Cognitive technologies capabilities

“The art of creating machines that perform functions that require intelligence when performed by people” (Kurzweil, 1990)

Main Capabilities

A. Continuously learn and improve performance based on feedbacks

B. Discern an expression’s meaning based on contextual cues

C. Generate hypotheses and apply rules to make decisions

D. Draw relationships between unrelated concepts to make sense of a situation

E. Leverage handwriting, voice, and image recognition to ingest and process data

Technological enablers

A. Machine Learning
B. Reinforcement Learning
C. Natural Language Processing
D. Semantic Computing/Ontology
E. Text Analytics Engine

Image Recognition
Handwriting Recognition
Information Retrieval
Voice Recognition
Natural Language Generation
Textual Entailment
Augmented/Virtual Reality
Speech Synthesis
Probabilistic Inference
Virtual Decision Advising
Rules-Based Engine

Cognitive technologies enhance human capabilities by automatically extracting concepts and relations from data, understanding the meaning, independently learning from patterns and experiences.
# How is the Cognitive offering defined?

Deloitte’s approach groups the cognitive technologies in three distinct solutions, with different strategic goals.

## Cognitive Technologies

<table>
<thead>
<tr>
<th>Solution</th>
<th>Description</th>
<th>Advantages</th>
<th>Business Goals</th>
</tr>
</thead>
</table>
| **Cognitive Automation**  | • Enable machines to replicate human actions and judgement with robotics and cognitive technologies | • Automate repeatable tasks to improve efficiency  
• Unchain profits from scale constraints to increase enterprise flexibility  
• Engage existing talent to focus on higher-value tasks | ![Cost Optimization](Low Impact) ![Revenue Generation](High Impact) |
| **Cognitive Insights**    | • Identify opportunities for growth, diversification, and efficiencies by creating large-scale organizational intelligence with pattern detection and the ability to analyze multiple data sources | • Uncover hidden patterns to identify new opportunities for innovation  
• Apply a science-based decision-making process informed by deeper insights  
• Push real-time, contextual insights to decision makers at relevant moments. | ![Cost Optimization](Low Impact) ![Revenue Generation](High Impact) |
| **Cognitive Engagement**  | • Use intelligent agents and avatars to deliver mass consumer personalization at scale and smarter, more relevant insights to amplify end-user experience | • Drive consumer behavior by delivering hyper-personalization at scale  
• Deploy personalized digital assistants to interact with customers  
• Generate personalized and contextual recommendations to consumers | ![Cost Optimization](Low Impact) ![Revenue Generation](High Impact) |
Robotics & Cognitive Automation

Enable machines to replicate human actions and judgement with robotics and cognitive technologies

**Advantage**

- **Improve efficiency, quality, and accuracy** of process outcomes and **lower associated costs** by automating tasks that vary in complexity
- **Increase flexibility** across the enterprise by decoupling profits and revenues from scale constraints of manual labor
- **Develop new competencies** by engaging freed-up labor to focus on higher-value tasks

**In action**

*Challenges with the prior authorization process resulted in costly manual oversight. Predictive solution automated triage of 1,200+ forms processed daily and corrected submission errors.*

- Improved operational efficiency by 35%
- Reduced decision time from 72-96 hours to real-time
- Continuously learned and improved

**Use cases**

- Intelligent HelpDesk
- Email operations automation
- Automation of claim management process
  - Cognitive OCR
  - Rules-based automation
- Prior authorization automation
- Supply chain risk monitoring
  - Digital front office
  - Labor law discovery
- Asset warranty processing
Cognitive Insights
Identify opportunities for growth, diversification, and efficiencies by creating large-scale organizational intelligence with pattern detection and the ability to analyze multiple data sources

Advantage

- **Extract concepts and relationships** from data streams, text sources, and social media
- **Generate new insights** including market threats and opportunities through cognitive analysis
- Deliver **applications that intelligently “understand”** the context and provide the right insight at the right time explaining why it is relevant and important

In action

*Utilizing machine learning, visualization, and data federation, the SEMOSS platform enabled a US federal government agency to analyze disparate data sets on gene patterns to drive drug development.*

- Integrated data types in a single platform, SEMOSS (Semantic Open Source Software)
- Accelerated scientific discovery from months to days
- Rapid hypothesis generation and validation

Use cases

- Fraud Loss Models Evaluation
- Risk Modeling
- Route Optimization
- Fraud, waste, abuse detection and prevention
- Innovation success predictor
- Market trend sensing
Cognitive Engagement

Use intelligent agents and avatars to deliver mass consumer personalization at scale and smarter, more relevant insights to amplify end-user experience

Advantage

- **Provide answers** from trusted information sources (e.g., medical journals) to end users to support decision-making and make intelligent decisions on behalf of consumers

- **Establish user engagement** using data from past experiences and behavior of similar profiles

- **Provide self-serve ability via question/answer**, personalized, and proactive recommendations that will help drive desired behaviors

In action

The SmartVideo solution leveraged patient data to generate personalized care videos, in real-time, delivering a positive consumer-centric experience and simplifying and personalizing engagement.

- Personalized
- Measurable
- Real Time
- Secure

Use cases

- Customer Care Chatbot
- Financial Advisor
- Entertainment concierge
- Personalized wealth management
- Customized online banking menu
## Cognitive Technologies use cases in the Financial Sector Industries by level of opportunity

### Channels & Marketing
- **Brand Management**
- **Business Development**
- **Self-Service**
- **Internet**
- **Call Center**

### Customer Management, Sales & Service
- **Sales Management & Effectiveness**
- **Customer Relationship Mgmt.**
- **Customer Analytics**
- **Product Coverage & Sales Planning**
- **Customer Care & Issue Management**
- **Customer Credit Rating & Account Recovery**

### Securities & Corporate Banking
- **Corporate Finance Services**
- **Market Data**
- **M&A Advisory Services**
- **Advisory & Wealth Management**
- **Order Management & Pricing**
- **Settlement & Clearing**

### Investment Management
- **Portfolio Planning**
- **Portfolio Analysis**
- **Portfolio Management**

### Banking
- **Account Management**
- **Payment & Processing**
- **Credit & Debit Cards**
- **Payment Capture**
- **Trade Finance**
- **Liquidity & Cash Management**

### Lending
- **Private Client Lending**
- **Mortgage**
- **Home Loan Savings**
- **Collection & Recovery**
- **Collateral Management**
- **Business Lending**

### Business Support
- **Risk**
  - Market Risk & Valuation Models
  - Credit & Liquidity Risk Mgmt.
  - Business Risk Models
- **Treasury**
  - ALM
  - Treasury Administration & Mgmt.
  - Asset Securitization
- **Finance**
  - Accounting
  - Regulatory Reporting
  - MIS/HR
- **Compliance**
  - Audit & Compliance Guideline
  - Fraud/AML Resolution
  - Regulatory Compliance
- **IT Services**
  - System & Platform Operations
  - IT Policies & Plan
  - Business Continuity

### Opportunities
- low
- medium
- high
# Cognitive Technologies in Action

A collection of selected use cases

<table>
<thead>
<tr>
<th>Industry</th>
<th>Description</th>
<th>Solution</th>
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<tbody>
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<td>Insurance</td>
<td>Development of an <strong>intelligent helpdesk</strong> supporting salespeople</td>
<td>Automation</td>
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<td></td>
<td></td>
<td>(NLP)</td>
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<tr>
<td>Banking</td>
<td><strong>Customer Care Chatbot</strong> based on users conversations</td>
<td>Engagement</td>
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<td>(Chatbot)</td>
</tr>
<tr>
<td>Consumer Finance</td>
<td><strong>On-boarding chatbot</strong> to help customers in loan requests</td>
<td>Engagement</td>
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<td>Insurance</td>
<td><strong>Chatbot</strong> supporting users facing login issues</td>
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