

# The Future of Personal Assistants

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# Yesterday's "Personal Assistants"



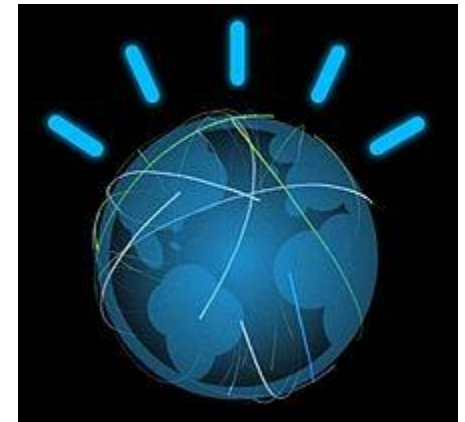
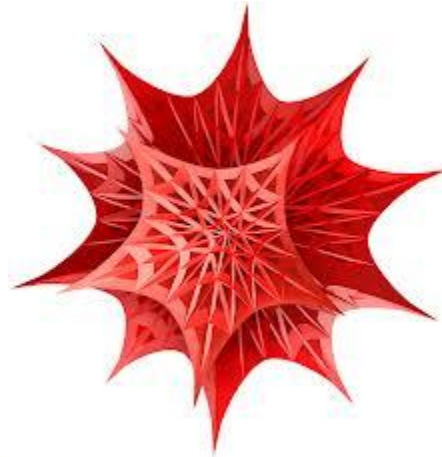
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"FORBIDDEN PLANET"  
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# Today's "Personal Assistants"



# Today's "Personal Assistants"

- **Voice search/ Web-search**
- **Question Answering. One-Shot**
- **Chatbot/ Stimulus-Response operation**
- **Specialized – Hard-coded custom applications**
- **Vendor centric/ Smartphone app**
- **Passive/ Reactive**
- **Very limited understanding, ontology, and general knowledge**
- **Limited conversation, memory, personalization, learning, etc.**

# Tomorrow's "Personal Assistants"

- Wide Range of **General** Skills and Knowledge
- Skills and Knowledge are **Integrated**
- Real **Understanding**
- Increasingly **Personalized** Knowledge and Skills
- Many modes of **Learning** (incl. Tool Use)
- Conversational and Goal-Directed
- Proactive
- Meta-Cognition, Introspection and Self-Awareness

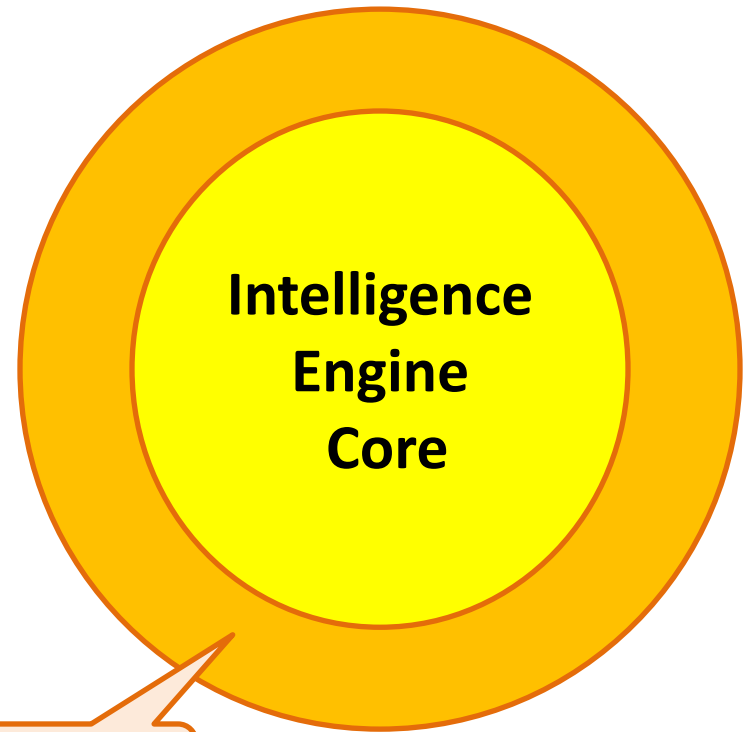
# Conventional Apps

Static – Pre-Built



# Apps with a Brain

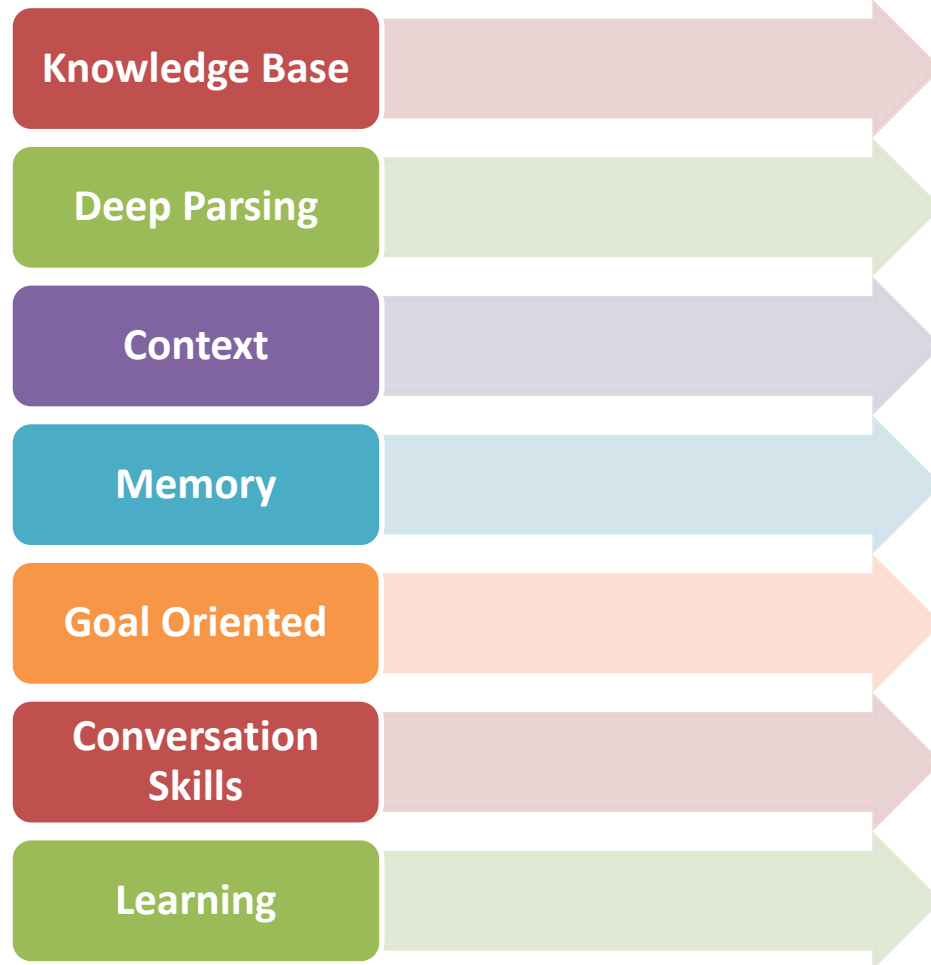
Dynamic Evaluation & Flow



Additional Knowledge

# Really understanding...

“I’ll meet him at our new bank, same as last time – got it?”



# Some **Features** of Brain-based Apps

## Knowledge Base

- **Language Knowledge: Large vocabulary of words and phrases.**
- **Plural, tenses, abbreviations, synonyms, homonyms, etc.**
- **Ontology: Entities/ attributes/ relationships, abstract/ concrete**
- **Common sense facts about customers, products, time, etc.**



# Some **Features** of Brain-based Apps

## Deep Parsing

- **Statistical parse & semantic parse**
- **Meaning extraction “...next Tuesday in the afternoon”**
- **Fuzzy grammatical parsing**
- **Using context, memory, and goals**

# Some **Features** of Brain-based Apps

## Context

- **Who is the speaker? (14 versus 40, expert?)**
- **Where are calling from? (home, vacation, cell, etc.)**
- **When and why are they calling?**
- **What transpired before?**

# Some **Features** of Brain-based Apps

## Memory

- **STM** – What was said earlier: “...can you cancel that first order?”
- **LTM** – Previous conversations: “I would like it at the usual time”
- **LTM** – Personalization: “...you still prefer express shipping?”

# Some **Features** of Brain-based Apps

## Goal Directed

- Identifying goals
- Multiple ways to achieve goal
- Knowing when goal is achieved

# Some **Features** of Brain-based Apps

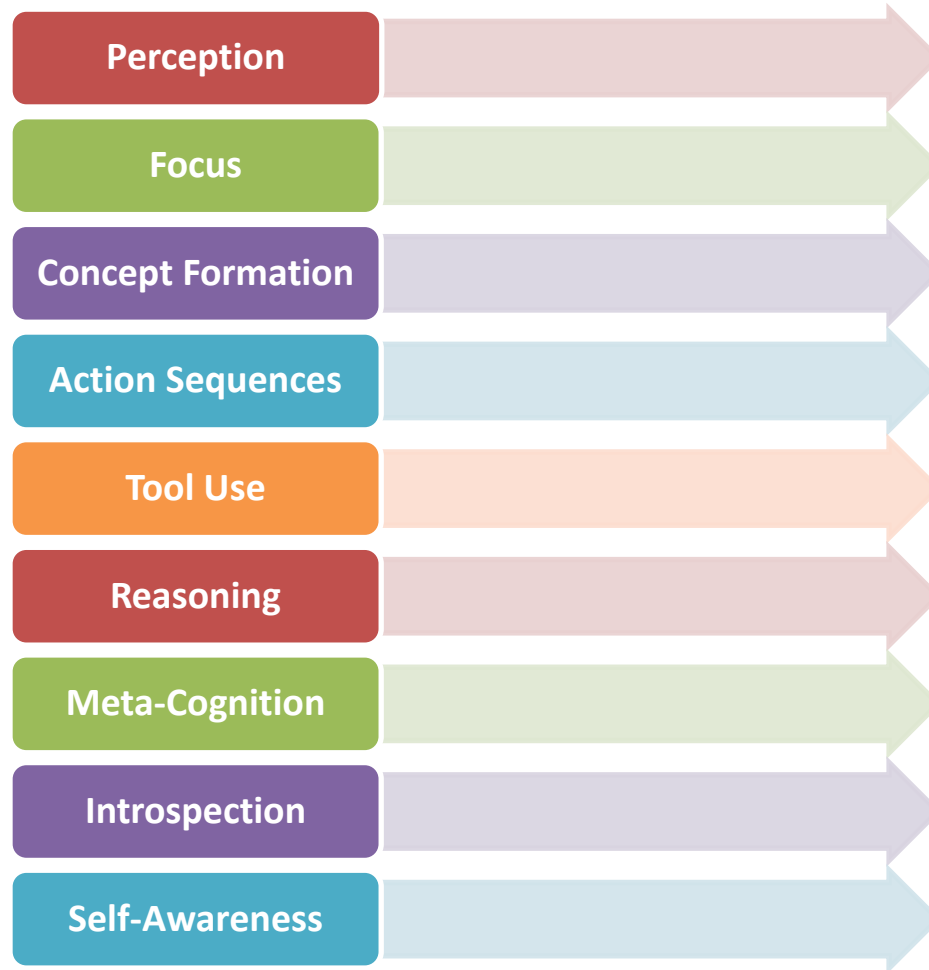
## Learning

- Learning new or personal phrasings (what they mean)
- Learning general or personal preferences
- Learning how issues were clarified effectively
- Learning effective goal strategies

# Acquiring Knowledge & Skills

- Built in
- Feature extractors/ encoders
- Look up
- Instance learning (one-shot)
- Unsupervised (clustering)
- Exploration (random or structured)
- Ape (copy/ mirror)
- Guided (hand holding)
- Instructed (voice, gesture, text, etc)
- Supervised (categorize, label)
- Self-supervised (internally monitor results)
- RL (explicit reward signal)
- Study (read, view)
- Figure out

# Other Cognitive Features



# Further Out...

- **Trusted Advisor**
- **The 'Extended Self' ?**





# Thank You

**Peter Voss**

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