

Cognitive Automation

Augmented Intelligence Improves Decision Making by Automating Human Judgement + Perception

Cognitive Automation is an *artificial intelligence* technology that mimics the human thought process to automate tasks that require judgement and perception. Human cognition involves real-time analysis of environment, context and intent, among many other things that drive decision-making. Cognitive computing brings together AI techniques like Machine Learning, Neural Networks, Natural Language Processing and Semantic Analysis to build *knowledge models* that help with decision making, problem solving and task completion.

There are several advantages to cognitive computing over other AI. Cognitive systems are *pre-trained to automate* specific business processes and require less data before they can make an impact. They don't require help from data scientists or IT to train complex models. Cognitive systems are designed for business users, with the goal of being operational in just a few weeks.

Cognitive Automation
Improves Quality
and Consistency
of Human Decisions
with Machine Guided
Outcomes

The coolest thing about cognitive systems is that they can learn from results of their own computations. The more data is added to a system the more connections it forms allowing it to constantly adjust to the new information being fed. As part of their design, cognitive technologies are *adaptive*, *interactive* and *contextual*, allowing system training to be *iterative*, *stateful* and *unsupervised*.

The Augmented Worker

Cognitive Automation augments human intelligence by automating repetitive tasks that require judgement and perception, to enable *deterministic outcomes*.

Outcomes are considered deterministic when they are consistently more accurate than the alternatives. Consider how a professional athlete hits a ball, compared to non-professional. They always tend to hit it a little better.

Adaptive



Cognitive systems must be flexible enough to learn as information, environment changes and user goals evolve.

Judgement and perception analysis must be applied at the inflection point of data change allowing a system to react in real-time and adjust as needed.

Interactive



Human-computer interaction (HCI) is critical to cognitive systems. Unlike reports or dashboards that focus on presentation of historical data, a cognitive system interface must consider how humans identify and handle new information.

Applications must integrate with other systems, devices or cloud platforms as well as provide a way for users to model cognitive processes.

Iterative + Stateful



Cognitive computing systems can identify problems by engaging users and pulling in additional data when stated problems are vague or incomplete.

They often accomplish this by asking humans to help classify information and maintaining a history of similar situations that occurred.

Contextual



Context and semantics are critical in a thought processes, and cognitive systems must be able to identify and extract contextual data, such as name, location, synonyms or specialized terms.

This may require drawing on multiple sources of structured and unstructured data, auditory or visual streams and IoT sensors.

Professional ball players may not always be accurate, but their margin of error is reduced so significantly that over time, the outcome of a game is changed dramatically.

Similarly, the sum of all actions taken by users of cognitive automation tools are consistently better, leading to deterministic outcomes.

Consistent improvement of decision accuracy is what drives business advantages. You don't need to be completely correct all the time, you do need to be consistently more accurate than the competition.

Yet cognition may fail for several reasons:

- Stale or Untimely Information
- Incomplete or Unknown Facts
- Lack of Historical Information
- Cognitive Bias or Prejudgment
- Volume and Velocity of Data
- Small Decision Window

Augmenting knowledge worker intelligence with *decisionware* technology that improves or eliminates the above limitations can enhance productivity and collaboration in the digital workspace; and free up employees to engage in other, high value tasks.

Cognitive Computing vs. AI

Unlike Artificial Intelligence, whose goal is to automate decision-making, removing people from the process – the purpose of Cognitive Computing is to augment human intelligence in order to improve decision quality.

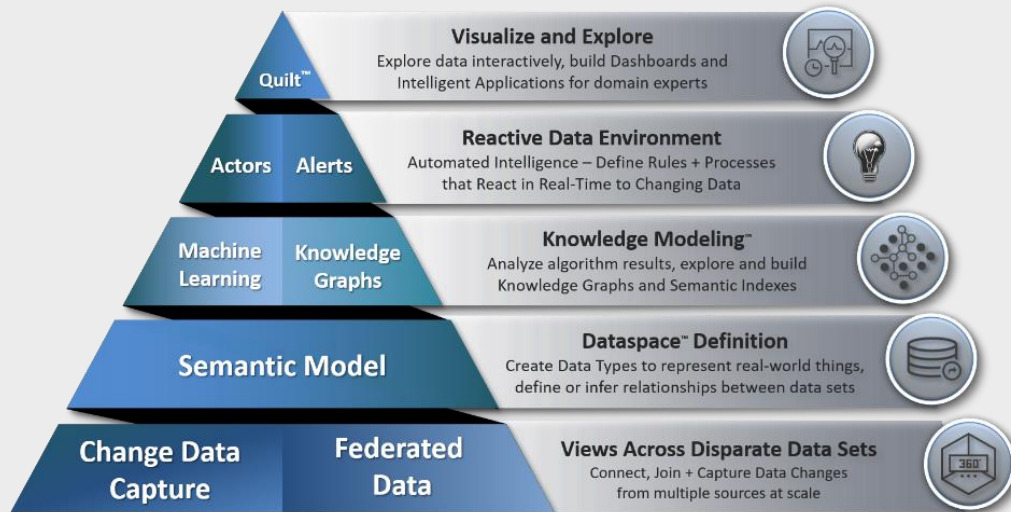
Consider an AI technology like IBM Watson used for Oncology's cancer treatment¹. The solution uses deep learning and evidence-based reasoning to predict patient outcomes and recommend which treatment courses to follow, assuming the role of an expert.

A cognitive computing system by contrast, would perform similar analysis to assist the medical team with research, providing options that help them decide on a treatment course.

Cognitive automation tools are designed for *prescriptive analysis*, to assist non-experts in decision-making tasks. Experts rely on a broad range of specialized knowledge and personal experience to judge situations, understand ambiguity and pick up subtle clues that less experienced workers or AI simply cannot.

Most importantly, over time experts develop a *learning discipline* enabling them to convert information into knowledge and insight. And it is here that cognitive automation tools can help level the playing field.

¹ How Watson Overpromised and Underdelivered on AI Healthcare
IEEE Spectrum – April 2019



StreamScape's Real-Time Decisionware for Cognitive Automation

Without the learning discipline and constant reinforcement of concepts, ideas, facts and their connections our minds tend to forget, rearrange and even fabricate portions of an information set, resulting in *cognitive entropy*. Complex theories are simplified, cause and effect may be reversed, overlooked or altered due to cognitive bias.

Cognitive psychologists call the reinforcement act *associative learning*. And it may take years for a human to learn and retain meaningful connections between specialized facts, ideas and concepts, thereby gaining expertise in a given field or subject.

However, cognitive computing systems do not have such limitations. They can evaluate large volumes of structured and unstructured data in minutes, discover patterns or relationships, and find connections automatically. Training such decisionware using specialized data sets lets the machine turn information into insight, yielding more accurate and consistent results that can assist non-experts.

How did Watson do, compared to the experts it sought to replace? Evidence suggests that AI excelled at simple diagnosis learned from statistics and patterns with accuracy rates as high as 83%, but for complex treatment plans concordance with experts fell below 50%.

A Smarter You

Cognitive computing systems enhance human intelligence with integrated AI, improving your decision making with data-driven insights and machine-guided recommendations.

The resulting *intelligent applications* combine multiple algorithms with analysis techniques, process automation tools and specialized data models called *Knowledge Graphs* to classify, prescribe, and adapt recommended solutions to problems. They improve our knowledge, reduce mistakes and help mitigate the risks of decision automation.

Intelligent applications are going mainstream. According to IDC, the largest area of spending in 2019 worldwide was cognitive systems that automate business processes, learn, discover, and make recommendations or predictions. IT spending on cognitive automation has grown to nearly \$35.8 billion with an annual growth rate of 40% expected over the next five years.

CIO's should challenge software vendors to incorporate cognitive computing features into advanced analytics, data forensics, customer experience and operational support solutions.

Cognitive Automation Engine

StreamScape's *real-time decisionware* is a data engine purpose-built for *cognitive automation* that can be deployed cloud-native, hybrid or on-premise to access data from any source. The system learns by association, to discover relationships, build *knowledge graphs*, indices and semantic links, assisting decision makers with the following critical questions:

- Have I seen this information before?
- What was done in a similar instance?
- What steps should be taken next?

Our *cognitive automation engine* integrates Real-Time Analysis, Data Mining and Natural Language Processing into a powerful platform for *prescriptive analytics* that accelerates time to market at a significantly lower price point. Key product features include:

- Data Virtualization + Link Discovery
- Classification, Clustering, Smart Tagging
- Feature Extraction + Data Labeling
- Semantic Graphs + Probabilistic Analysis
- Knowledge Modeling for Deeper Insight

Contact sales@streamscape.com to learn how cognitive automation can help your business.