund von Freundschaft mit Emotionaler KI» (Tabea Jacober, Bachelor of Communication and Media graduate, completed: 2023)

– «Affective Computing: Freundschaften mit künstlich intelligenten Wesen» (Özlem Günes, Bachelor Business Technology 2023)

Imprint

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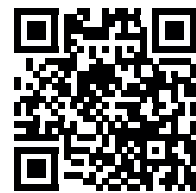Isabelle Stutz
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zh aw

Swiss National Science Foundation

Science Fiction Prototyping

Friendship with Artificial Intelligence

Projektwebsite