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New Technologies in Banking

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Machine Learning Success Stories

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- Customer Profiling
- Predicting Customer Behavior
- Recommendation Engines
- Speech Recognition
- Face Detection
- Fraud Detection
- Autonomous Driving
- Medical Diagnosis
- Games Playing
- News Stories Writing
- ...

Why is Modern Analytics so Successful?

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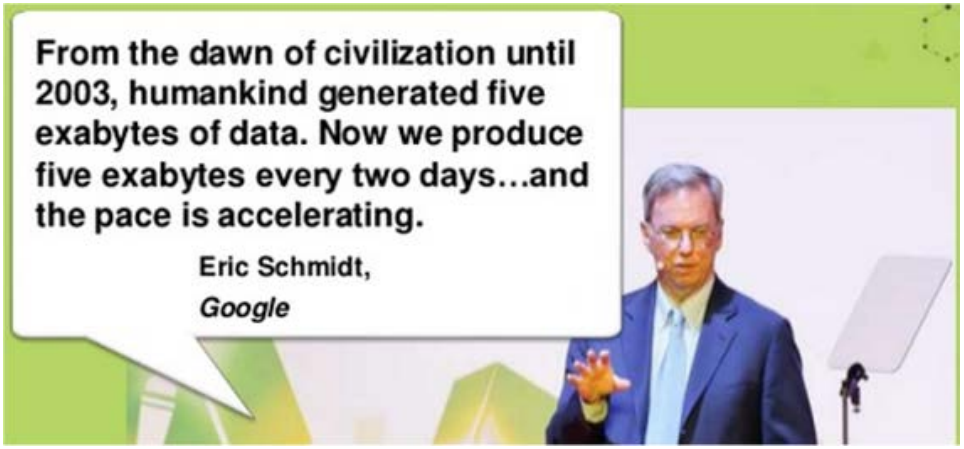
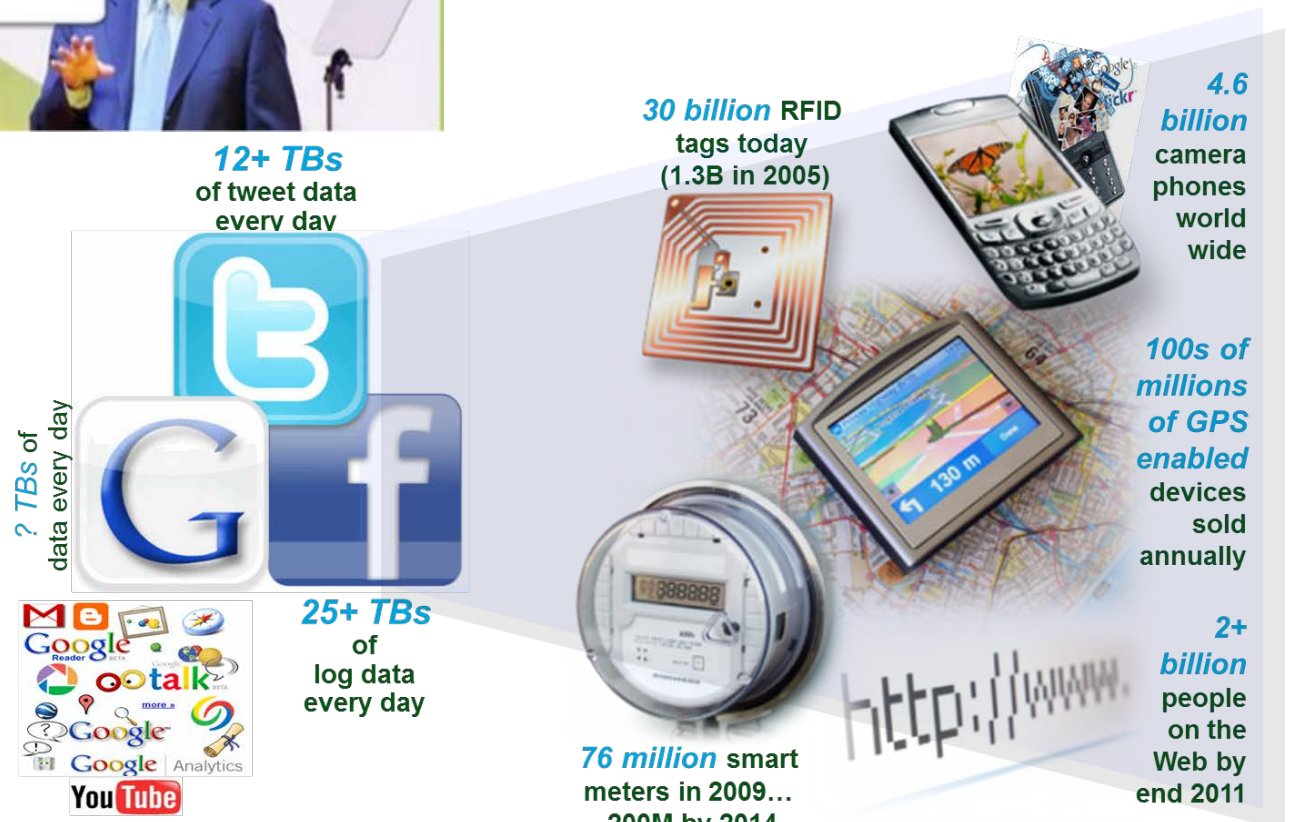
1. More Data for the Analysis
2. More Computing Power
3. New Methods and Algorithms
4. New Analysis Processes

More Data for the Analysis



Source: Bernard Marr



Source: Ruoming Jin

Worldwide Corporate Data Growth

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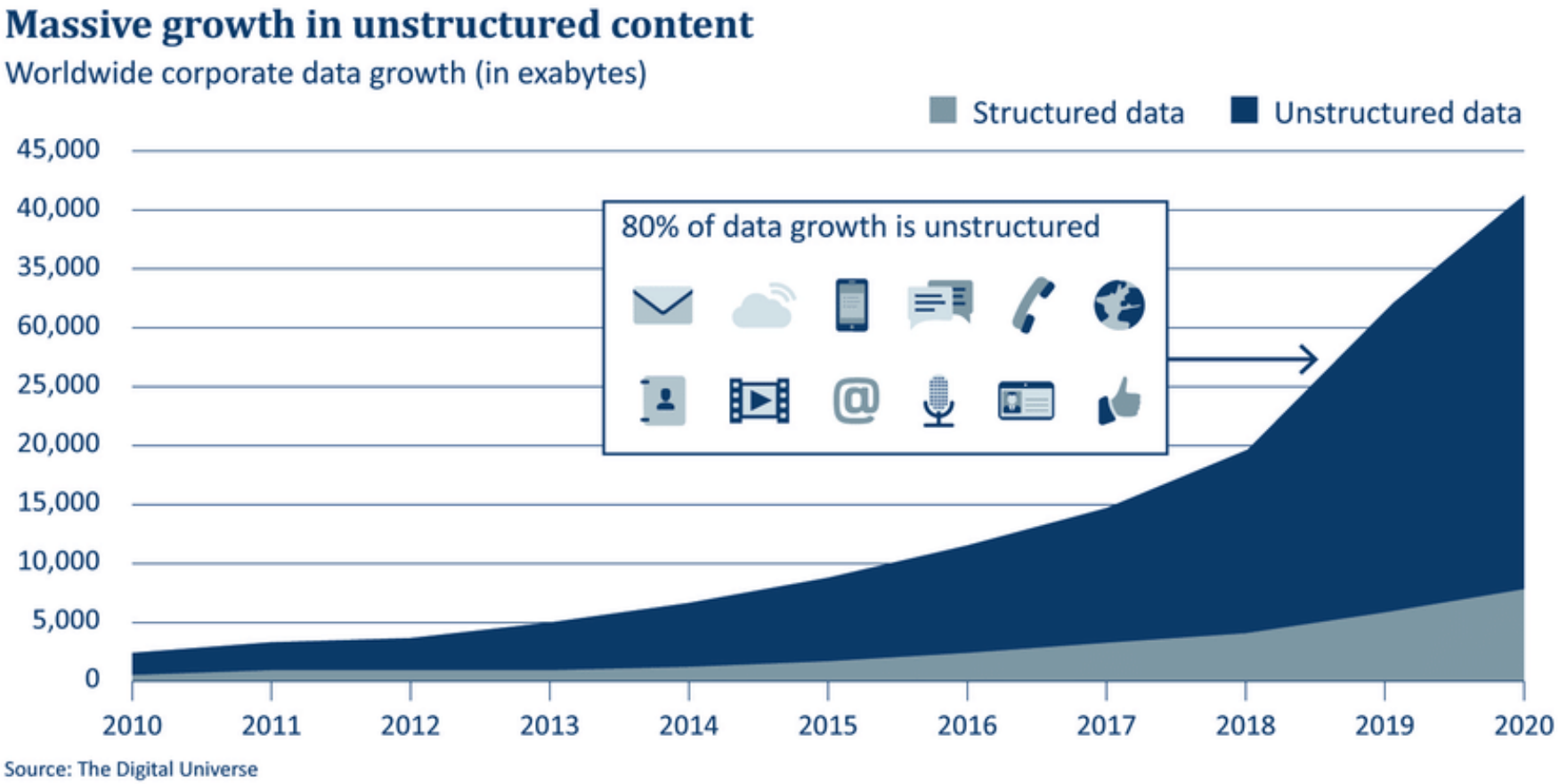

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Growth of Computing Power

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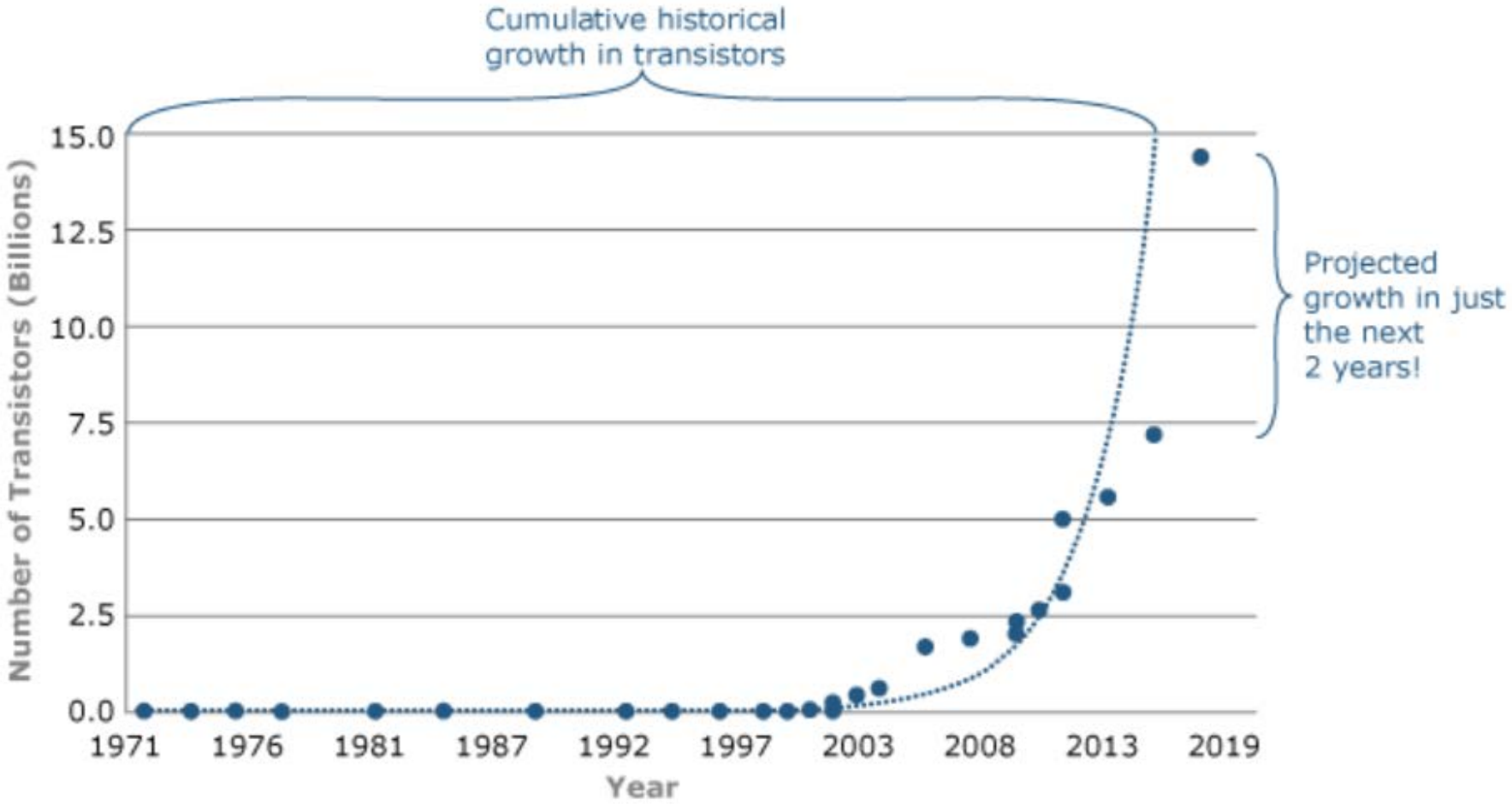

Source: Michael Kitces

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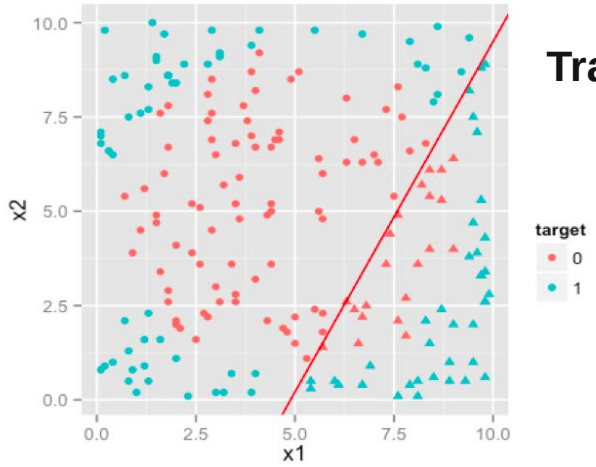
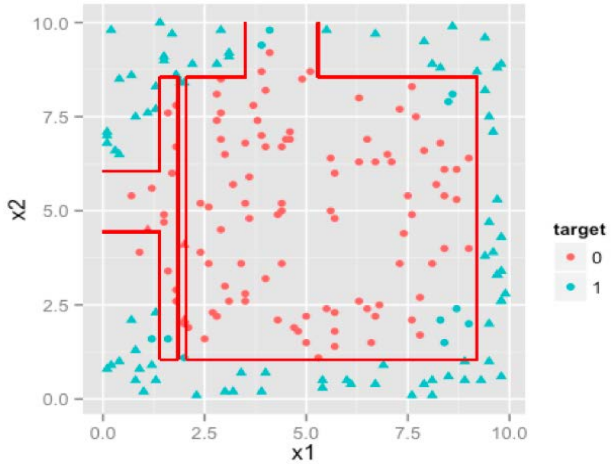
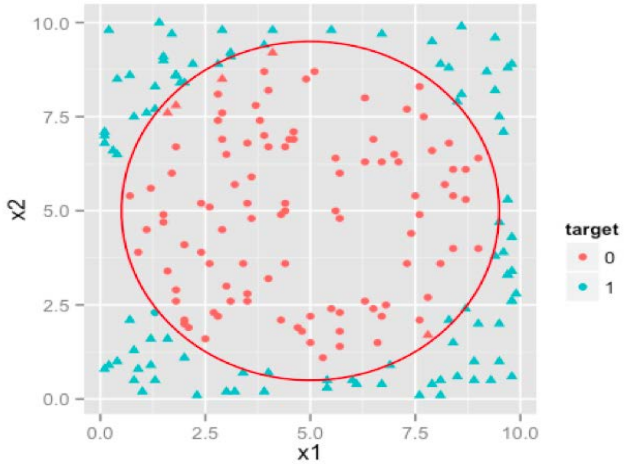
Old vs. New Methods



Traditional Regression



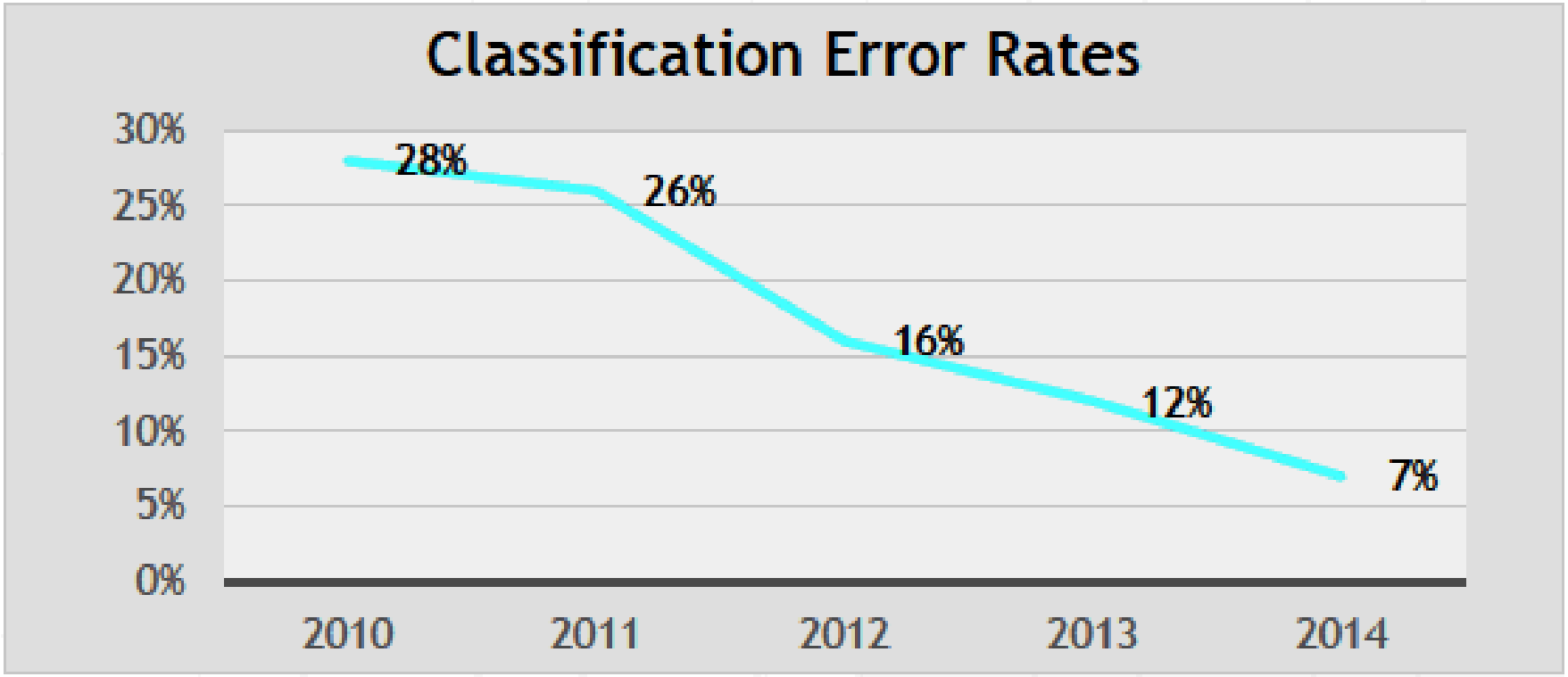
Decision Tree



Neural Network

Source: Lalit Sachan

Decrease of Error Rates



Source: Larry Brown

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Traditional vs. Modern Analytics Process

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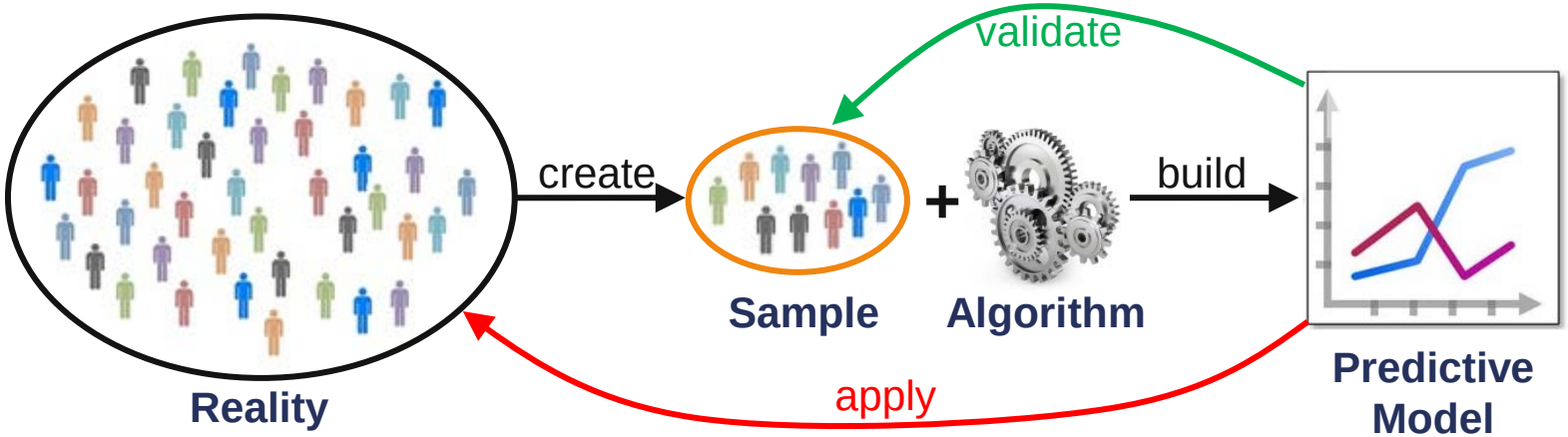
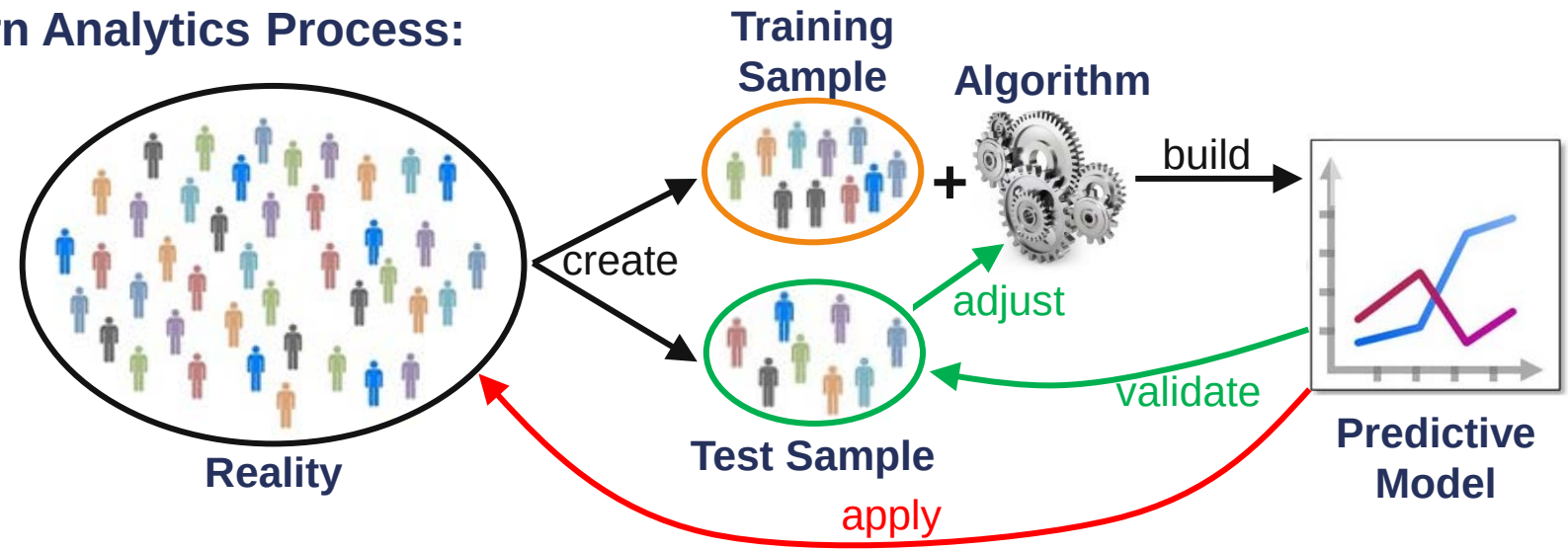
Traditional Analytics Process:



Modern Analytics Process:



Best Fit vs. Best Prediction

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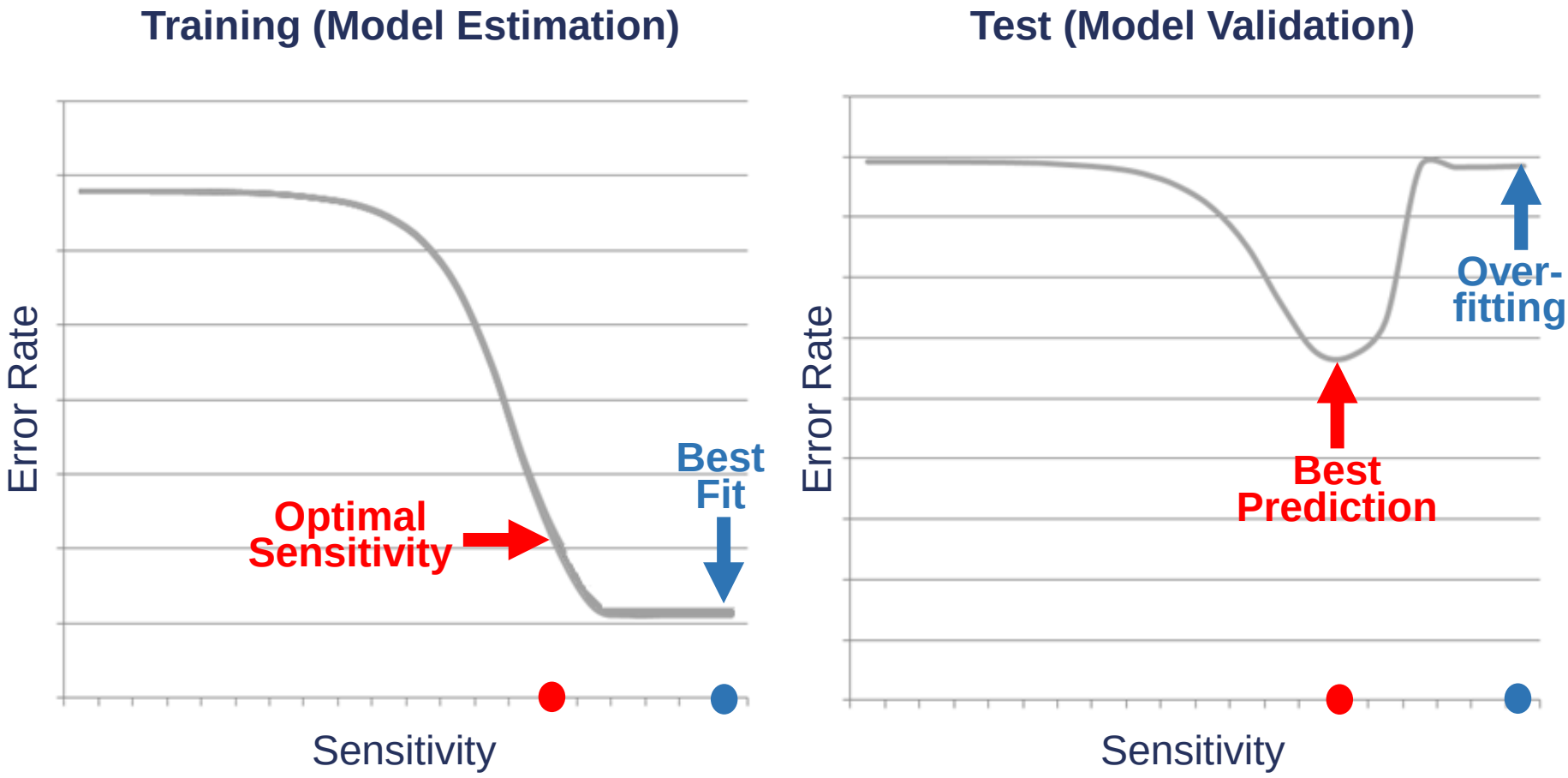
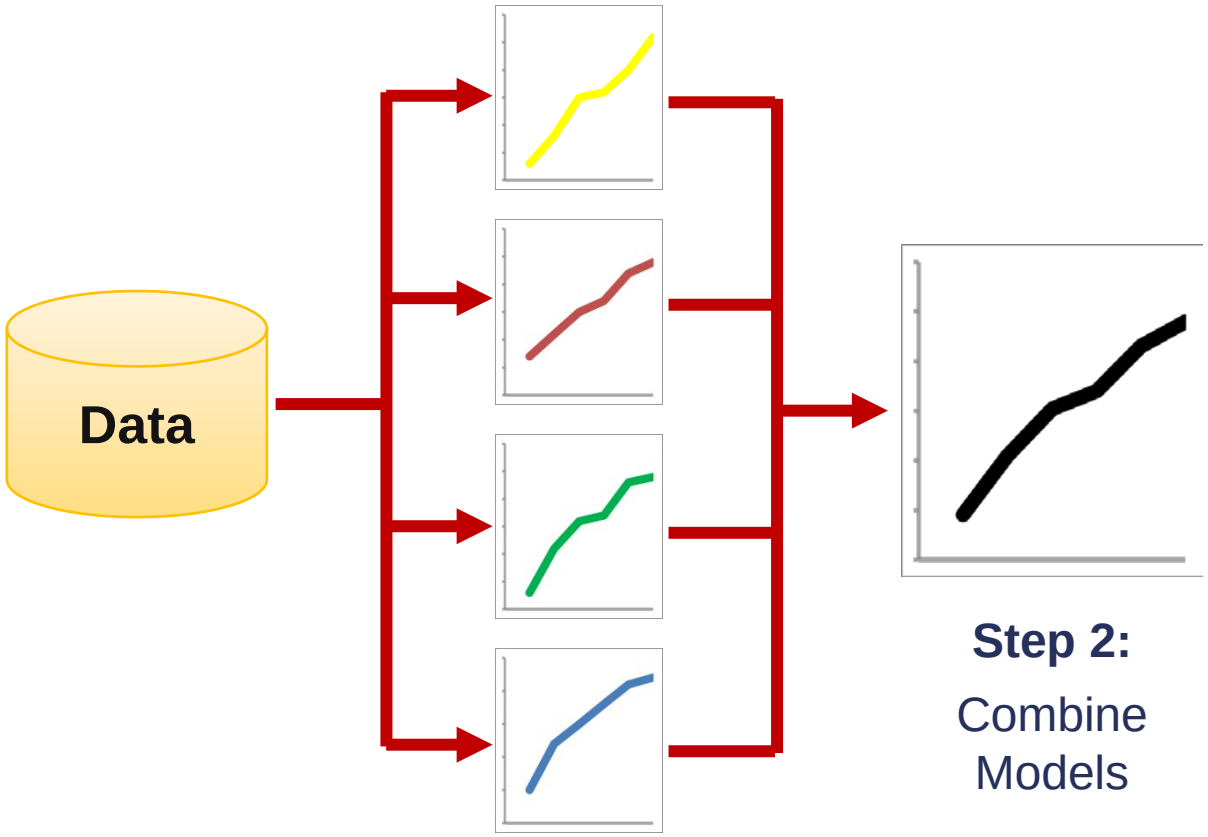


Source: Roßbach/Karlow

Ensemble Learning



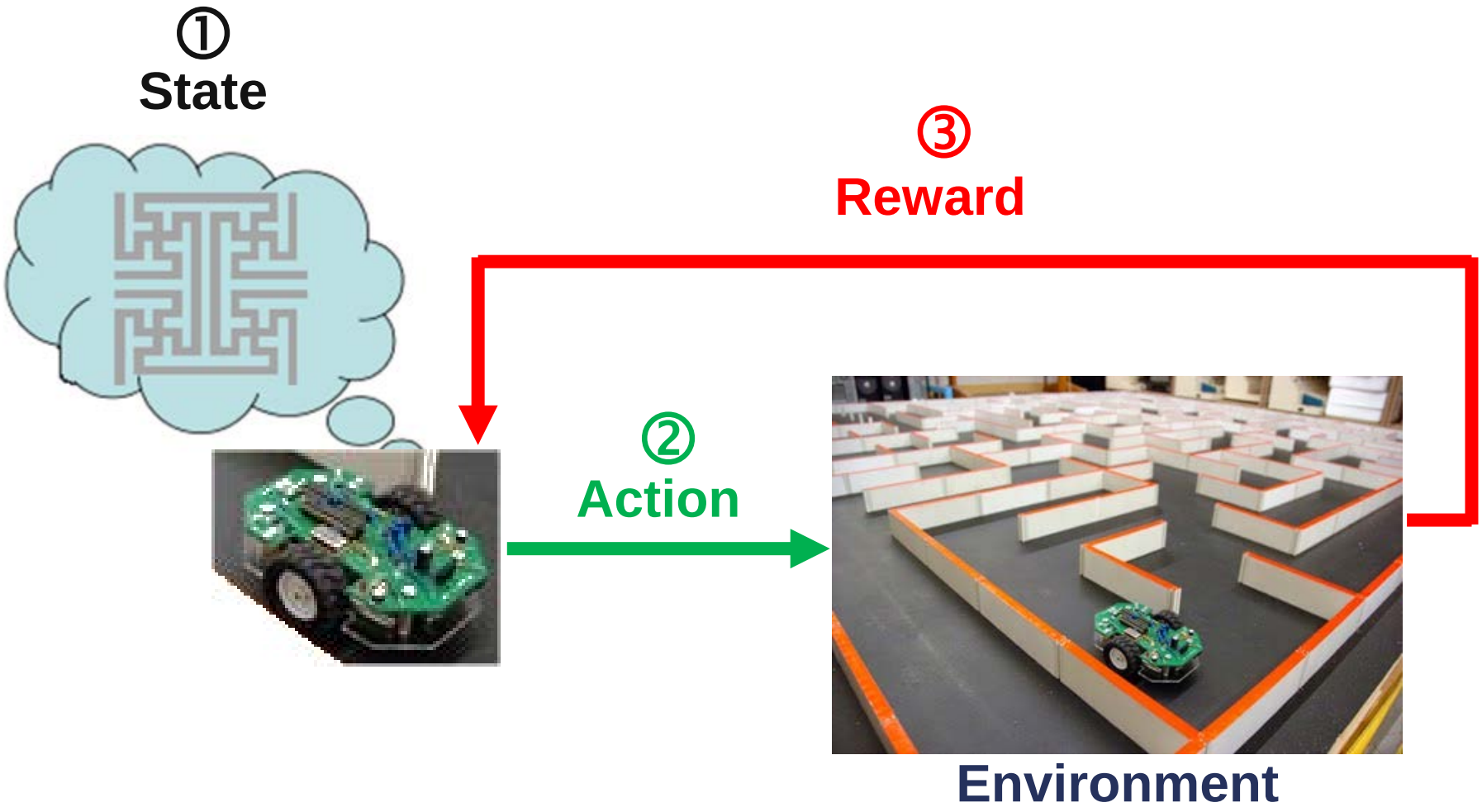
Step 1:

Create Multiple Models

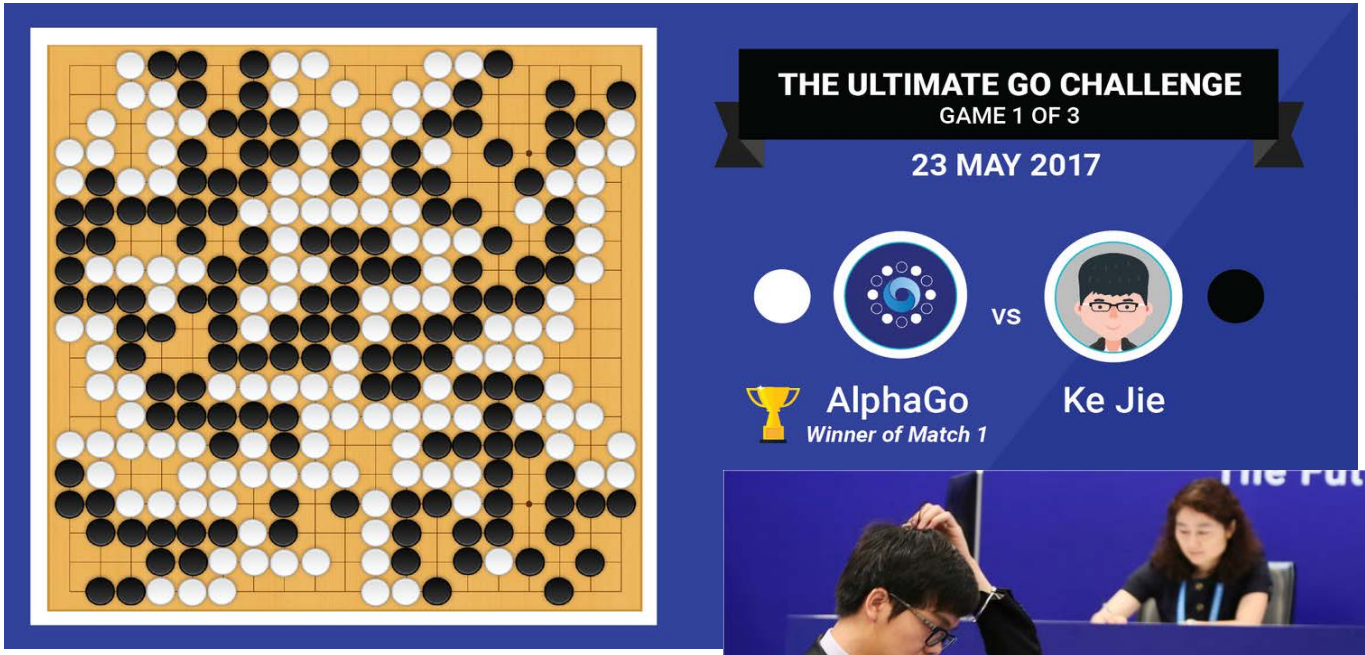
Step 2:

Combine Models

Reinforcement Learning



AlphaGo



Source: The New York Times

Training:

(1) Learned to play by using a database of around 30 mio. recorded moves

(2) Playing millions of games against other instances of itself

Libratus

Libratus has beaten four of the world's best poker players in a 20-day tournament.

Source: Twitter

Poker is a game with imperfect information.

The AI is additionally required to bluff and correctly interpret misleading information.

Old and New AI

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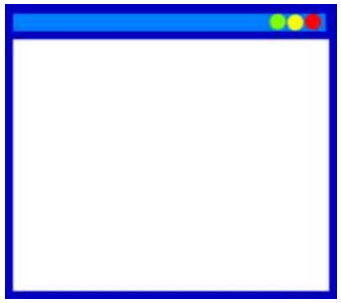
Former AI:

Knowledge

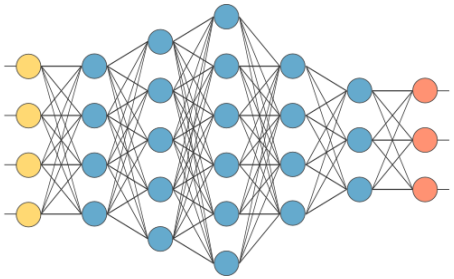
Logic



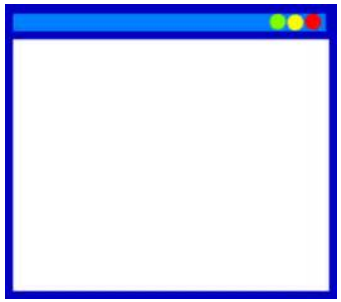
Expert **Programmer** **Application**

Self-learning AI:

input to



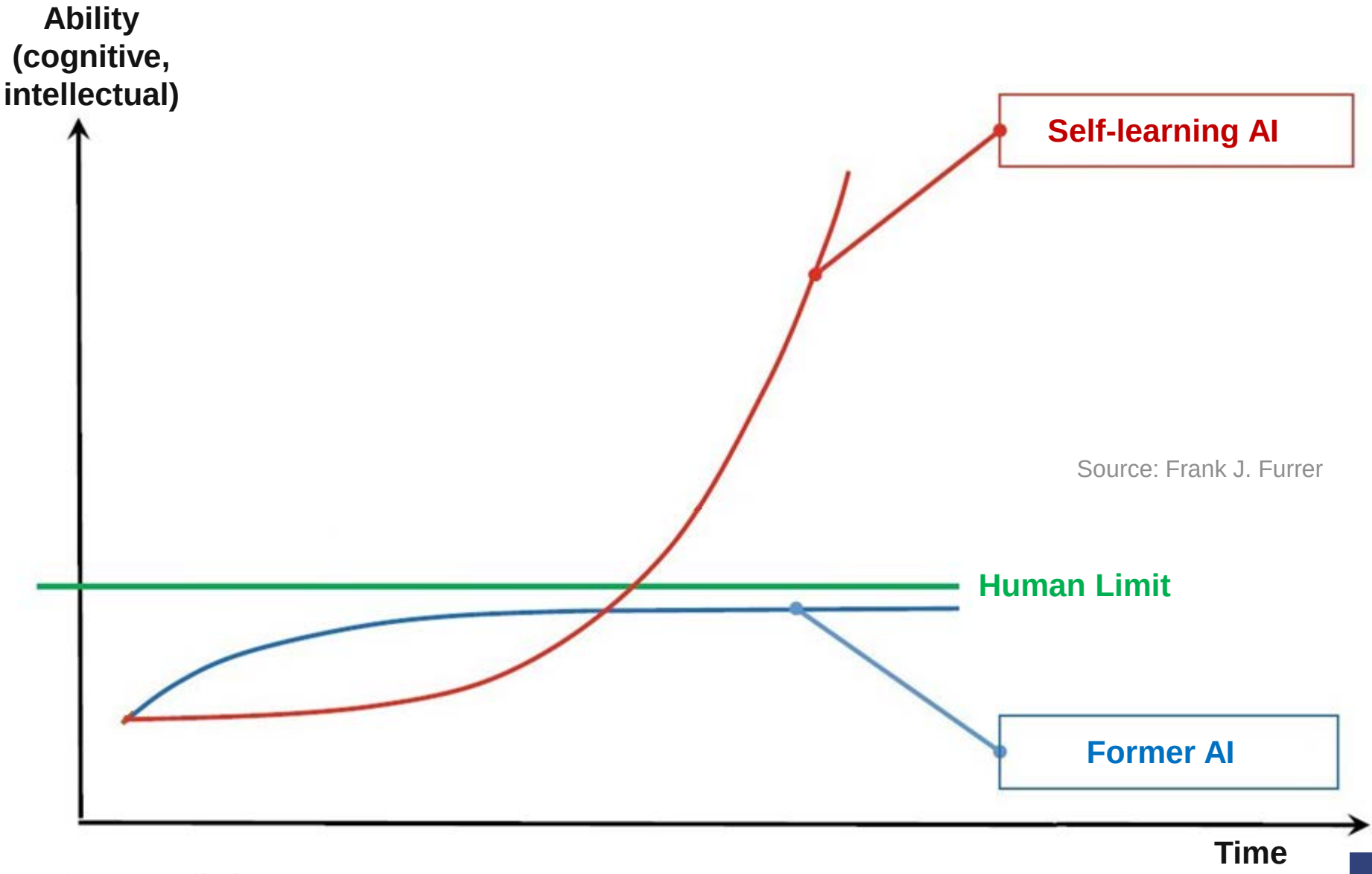
results in



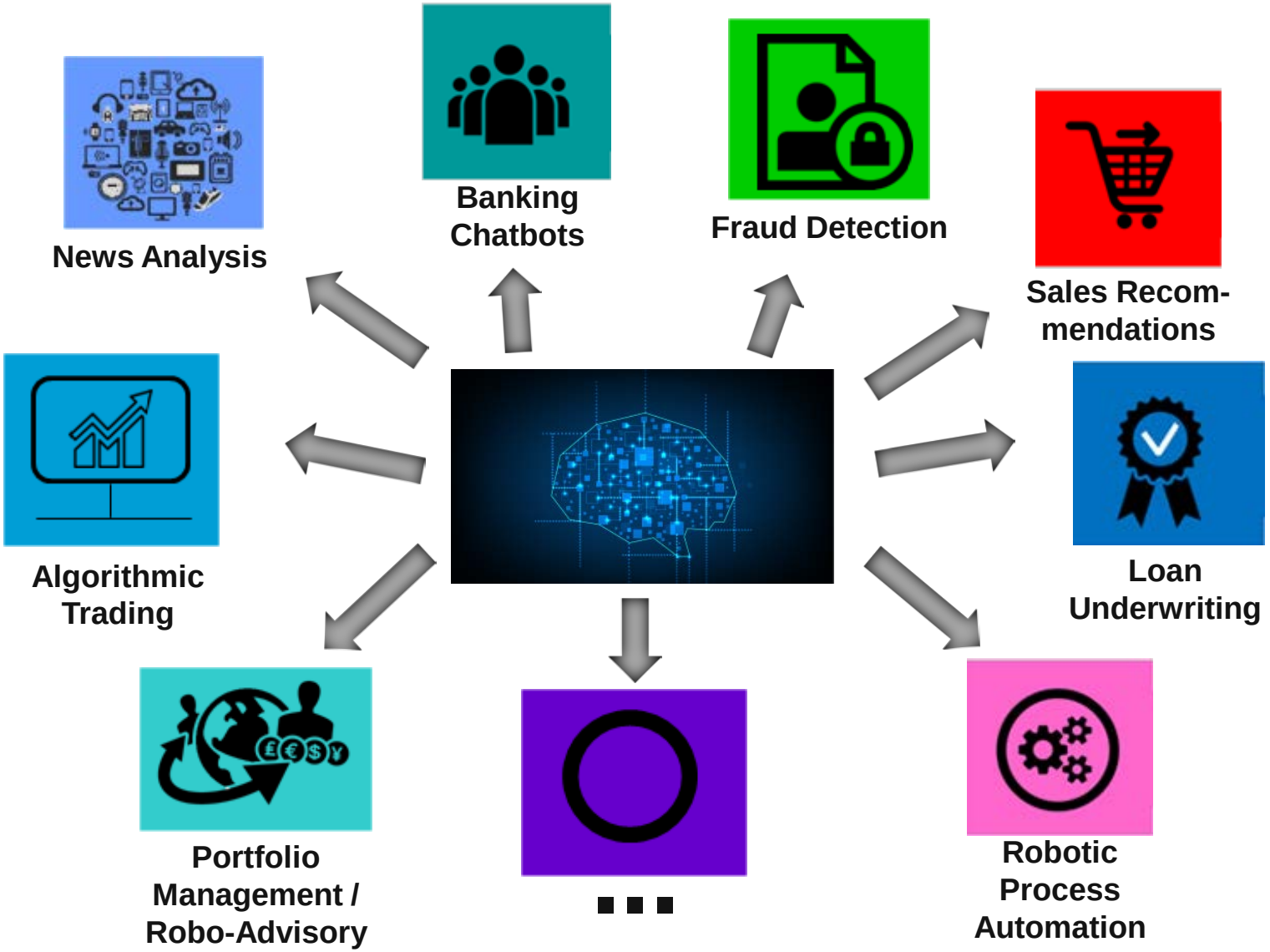
Data **Algorithm** **Application**

extracts inherent knowledge

Potentials


Ability (cognitive, intellectual)
Self-learning AI
Source: Frank J. Furrer
Human Limit
Former AI
Time

Potential Applications of AI in Banking



Robotic Process Automation

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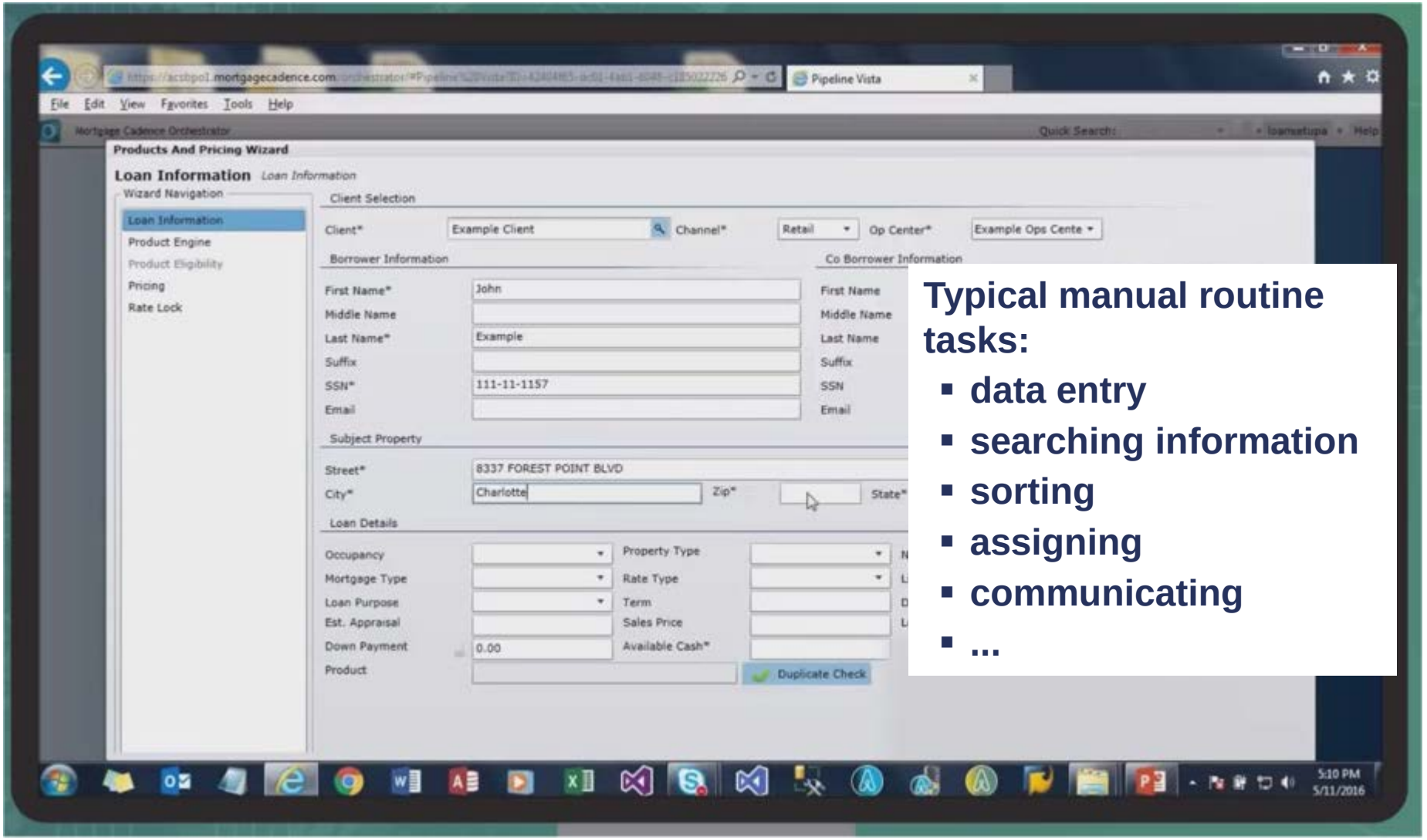

Typical manual routine tasks:

- data entry
- searching information
- sorting
- assigning
- communicating
- ...

Source: Accenture

Robotic Process Automation

- **Robotic Process Automation is a technology where human employees are replaced by software robots.**
- **The software-robots mimic user interaction by running on the end-user computers.**
- **Simulating the usage of keyboard and mouse they work with the same applications as the humans do.**
- **Perform routine tasks such as entering data, interpreting emails, performing calculations, creating documents, ...**
- **AI/ML-enhanced generations are able to interpret, reason, learn, and making decisions.**

Robo-Advisors

Digital platforms that provide automated, algorithm-driven asset allocation of investments without human involvement.

Typical functions:

(1) Collect customer information (goals, risk attitude, ...)

(2) Composition of an individual portfolio

(3) Automatic rebalancing

Advantages:

- **Cheaper (usually annual flat fee of 0.2% to 0.6% of balance)**
- **Customer needs less capital (usually between $0 and $5,000)**
- **Available 24/7**

Applications of AI and ML in Robo-Advisory

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- **Gain better customer understanding**

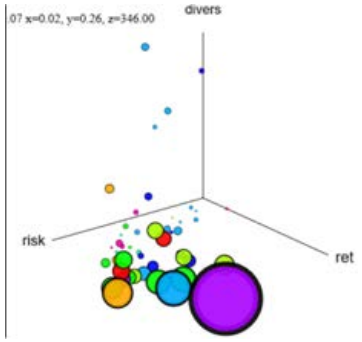
  Find patterns to customize a financial plan and investment strategy using Facebook posts, spending habits, investment choices, pins on Pinterest, tweets, etc.

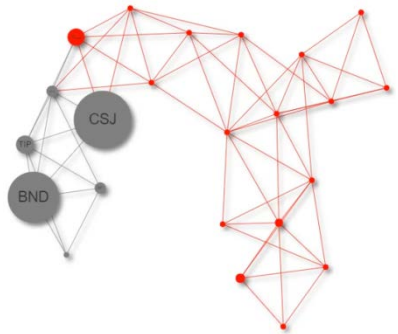
- **Predicting markets**

  Predict market or security prices and returns, based on capital market data, news and sentiment analysis etc.

- **Constructing and rebalancing portfolios**

  Application of Graph-based Machine Learning. Using nonlinear and more robust graph structures instead of linear correlations.





- **Interacting with the customer**

  Using chatbots to communicate with the customer.

What is a Chatbot?

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- Chatbots are software programs that interact with a human through text or voice
- Can understand our free formulation in text or speech and can respond in the same way
- Reinvents the customer communication of a bank
- More convenience compared to a classical banking app
- Able to manage a huge amount of one-to-one conversations simultaneously
- Combine customer intimacy on the one and automation on the other side

Text-based Chatbots

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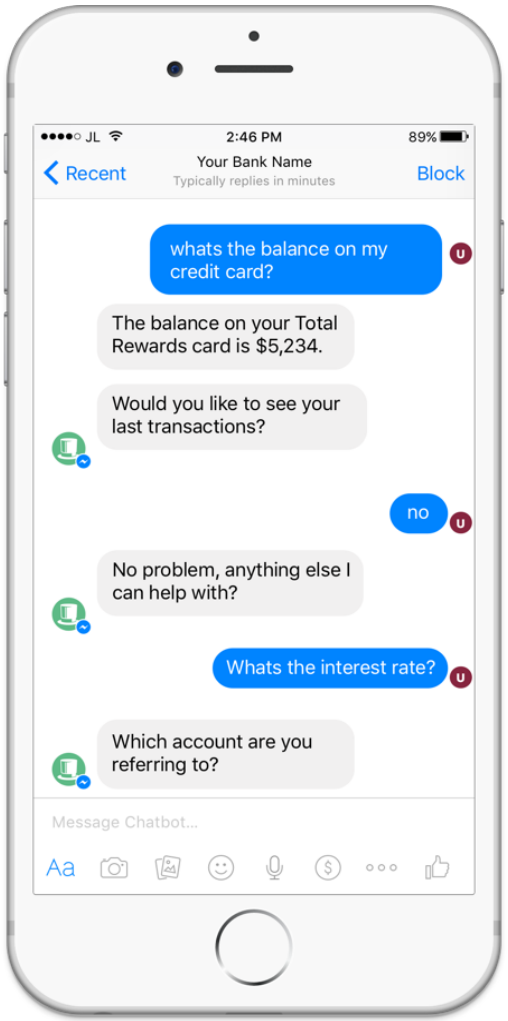

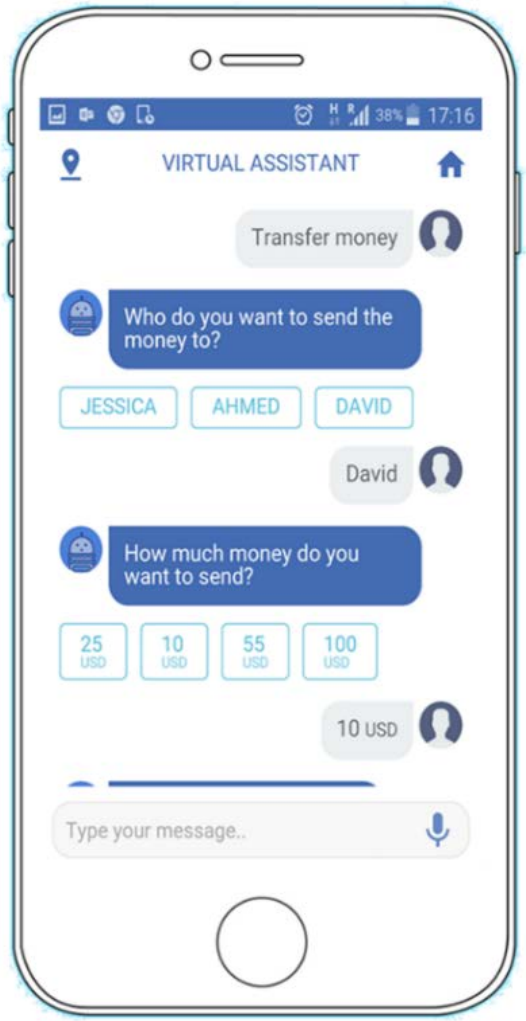

Source: Finlabs

Source: Yello

Voice-based Chatbot

Source: Astute Solutions

Virtual Reality

Computer-generated simulation of an artificial reality

Virtual Reality Banking App

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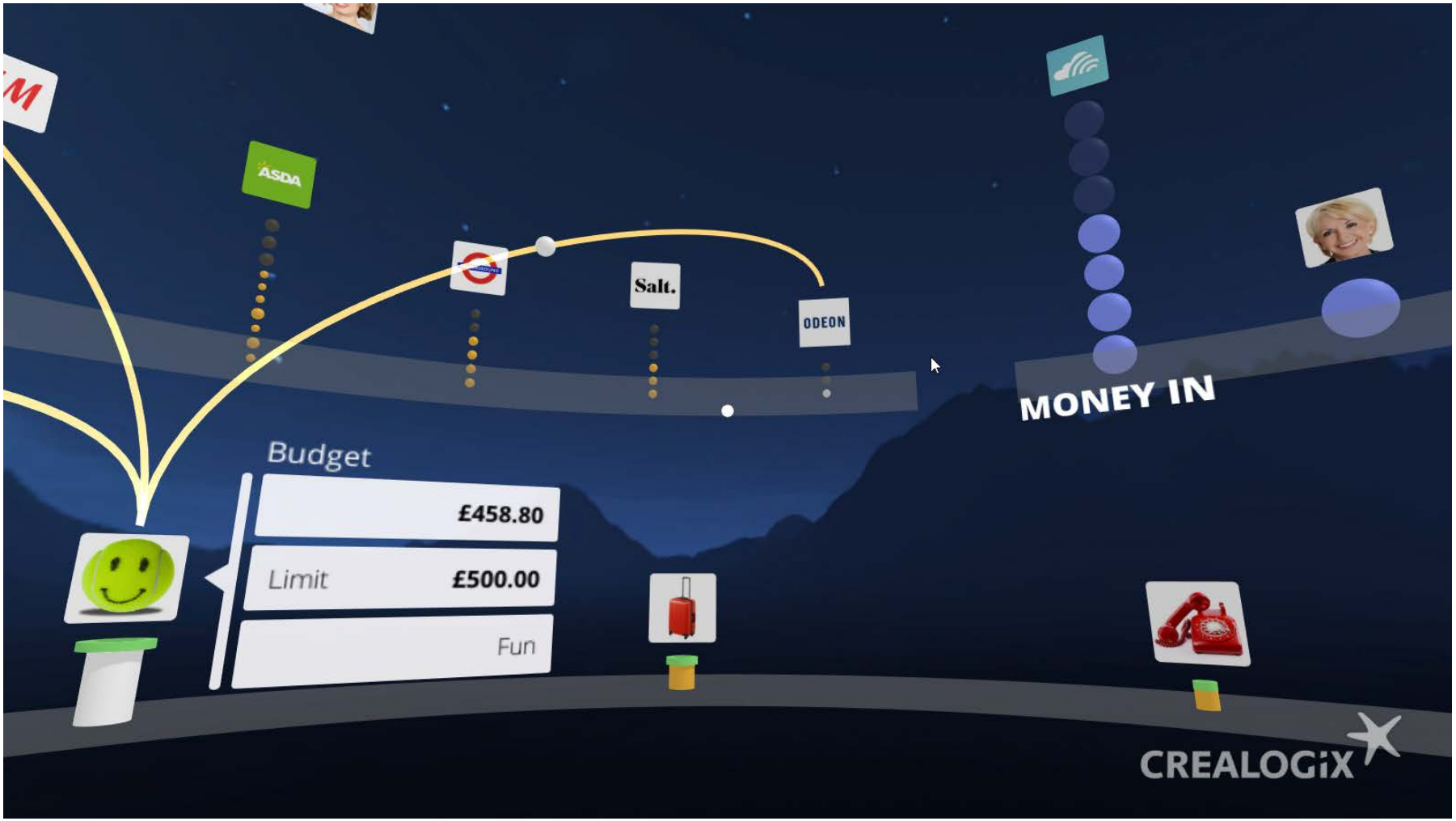

Source: Crealogix

Virtual Reality Banking App

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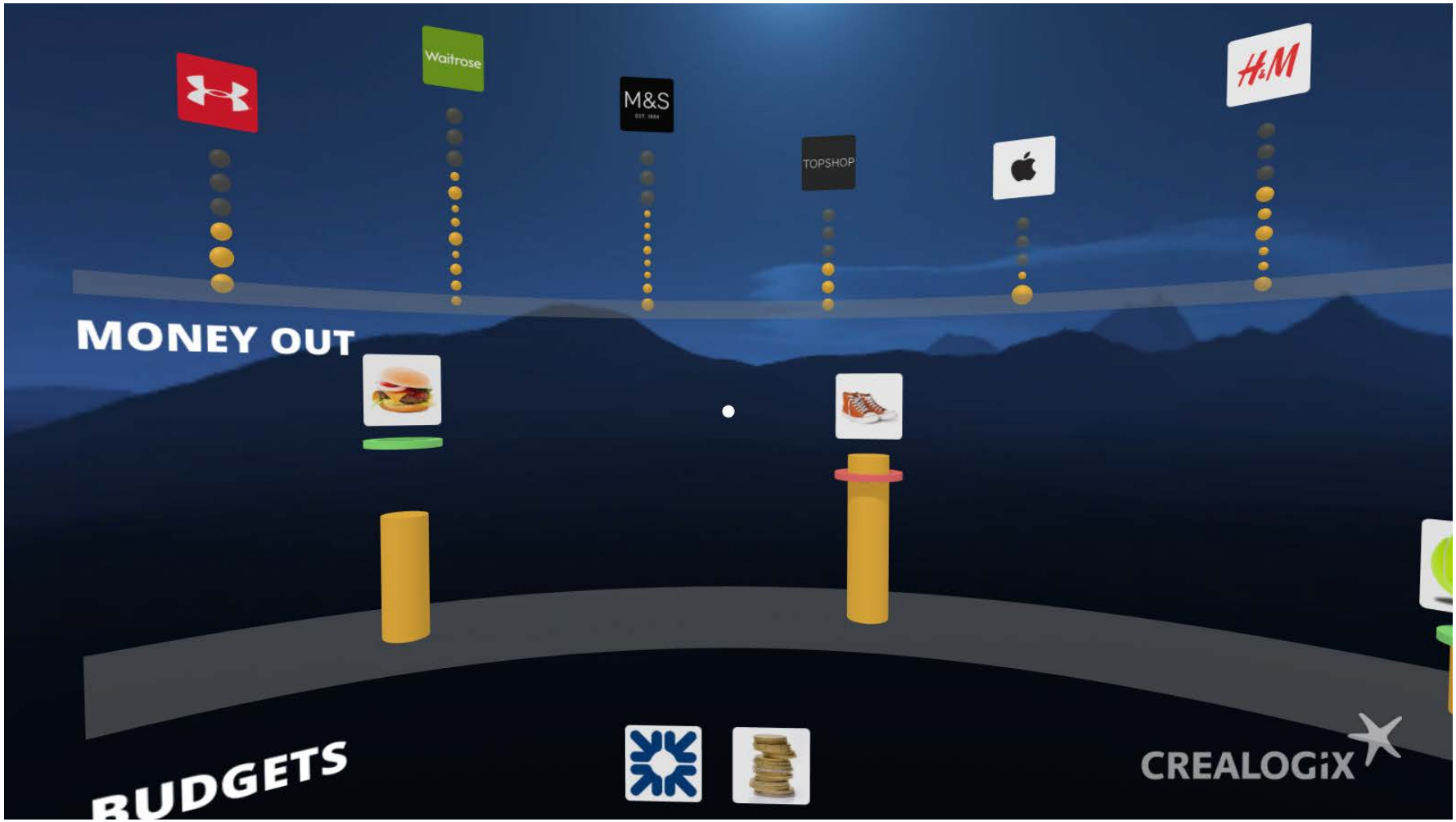

Source: Crealogix

Data Visualization via Virtual Reality

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Source: Fidelity

Virtual Branch

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Source: GTE Financial

Augmented Reality

Enriches the real world with computer-generated enhancements

Augmented Reality at Citi Bank

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Source: Citi Bank

Augmented Reality at Citi Bank

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Source: Citi Bank