Digital Humans

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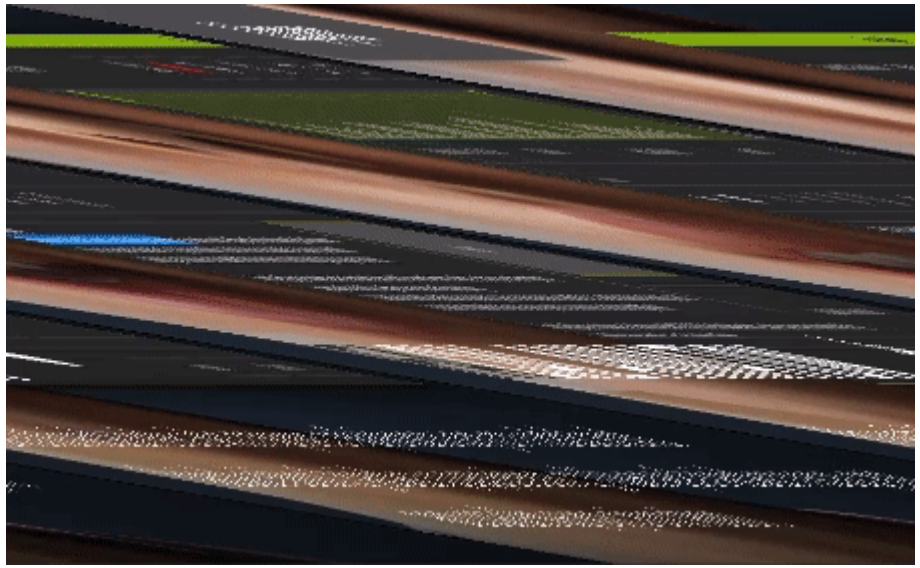
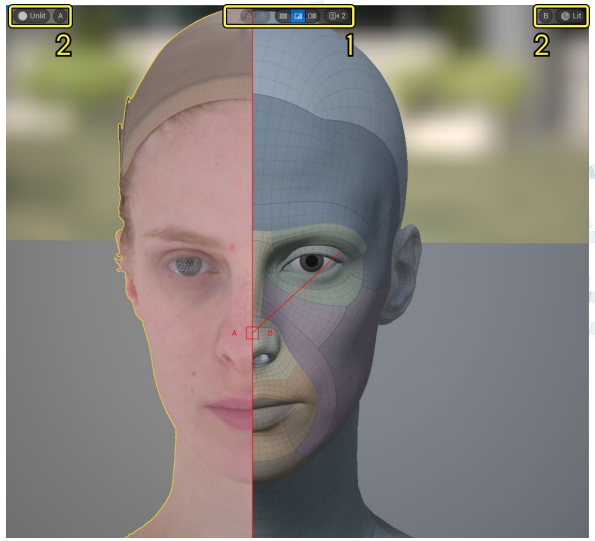
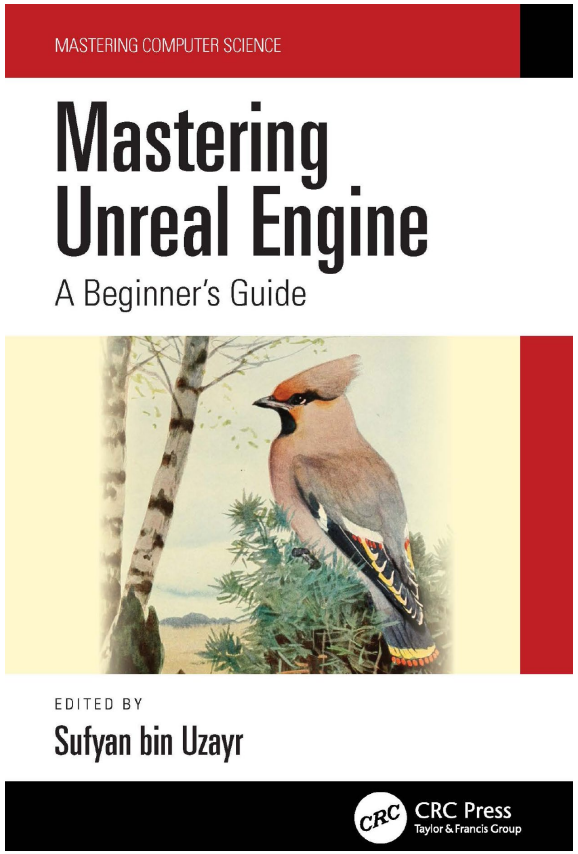


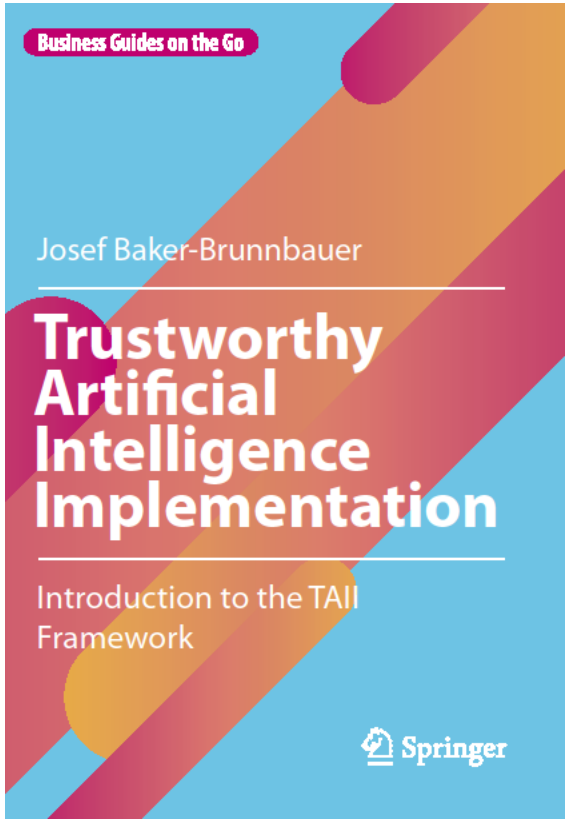
Building AI data Products



Les 05

hr.nl/ai





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Main Deliverable
individual digital human **AI Report** on:

*A real-life **machine learning use-case***
*of an existing **data product** solution*

A data product is any application or tool
using data science combined with algorithms
---required by the AI-model---
that autonomously aids businesses (profit or non-profit)
to provide a solution to a given societal problem
solely based on sampling data.

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[AI] data product

comprises a human-centered interface,
creating meaningful insights derived
from data science principles & methodologies such as:

- *Human Factors*
- *Predictive Analytics*
- *Descriptive Data Modeling*
- *Data Mining*
- *Machine Learning*
- *Risk Management*
- *Advanced statistics*
- *Predictive Modeling*
- *Natural Language Processing*

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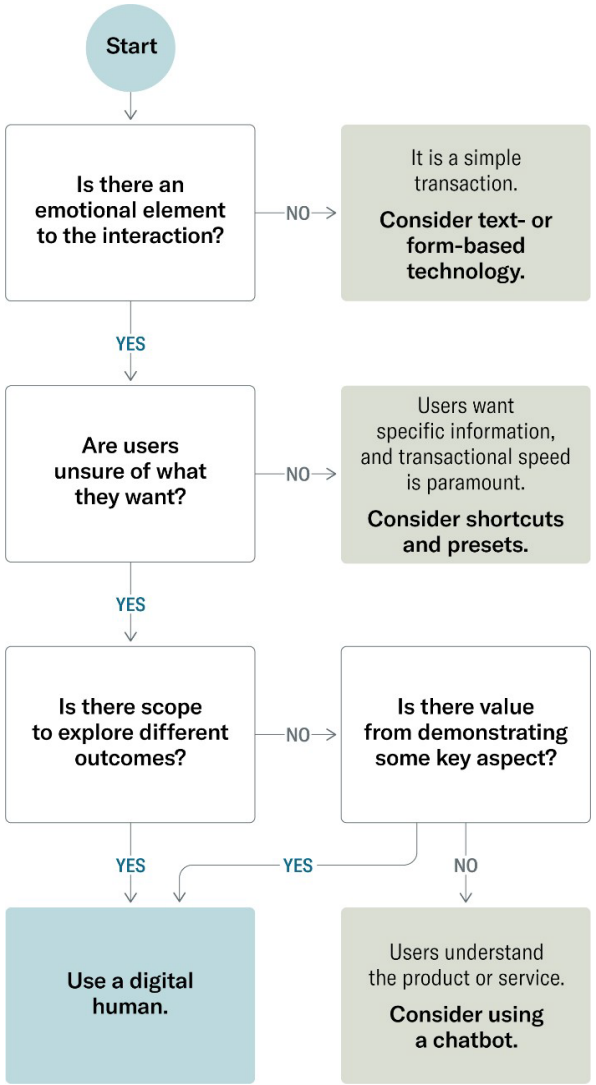
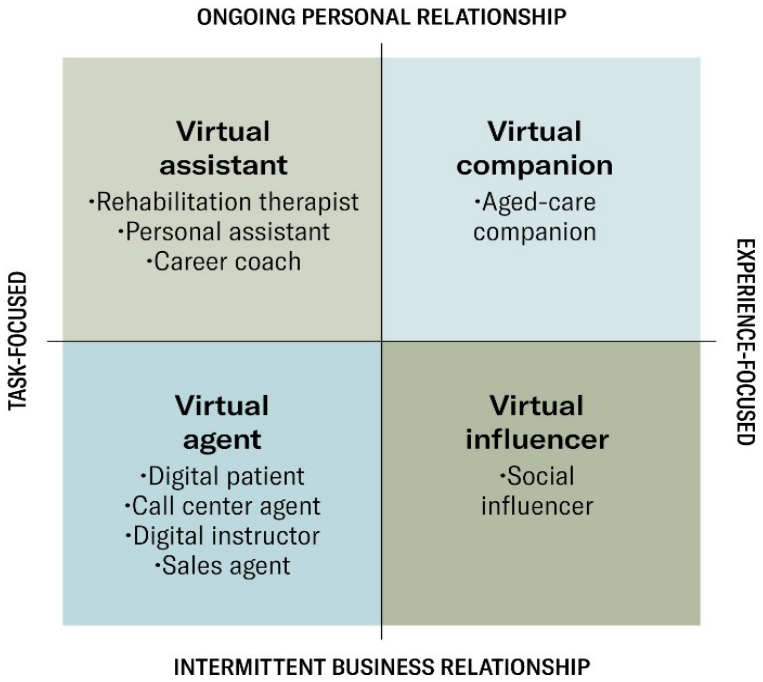
When Should You Deploy Digital Humans?





Bron: Harvard Business Review (April 2023): AI with a Human Face. The case for—*and against*—digital employees by Mike Seymour, Dan Lovallo, Kai Riemer, Alan R. Dennis, and Lingyao (Ivy) Yuan
https://hbr.org/2023/03/ai-with-a-human-face

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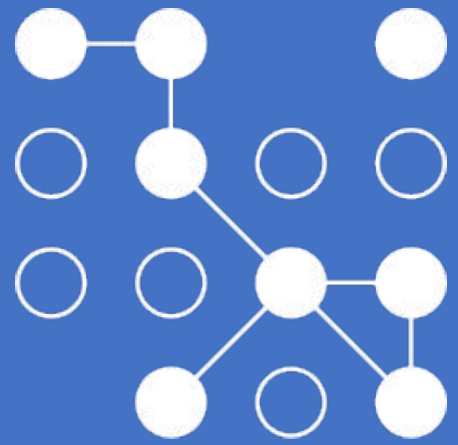
DATA SCIENCE

HUMAN FACTORS

DATA PRODUCT

+

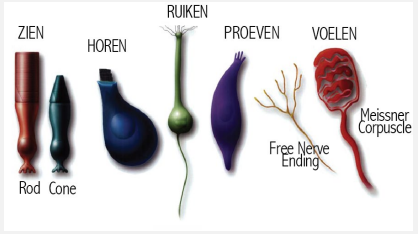
=



HUMAN FACTORS
De mens als maatstaf der dingen

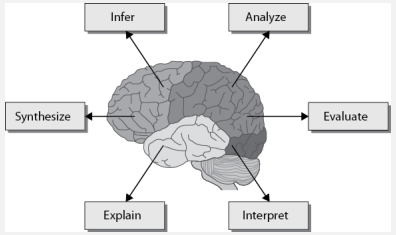
NEUROETHOLOGIE	Neuro-ethologisch perspectief: wat maakt ons humaan?

Gewaarwording & Perceptie



Biologie / neuro-wetenschappen

Cognitie & Semiotiek



Biologie / Neuro-wetenschappen

Gedrag & Communicatie

Biologie / Psychologie

Theory of Mind (ToM)

Psychologie / Sociologie

It is a form of interaction

> • The activity of abstracting is basically a form of interaction between people in which they **simplify the complexity** of their own ordinary, everyday interactions [...] in an effort to **make meaning** of what they are doing [...].

– Ralph Stacey

Complexity and Organizational Reality

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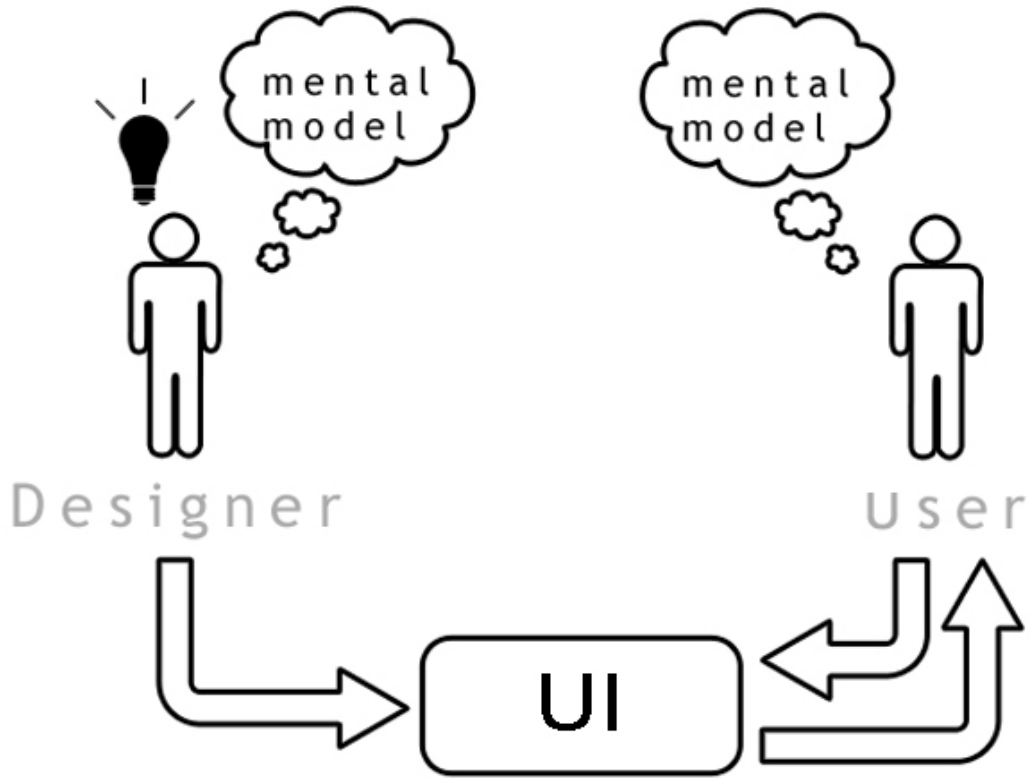

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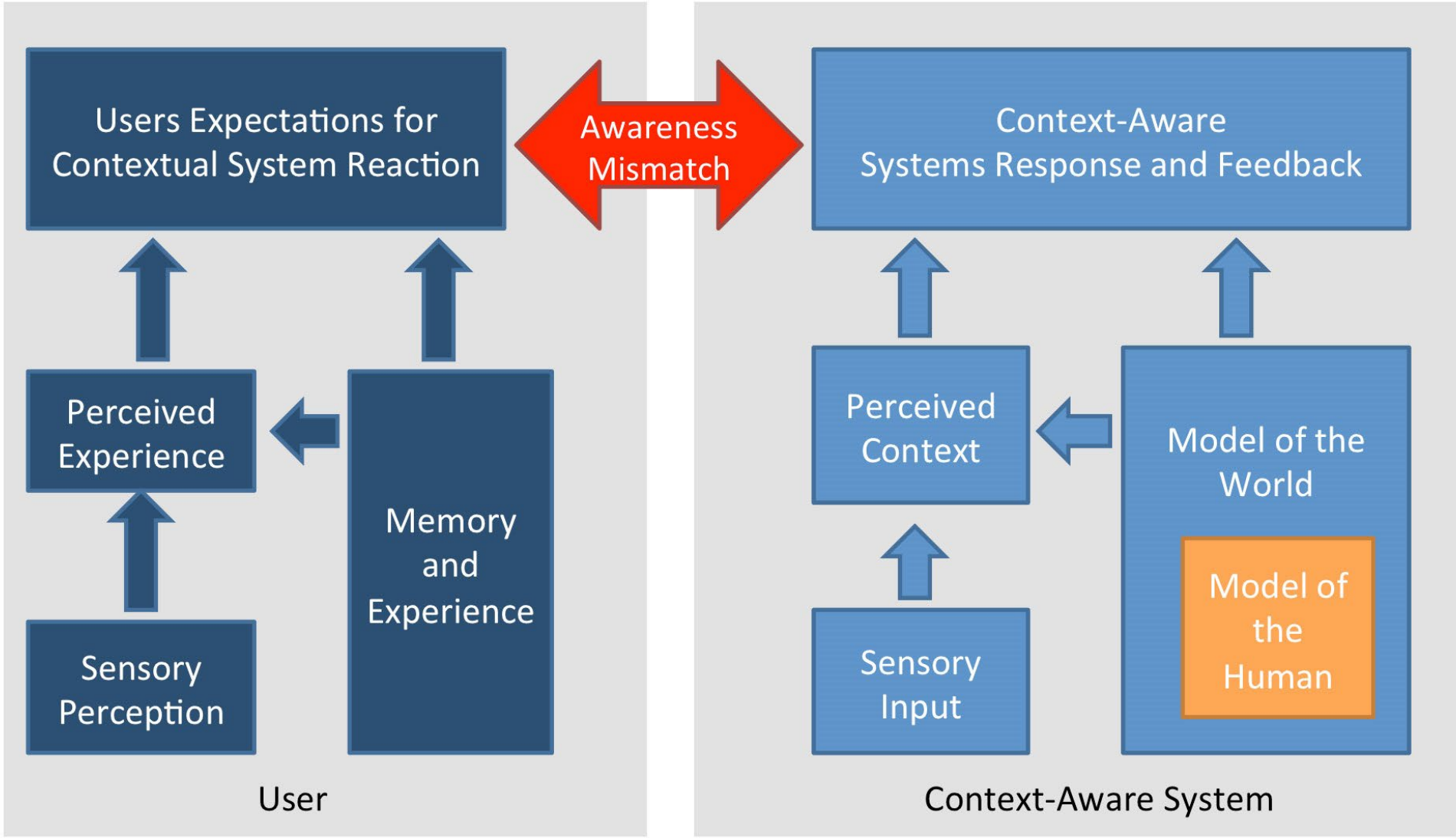

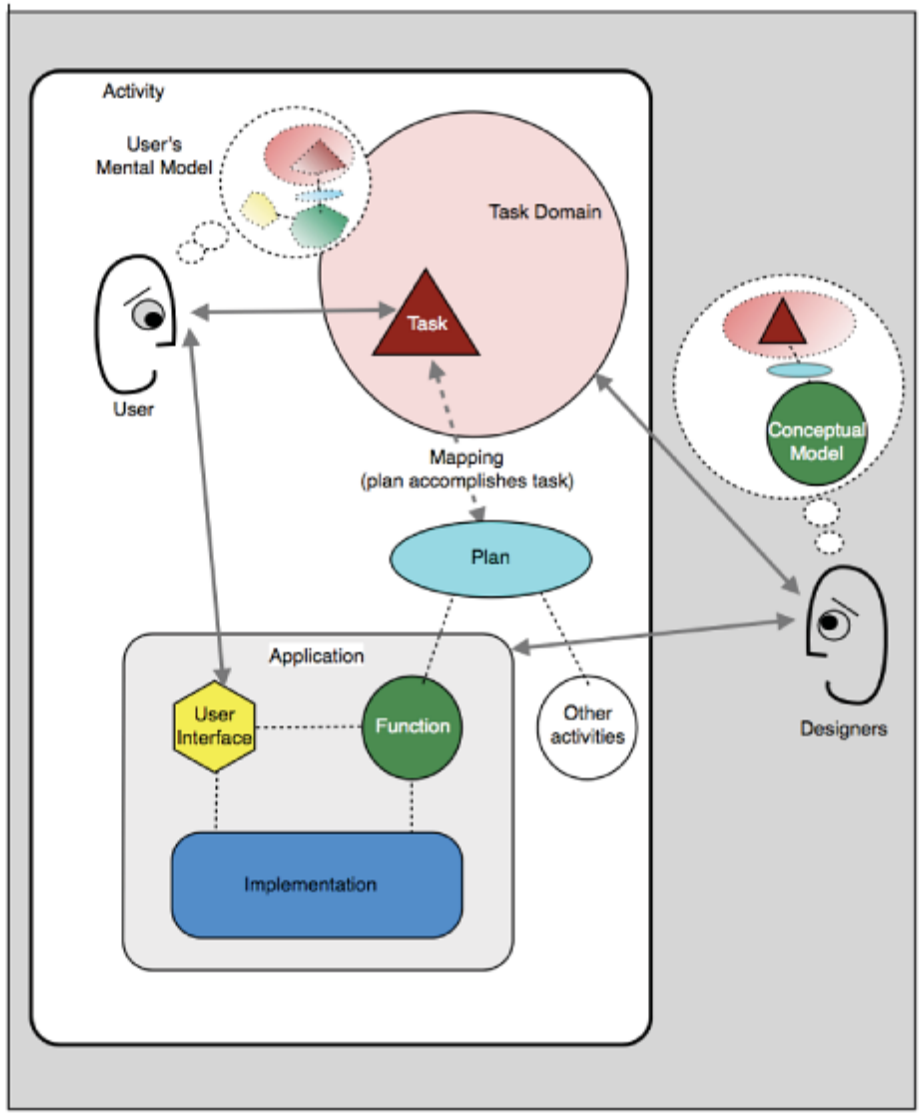

Figure 1.2: Designers' model of a user using an application.

What do these people have in common?

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Alphabet

amazon

PayPal

TESLA

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Big-Tech is build upon data [products]




Alphabet

amazon

PayPal

TESLA

FOURSQUARE

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Data Product a definition:

Products fueled by data and machine learning can be a powerful way to solve users' needs.

Prime examples include:

- Google-search
- Amazon product recommendation
- Tesla?
- Facebook?

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Data Product a definition:

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Prime examples include:

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- Facebook?

Data products types

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Type I	Type II	Type III
Data as a Service	Data-enhanced Products	Data as Insights
› Weather data	› Autonomous driving	› Marketing planning
wetteronline	TESLA	rb Reckitt Benckiser

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Data Product (top- down)taxonomy:

automated decision-making

decision support

algorithms-as-a-service

derived structured data

raw unstructured data

TYPES of DATA PRODUCTS

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Sort items into predefined classes

Estimate a numeric value at a specific time

Predict the behaviour of a value in the future

Sort items into similar groups

Recommend items to users

Generate artificial text

Choose from alternative strategies, acting on feedback

Choose from alternative strategies, acting on existing data

Outlier detection

Estimate the probability of an event happening

Rank items to prioritize human action

https://queirozf.com/entries/11-types-of-data-products-with-examples#1-sort-items-into-predefined-classes

DIGTALE IMPLEMENTATIE

Digital human

GAME ENGINE

MetaHumanTutorial-how to use the DSK

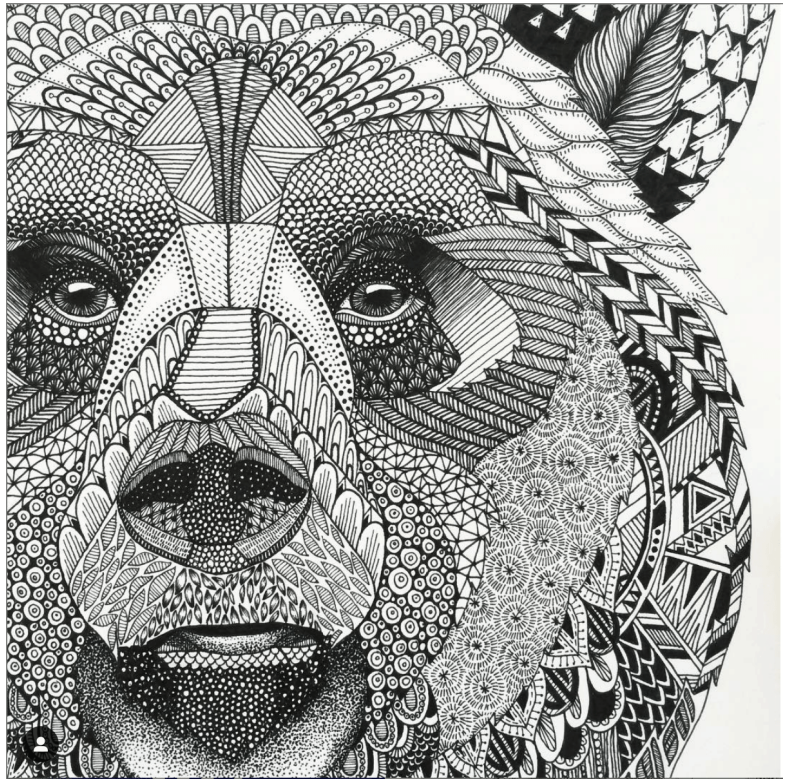
https://docs.unrealengine.com/5.2/en-US/using-dialogue-voices-and-waves-in-unreal-engine/

https://www.unrealengine.com/marketplace/en-US/item/66b869fa0d3748e78d422e59716597b6

Do it Yourself

Describe by means of a conceptual model
what kind of data-product you to build or explain.
Must contain a description of:

Data description
Model description (type of DATA VIZ)
(learning)algorithm



See also: https://github.com/robvdw/RCA_AIG_042Q6_ARTIFICIAL_INTELLIGENCE

Digital Human as a data product

A. Defining Digital Human as a Conversational Agent (in your own words)
B. What AI problem/use-case does it solve? / Is it a good fit?
C. Designate the Capability Domain & Application Domain
D. Description of Data Product Components & Techniques Involved

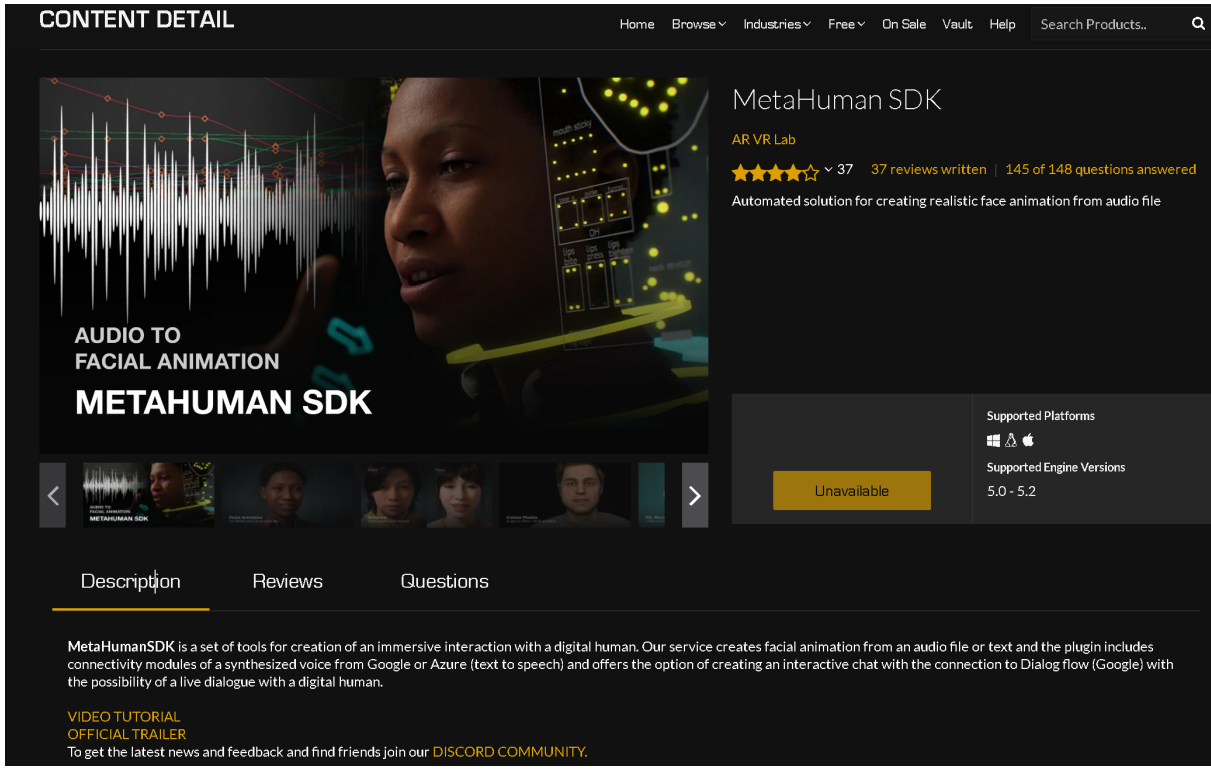
Describe ===>

Graphical User-interfacing
Multimodal (audio-visual) Appearance / Look & Feel
AI-model in terms of its Agency and Architecture
learning algorithm (LM)
how it is trained
the parameters involved

Defining Digital Human as a Conversational Agent

Data Product
Conversational Agent Concept

Lip-synced
life-like "digital Human"
The Key to Diverse Applications of AI-generated Characters



https://www.unrealengine.com/marketplace/en-US/item/66b869fa0d3748e78d422e59716597b6

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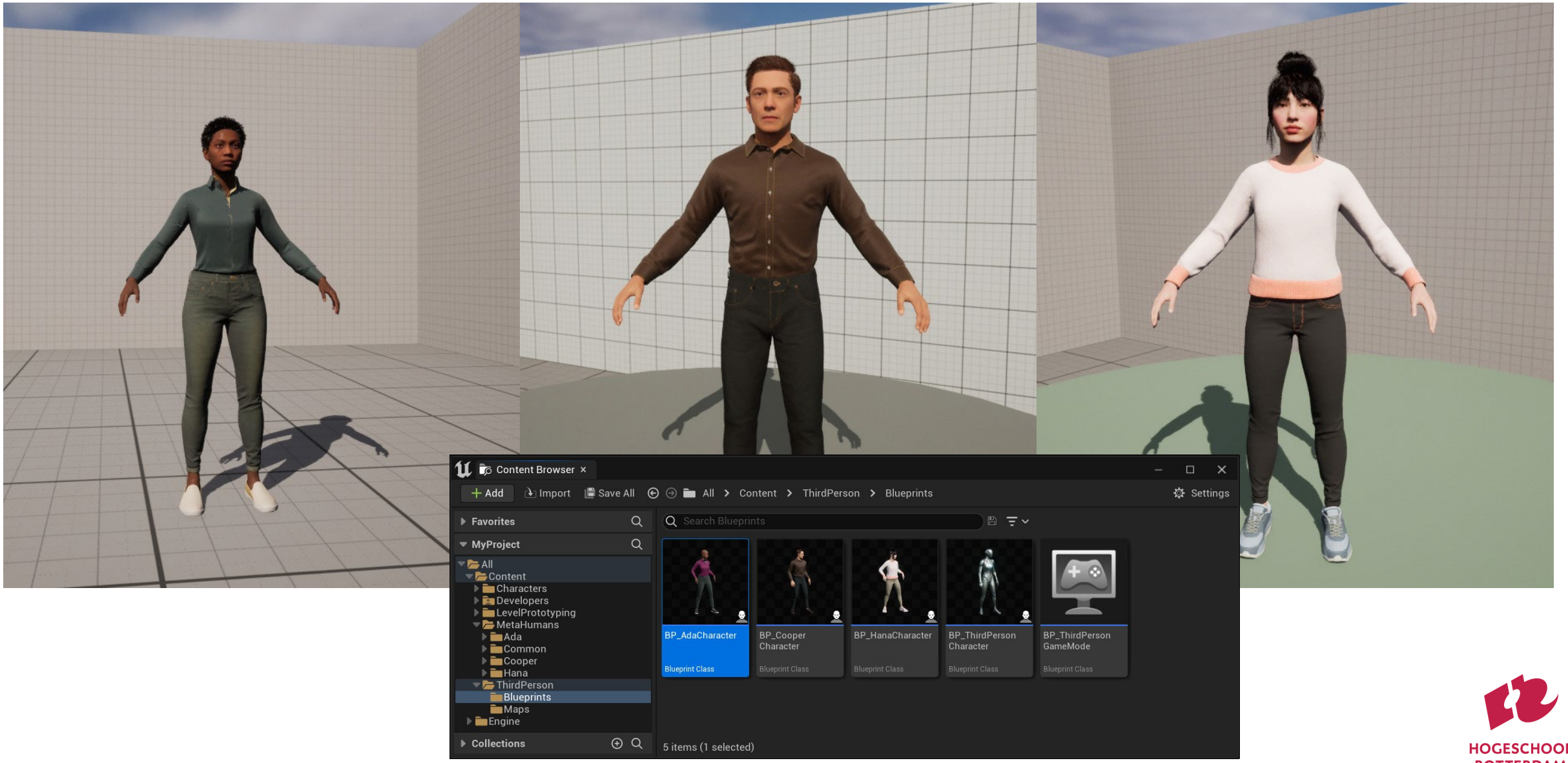

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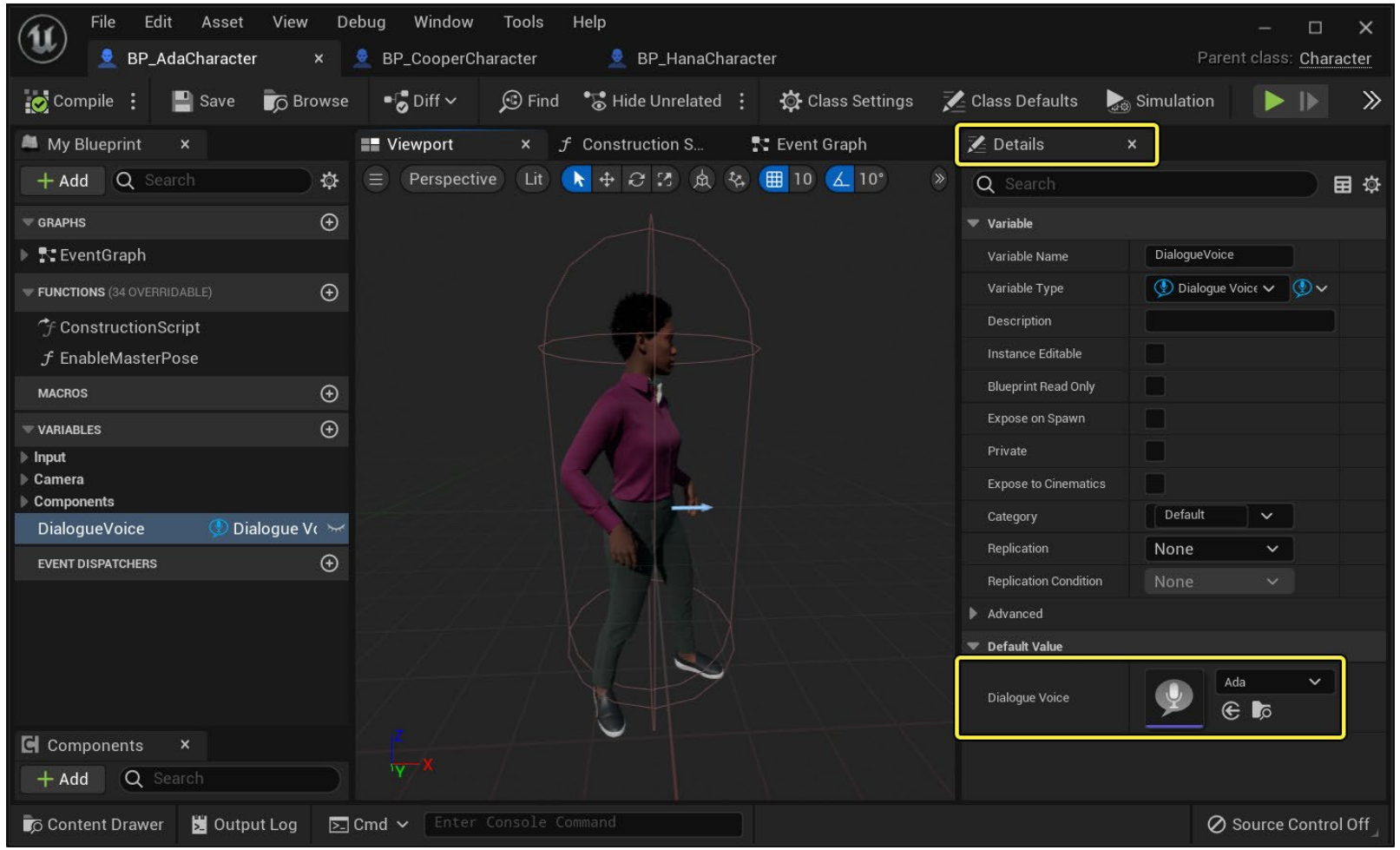

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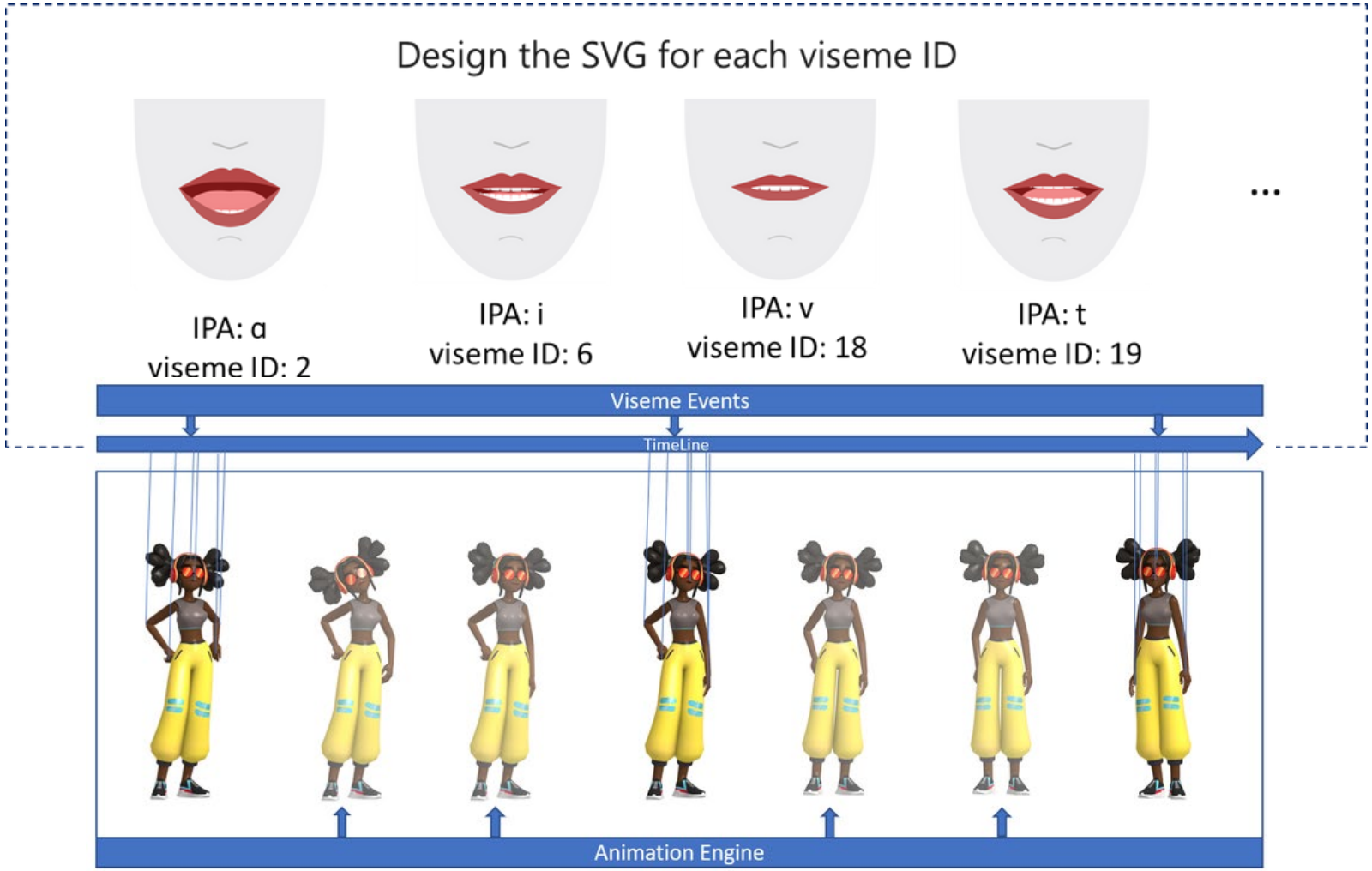
What AI problem/use-case does it solve? / Is it a good fit?



https://techcommunity.microsoft.com/t5/azure-ai-services-blog/azure-neural-text-to-speech-extended-to-support-lip-sync-with/ba-p/2356748

https://www.reallusion.com/iclone/lipsync-animation.html

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https://www.reallusion.com/iclone/lipsync-animation.html

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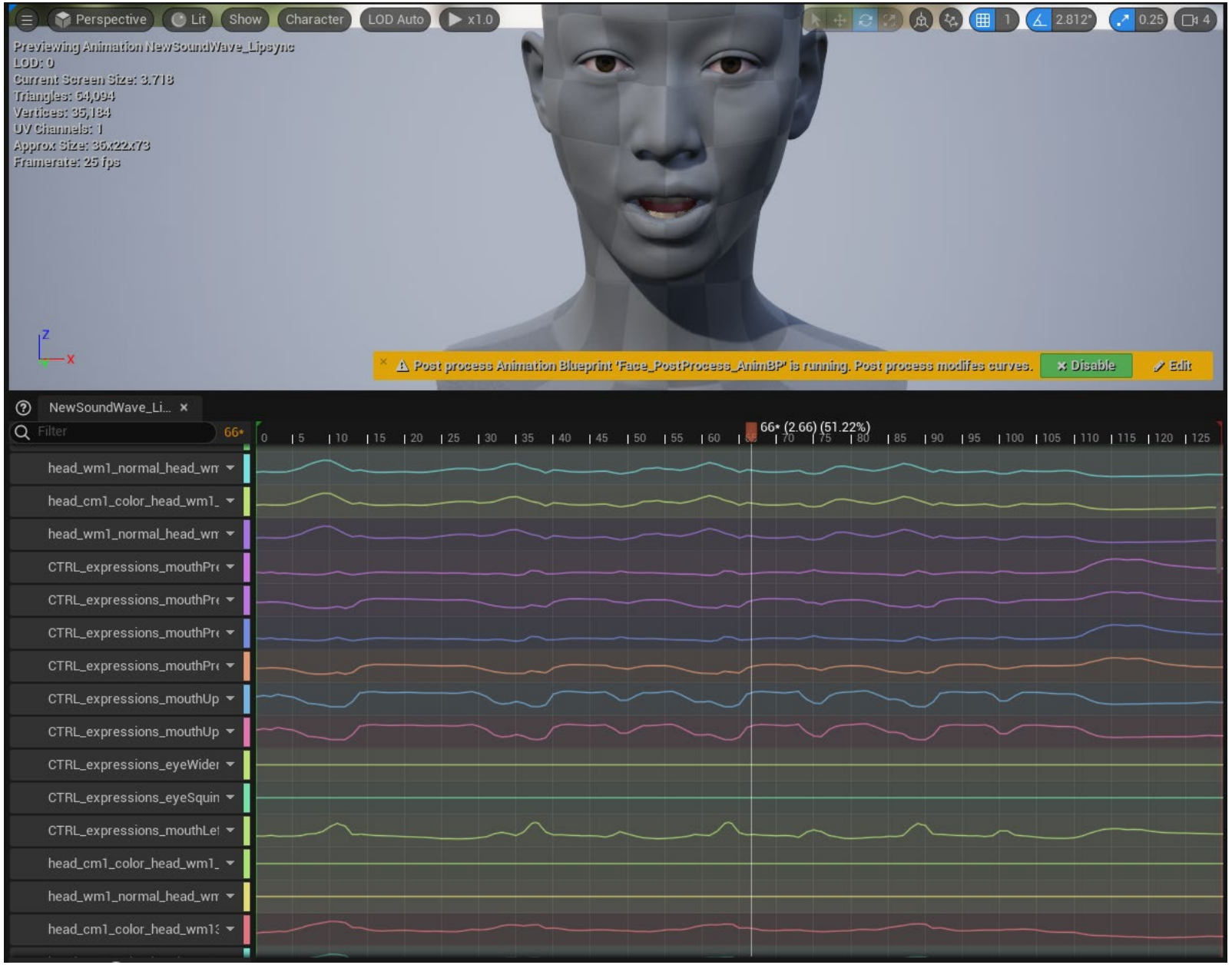

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Designate the Capability Domain & Application Domain

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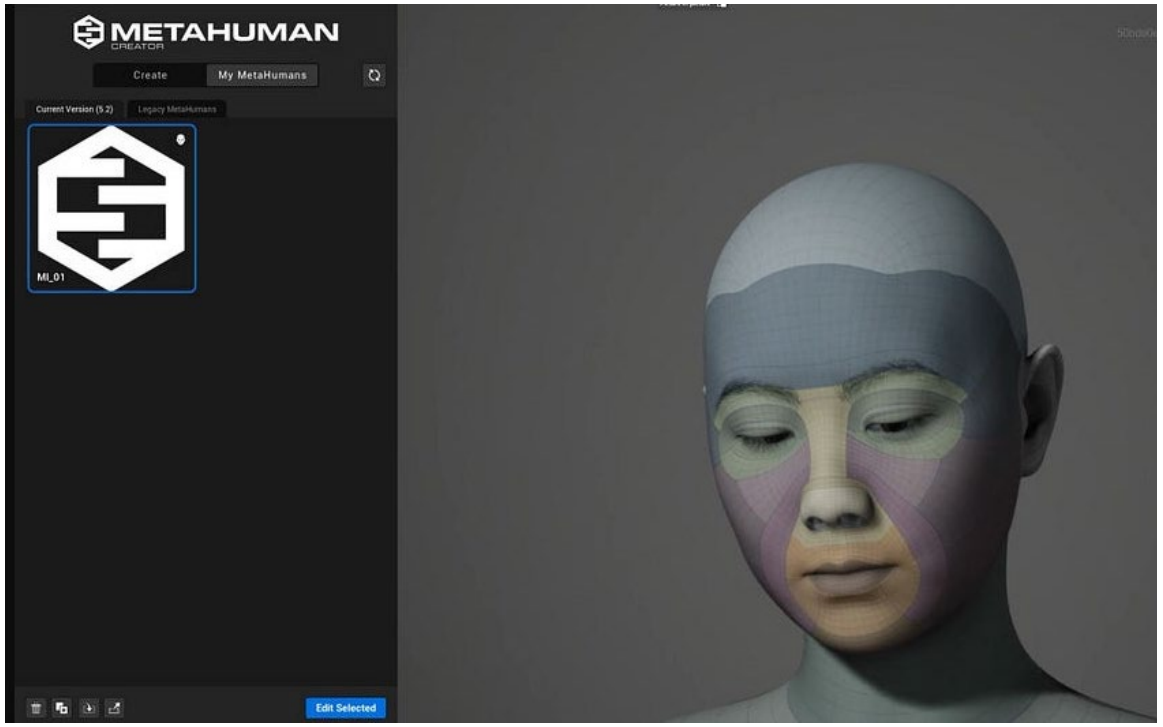
MetahumanSDK is a Unreal Engine plugin
to Create real time
photorealistic avatars
in a matter of minutes …

Text to Speech
Audio Lip-sync
Chatbot engine (plugin)
Talk component
(learning)algorithm



Description of Data Product Components & Techniques Involved

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MetahumanSDK

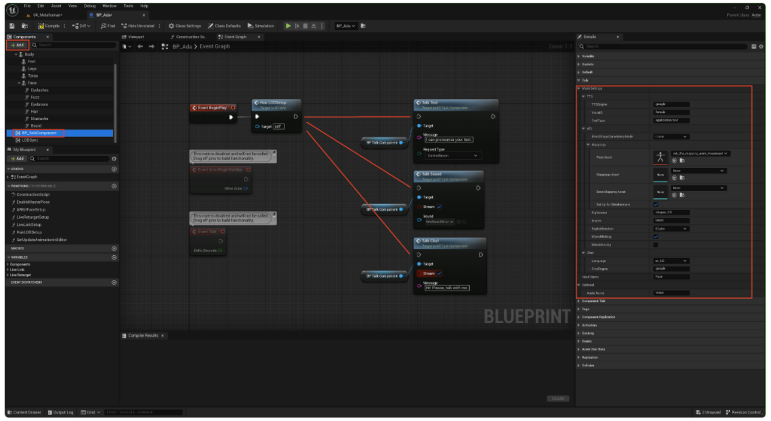
REFERENCE

Metahuman SDK Unreal Engine Plugin

- Quick Start
- Setup
- Text To Speech
- Audio To Lipsync
- Chatbot
- Combo
- Talk Component
- Changelog

Quick Start

- download plugin and register your personal account to receive your token and set token in plugin settings. Details about **Setup**.
- add talk component to your MetaHuman (by default you don't need to change any settings)
- call appropriate method Talk (Talk_Text, Talk_Sound, Talk_Chat)



You also can use our demo project for Unreal Engine 5.2 to get prepared levels.
It ask you to rebuild plugins because it include plugins. To do it you need installed Visual Studio with recommended by Unreal developers parameters.

Unreal documentation link
Project download link

Reference - Previous
Metahuman SDK Unreal Engine Plugin

Next
Setup

https://docs.metahumansdk.io/metahuman-sdk/reference/metahuman-sdk-unreal-engine-plugin/quick-start

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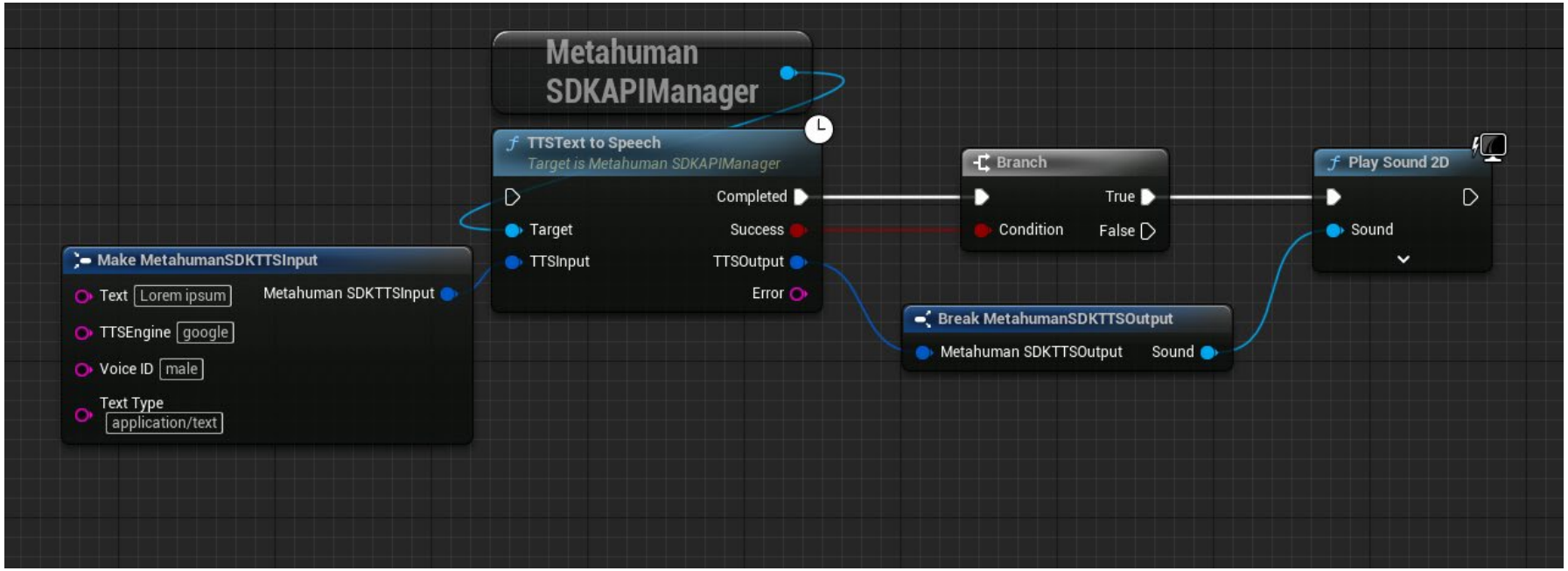
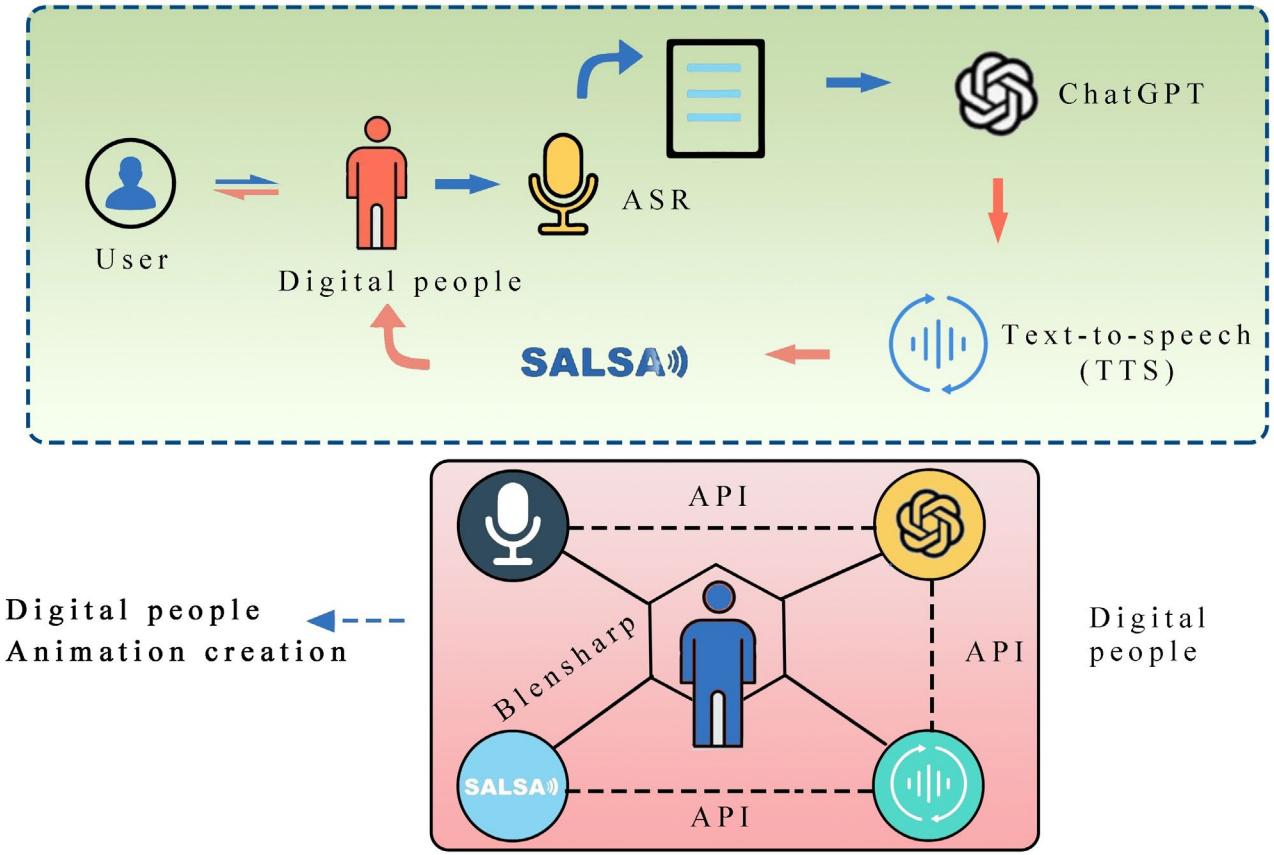
Model Description



https://docs.unrealengine.com/5.2/en-US/using-dialogue-voices-and-waves-in-unreal-engine/



Lan C, Wang Y, Wang C, Song S, Gong Z. Application of ChatGPT-Based Digital Human in Animation Creation. *Future Internet*. 2023; 15(9):300. https://doi.org/10.3390/fi15090300

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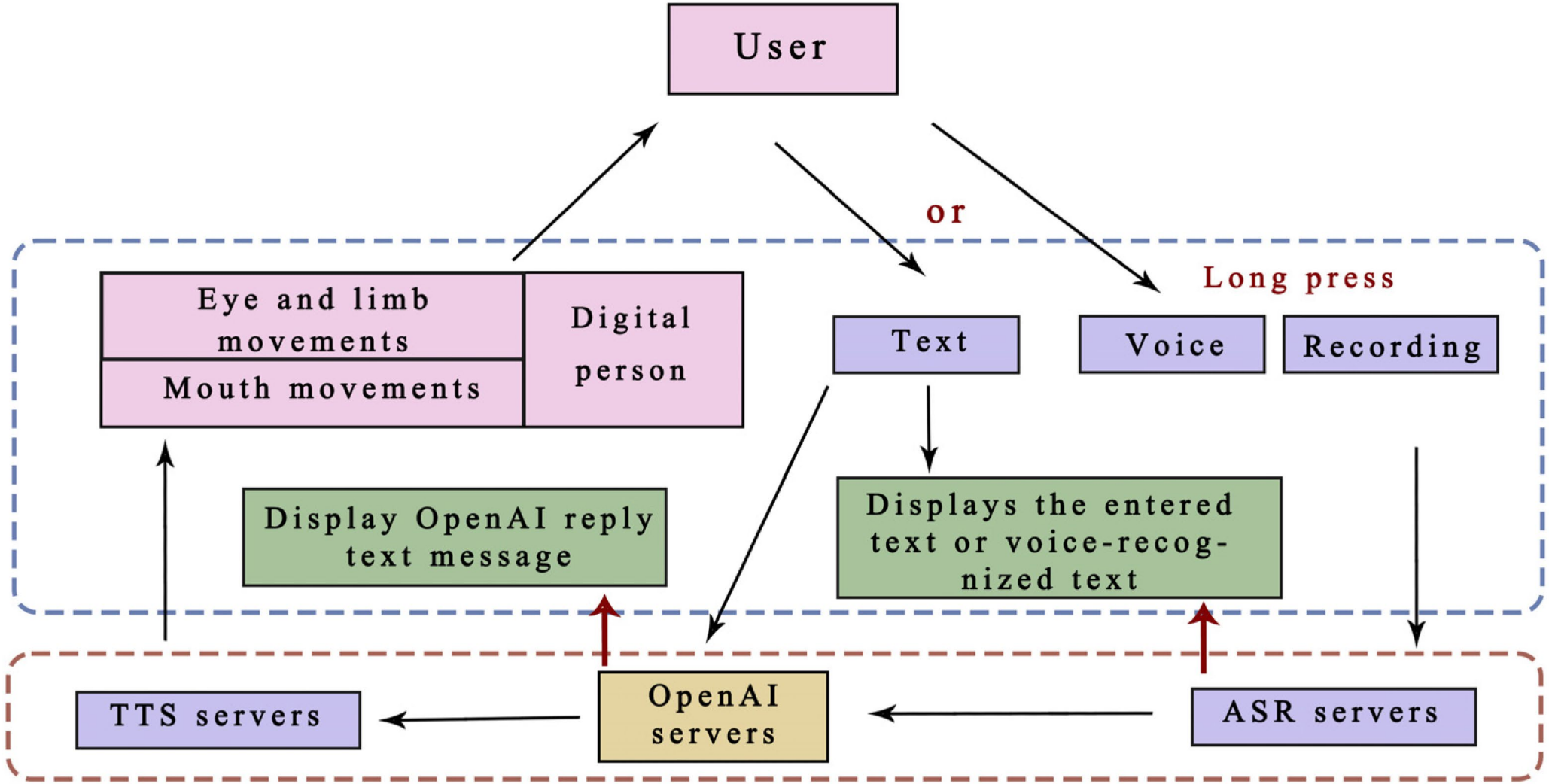

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DIGTALE IMPLEMENTATIE

Digital human

DEMO UNREAL 5.2

MetaHumanTutorial-
how to use the DSK

https://docs.unrealengine.com/5.2/en-US/using-dialogue-voices-and-waves-in-unreal-engine/

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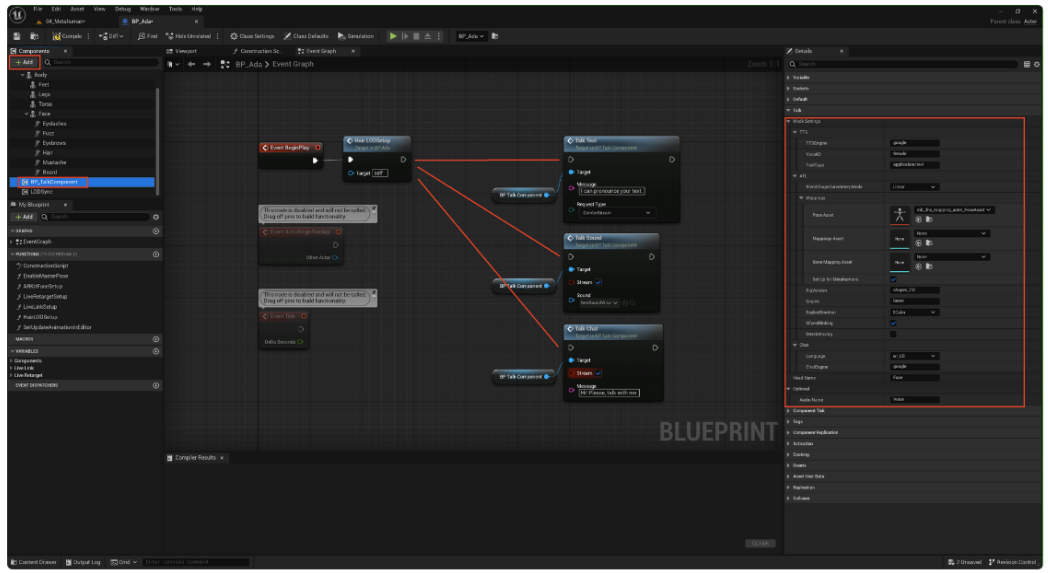

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Unreal documentation link
Project download link

Reference - Previous
Metahuman SDK Unreal Engine Plugin

Next
Setup

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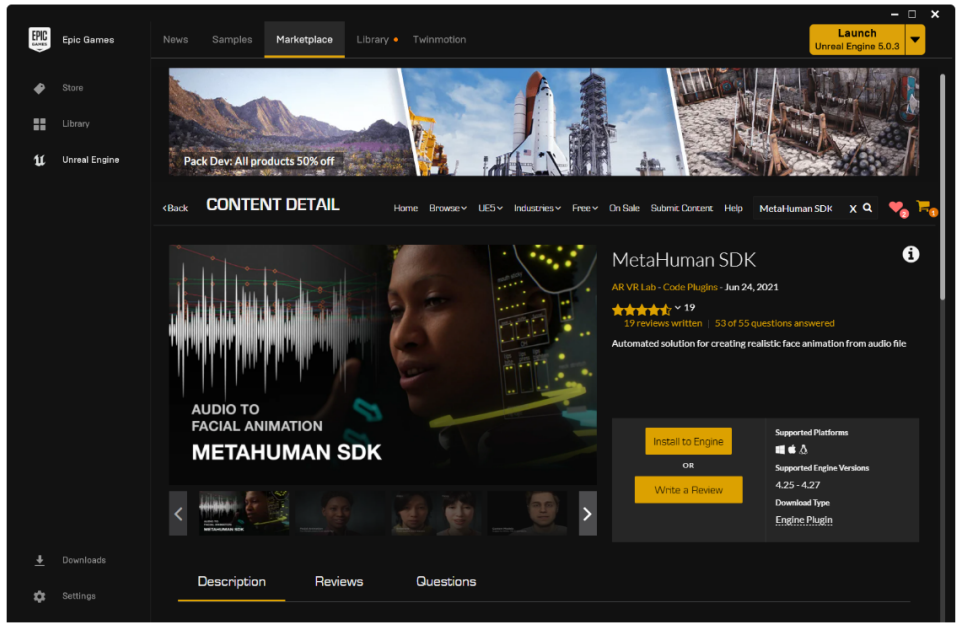
Setup

MetahumanSDK is a plugin for the Unreal Engine that extends your toolbox for creating virtual avatars. The first step is to connect the plugin to the project. You can create a new project or use an existing one.

Setup from the marketplace

In order to get stable release versions we suggest you install the plugin from the Epic Games Marketplace.

Please make sure that you have an EpicGames account. After this go to the EpicGames app, select Unreal Engine - Marketplace and search for "Metahuman SDK".



While on the plugin page click "Install to Engine" and select the engine version you need. The plugin is available for connection to your projects.

Text To Speech

The plugin provides tools for synthesizing speech from text.

When synthesizing, there are several voice synthesis providers available below. The list is to be expanded in the future.

available voice providers for use:

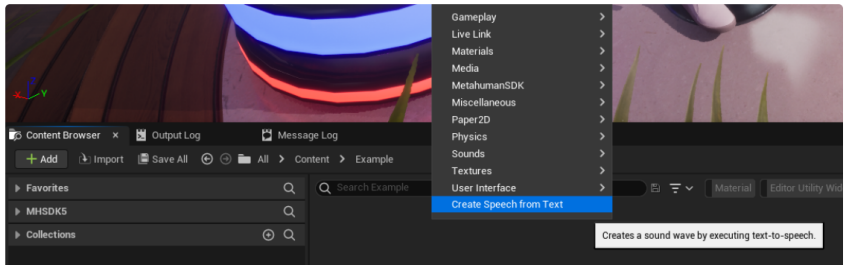
Engine ID	Voice ID
google	https://cloud.google.com/text-to-speech/docs/voices
azure	https://docs.microsoft.com/en-us/azure/cognitive-services/speech-service/language-support?tabs=stt-tts

VoiceID male and female are also available for all engines as default synonyms for voices.

In-editor usage

To use the TTS option from the editor and generate a sound asset, you need to do the following:

1. go to the folder, in the Content Browser right-click on an empty space
2. on the context menu select Create Speech from Text tab.



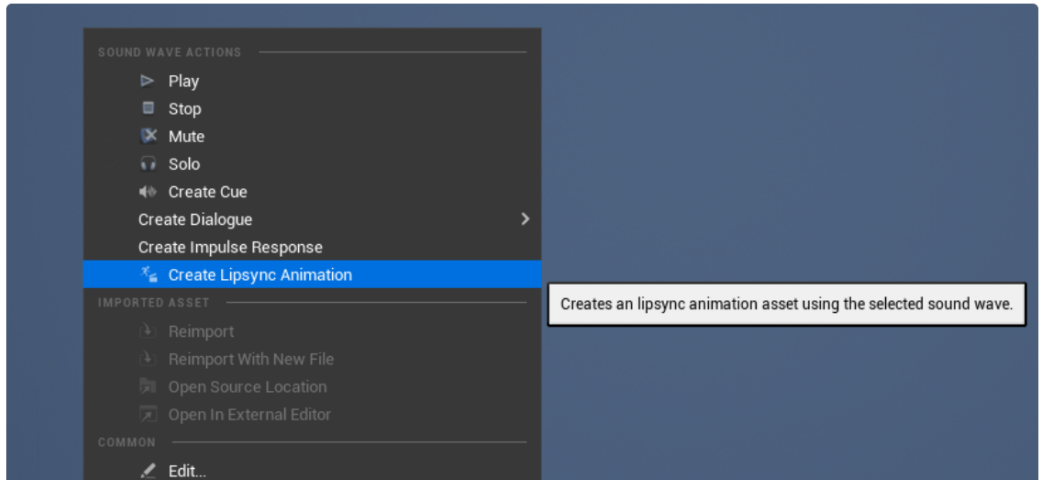
Audio To Lipsync

With the MetahumanSDK plugin creating lip-sync animations is now a breeze.

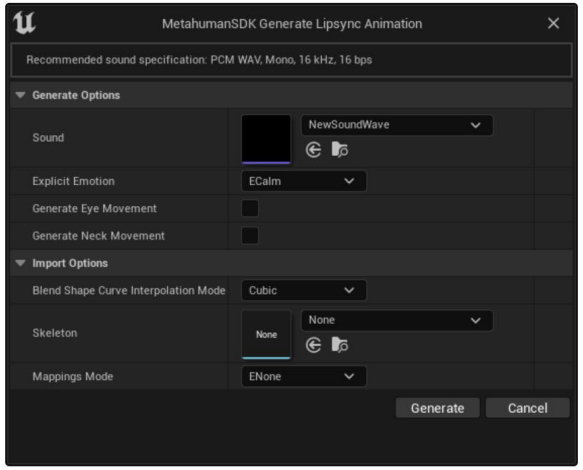
In-editor usage

To create an animation from an audio file using the editor, you need to do the following:

1. in the Content Browser select the sound asset you want to generate the animation from;
2. from the context menu select Create Lipsync Animation tab.



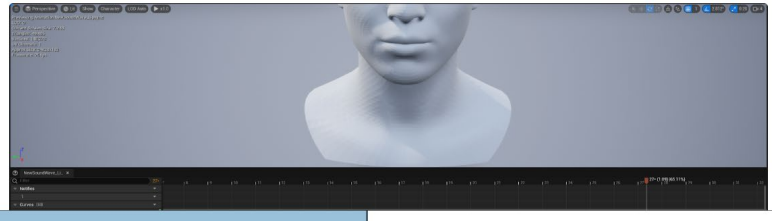
After that the window pops up.



Select the Skeleton for which the animation is generated.

If you use the default settings, the animation will be generated for ArKit-FACS blendshapes.

Apple Developer Documentation



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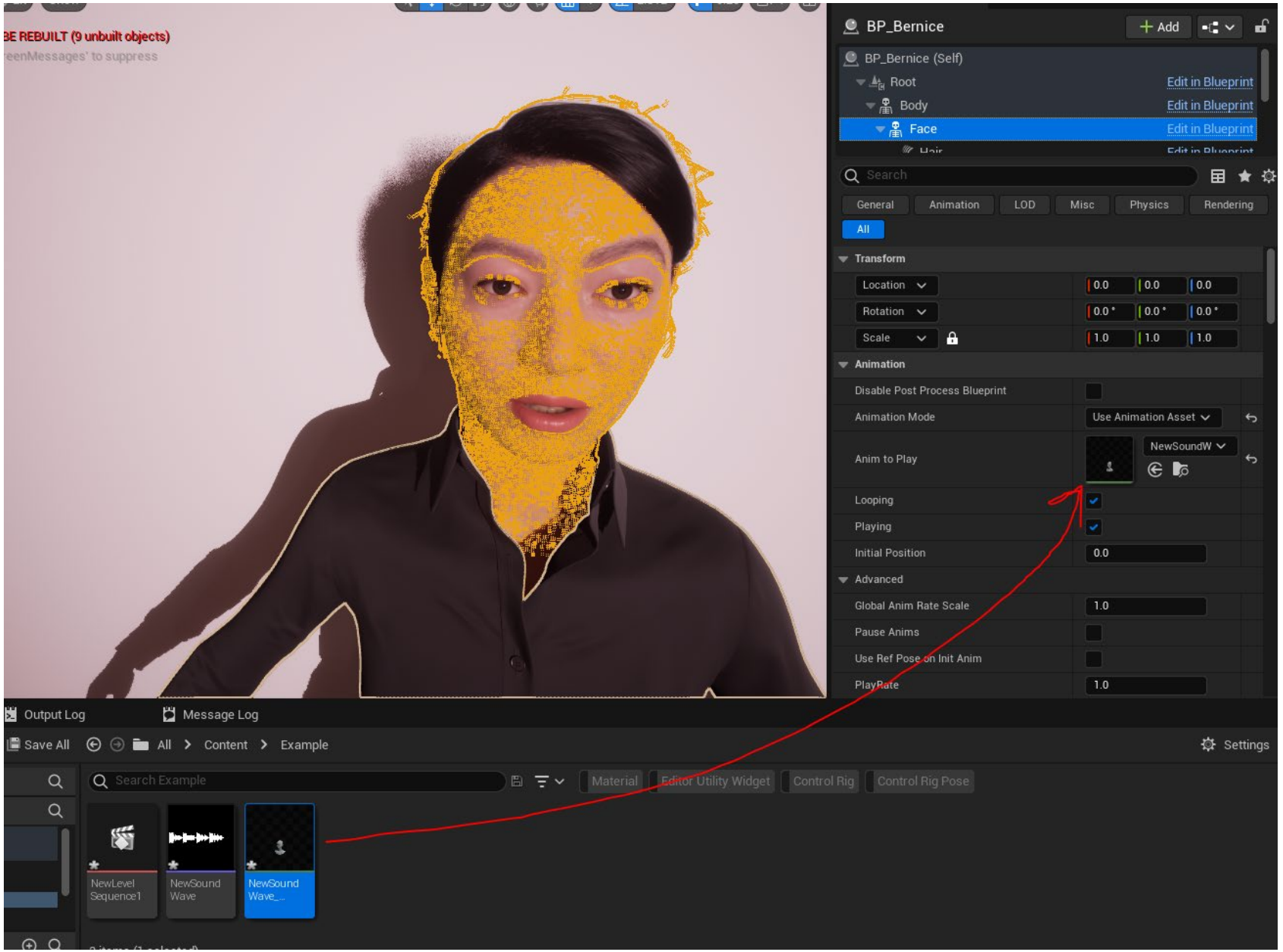

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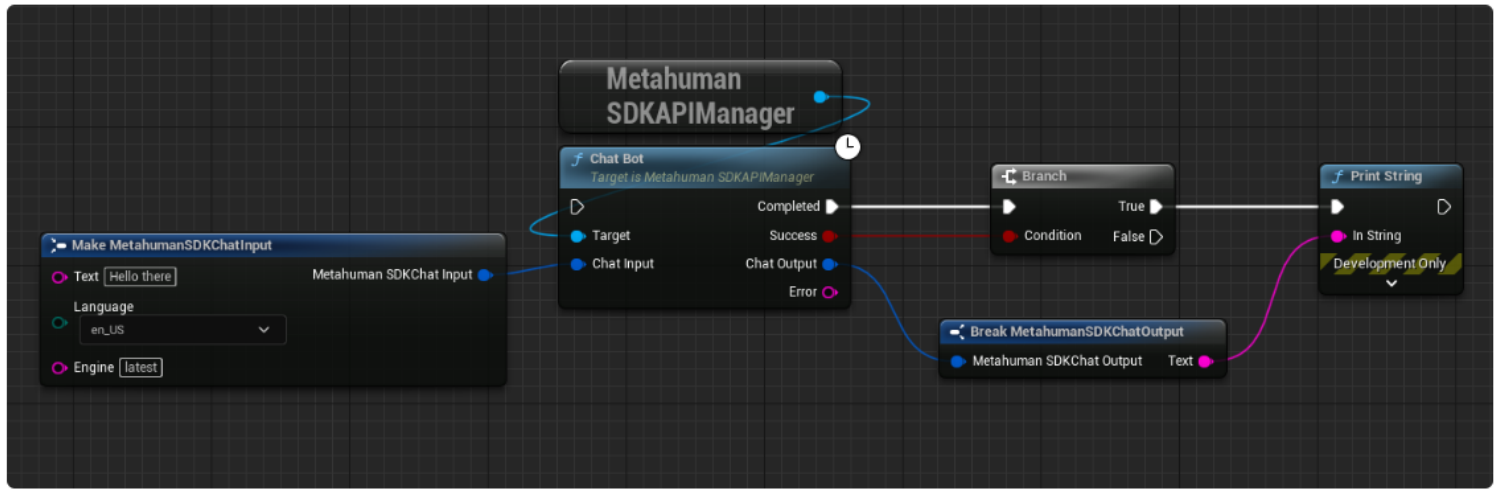
Chatbot

In addition, MetahumanSDK allows you to connect a chatbot to your project. At the moment the plugin supports with Google chatbot system. In the future there will be other chatbot providers available as well.



Previous
Audio To Lipsync

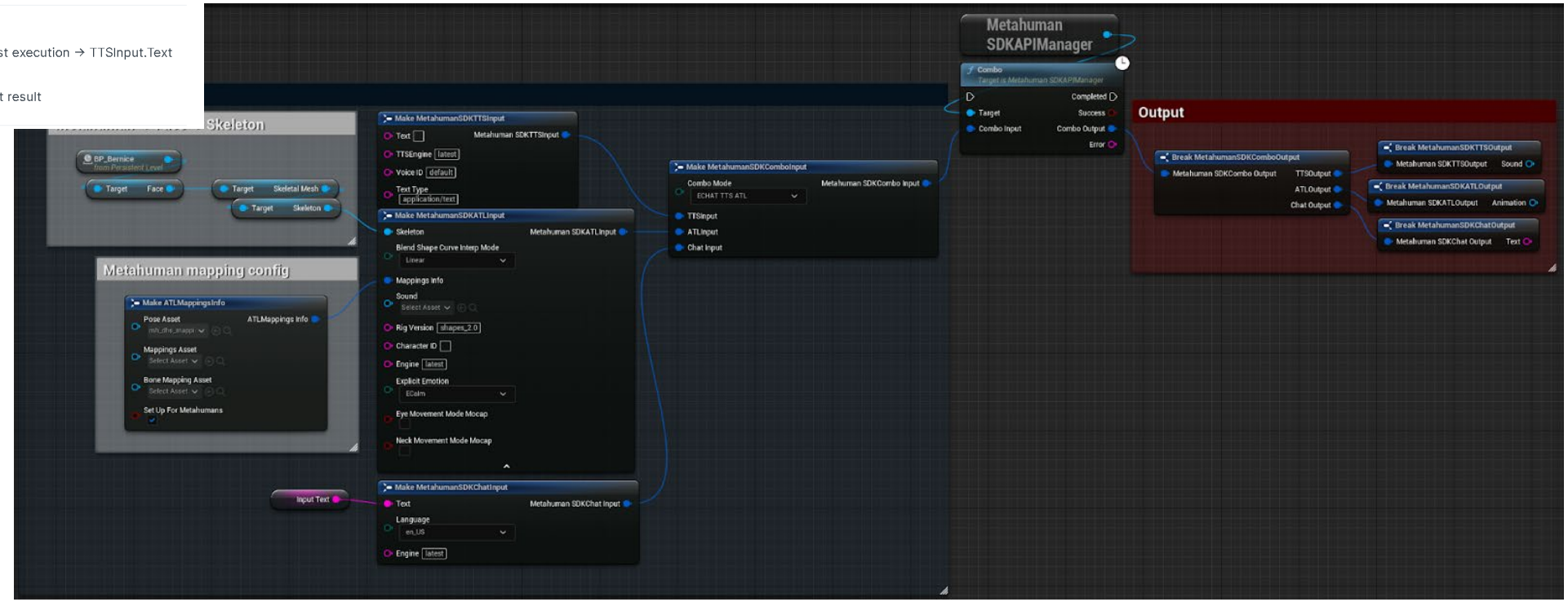
Next
Combo

Combo

Since Chat/TTS/ATL requests are often used together, the plugin provides a way to optimize execution time by eliminating the cost of additional requests by combining them into a single request.

Combo execution modes:

Mode	Text
CHAT TTS ATL	1. Chat request execution → TTSInput.Text. result 2. TTS request execution → ATLInput.Sound result 3. ATL request result
TTS ATL	1. TTS request execution → ATLInput.Sound result 2. ATL request execution
CHAT TTS	1. Chat request execution → TTSInput.Text result 2. TTS request result



https://www.reallusion.com/iclone/

https://medium.com/@kzhao37/guide-to-set-up-and-use-metahuman-animator-in-unreal-engine-5-2-384401bfb3ea

https://medium.com/keentools/keentools-facebuilder-x-metahuman-guide-81bc193ef2a

https://www.theverge.com/2023/3/22/23648834/metahuman-animation-epic-state-of-unreal-gdc-2023

https://www.magnopus.com/blog/unreal-engine-gdc-2023-metahuman-animator

https://medium.com/@twinsync.ai/lip-syncing-in-the-digital-world-the-key-to-diverse-applications-of-ai-generated-characters-4681fc39f54c

MetaHumanTutorial-how to use the DSK

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Digital Human Use Case Report structure

PART I
Problem Selection, Definition & Motivation + Human in the Loop

- Define Artificial Intelligence (in your own words)
- Define the 5 main characteristics (features) of AI
- Defining Artificial Intelligence (in your own words)
- Make your own info graphic/knowledge-map that gives an accurate overview of the state-of-the-art AI (see e.g., https://www.nesta.org.uk/report/future-minds-and-machines/2-what-artificial-intelligence/)

PART II
Digital Human as a data product

- Defining Digital Human as a Conversational Agent (in your own words)
- What AI problem/use-case does it solve? / Is it a good fit?
- Designate the Capability Domain & Application Domain
- Description of Data Product Components & Techniques Involved
    - Describe the Graphical User-interface
    - Describe the Multimodal (audio-visual) Appearance / Look & Feel
    - Describe the AI-model in terms of its Agency and Architecture
    - Describe the learning algorithm (LM)
    - Describe how it is trained
    - Describe the parameters involved

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Digital Human Use Case Report structure

PART III
Use Case Description & Application

- Give a short overview of the most popular Digital Human use cases + short description (in your own words)
- Find examples of
    - Assistance
    - Companionship
    - Conversational Exchange
    - Theory-of-Mind
    - Social Influencing
    -
- Describe, demonstrate, and analyse each of use-cases in terms of:
    - Prompt engineering techniques
    - Human-Computer Interaction (HCI) principles
    - Performance level / Accuracy
    - Parameter setting

PART IVI
Critical Reflection & Ethical Considerations

- Assess popularity / "ground-breaking" aspects
- Evaluate whether the AI data product solves the problem at hand
- Review potential issues & existing documentation in relation to the European AI-act

Studied Literature

- Select 3 review articles, describe in your own words their relevance
- Provide an APA-style overview of the sources used to write your AI-report

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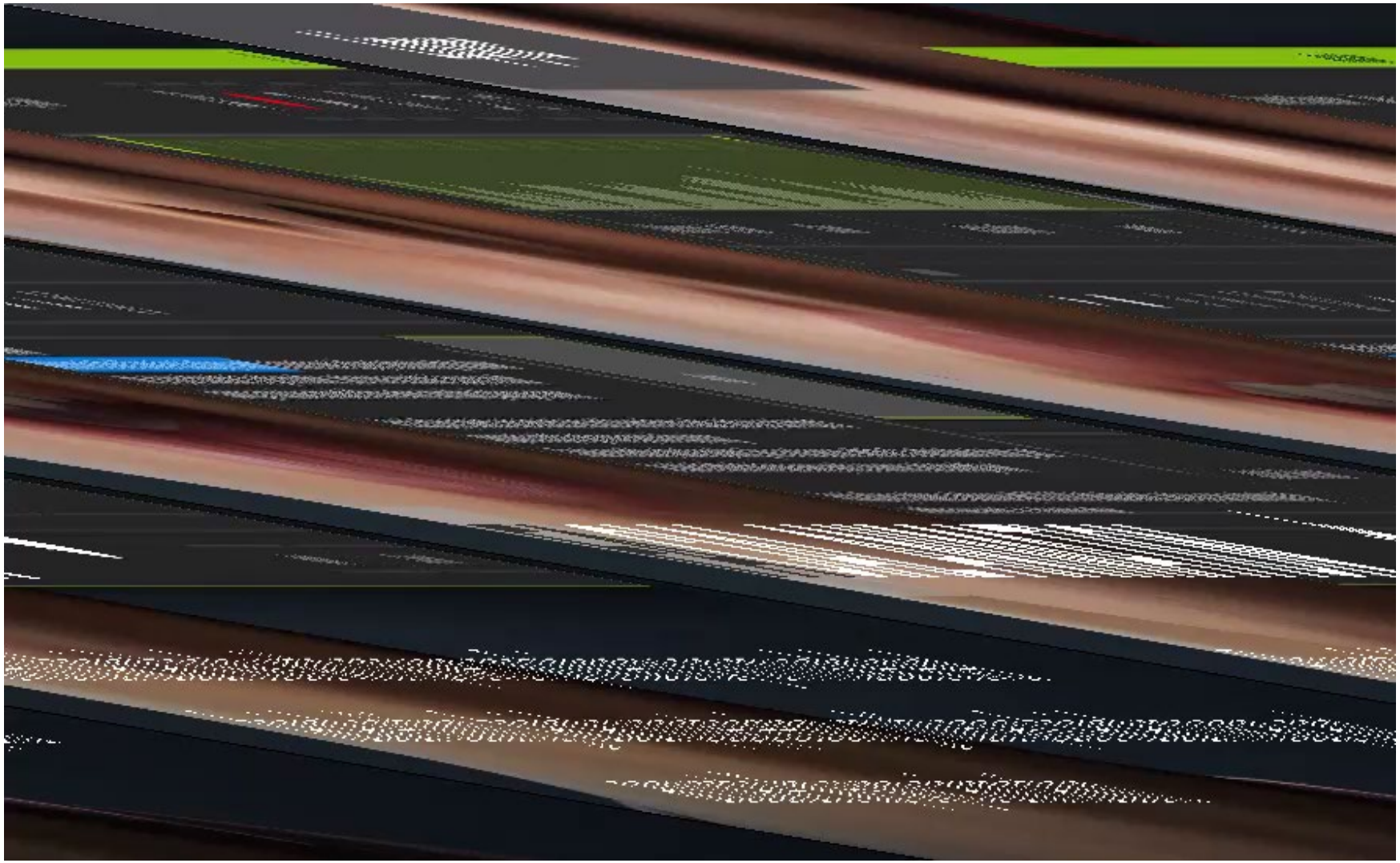
overtref jezelf



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