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Digital Companion for Industry

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Vertical domain knowledge is a differentiator for our service business – however it is often hard to access

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Siemens verticals


Mobility
Rail, Road


Oil & Gas


Power Utilities


Municipalities,
DSOs

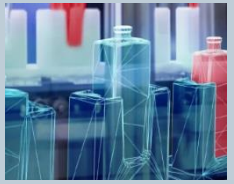

Buildings


Chemicals,
Pharma


Pump, Fans,
Compressors


Minerals,
Cement, Fiber


Auto,
Electronics


F&B, Product.
machines


Healthcare

…

Our domain and customer knowledge

Examples

- Products and components
- Customers and sites
- Damages and failures
- Maintenance history
- Service contracts
- …

Knowledge sources


IT systems
and Databases

Digital
files


Paper Files


Experts

New technologies help us to utilize our knowledge and expertise even further for maximum customer value

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Analog information handling

- Data and knowledge is mainly stored in humans and paperwork
- Human networks essential for getting knowledge access

Tools: Paper, copy machines, fax

IT based data & knowledge management

- Data & knowledge mainly stored in data-bases (e.g. FAQs, knowledge repositories)
- Users need expertise in where to find what information

Tools: Word, Excel, document management systems, relational databases, information retrieval

Digitally automated knowledge exploration

- Decentralized data sources are integrated and fused via logical models (e.g. semantics, ontologies)
- User can access all relevant knowledge via digital companion (similar to Google search)

Tools: Data lake & warehouses, knowledge graphs, ETL pipelines, natural language processing

AHI Mission

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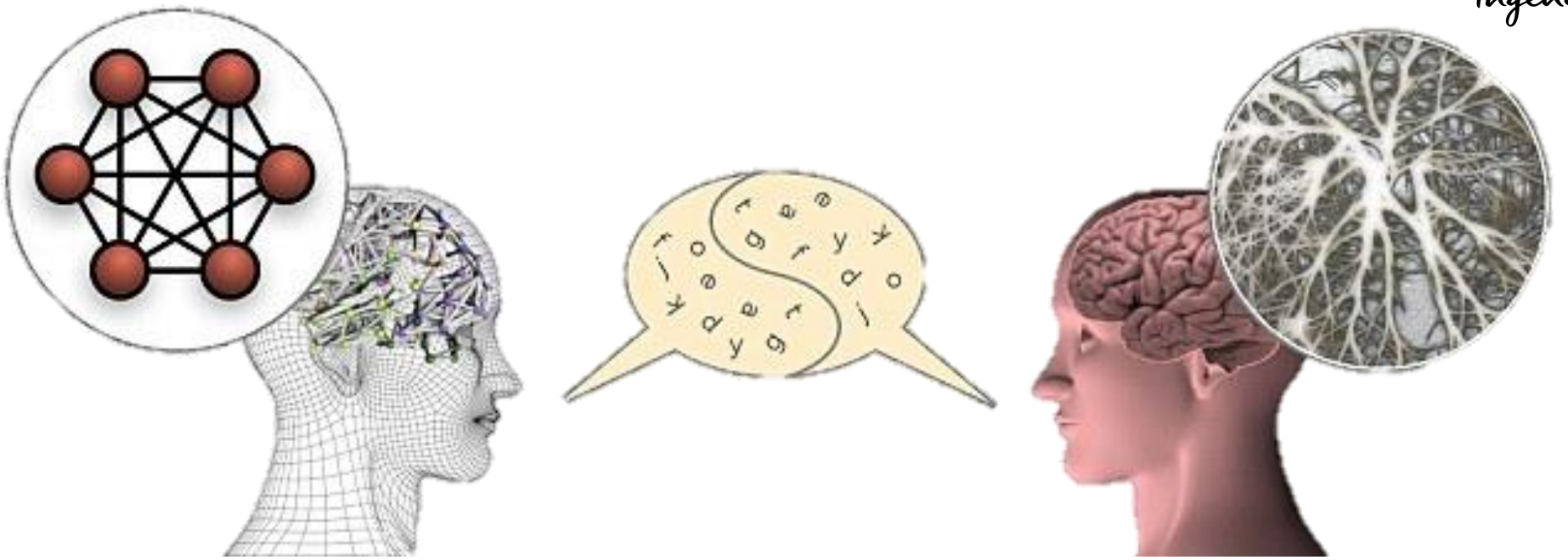

We create **digital companions** that **bridge between artificial intelligence** represented by Systems **and human intuition**.

This way we **relief human users from repetitive routines** (as systems take care of them) but free their minds to **focus on exceptional cases** that require **human intuition, creativity and world knowledge**.

We **construct user models** such that systems can **adapt to level of expertise** and emotional states: systems can become **empathic**. As a results, users become more satisfied, do less mistakes, and become more productive.

We establish seamless interaction between human and machine through intuitive, multi-modal and situation-aware interfaces, the so-called digital companions...

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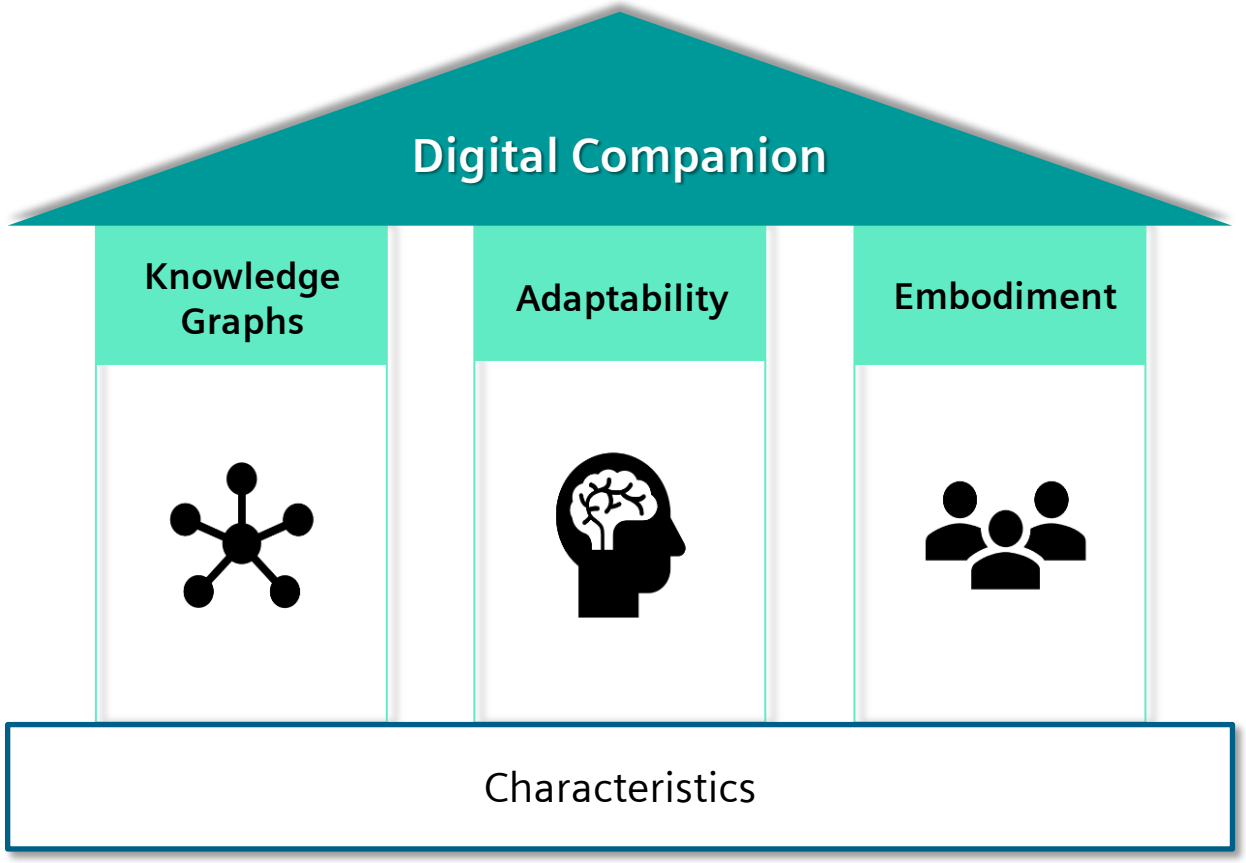
Digital Companion

- A digital companion aspires to help a user to better achieve her task.
- The digital companion remembers and interprets the user's behavior, adapts suggestions to goals and even anticipates the wishes of the user. Therefore, the companion has to become aware of the user's goals. The digital companion offers smart suggestions on how to proceed. The digital companion learns and improves over time. A natural dialogue between the user and the companion is realized by using adequate modalities, e.g. voice, gestures, etc..



Roles of digital companions

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- **Guardian** for human users should accompany and supervise users while monitoring their health status & environmental indicators
  - E.g. use of personal protective equipment at job site for field workers

- **Assistant** or **Mentor** can help human users by providing personal assistive services and enable users to fulfill tasks they wouldn't be able to do
  - E.g. make machine parts visible for repair of machine errors

- **Partner** can become an artificial personality that exhibit expressions through voice, e.g. and may track the user's state to adapt accordingly
  - E.g. show components for smart grid operations

Conceptual Architecture – Overall interaction model

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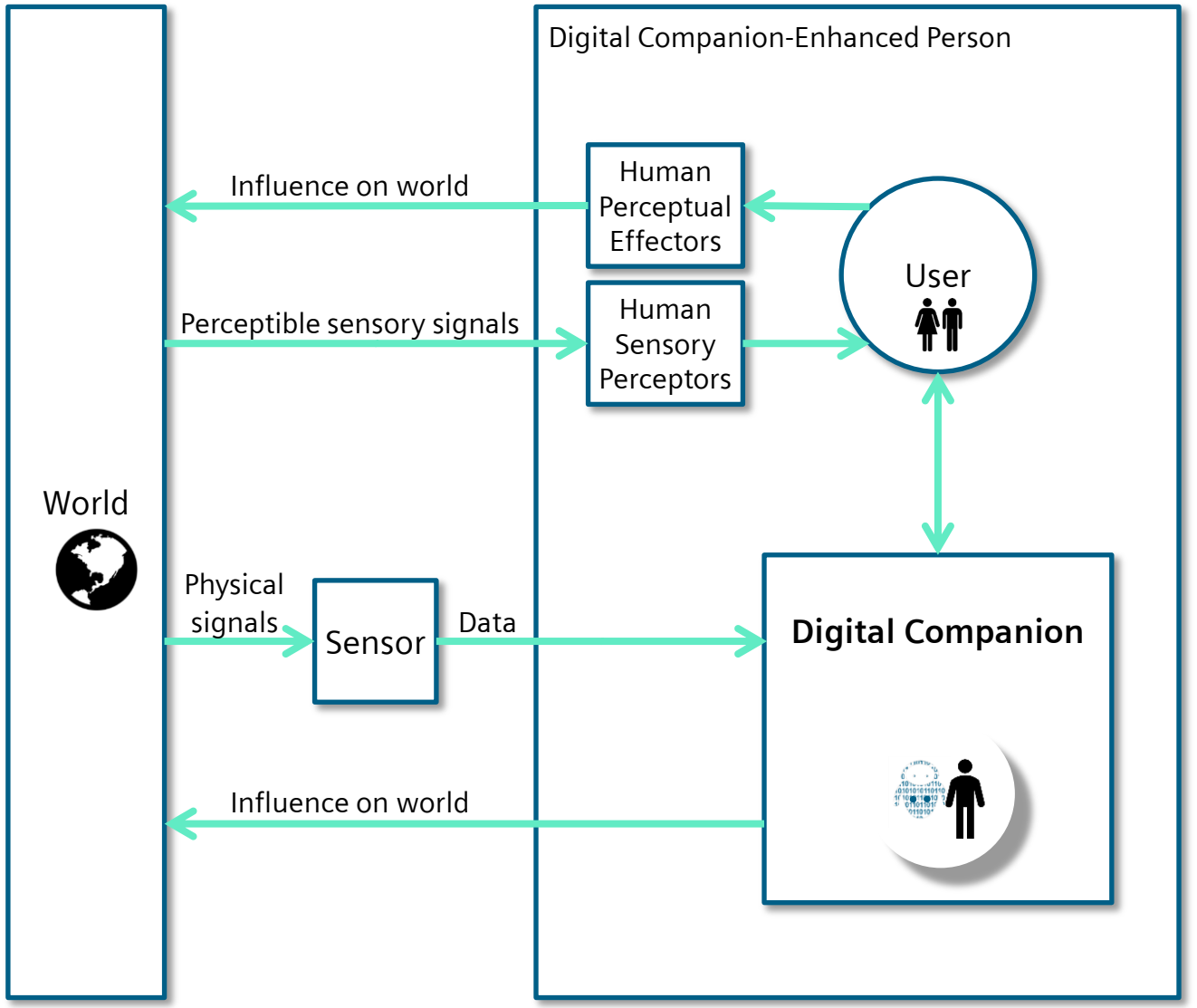
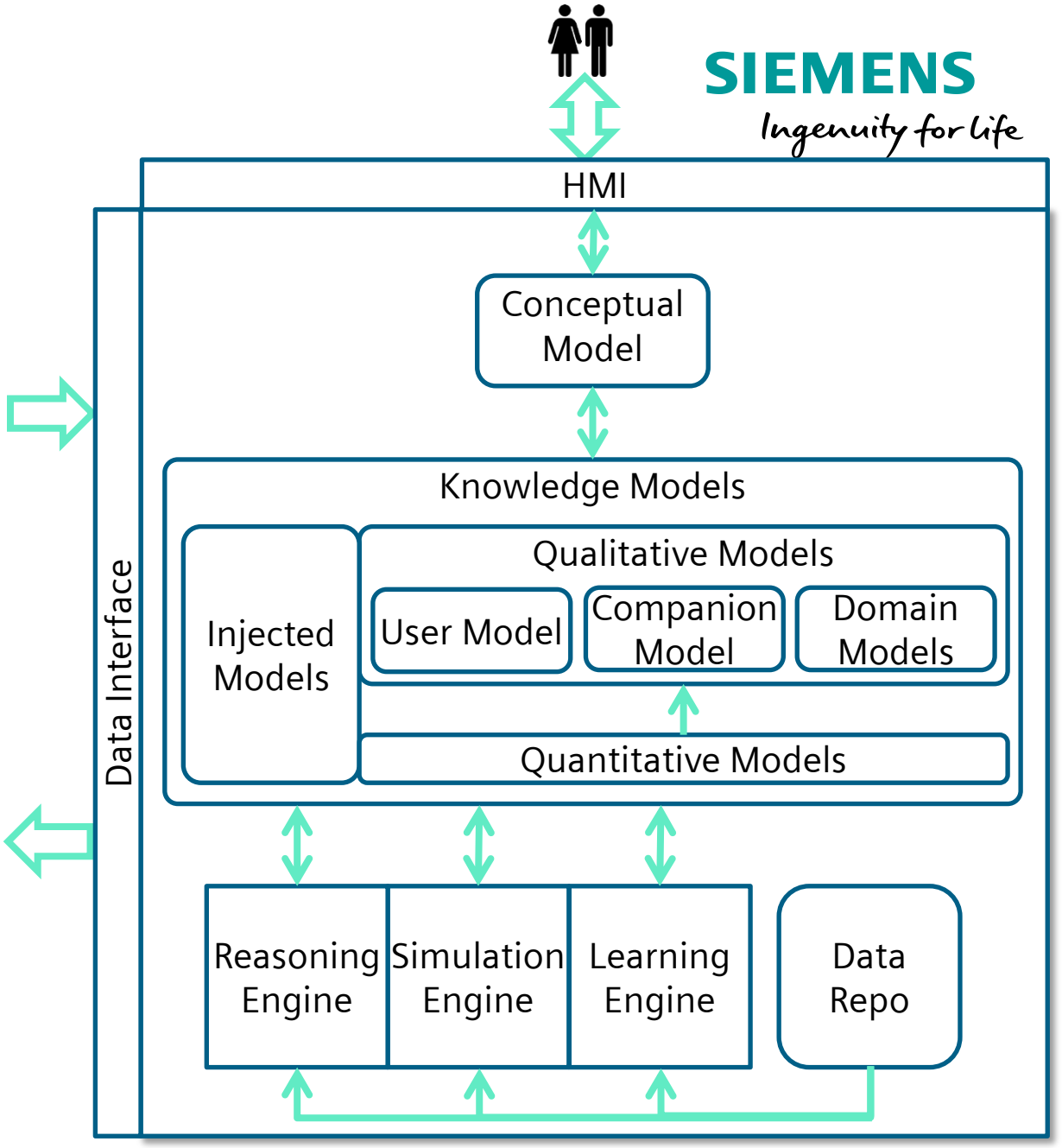


Digital Companion Components

- Human-Machine Interface:
  - Receives & translates information into
- Conceptual Model:
  - Understand each other and react
- Knowledge Models
  - Qualitative, quantitative, injected
- User Model
  - how to interact with users
- Companion Model:
  - Derive actionable decisions
- Domain Models:
  - represent all the domain knowledge
- Data Repo:
  - Collection of data from the world
- Learning Engine
  - Improve all Qualitative Models
- Simulation Engine:
  - experiment and integrate results
- Reasoning Engine:
  - Ask and answer questions about known information



Gridstarter:
Managing the Smart Grid through Augmented Reality

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Problem:

- Smart grid operators use 2D dashboards to visualize and manage grid information: Amount of displayed information represents a high cognitive load
- Grid management applications do not provide an intuitive user interface that allow operators to have a global view of their managed grid clusters

Solution:

- AR application based on a semantic backend suggesting apps to solve a certain problem in an intuitive and immersive manner
- Allowing smart grid operators to adjust performance metric to computed app placements on their gird cluster

➢ Providing a visual alternative to grid operators, capable of reducing cognitive load of monitoring a dashboard and see raw numeric app placement results

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Future directions

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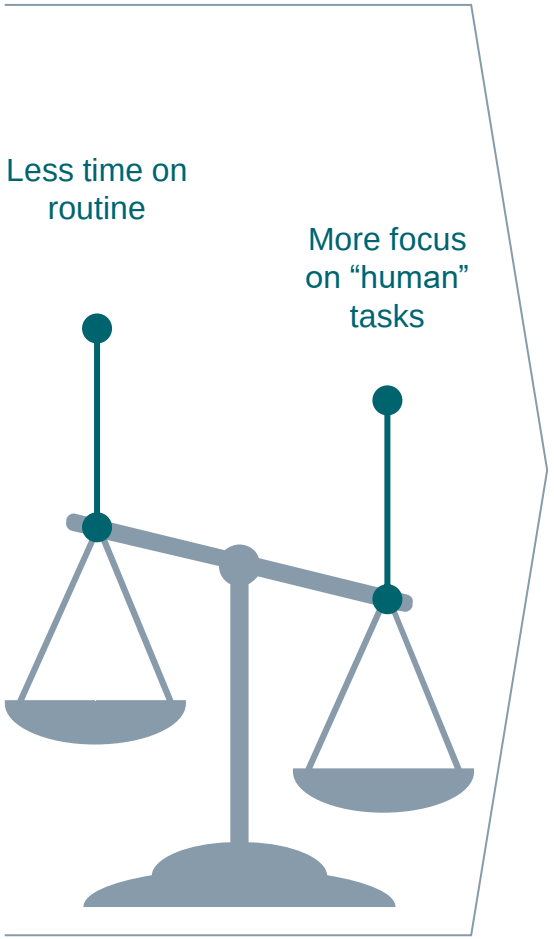

Challenges	Future directions
Source of knowledge	• How can Digital Companions access context-relevant data and generate knowledge out of that data?
Identification and learning of new concepts	• How can Digital Companions understand input questions and generate meaningful responses?
Interaction with human users	• How to balance interactions with a user and choose modalities for interaction?
Acceptance by human users	• How to ensure trustworthiness, privacy and safety, and that Digital Companions do not manipulate users?

Thank you very much!

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