Smarter Cities: Cognitive Computing in Government

Unit objectives

After completing this unit, you should be able to:

- Learn the concept of smarter cities of cognitive computing in Government
- Gain knowledge on emerging cognitive computing
- Gain an insight into areas & future applications for cognitive computing

Smarter cities: Cognitive computing in Government

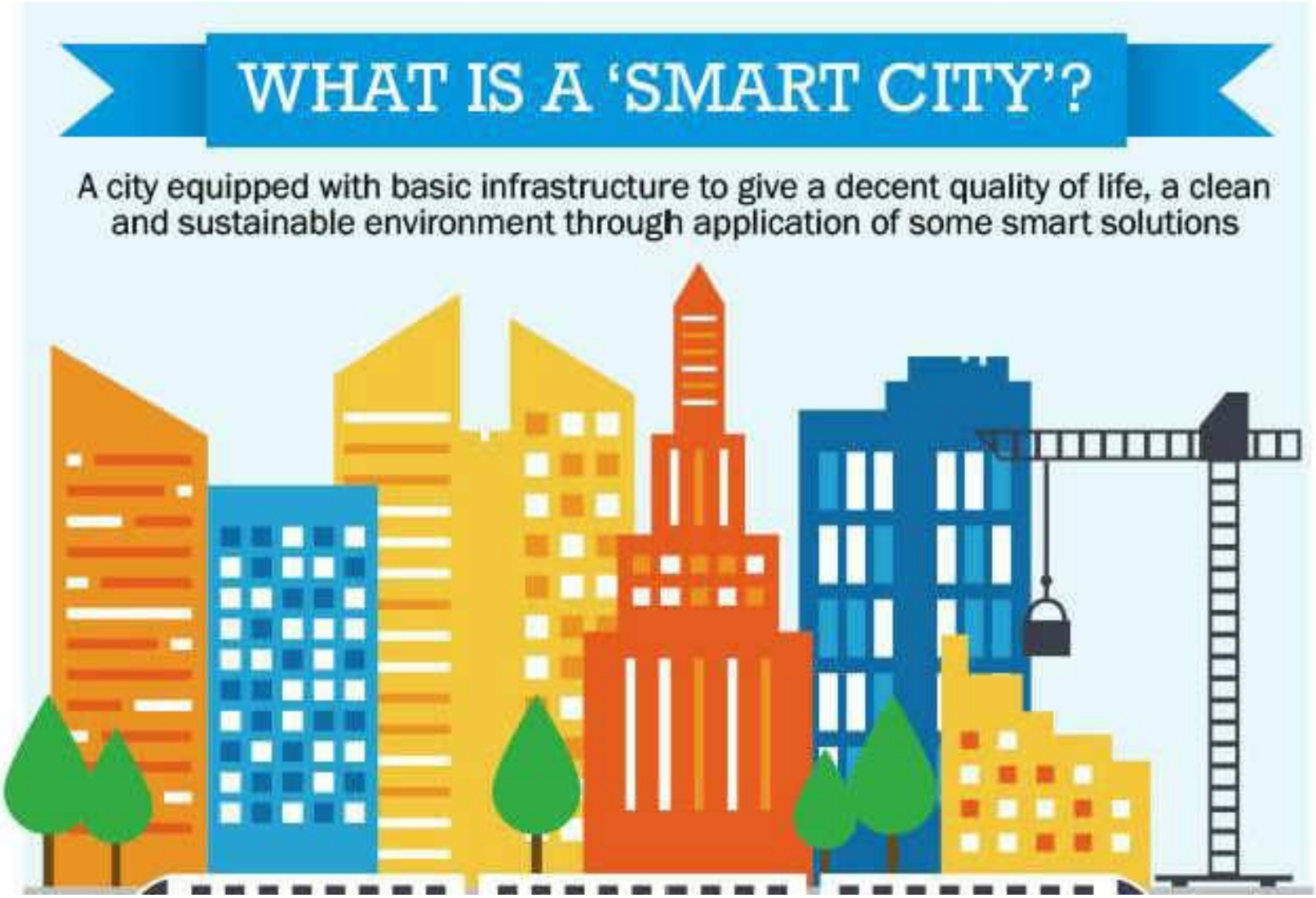


Figure: Smart city definition

Source: https://images.app.goo.gl/xNMihEsXdnTfr2JE8

Smart cities operations

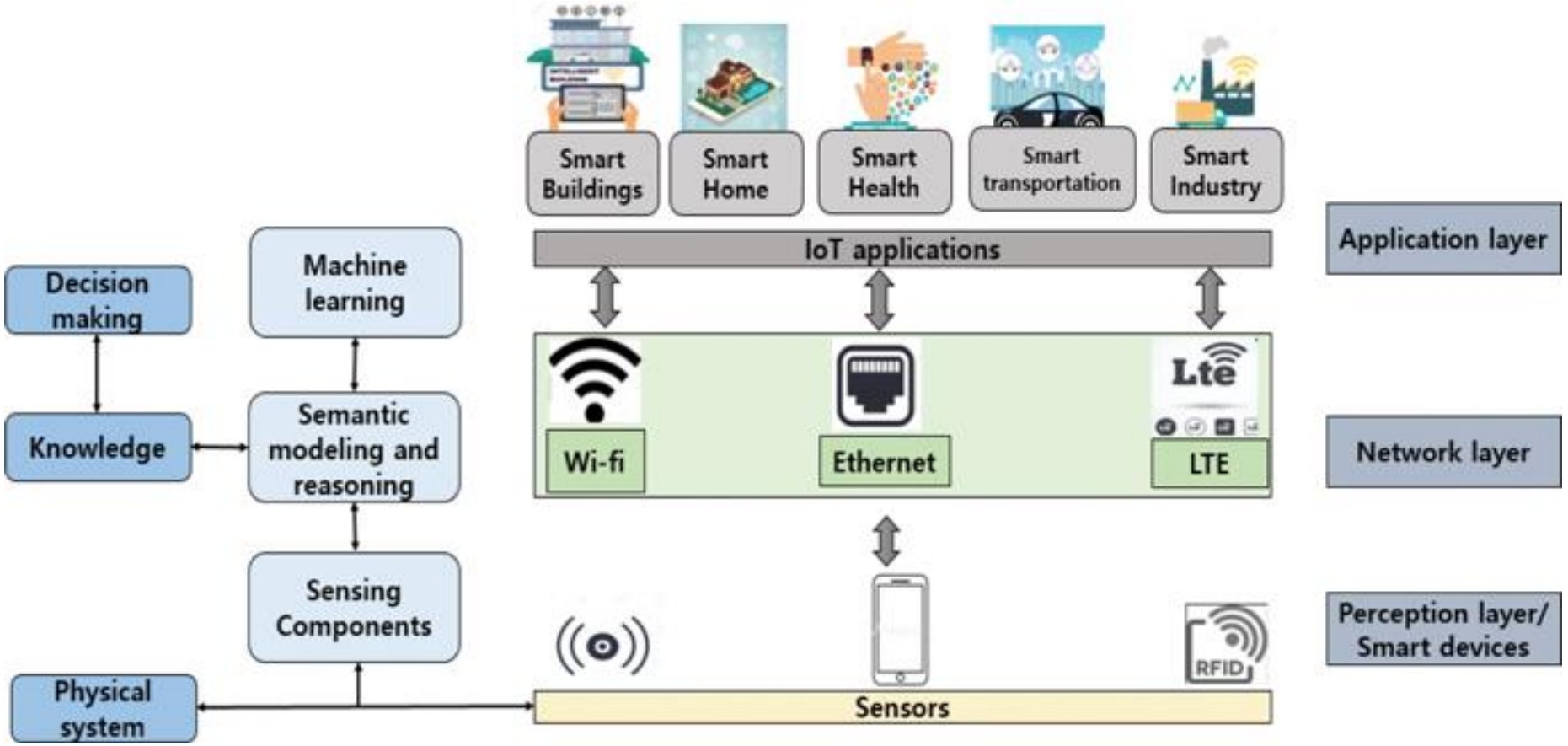


Figure: Foundations of cognitive computing for smarter cities

Source: https://images.app.goo.gl/yEc4DDLzTCKMZcFG6

Features of smart city (1 of 2)

Figure: Smart city features

Source: https://images.app.goo.gl/q7793ZH3CiezRqYH7

Features of smart city (2 of 4)

- **Collecting Data for Planning**

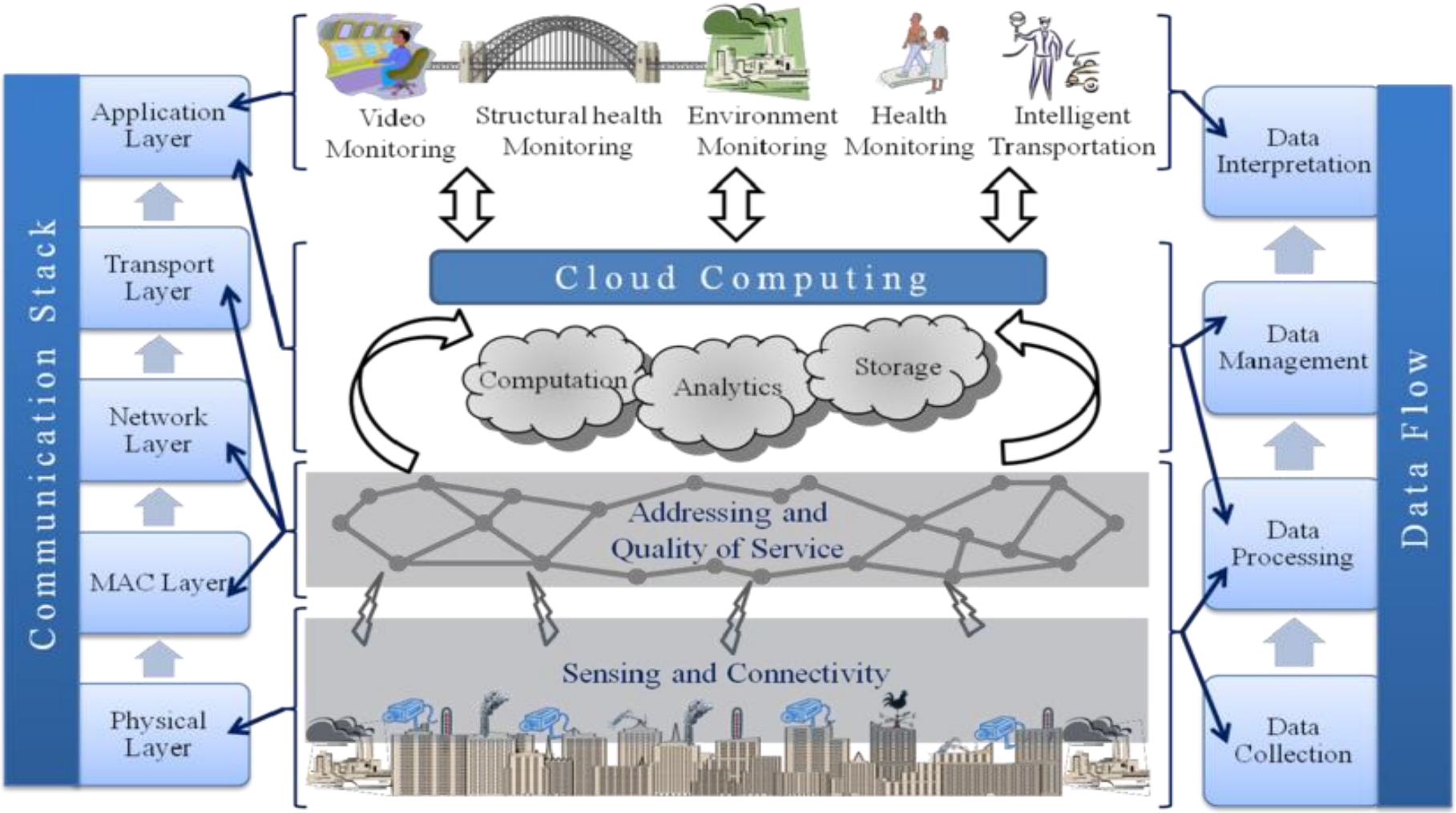


Figure: Data Collection for smart city

Source: https://images.app.goo.gl/kxHyQv8ecgWLzYhq7

Features of smart city (2 of 2)

- **Managing Security and Threats**

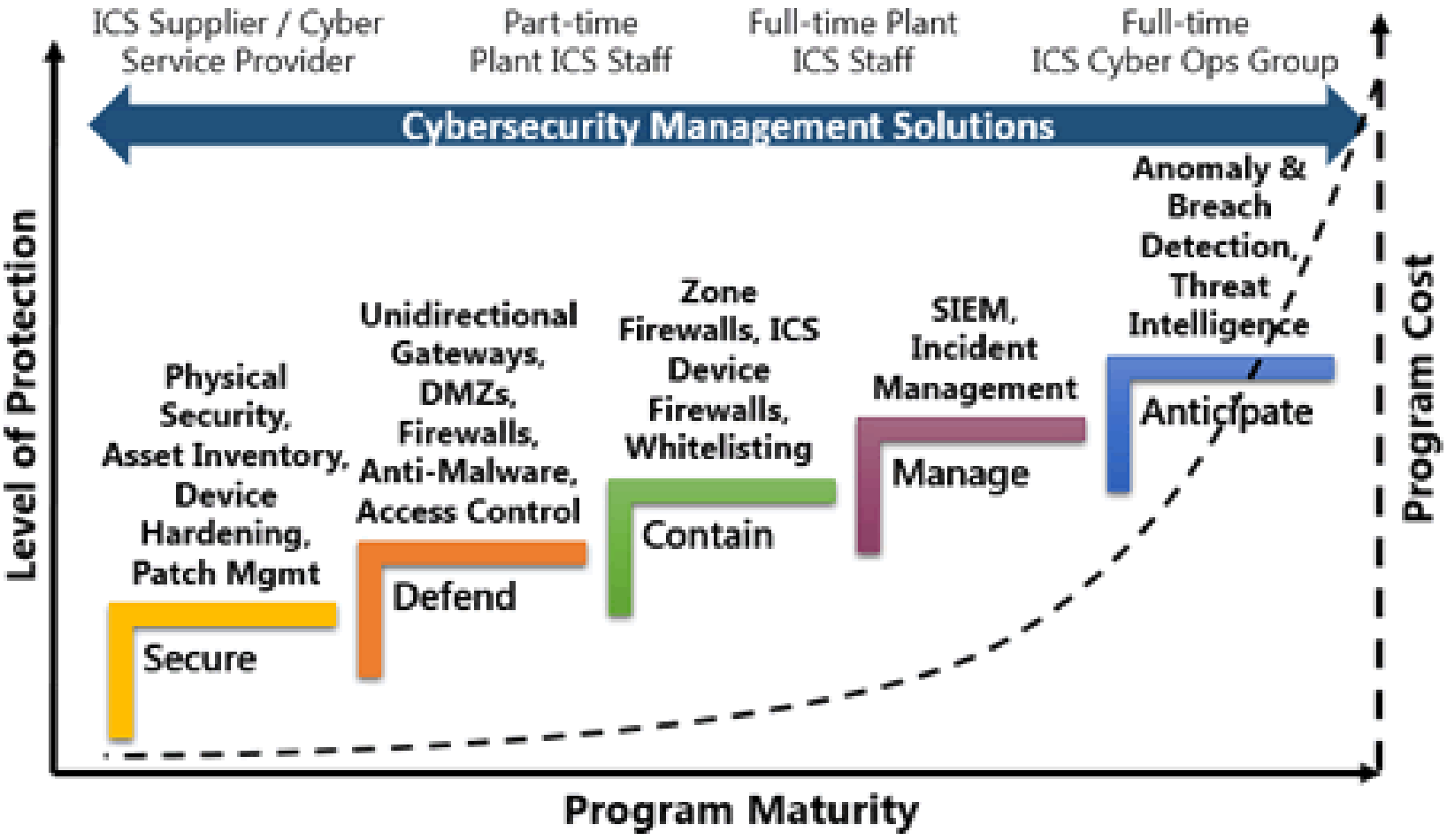


Figure : Security in smart city

Source : https://images.app.goo.gl/AQvPB76U1NUXqaJR7

Features of smart city (4 of 4)

- **Data Integration Across Government Departments**

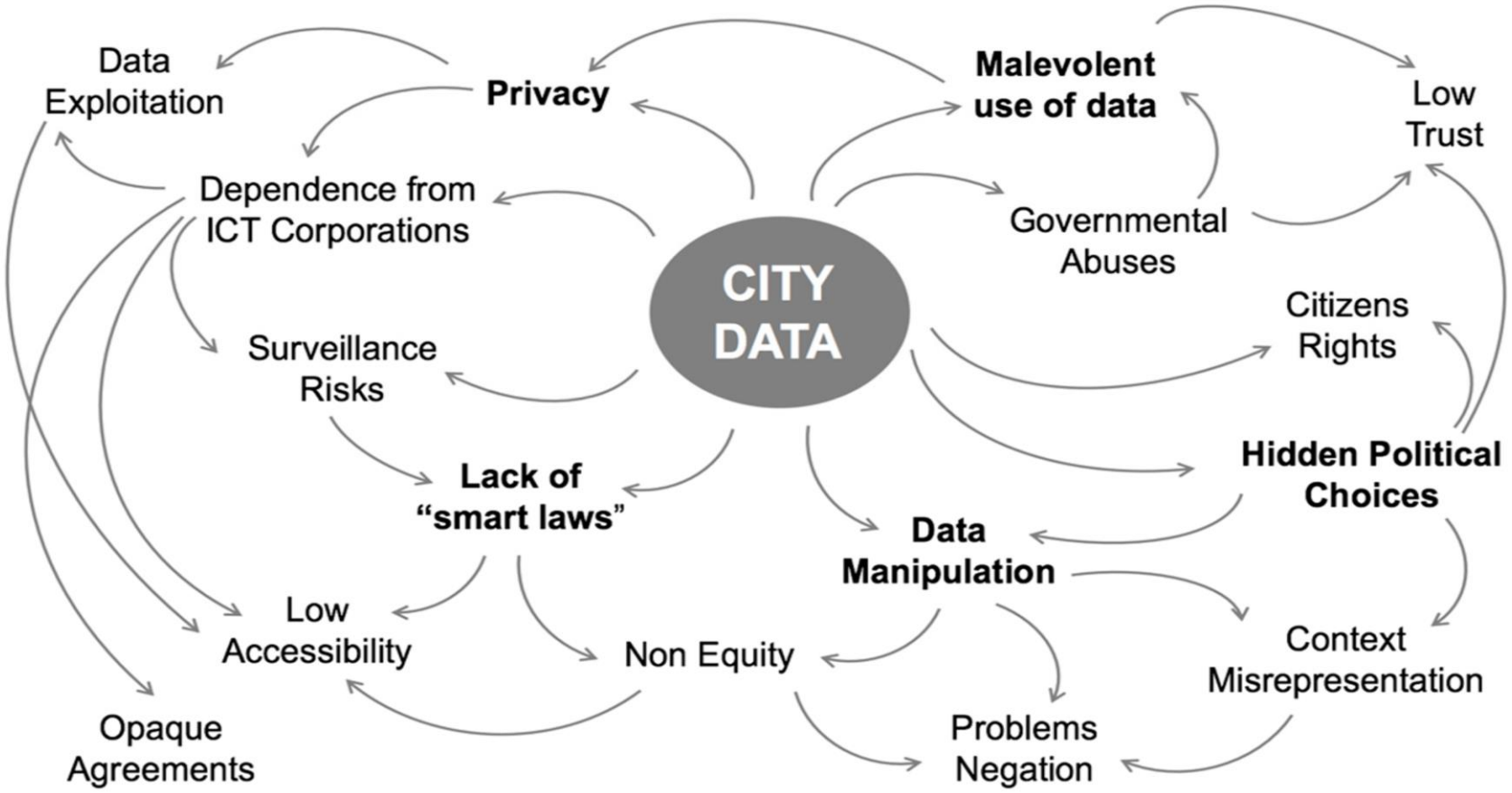


Figure: Data Integration for government department

Source: https://images.app.goo.gl/A8svitxpdczUPmm28

The rise of the open data movement for smart city

Figure: Open Data movement for smart city

Source: https://images.app.goo.gl/UFWKjjw3igK4F4SM7

The internet of everything and smarter cities

Figure: IOT and Smart city

Source: https://images.app.goo.gl/UE6kw4BFUYpsKAFv5

Understanding the ownership and value of data

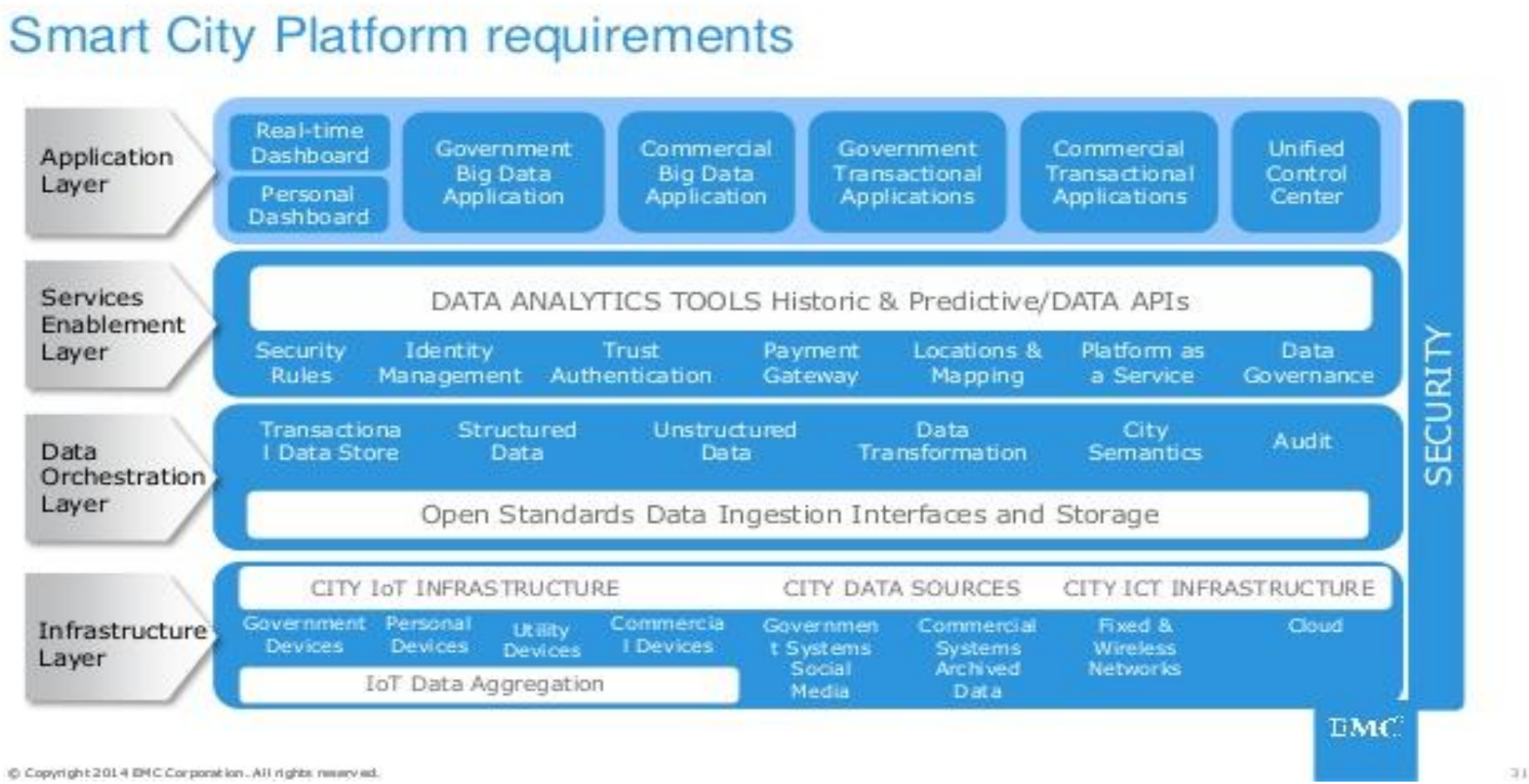


Figure: Smart city platform requirements

Source: https://images.app.goo.gl/BhLERV3ZFUGqyW87A

Cities are adopting smarter technology today for major functions

Figure: Major function for smart city operations

Source: https://images.app.goo.gl/eYmBQ45C2N2McAc29

Managing law enforcement issues cognitively (1 of 2)

- Law enforcement is a term for the activities of some members of government who act in an organized manner to enforce the law by discovering, deterring, rehabilitating, or punishing people who violate the rules and norms governing that society.

- Although the term encompasses police, courts, and corrections, it is most frequently applied to those who directly engage in patrols or surveillance to dissuade and discover criminal activity, and those who investigate crimes and apprehend offenders, a task typically carried out by the police, sheriff or another law enforcement organization.

- Although law enforcement may be most concerned with the prevention and punishment of crimes, organizations exist to discourage a wide variety of non-criminal violations of rules and norms, effected through the imposition of less severe consequences. There are also different units in different police departments, including “Undercover”, “Detective”, “CID”, “Gang Task Force”, “Drug Task Force”, "Custody Enforcement" , this varies from jurisdiction to jurisdiction.

Managing law enforcement issues cognitively (2 of 3)

- **The Problem of Correlating Crime Data**

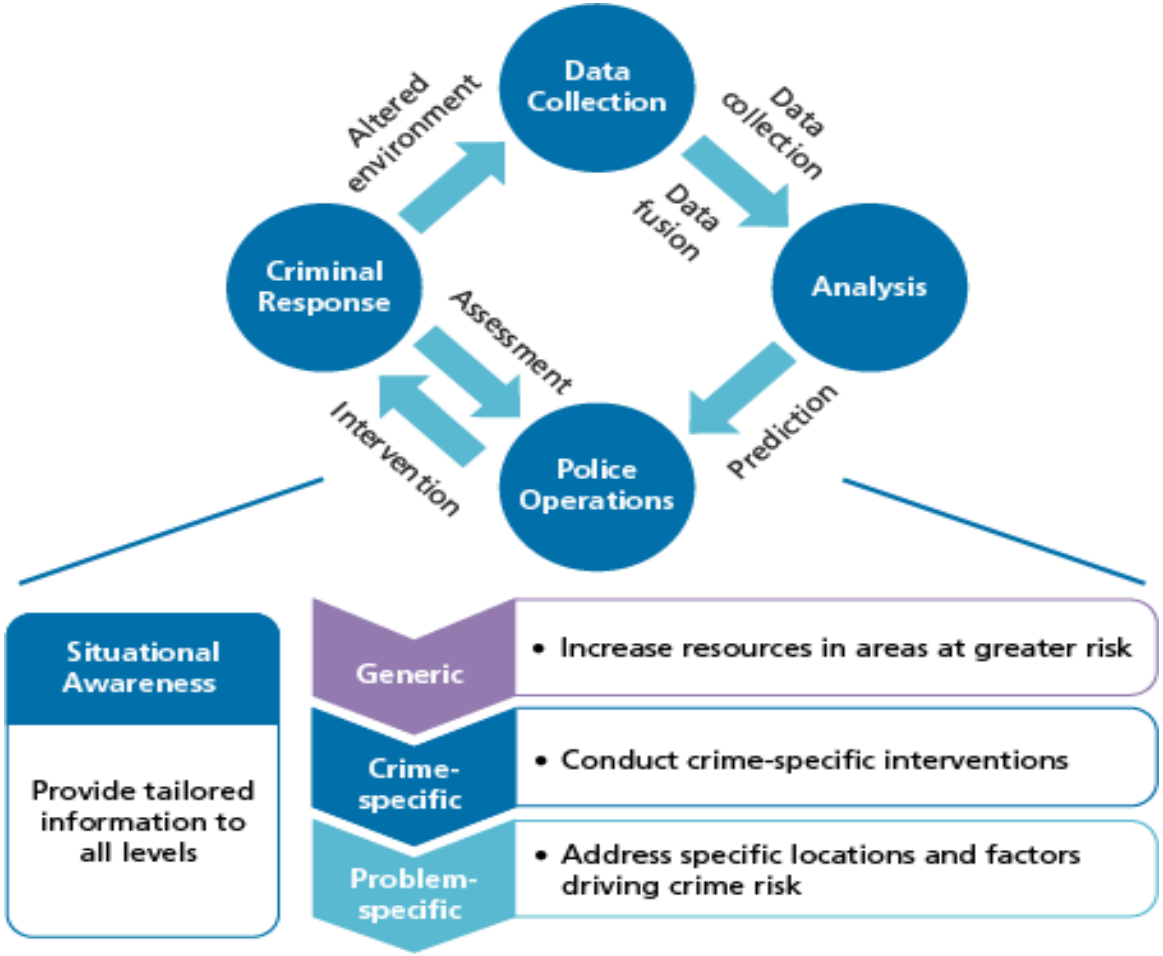


Figure: Crime data analysis

Source: https://images.app.goo.gl/bN5HNtvz9gZUy1Bk7

Managing law enforcement issues cognitively (2 of 2)

- **The COPLink Project**

COPLINK project in the press

The New York Times, November 2, 2002

COPLINK assisted in DC sniper investigation

ABC News April 15, 2003

Google for Cops: Coplink software helps police search for cyber clues to bust criminals

Newsweek Magazine, March 3, 2003

A computerized way for police to coordinate crime databases

Washington Post, March 6, 2008

National dragnet is a click away!
COPLINK in use in 1,600 police agencies in US!


Arts&Ideas
The New York Times
An Electronic Cop That Plays Hunches
Interconnecting Police Files Through New Computer System Helps Prosecutors in Sniper Case

abc NEWS

Newsweek

Figure: COPLink Project

Source: https://images.app.goo.gl/tFMWJyNSaappywDi9

Control of smart energy: From design to execution

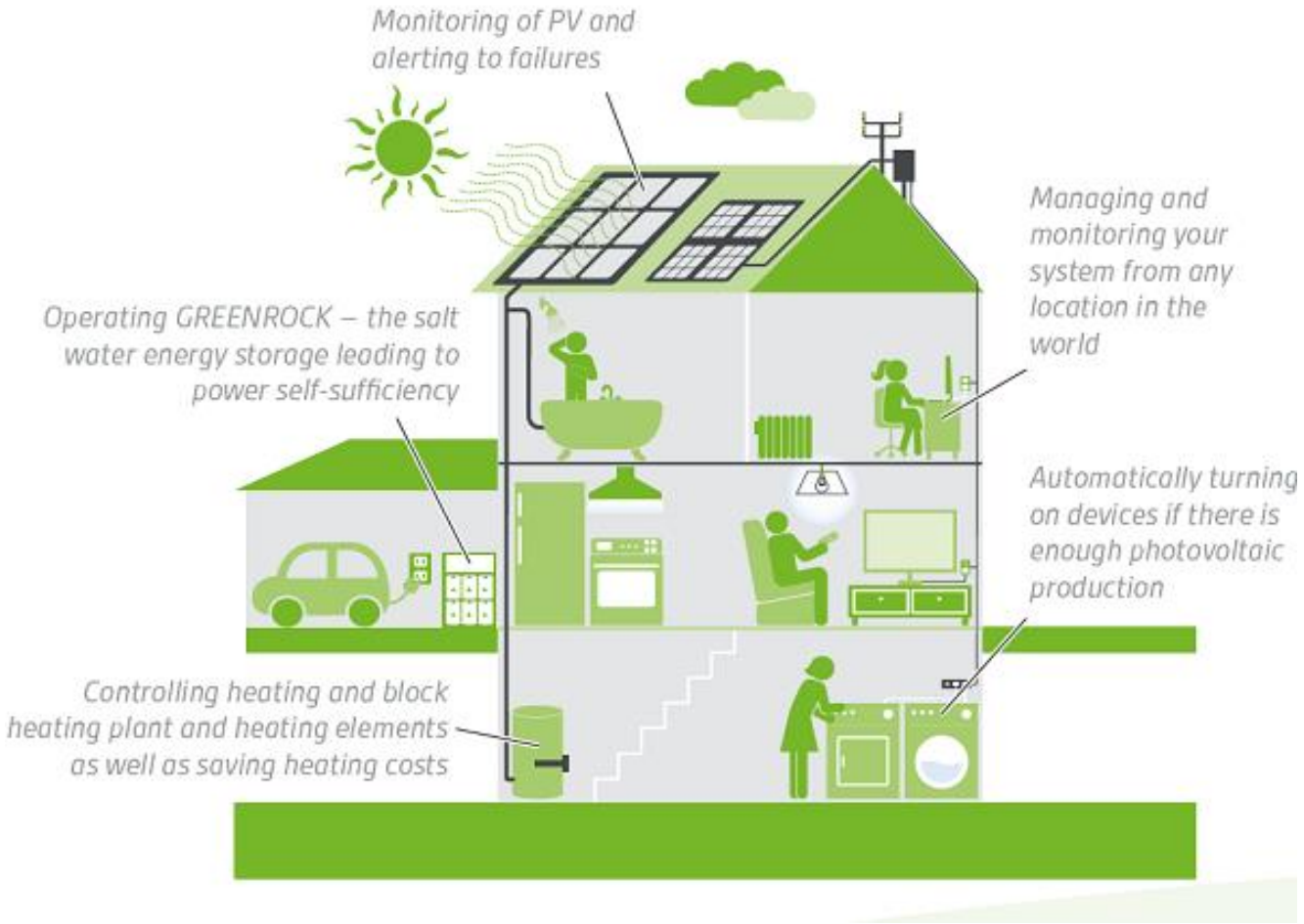


Figure: Smart energy Management

Source: https://images.app.goo.gl/Jocxf9Njd7DTiBYc7

The problem of integrating regional utilities management

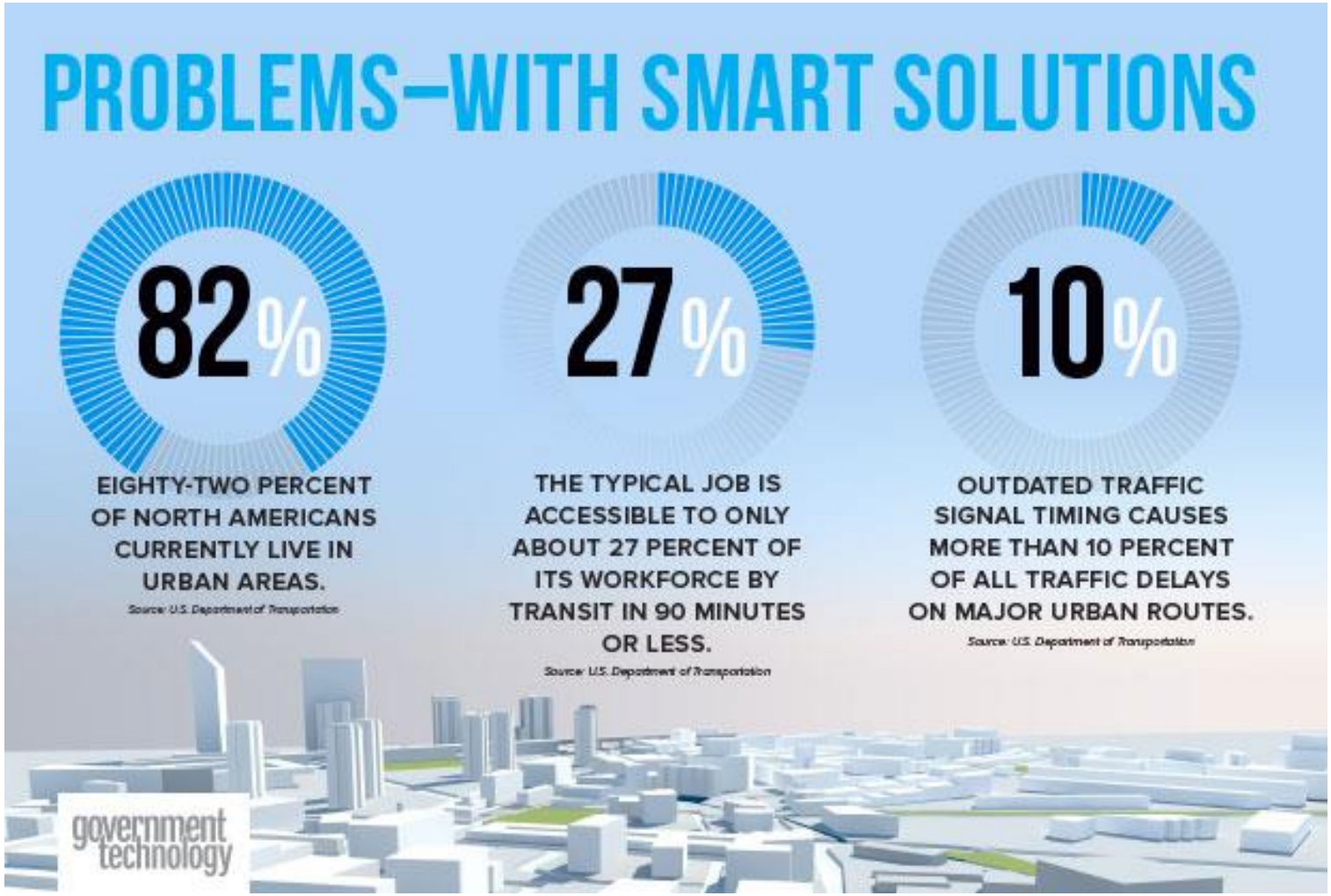


Figure: Problems with smart solutions
Source: https://images.app.goo.gl/cpSbPPJSqfFiKRZR6

The area energy management solutions project

Indian Smart City Solutions

- Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Three point Strategy:

- **Retrofitting** : make the existing area more efficient and liveable
- **Redevelopment**: replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density.
- **Greenfield** : Innovation driven projects

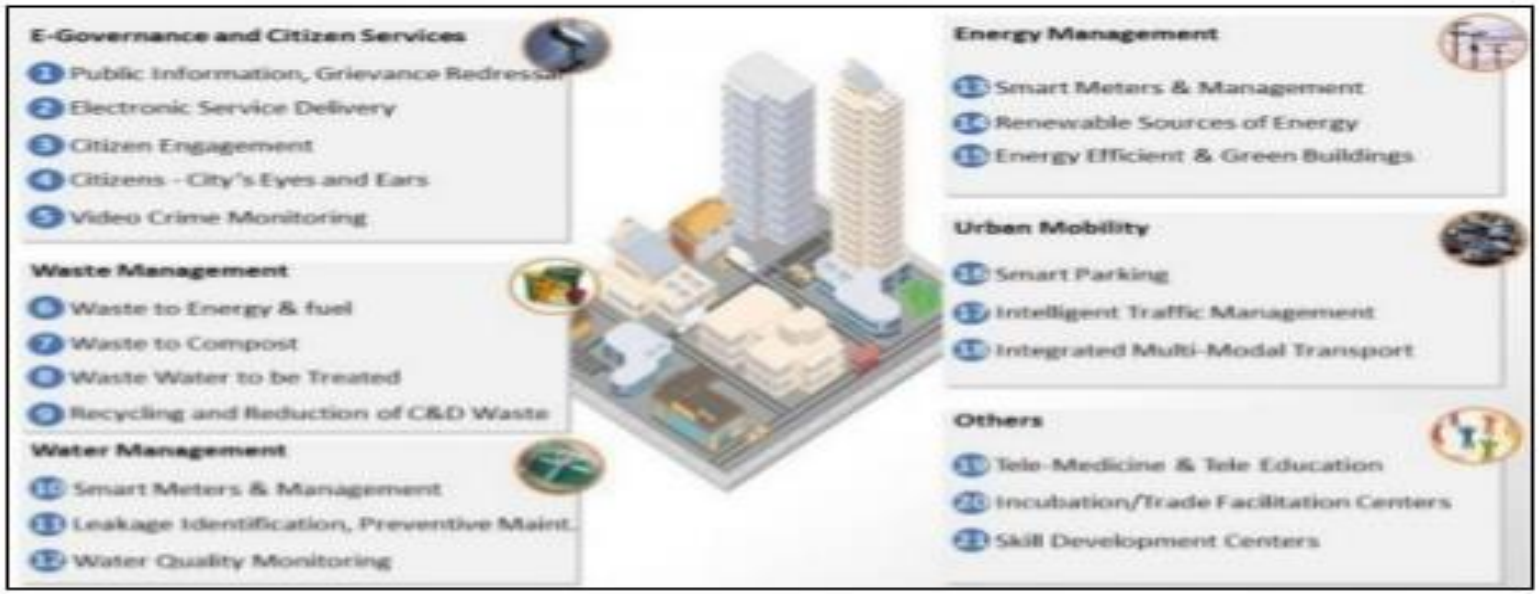


Figure: Smart city solutions

Source: https://images.app.goo.gl/v7EgUJXyVb6tUTaF8

The cognitive computing opportunity

Cognitive computing: the combination of humans, machine learning, and predictive modeling.

Vision: ingest and analyze many data types to provide insights for improved outcomes.

Enabling the opportunity for perpetual optimization.

Cognitive computing leverages tools such as:

- Natural language processing
- Visualization
- Data ingestion and analysis from: text, images, IoT data from smart devices, sensors, wearable's, social media
- Predictive data analytics

Figure: Cognitive Opportunity

Source: https://images.app.goo.gl/mjqijuvkAN9nXYig9

Self evaluation: Exercise 23

- To continue with the training, after learning the various steps involved in cognitive analytics and Watson machine learning, it is instructed to utilize the concepts of cognitive machine learning algorithms to perform the following activity.

- You are instructed to write the following activities using Python code.

- Exercise 23: Quora Topic Modeling

Protecting the power grid with Machine Learning

- **The Problem of Identifying Threats from New Patterns**

Figure: Risk Identification

Source: https://images.app.goo.gl/DgVkkUgrfXGXu42L8

Protecting the power grid with machine learning

- **The Grid Cybersecurity Analytics Project**

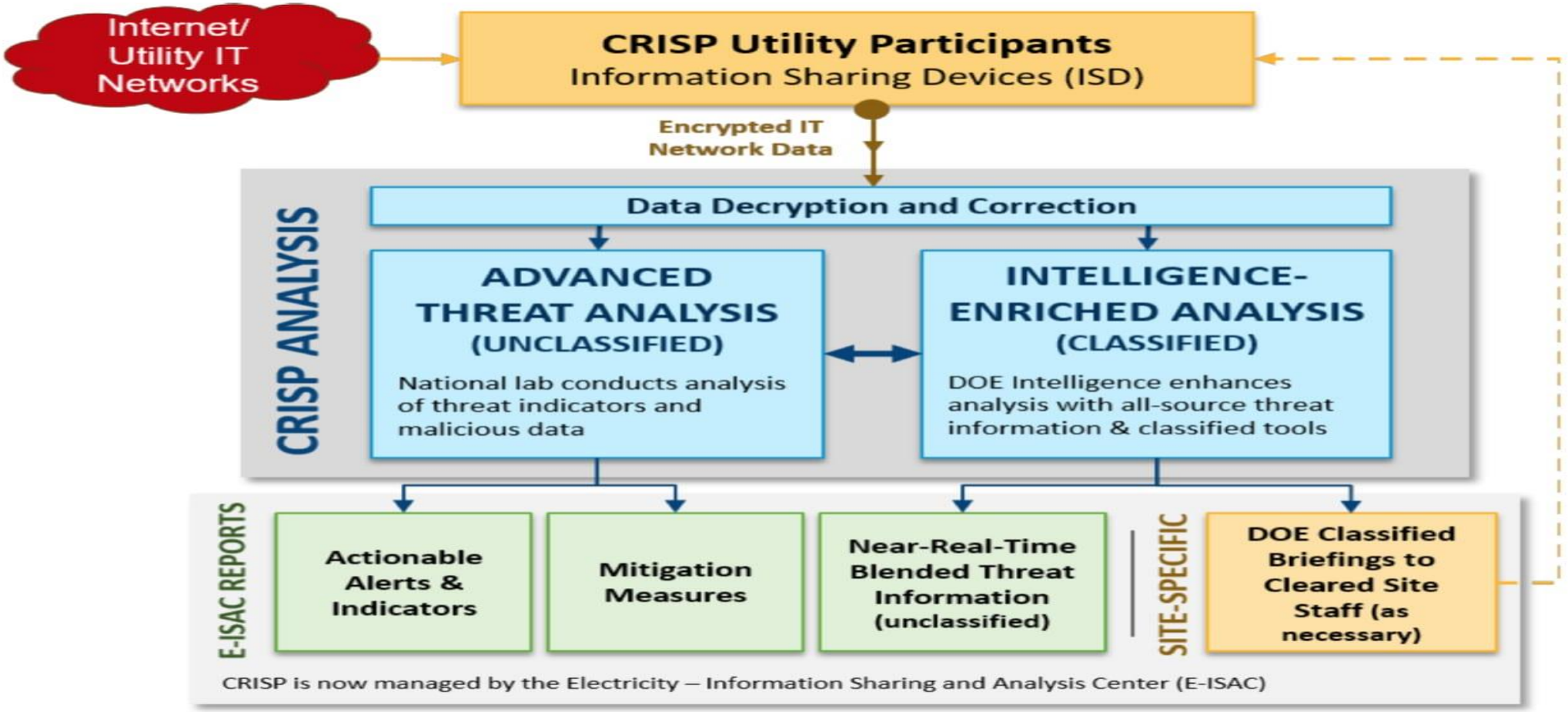


Figure: Cybersecurity Analytics project
Source: https://images.app.goo.gl/CwyxMYZ4RzdTPjvd7

Protecting the power grid with Machine Learning (4 of 4)

- **The Cognitive Computing Opportunity**

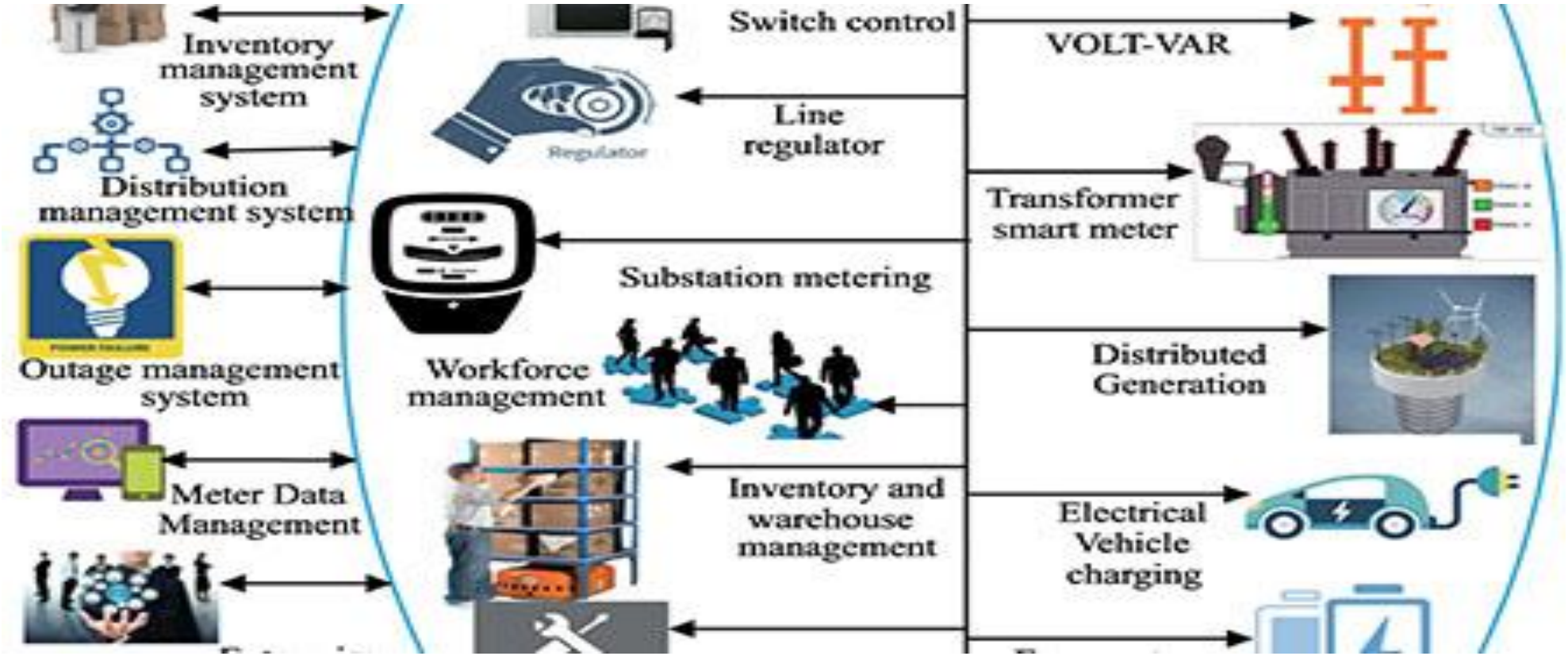


Figure: Power grid cognitive model

Source: https://images.app.goo.gl/EV7fZhpCe6LsvMXU7

Improving public health with cognitive

How can interoperability improve digital medicine?

AI and Big Data
- provide algorithms with clear data structure and semantics
- ensure validity of analysis results
- create trust in digital technologies

Medical Communication
- enable easy information retrieval
- avoid medical errors caused by communication barriers
- reduce documentation burden
- empower patients

Research
- improve the use of real-world data (e.g. for large-scale observational studies)
- create new research hypotheses (with data mining and AI)
- enable remote development of analysis scripts

International Cooperation
- pool data across organizations (e.g. rare diseases, precision medicine)
- tackle global public health issues (e.g. infection control, epidemics)
- provide global access to new technologies

Figure: AI with Healthcare

Source: https://images.app.goo.gl/zWHQ5Fq1diDajquPA

Smarter approaches to preventative healthcare (1 of 2)

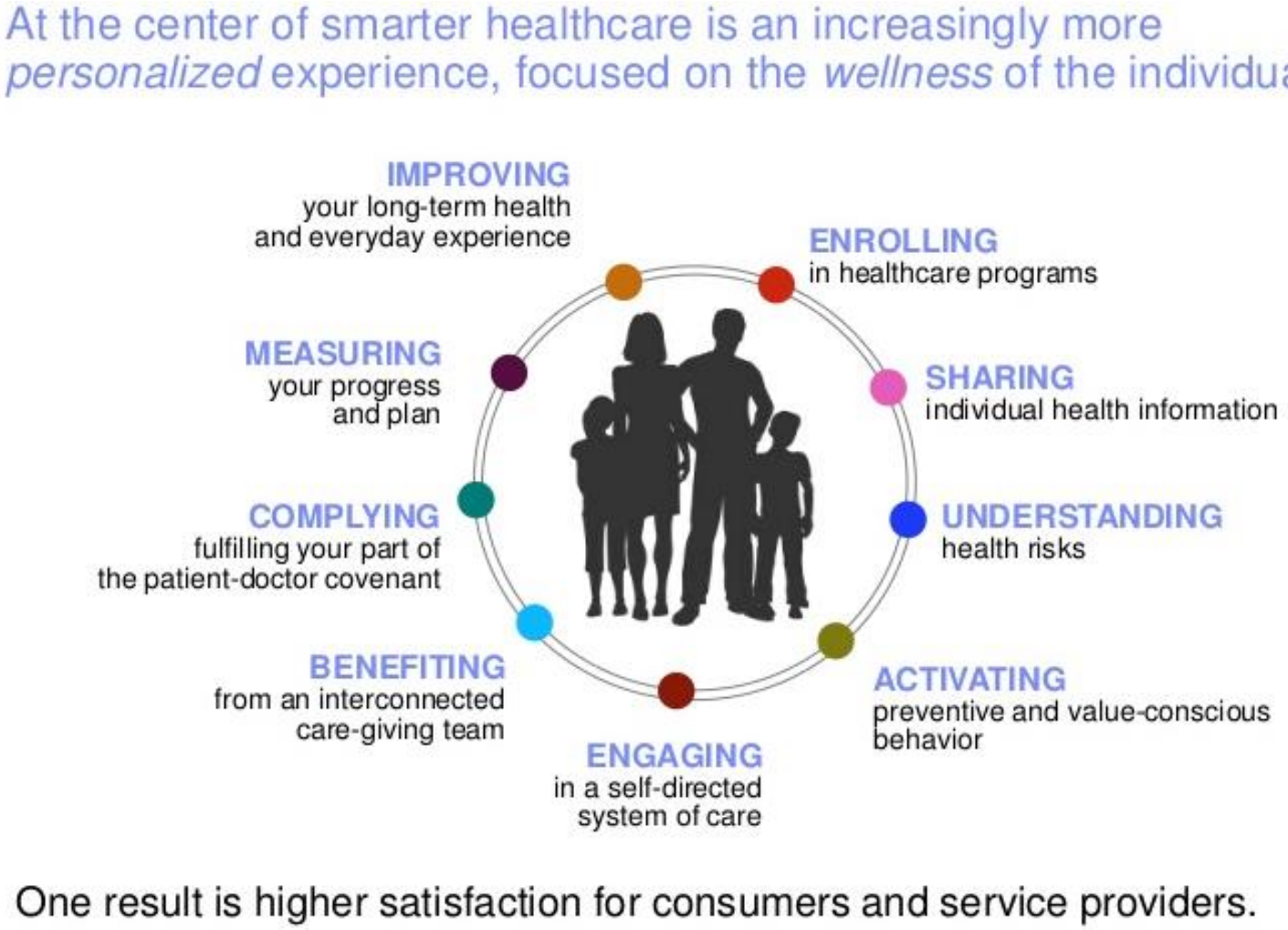


Figure: Smarter Approaches to Preventative Healthcare

Source: https://images.app.goo.gl/7NgtEY6vF1jsL5TZ9

Smarter approaches to preventative healthcare (2 of 2)

- **The Town Health Station Project**

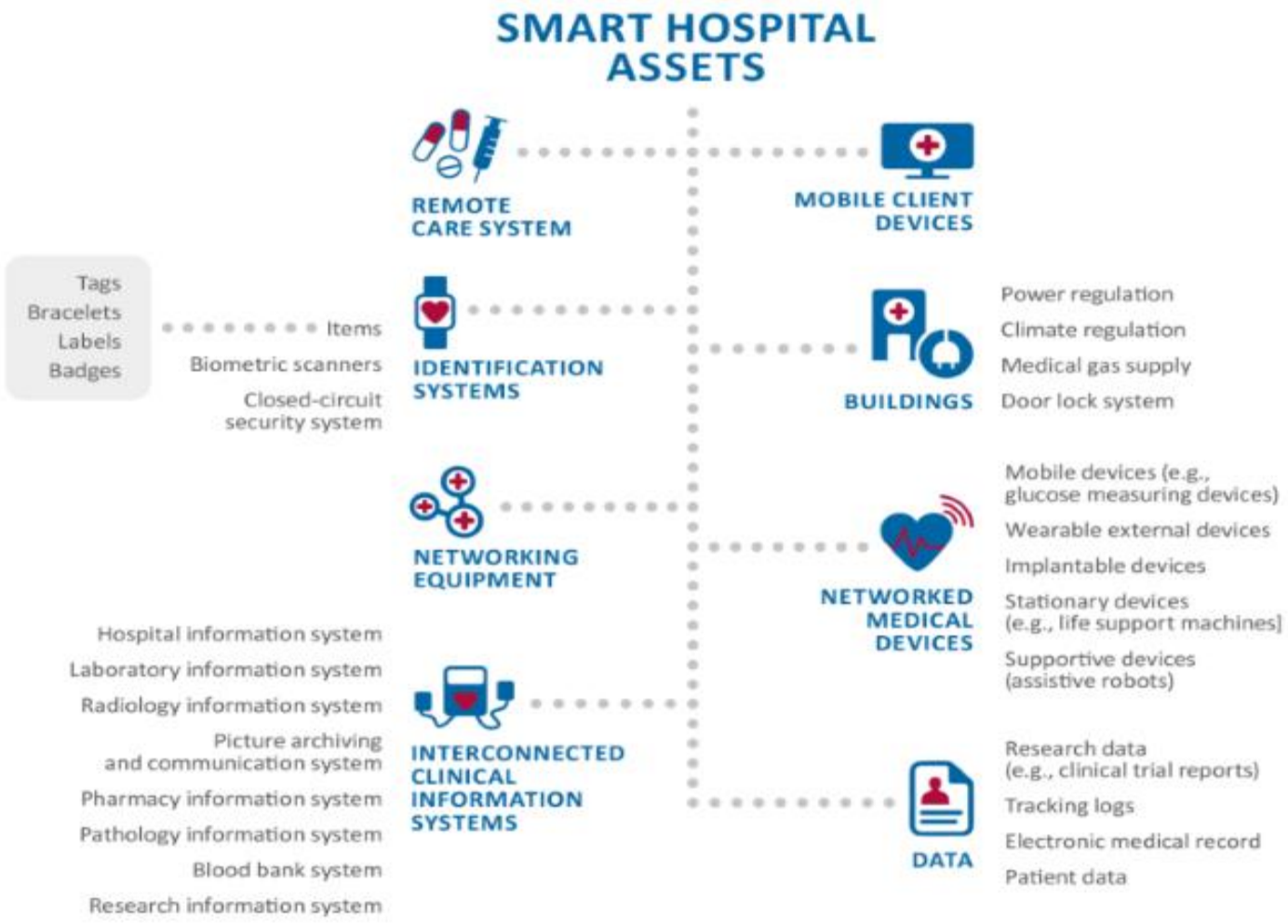


Figure: Smart Hospital

Source: https://bit.ly/3fLR4dc

Smarter approaches to preventative healthcare (3 of 3)

- **The Cognitive Computing Opportunity**

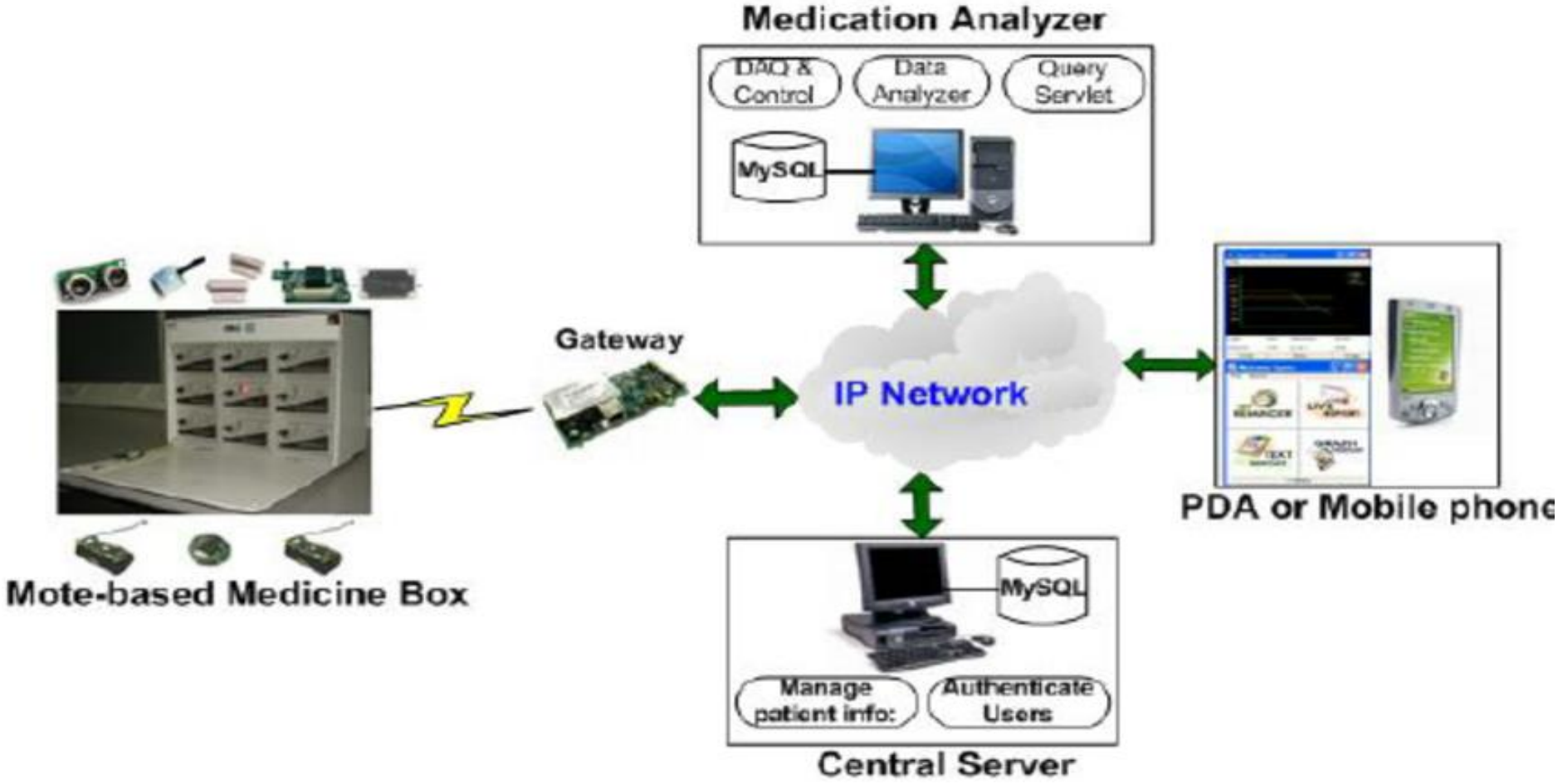


Figure: Smart Medicine

Source: https://images.app.goo.gl/RXyxHepNzNEyxCkS9

Building a smarter transportation infrastructure

Figure: Smart Transportation

Source: https://images.app.goo.gl/zHgg1T1L8nNNiw2X6

Building a smarter transportation infrastructure (2 of 4)

- **Managing Traffic in Growing Cities**

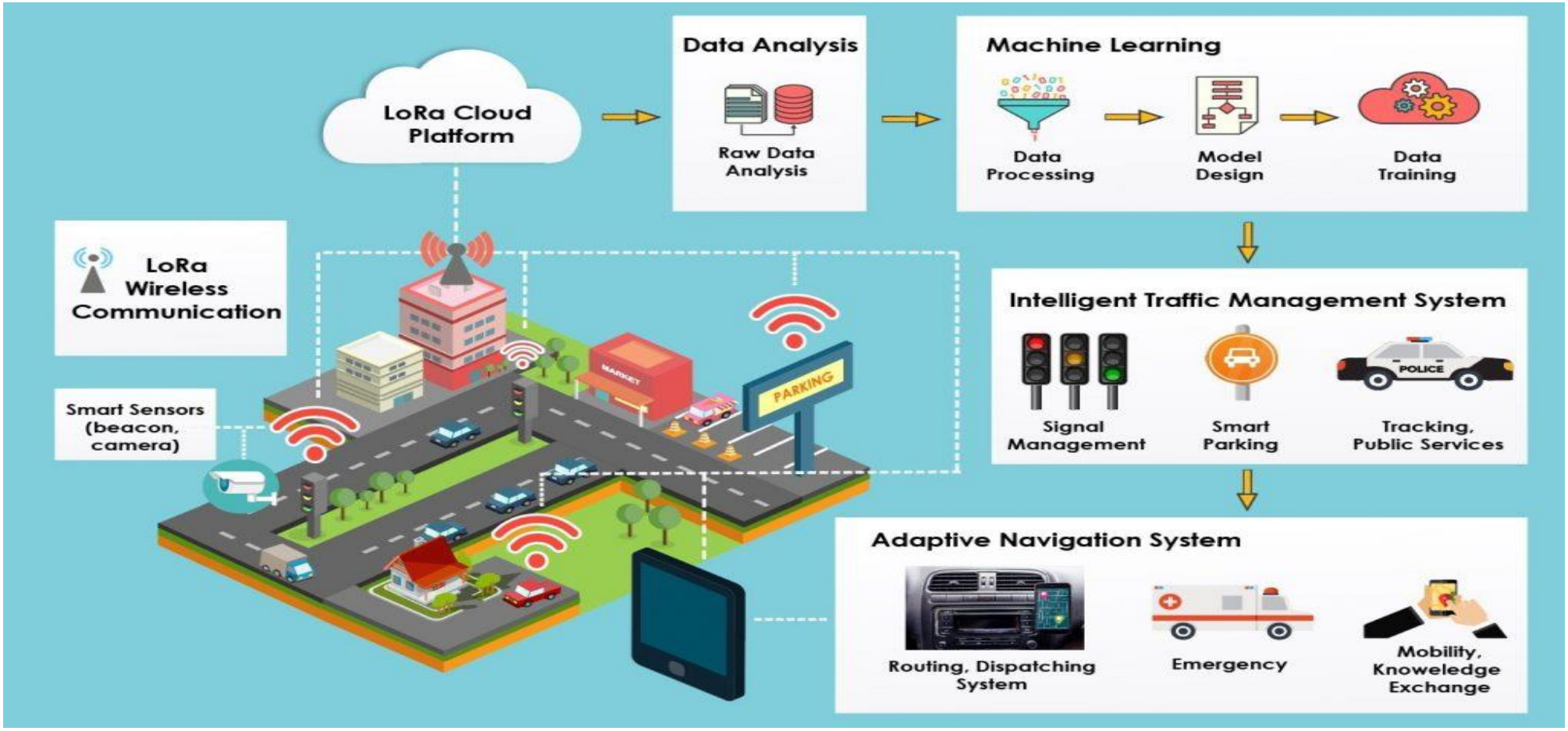


Figure: Smart Traffic

Source: https://images.app.goo.gl/Dihd1W7YH5uBmKvq9

Self evaluation: Exercise 24

- To continue with the training, after learning the various steps involved in cognitive analytics and Watson machine learning, it is instructed to utilize the concepts of cognitive machine learning algorithms to perform the following activity.

- You are instructed to write the following activities using Python code.

- Exercise 24: Natural Language Processing.

Building a smarter transportation infrastructure (4 of 4)

- **The Cognitive Computing Opportunity**

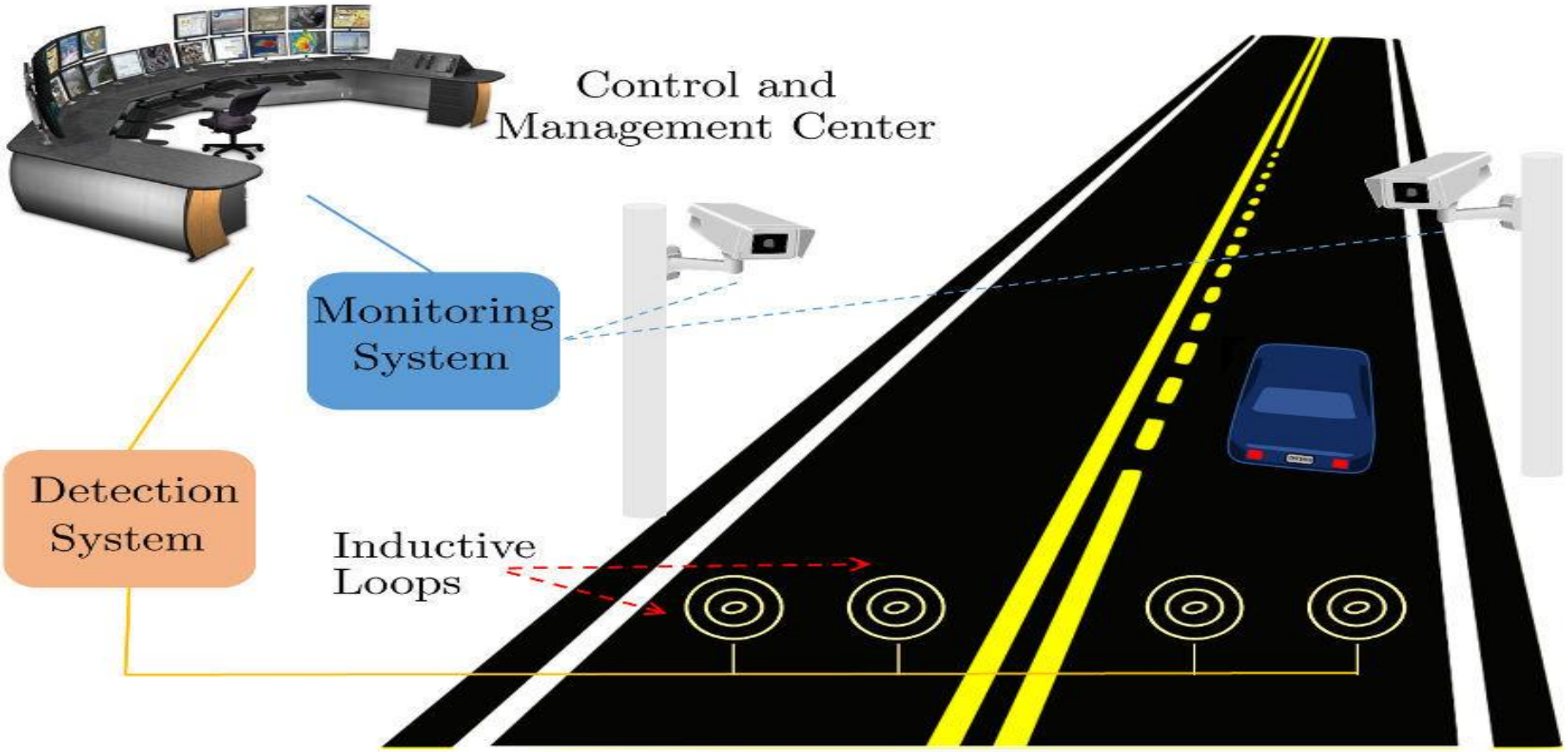


Figure: Smart Traffic Management

Source: https://images.app.goo.gl/6y8Yg7oYC7HzH1kv7

Using analytics to close the workforce skills gap

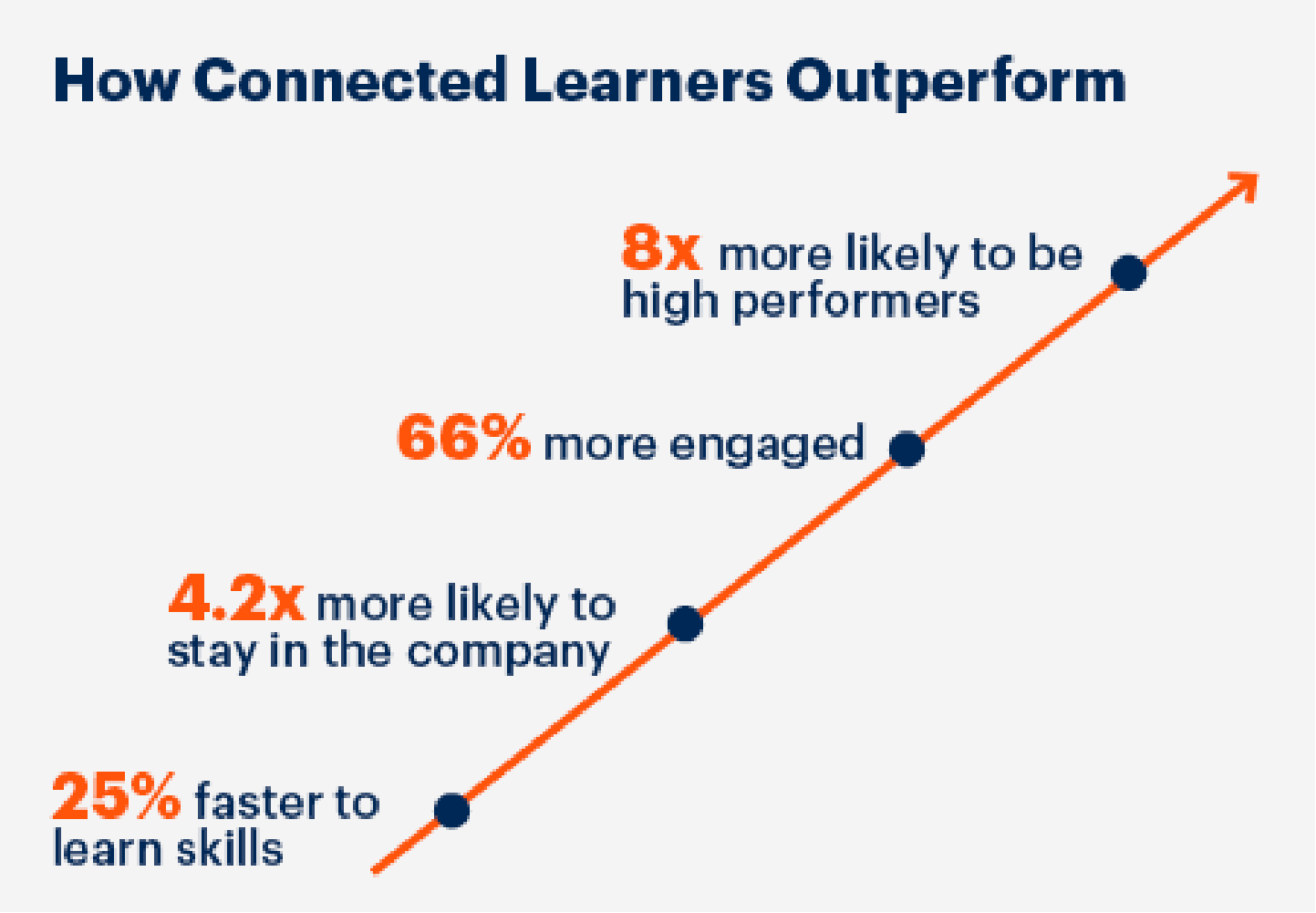


Figure: Using Analytics to Close the Workforce Skills Gap

Source: https://images.app.goo.gl/qt5Auja9jAiAxXS78

Identifying emerging skills requirements and just-in-time training

IBM ICE (Innovation Centre for Education)

Figure: Emerging Skills Requirements and Just-in-Time Training

Source: https://images.app.goo.gl/3PJSfUb4zrc8CrfX6

The Digital On-Ramps (DOR) project

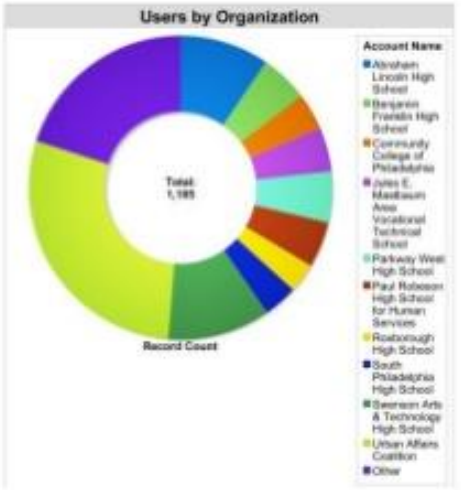
Digital On-Ramps ePortfolio

Pilot Programs

- Summer 2015 WorkReady Program – 400 youth
- Fall 2015/Spring 2016 – 10 Public Schools - 500 seniors
- Community College of Philadelphia – KEYS program
- Employer Pipeline Training – SodexoMAGIC

Future Programs

- Summer 2016 - WorkReady Program – 3000 youth
- School District of Philadelphia – est. 8000 seniors
- Reentry Programs – STAR Program
- E3 Power Centers
- Drexel – Employer/Academically



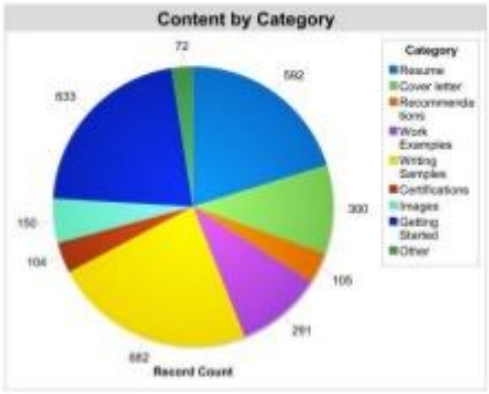


Figure: DOR Project

Source: https://images.app.goo.gl/EakdGYMNrBhspbSy5

Creating a cognitive community infrastructure

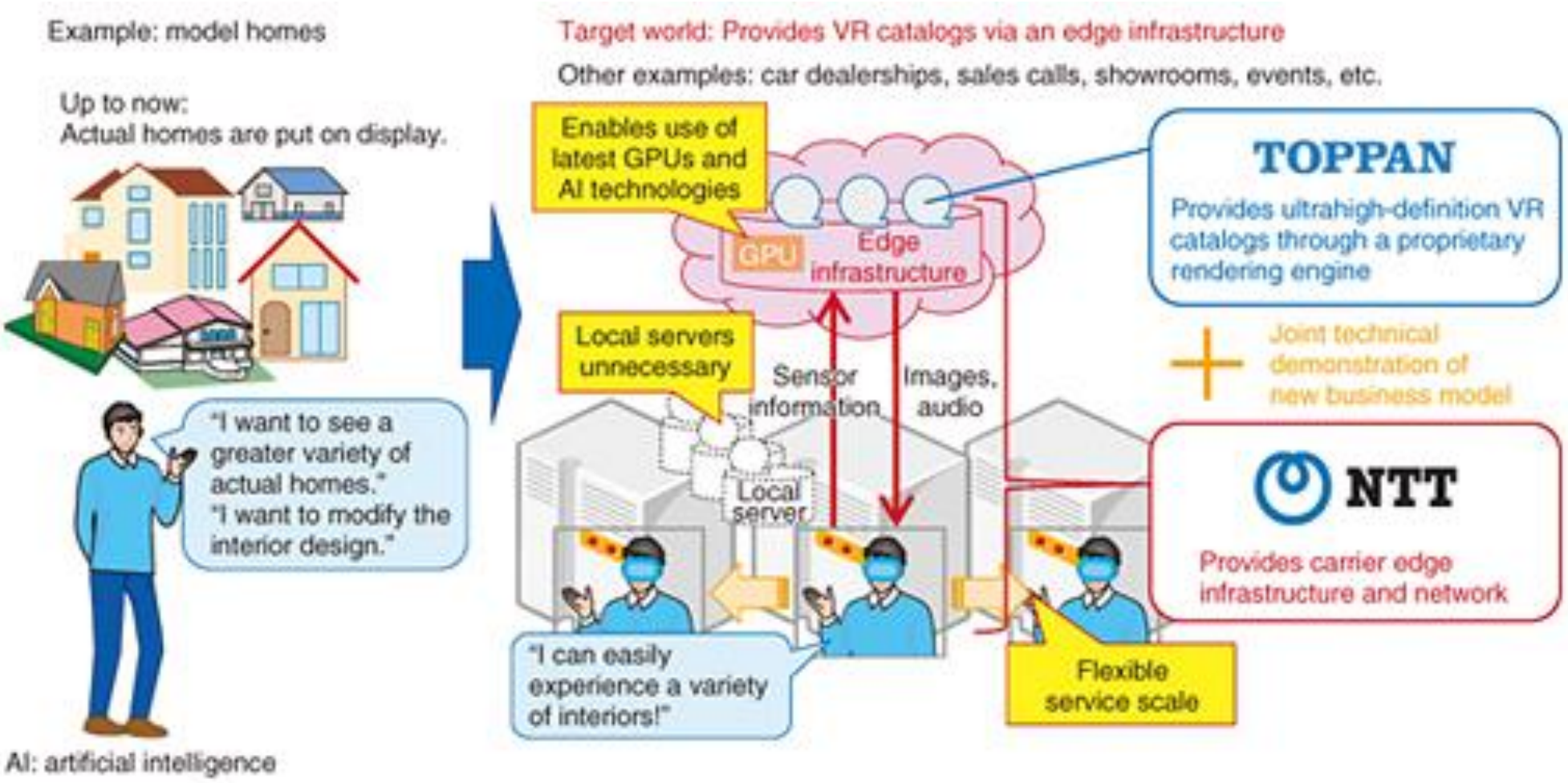


Figure: Cognitive computing Infra

Source: https://images.app.goo.gl/uCS24hmL7BZztZZB7

The next phase of cognitive cities

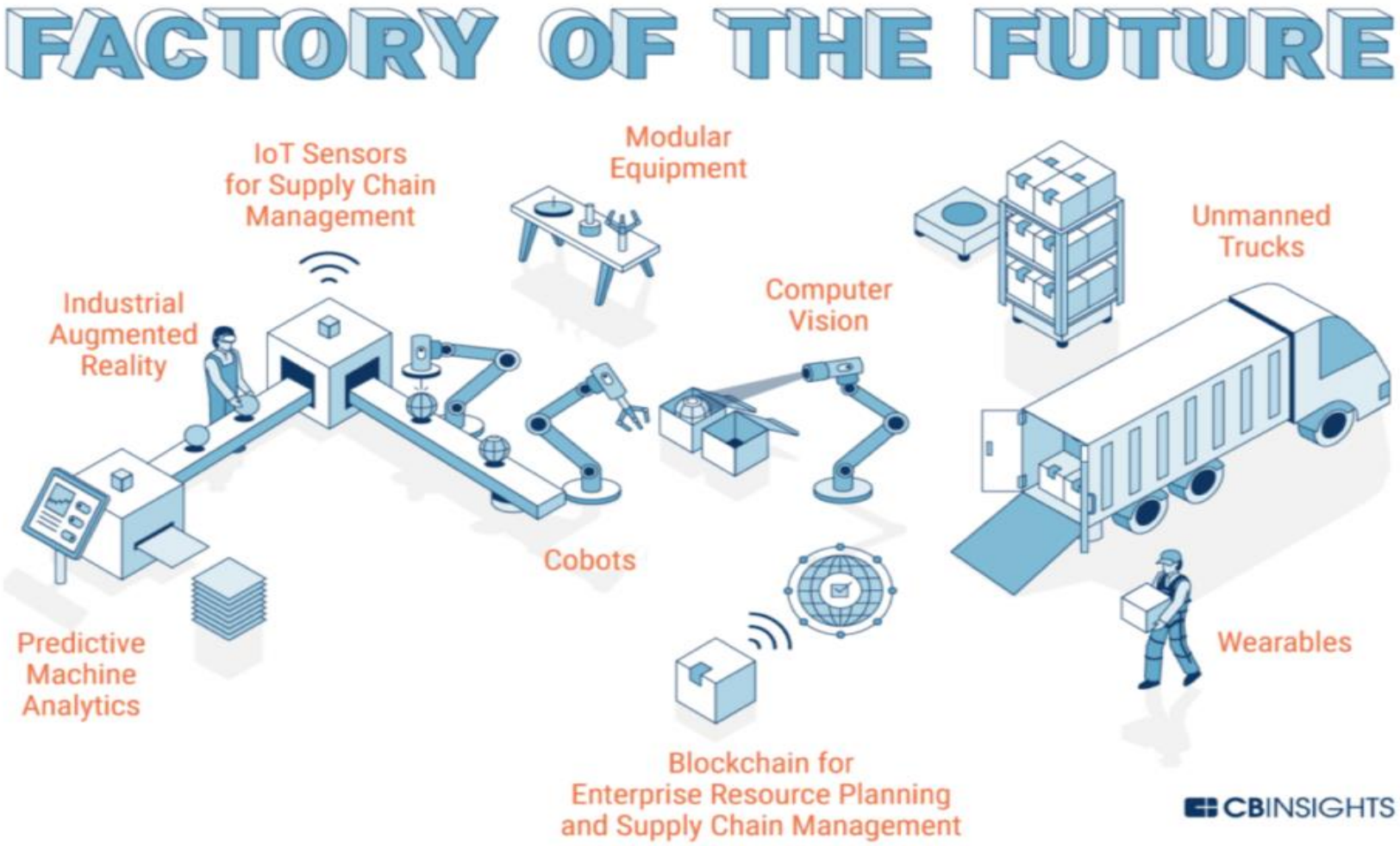


Figure: Future of cognitive city

Source: https://images.app.goo.gl/yvFJqrRfCUT2kzLa8

Retail

Figure: Cognitive in Retail Industry

Source: https://images.app.goo.gl/hqwZvtibS8e5afeA7

Travel

Figure: Travel with cognitive computing

Source: https://images.app.goo.gl/nh3Ph5eAjp7vQ4cr5

Transportation and logistics

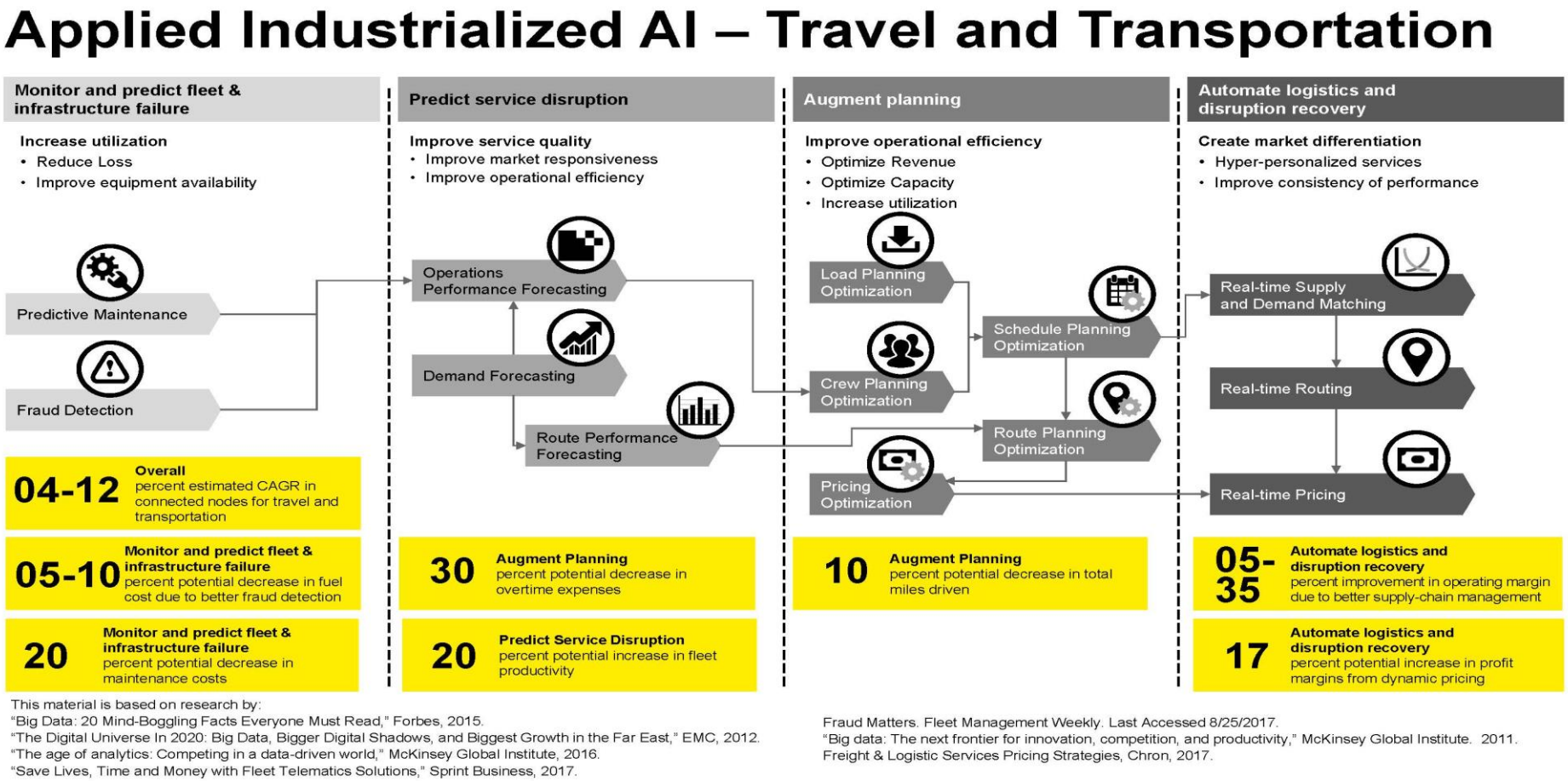


Figure: AI in Transport

Source: https://images.app.goo.gl/u7iCP7hoQvx9sP4r6

Telecommunications

- **Internet service Provider (ISP)**

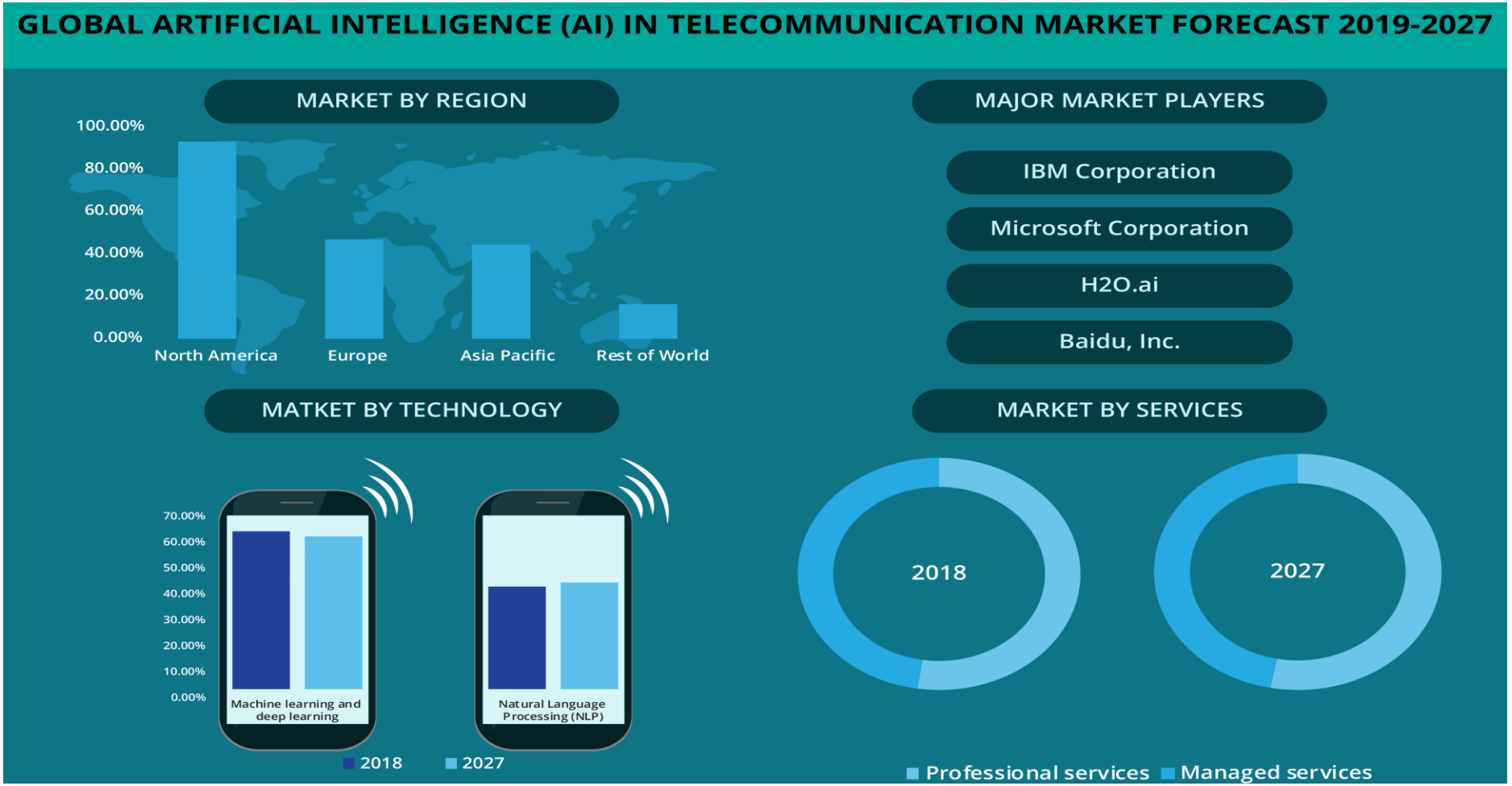


Figure: Cognitive in Telecom

Source: https://images.app.goo.gl/qZ3YqgjJ9bG7529U9

Security and threat detection

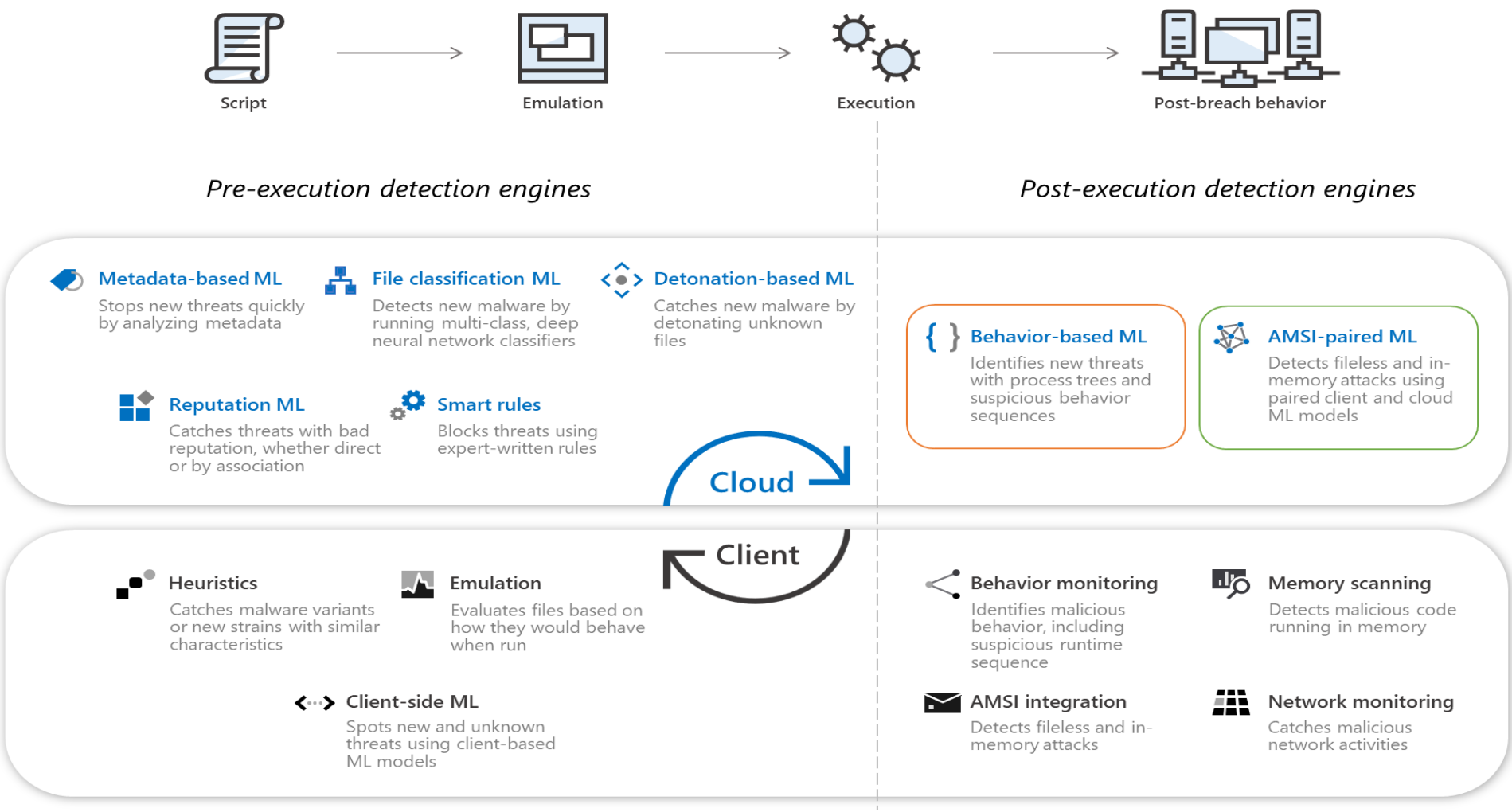


Figure: Security and Threat Detection in cognitive computing

Source: https://images.app.goo.gl/tLz9r7Aw7ttwZ9m1A

Other areas that are impacted by a cognitive approach

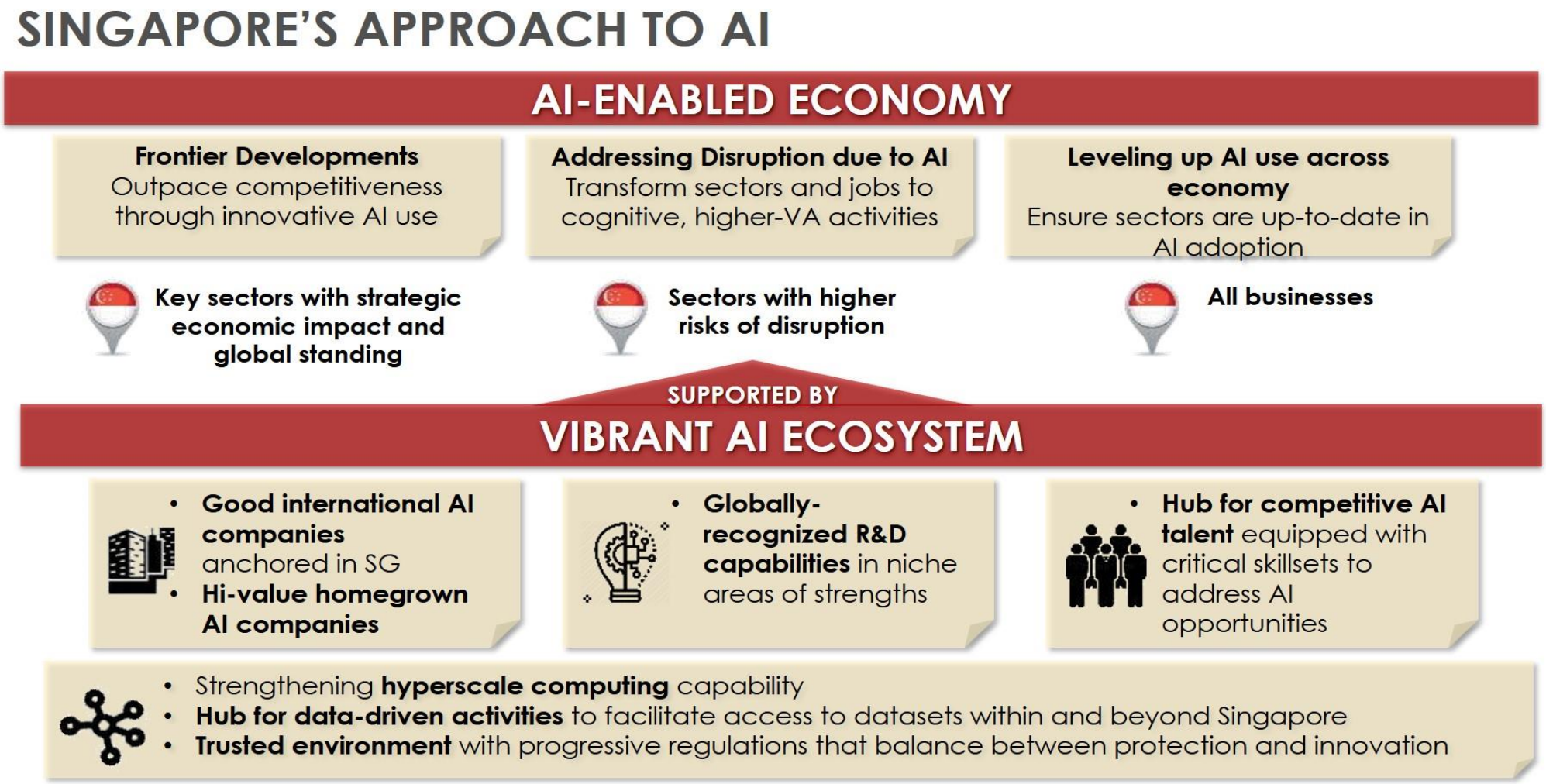


Figure: Singapore based AI and cognitive Approach

Source: https://images.app.goo.gl/rPT9hvpRuAFn2uxx9

Solutions in other areas (1 of 2)

- **Financial services**

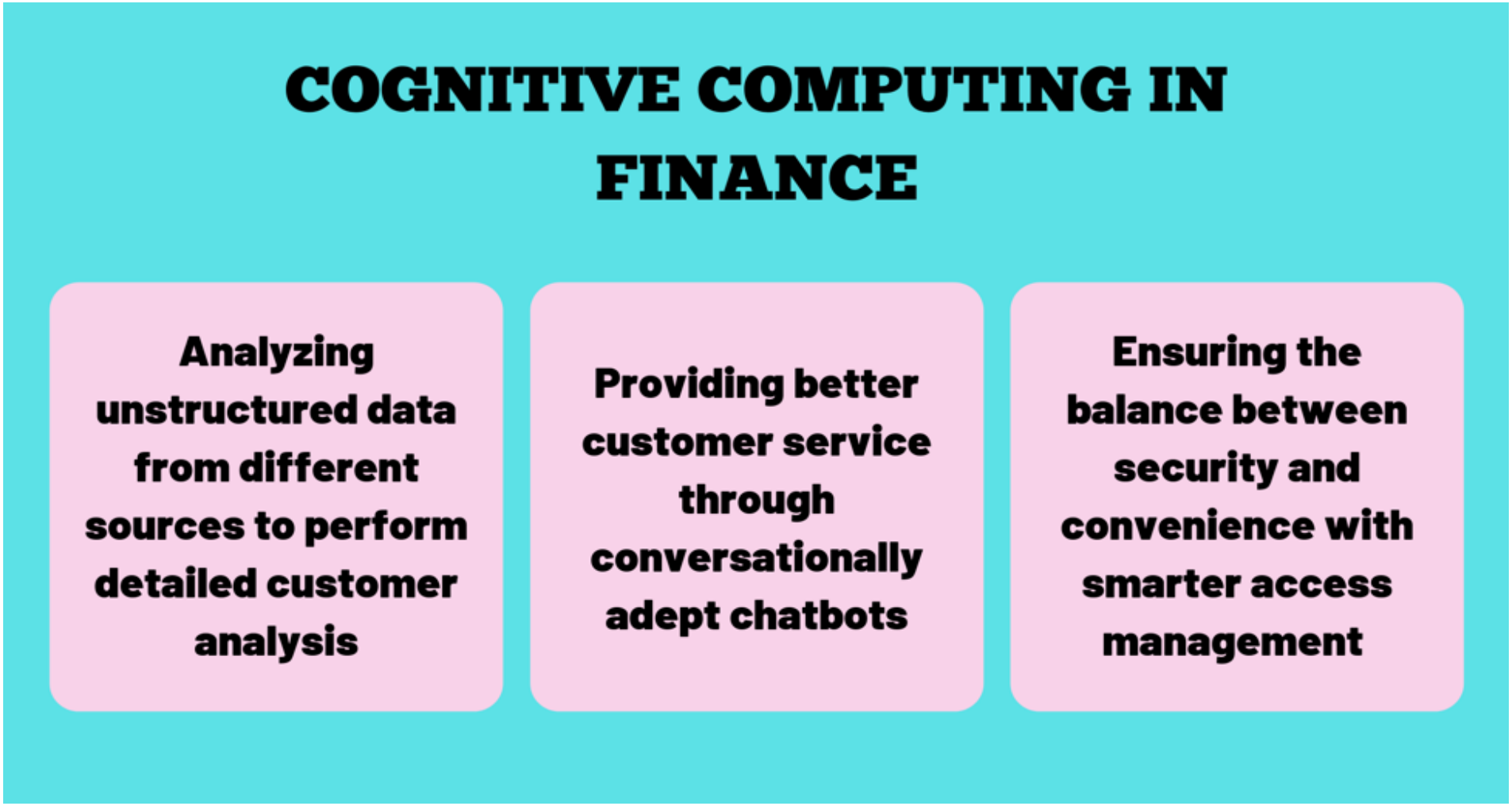


Figure: Financial services

Solutions in other areas (2 of 2)

- **Legal applications**

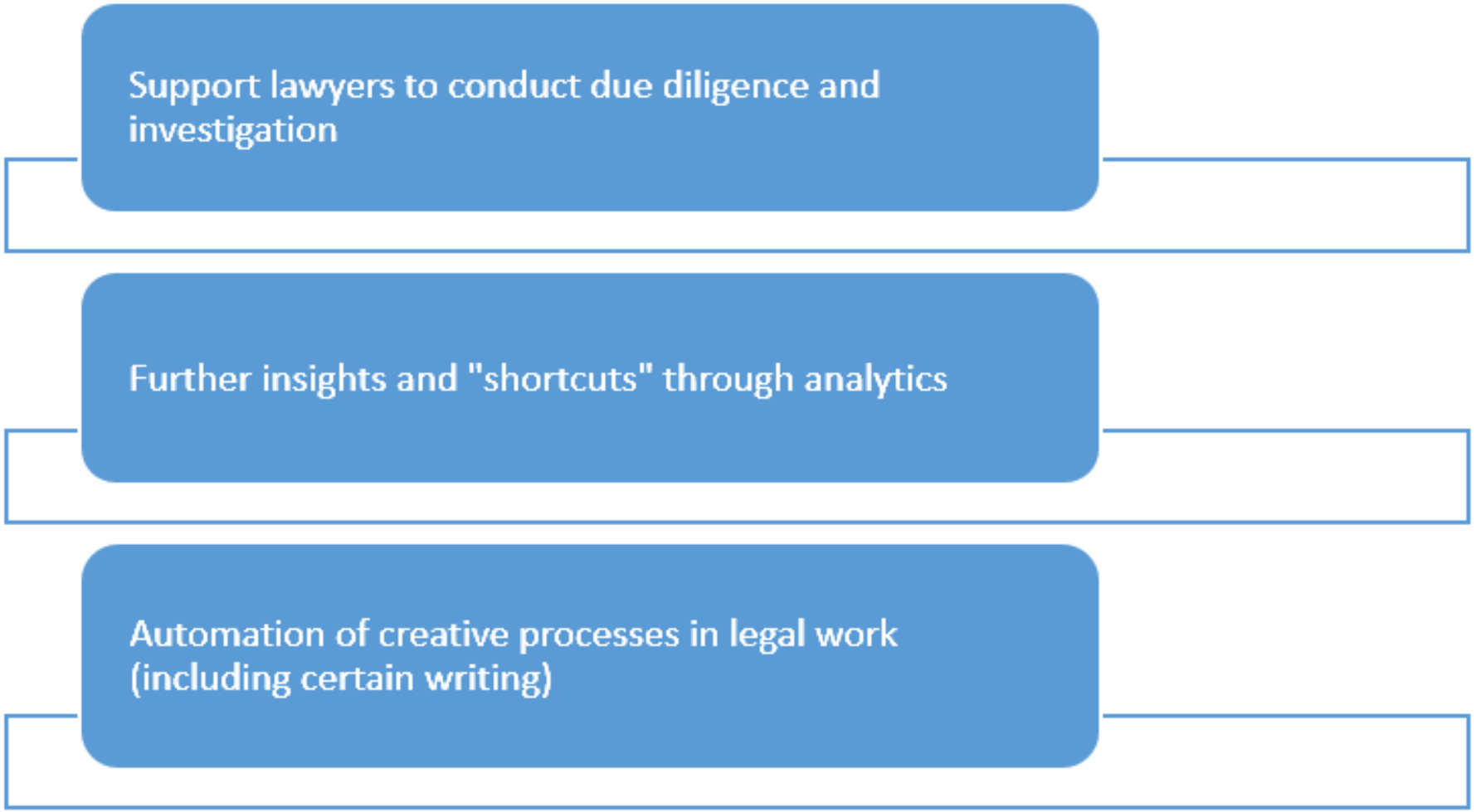


Figure: AI's existing legal applications

Solutions in other areas (3 of 3)

- **AI in Law: Business Applications**

Basis on Business evaluation and legal proposals, existing AI requests seem to fall into six key categories:

- Due Diligence – AI tools allow litigators to detect context information to carry out due diligence. In this section we agreed to include a study of contracts, legal analysis and online discovery.
- Technology prediction – The results of litigation prevention are produced by AI software.
- Legal analytics – lawyers will make use of previous jurisprudence data points, rate of profit/loss, and a judicial context for patterns and trends.
- Document automation – Software models are being used by law firms to create completed documents using input data.
- IP (Intellectual property) –. AI applications always guide lawyers to analyze broad IP portfolios and to know the substance
- E-billing – Lawyers' working hours would be calculated automatically.

Future applications for cognitive computing

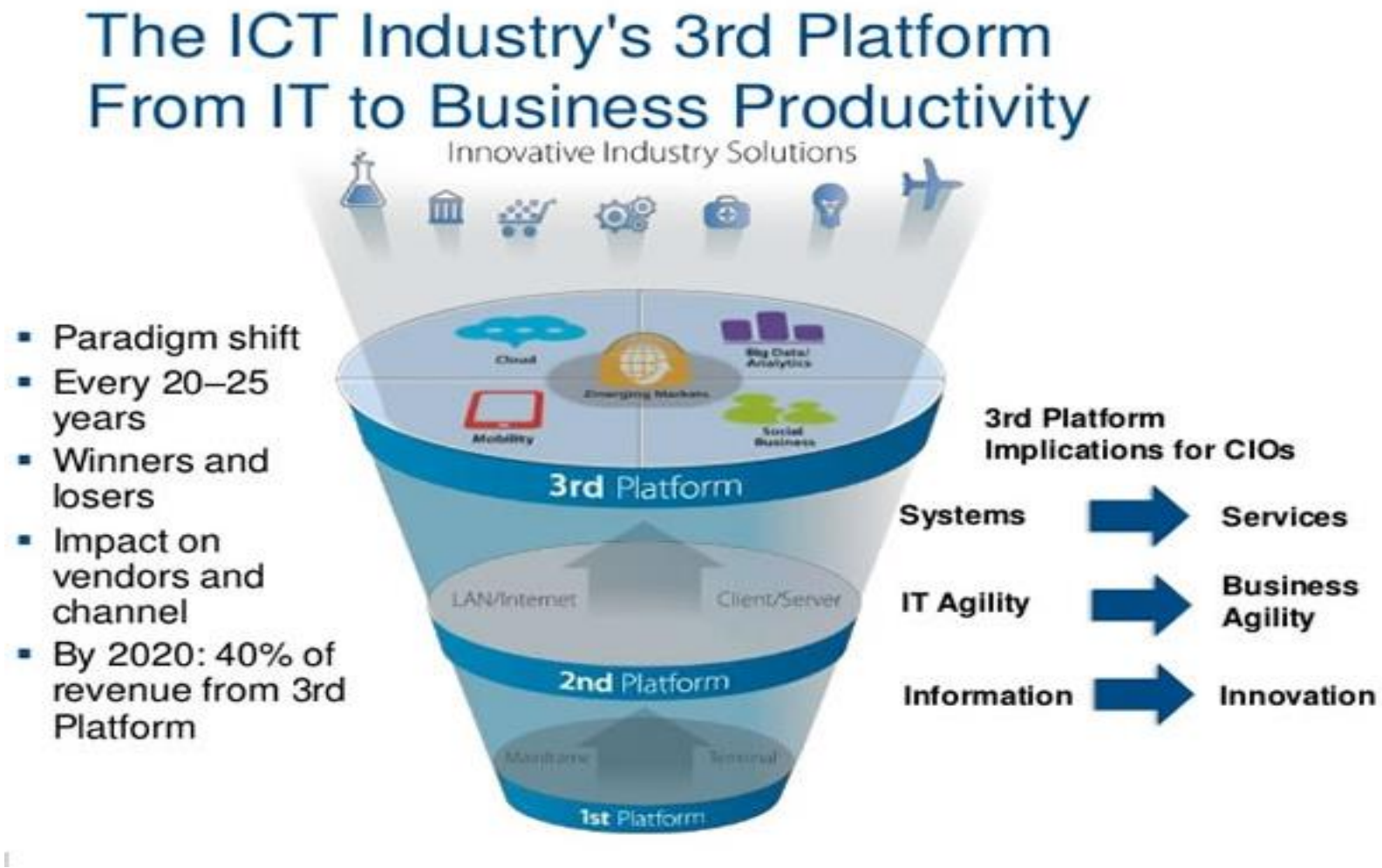


Figure: Cognitive computing future Applications

Source: https://images.app.goo.gl/DnM7VZGqetngT2gk6

Requirements for the next generation (1 of 2)

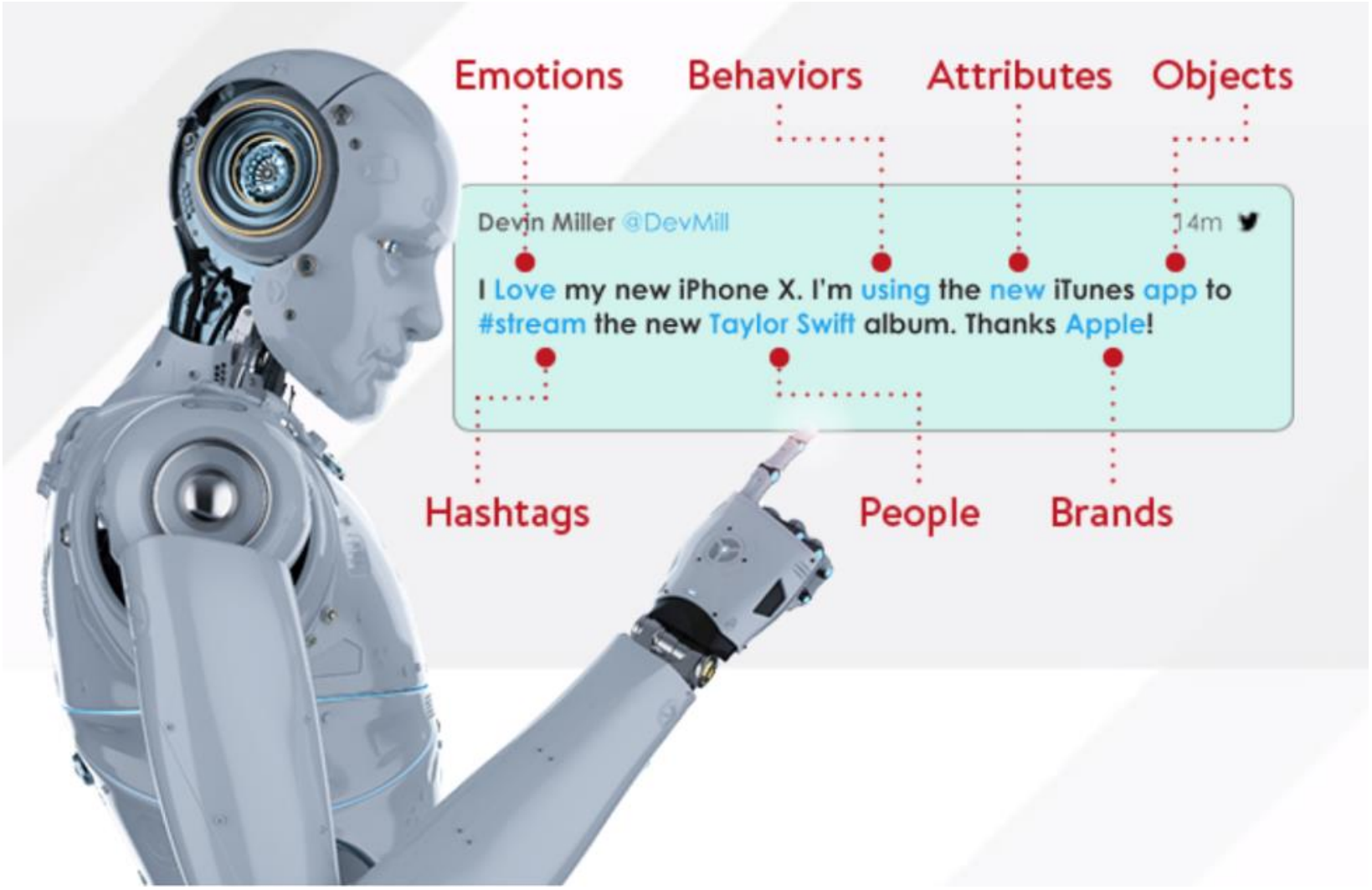


Figure : Next Generation AI model

Source: https://images.app.goo.gl/sh5sC6US8deR4DFBA

Requirements for the next generation (2 of 2)

- **Leveraging Cognitive Computing to Improve Predictability**

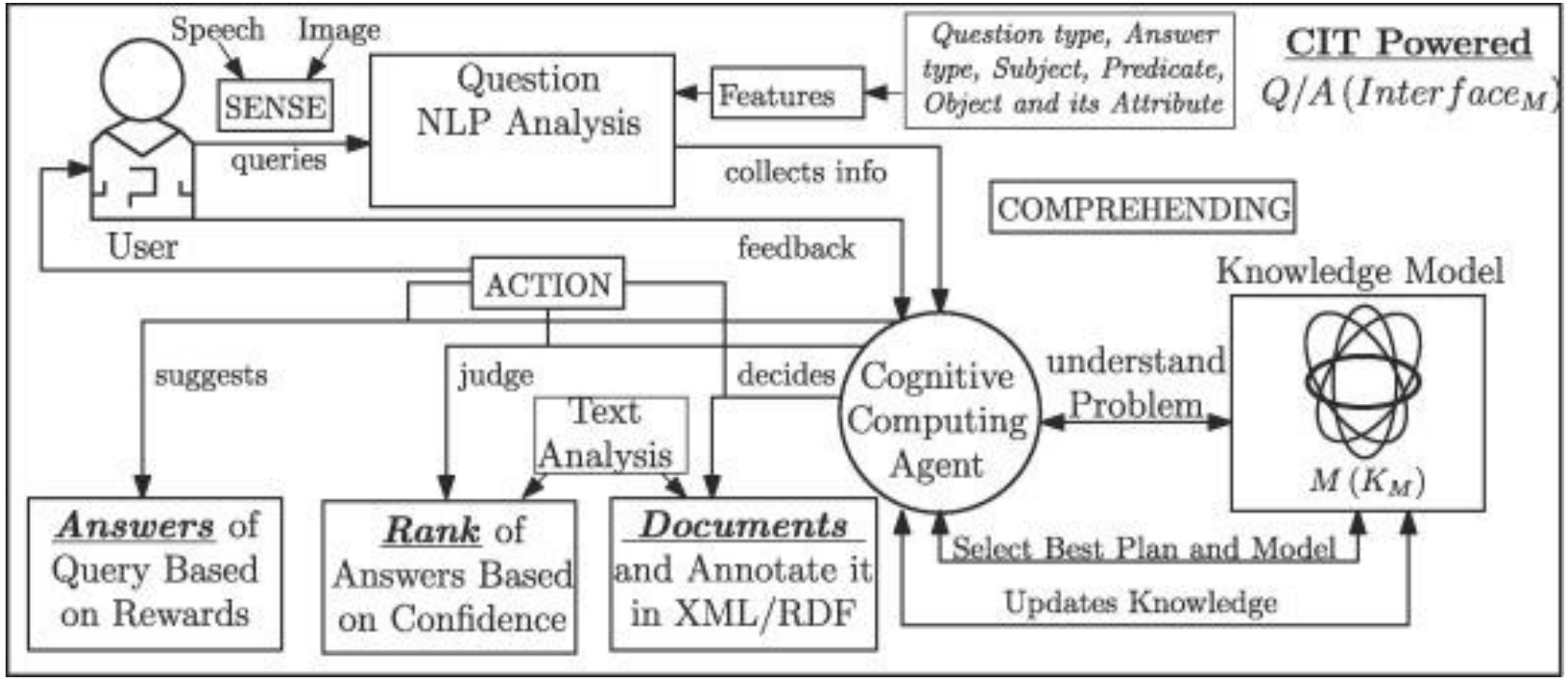


Figure: Cognitive analytics for productivity

Source: https://images.app.goo.gl/gH3GvZrsZsgrz8Fv7

Requirements for the next generation (3 of 3)

- **The New Life Cycle for Knowledge Management**

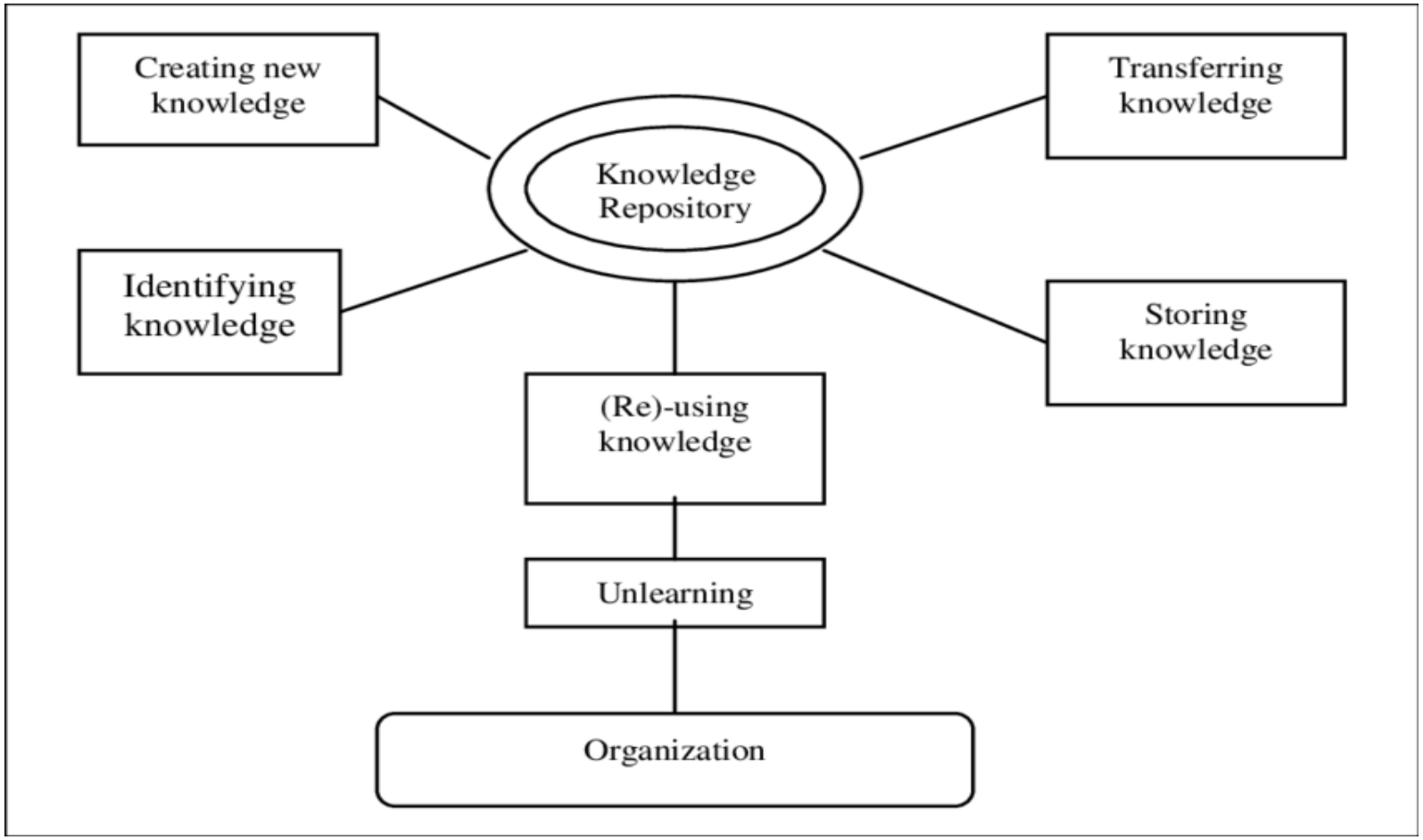


Figure: The life cycle of knowledge management

Source: https://images.app.goo.gl/WYG5Yw8Lyb1816ZBA

Self evaluation: Exercise 23

- To continue with the training, after learning the various steps involved in cognitive analytics and Watson machine learning, it is instructed to utilize the concepts of cognitive machine learning algorithms to perform the following activity.

- You are instructed to write the following activities using Python code.

- Exercise 23: Quora Topic Modeling

What is knowledge management? (1 of 2)

- What is Knowledge Management?
  - Knowledge Management (KM): Is the over-arching umbrella that comprises the strategies and practices an organization uses to discover, create, capture, document, categorize, classify, protect, secure, file, obsolete destroy and renew knowledge.
  - Includes external processes to identify, reference, adopt, share, archive and maintain knowledge assets.
  - Focuses on transferring know-how that involves retrieving, exchanging, accessing, and disseminating understanding

What is knowledge management? (2 of 2)

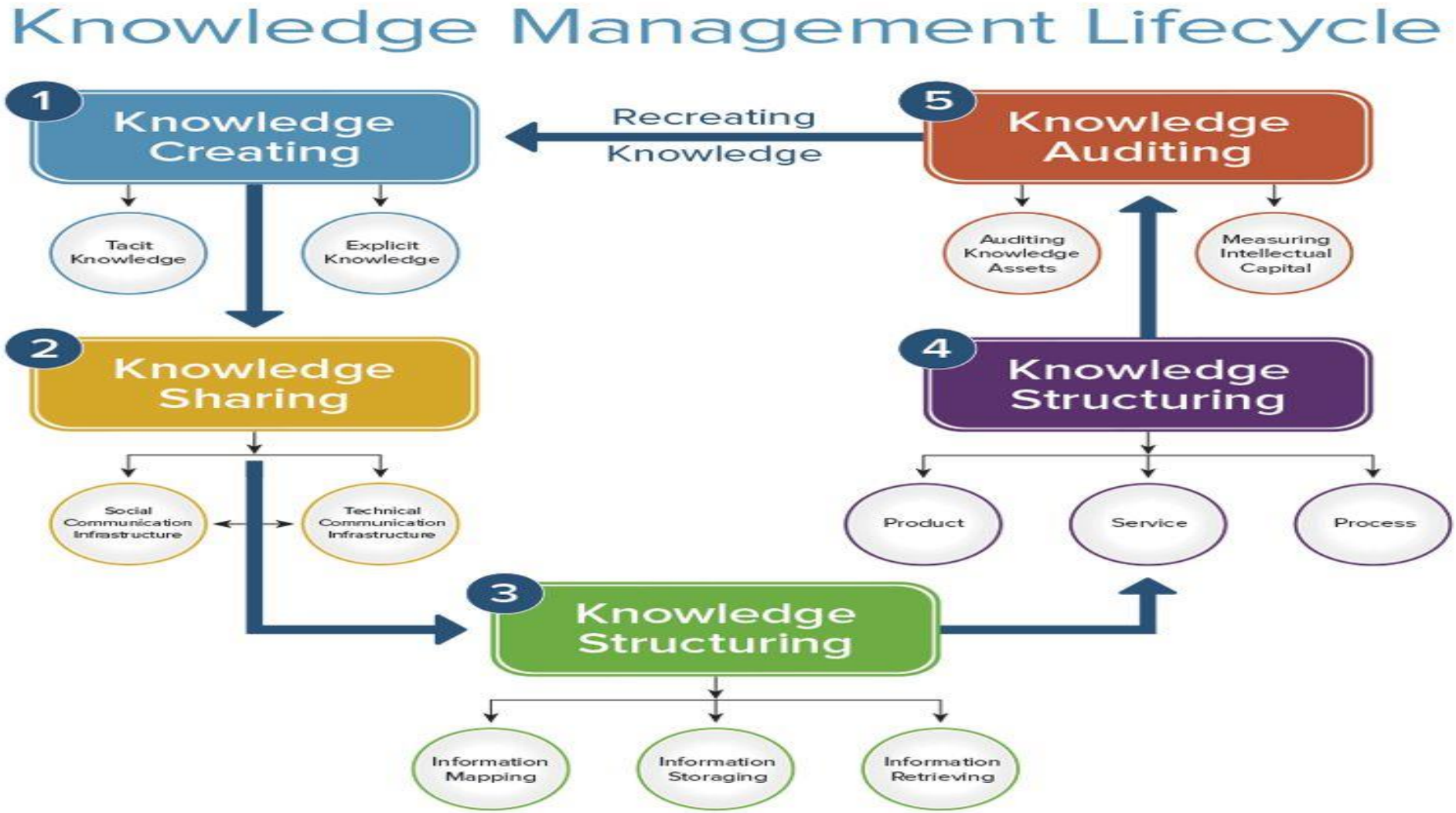


Figure: Knowledge Management life cycle

Source: https://images.app.goo.gl/KzBnNXCpNYND4ktb7

What is knowledge management? (3 of 3)

- **Use cases for customer support and knowledge management**

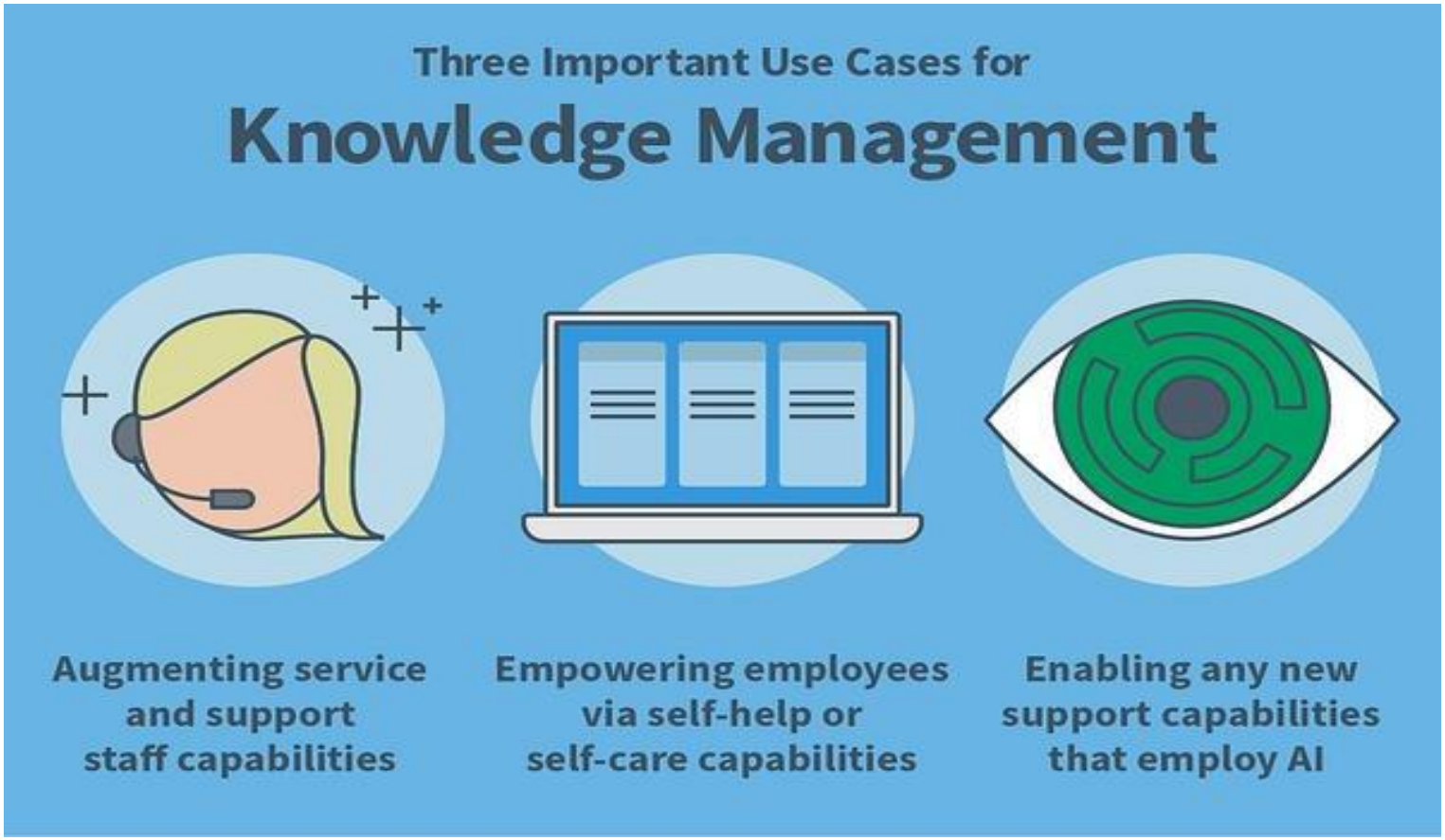


Figure: customer support and knowledge management

Source: https://images.app.goo.gl/rhhTYYzWcBMtdMYr7

Requirements for the next generation (1 of 2)

- **Creating Intuitive Human-to-Machine Interfaces**

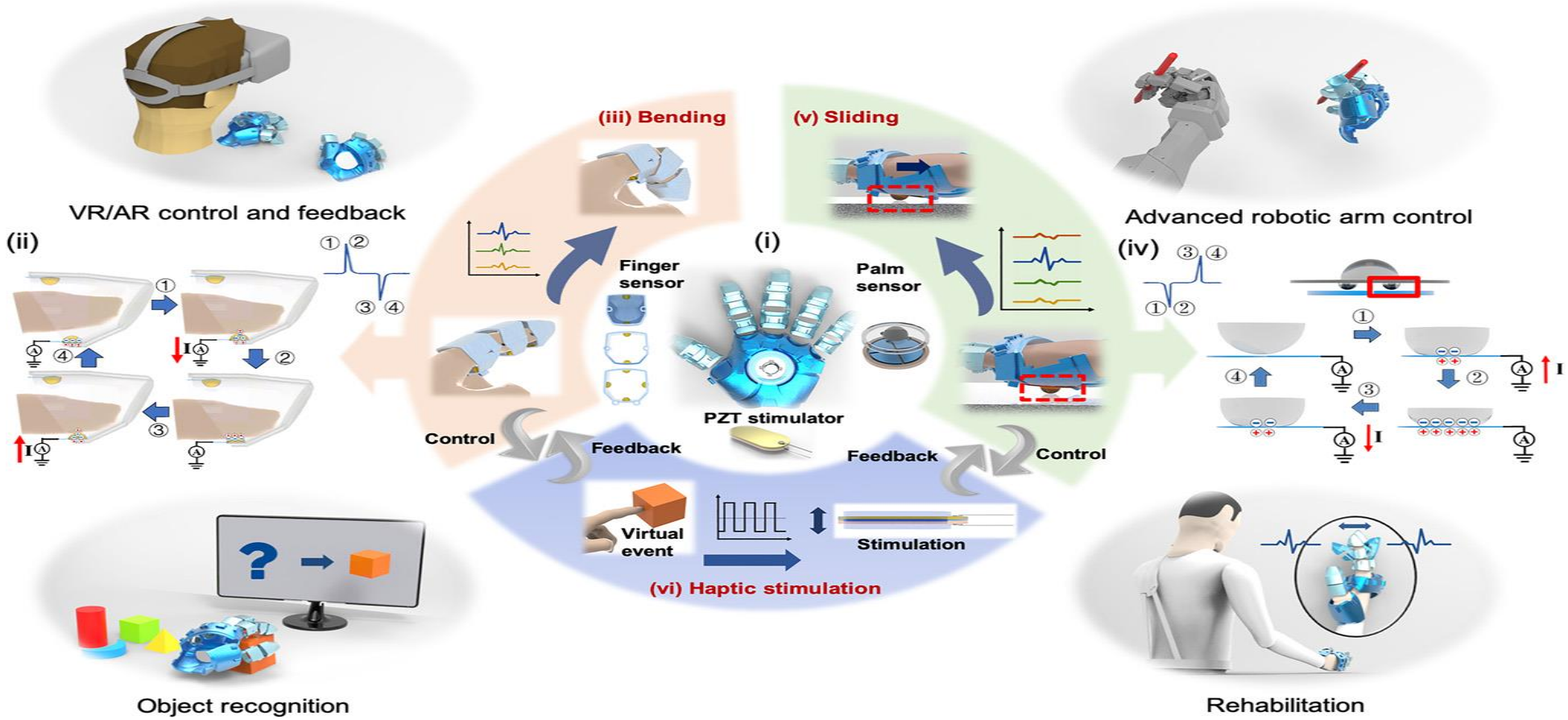


Figure: Human to Machine Interface

Source: https://images.app.goo.gl/sFcN6on4SbFKV9w29

Requirements for the next generation (2 of 2)

- **Requirements to Increase the Packaging of Best Practices**

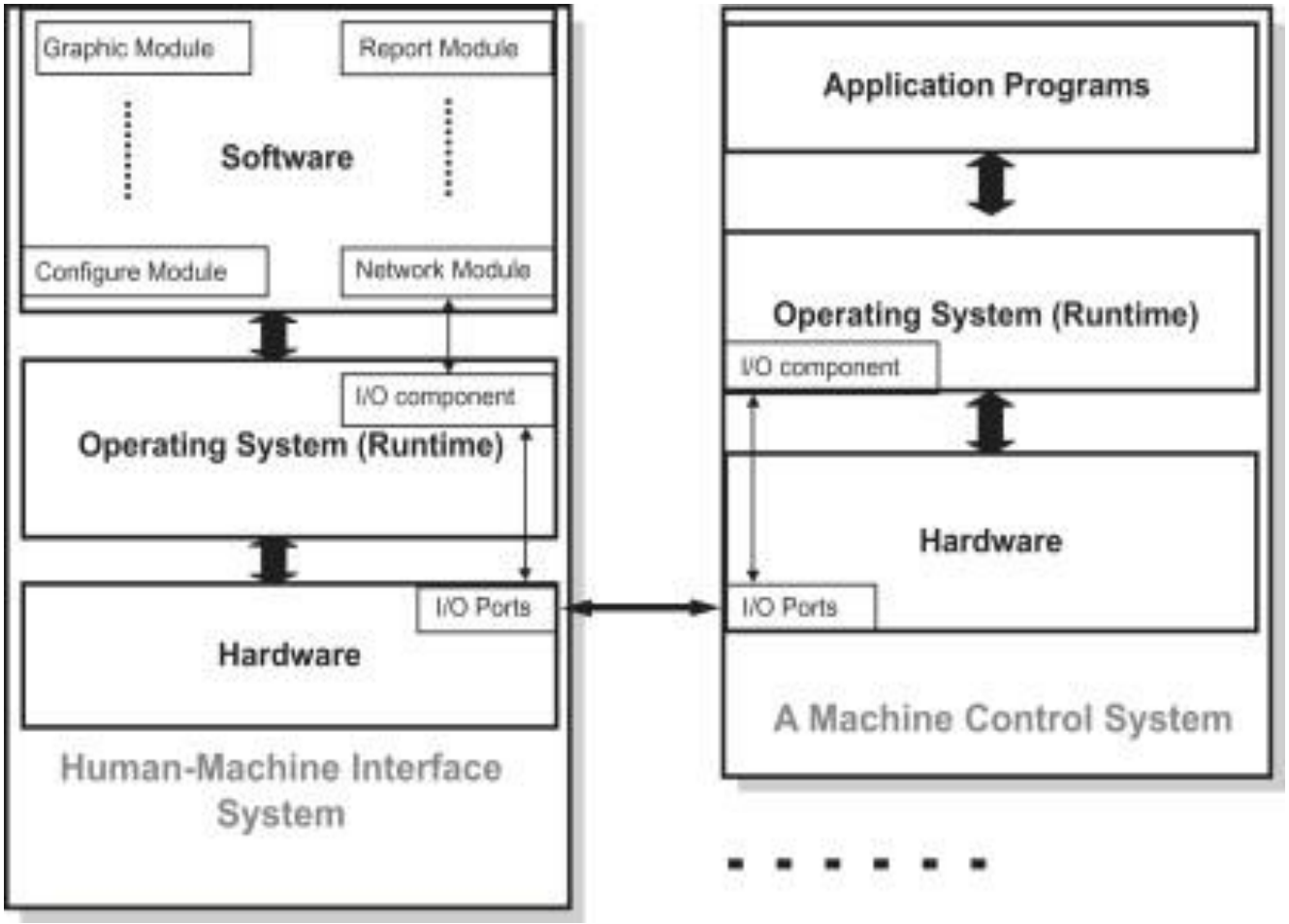


Figure: HMI for next generation model

Source: https://images.app.goo.gl/Naf2q24BMHq5YGPKA

Technical advancements that will change the future of cognitive computing (1 of 2)

- **What the Future Will Look Like**

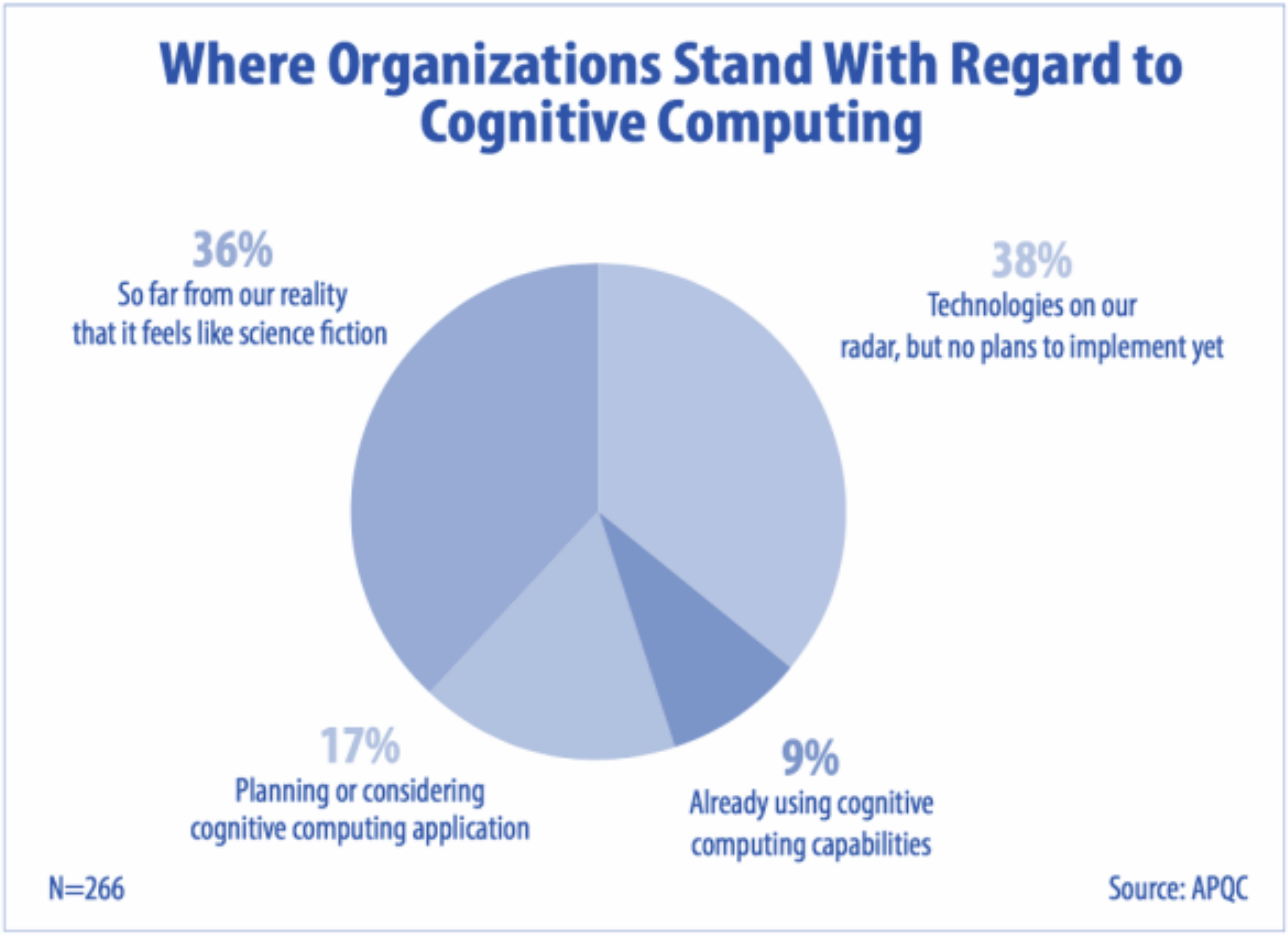


Figure: Organization with cognitive model

Source: https://images.app.goo.gl/7q6h4zGdifgspo2r5

Technical advancements that will change the future of cognitive computing (2 of 2)

- **The Next Five Years**

The Cognitive Era is not prediction of a future time period, it has already begun

"The numbers in the new AI field are staggering: more than 2,300 startups (a comprehensive list can be found here) have been founded; venture capitalists are investing billions of dollars." *Forrester*

"IDC expects the overall market to grow significantly in the 2015–2019 forecast period, at a CAGR of approaching 35%." *IDC*

"Smart machines are not future fantasy; they are commercially available. According to Gartner's analysis of external sources, more than $10 billion have already been purchased through more than 2,500 technology companies." *Gartner*

Frost & Sullivan: Future Applications of Cognitive Intelligence

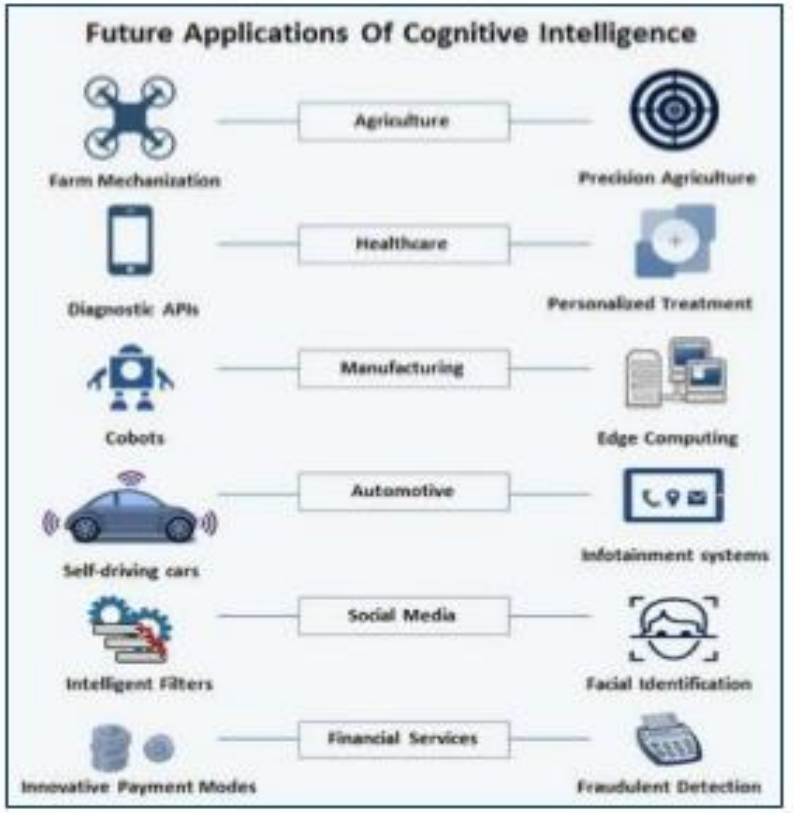


Figure: Cognitive future

Source: https://images.app.goo.gl/kpeUcXqYeYhcveM27

Technical advancements that will change the future of cognitive computing (3 of 3)

- **Looking at the Long Term**

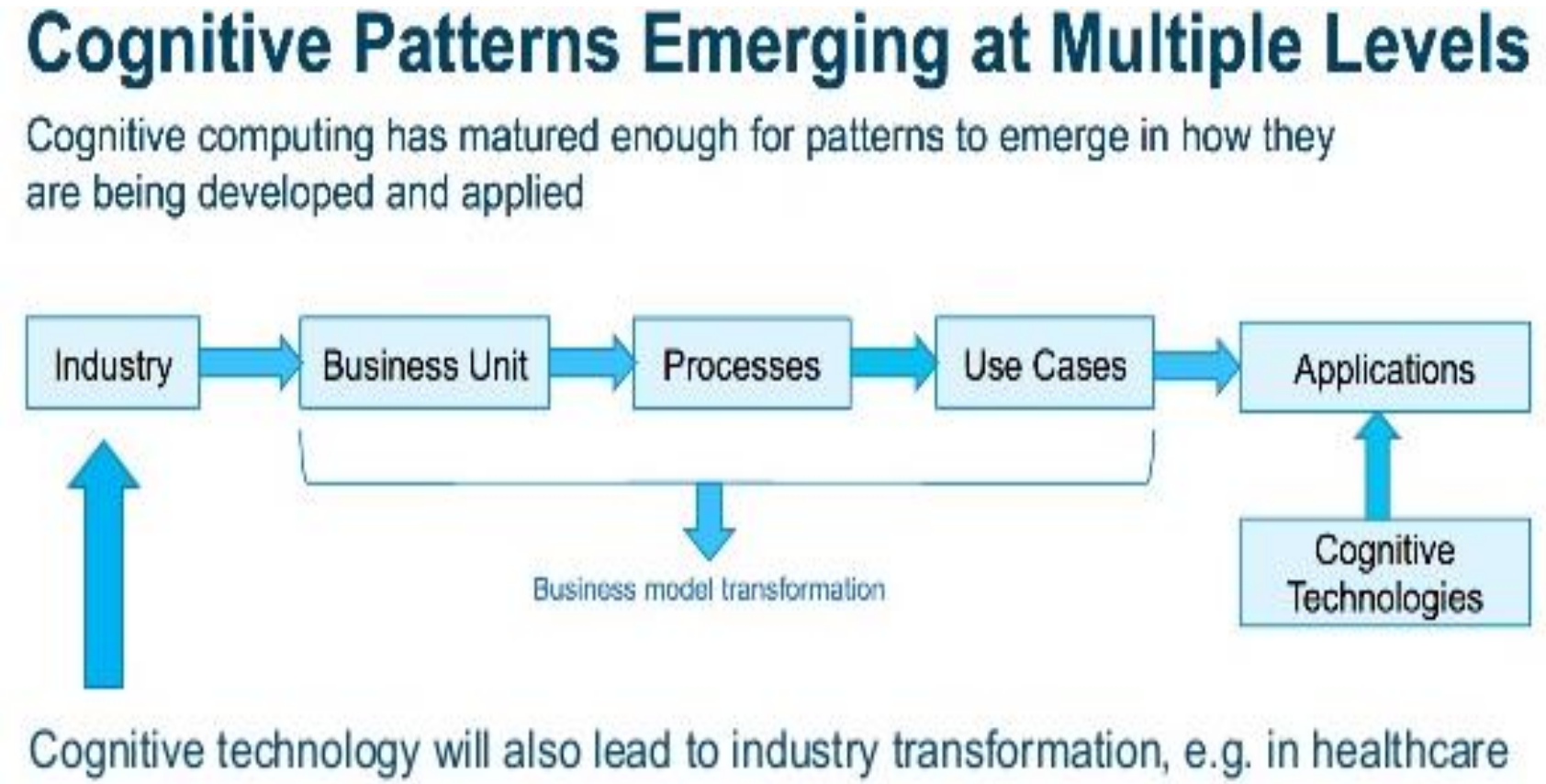


Figure: Cognitive pattern at multiple levels

Source: https://images.app.goo.gl/9qAiKApaep6zmSHr6

Emerging innovations

Business solution innovations

are packages of platform technology that work together to enable new ways of understanding and engaging with customers across their life cycle.

- Customer analytics
- Digital experience solutions
- Customer-driven design
- Internet of Things

Emerging technology is enabling innovation at the platform level:

Interaction platforms innovations

enable firms to interact with customers, employees, and partners in natural, engaging, and constantly connected new ways.

- Next-generation connectivity
- Wearable technology
- Natural computer interfaces

Digital delivery and aggregation platform innovations

enable firms to execute intelligent processes and deliver relevant insights by exploiting all the underlying data.

- Real-time data sourcing and delivery
- Advanced analytics
- Digital identity management
- Software acceleration platforms and tools

Infrastructure and context platforms innovations

enable firms to manage all the processes and data needed to understand and exploit customer context and adapt to constantly changing markets and customer preferences.

- Advanced silicon devices
- Software-defined infrastructure
- Cloud integration
- Big data management

118916

Source: Forrester Research, Inc.

Figure: Emerging Innovations

Source: https://images.app.goo.gl/V14yDaL5GDFwAMnQ7

Deep QA and hypothesis generation (1 of 2)

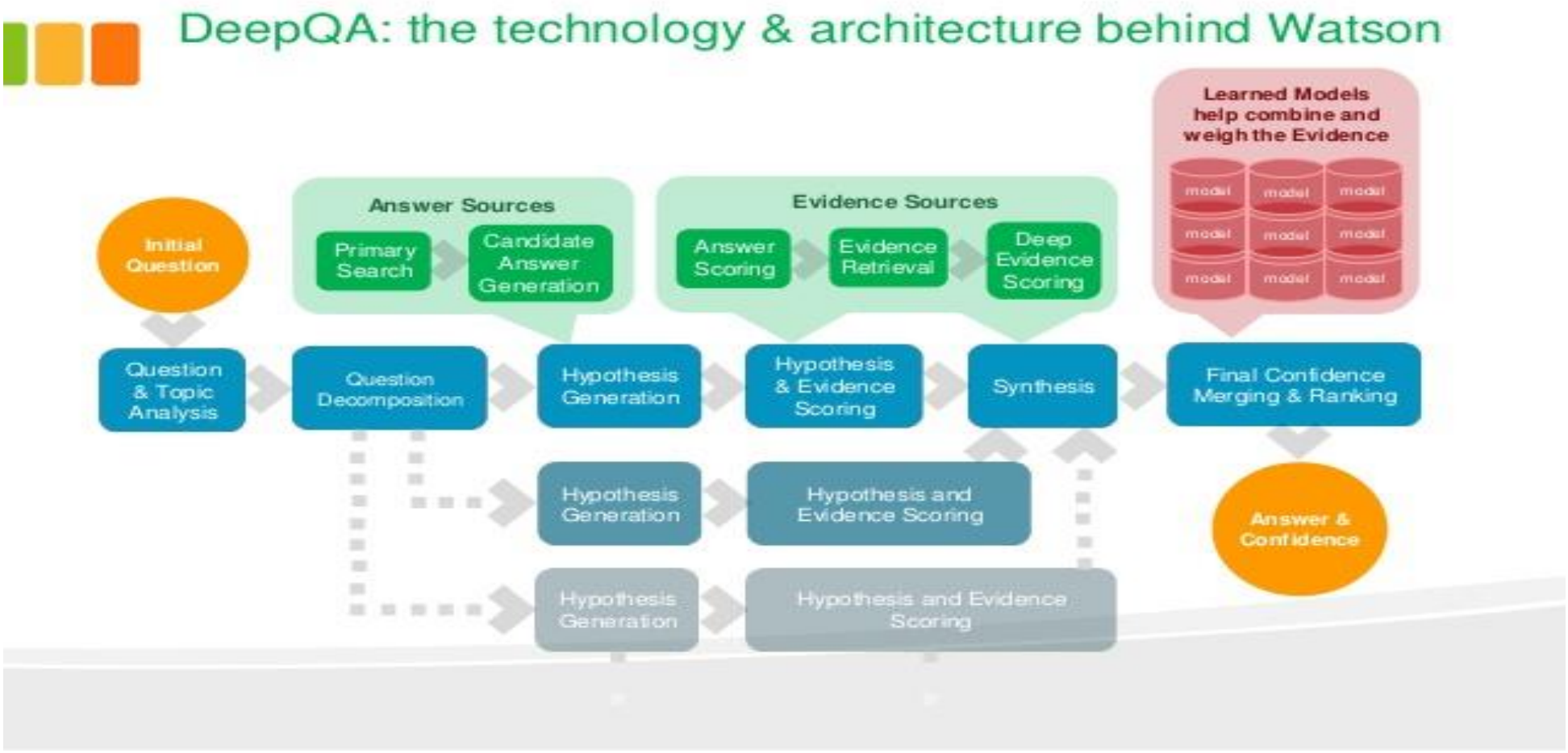


Figure: DeepQA Architecture

Source: https://images.app.goo.gl/pgPk9szHyhNBCLjP6

Deep QA and hypothesis generation (2 of 2)

Example	Experimental hypothesis: H_1	Null hypothesis: H_0
Music	The Beatles have sold more records than Michael Jackson.	The number of records sold by The Beatles and Michael Jackson will not be different.
Optometry (Correlational research)	The instance of dry eye is different in men and women.	There is no difference in the prevalence of dry eye in men and women.
Optometry (Experimental research)	Students with highly rated supervisors will have higher marks than students with lower rated supervisors.	No difference between the marks of students who had highly rated supervisors to those who had lowly rated supervisors.

Figure: Summery of H1 and H0 example

Source: https://images.app.goo.gl/iekL2Tv5Nf2VjX7x6

Deep QA and hypothesis generation (3 of 3)

- The doctor's hypotheses could have taken the following forms:
  - H1 “Childbed fever” is caused by “cosmic effects”.
  - H2 Overcrowding is the cause of “childbed fever".
  - H3 Diet is the cause of "chitdbed fever".
  - H4 the rough examination by the medical staff results in the onset of “childbed fever”.
  - H5 the dorsal delivery position results in the onset of “childbed fever".
  - H6 Psychological effects (the priest) are the cause of “childbed fever”.
  - H7 Cadaverous material is the cause of “childbed fever".

Natural Language Process (NLP)

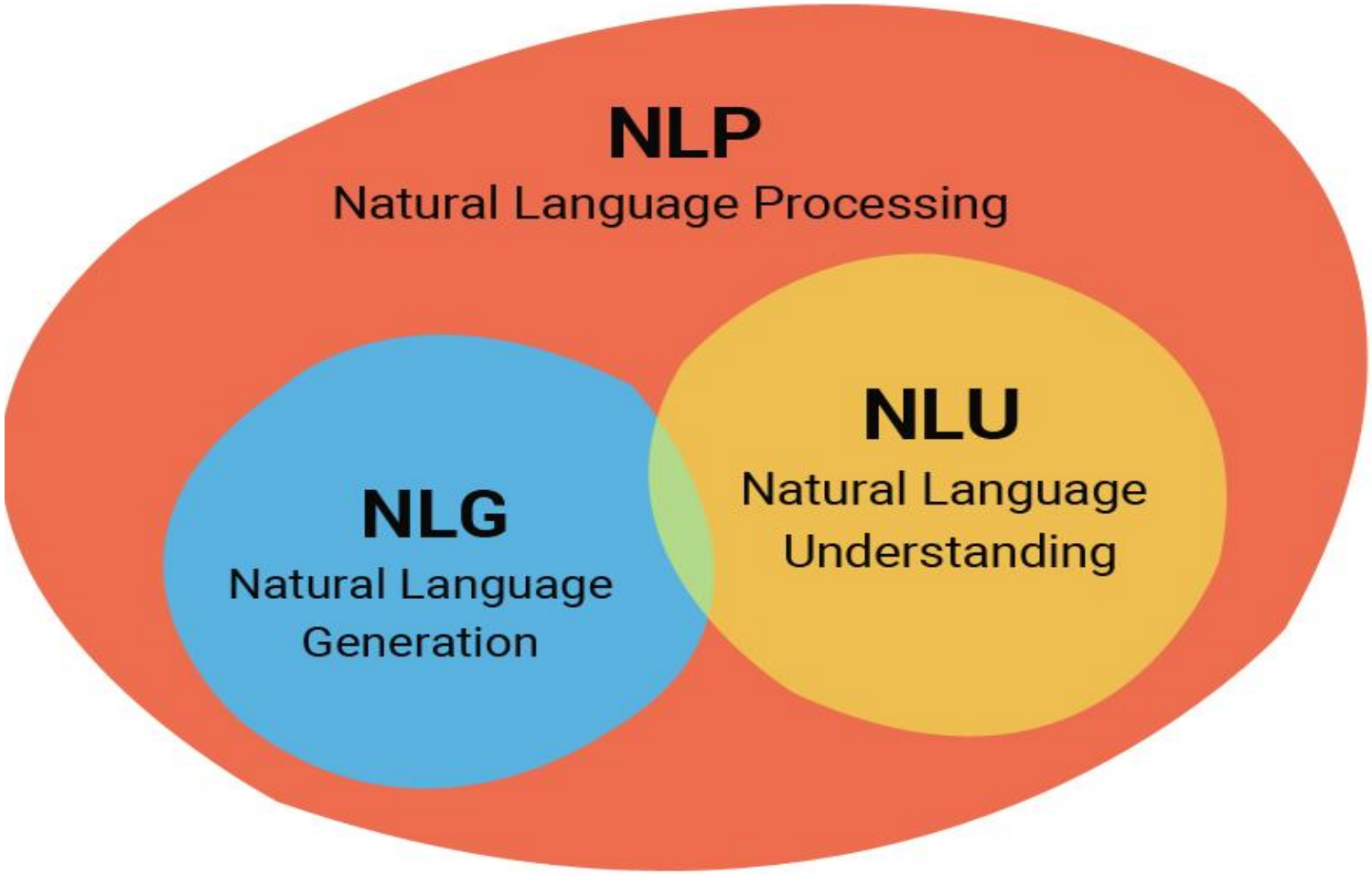


Figure: NLP, NLG and NLU

Source: https://images.app.goo.gl/N8EwoKfzngbjjwK48

Cognitive training tools

Some of the Best Cognitive Computing Tools:

- SparkPredict by SparkCognition.
- ignio™ Cheetah by TCS.
- Iris by Apixio.
- AlphaGo by Google.
- Aila by Enterra Solutions.
- Cortex Certifai by CognitiveScale.
- IBM Watson.

Data integration and representation

- Data pre-processing.
- Data cleaning: Fill in missing values, smooth noisy data, identify or remove outliers, and resolve inconsistencies.
- Data integration: Integration of multiple databases, data cubes, or files.
- Data transformation: Normalization and aggregation.
- Data reduction: Obtains reduced representation in volume but produces the same or similar analytical results.
- Data discretization: Part of data reduction but with importance, especially for numerical data

Emerging hardware architectures (1 of 2)

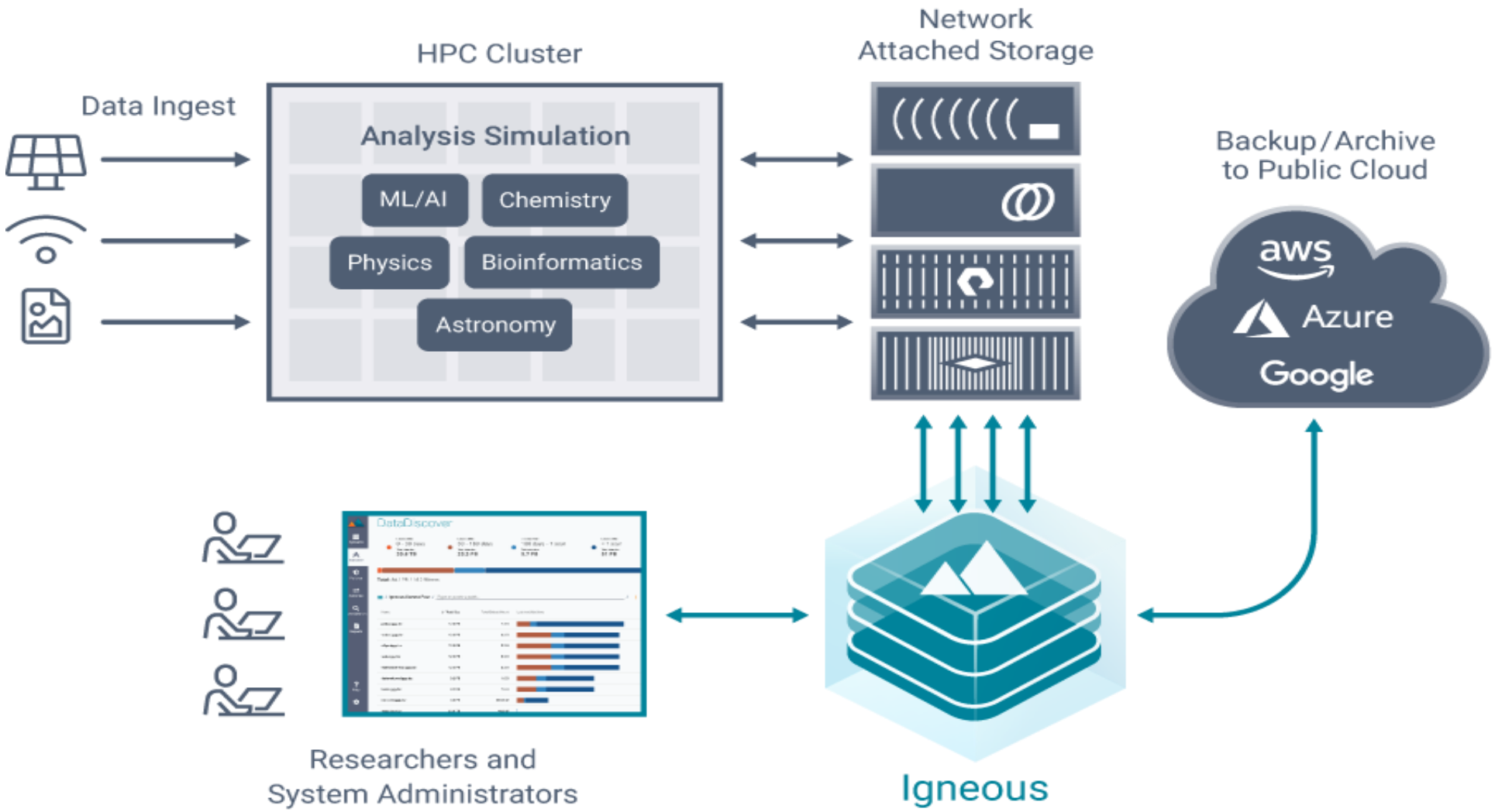


Figure: High Performance Computing

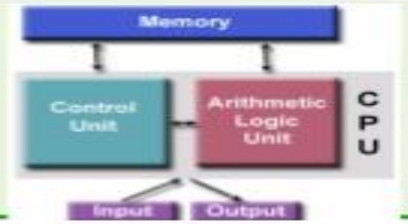
Source: https://images.app.goo.gl/feDMJa9CFcmNr1qd8

Emerging hardware architectures (2 of 2)

- **Neurosynaptic Architectures**

Comparison with Conventional Chips Architecture

	Conventional Computer	Brain Inspired Computer
Architecture	**Von Neumann**	**Neural Network**
Computing unit	CPU	Synaptic Chip (e.g. TrueNorth)
Storing unit	Memory	Synaptic Chip (e.g. TrueNorth)
Computing	Serial (multiple cores)	Massively Parallel
Communication	CPU <-> Memory	Neurons <-> Neurons
Advantage	Processing (Logical, Analytical)	Learning (Pattern Recognition)



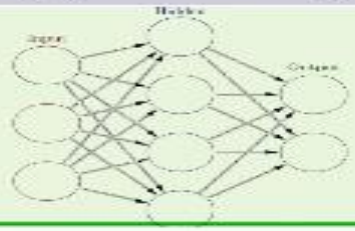


Figure: Comparison with conventional chips Architecture

Source: https://images.app.goo.gl/JBbwUMK18M4kv8FK9

Emerging hardware architectures (3 of 3)

- **Quantum Architectures**

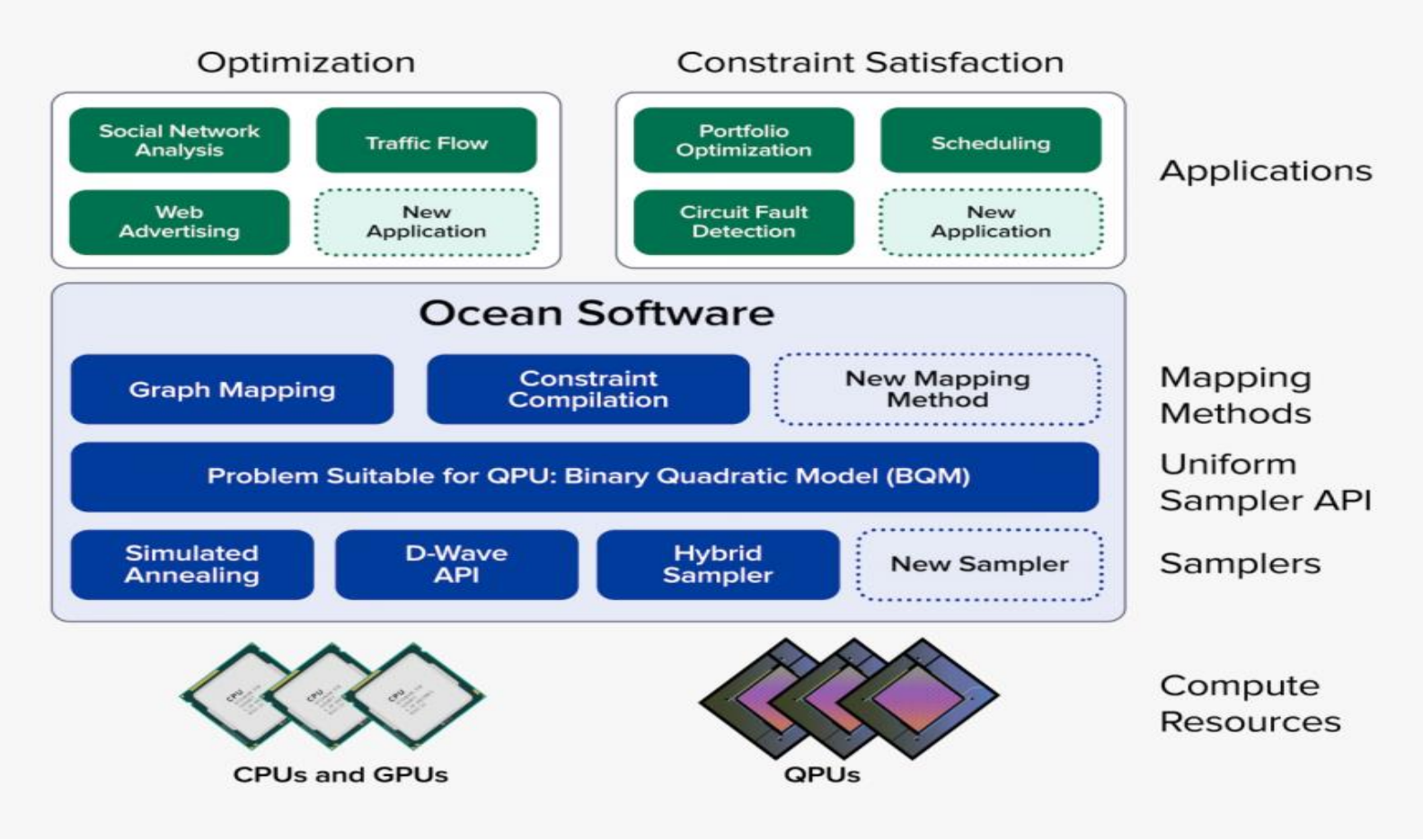


Figure: Quantum Architectures

Source: https://images.app.goo.gl/mysDygWA2sv5ofRr7

Alternative models for natural cognitive models

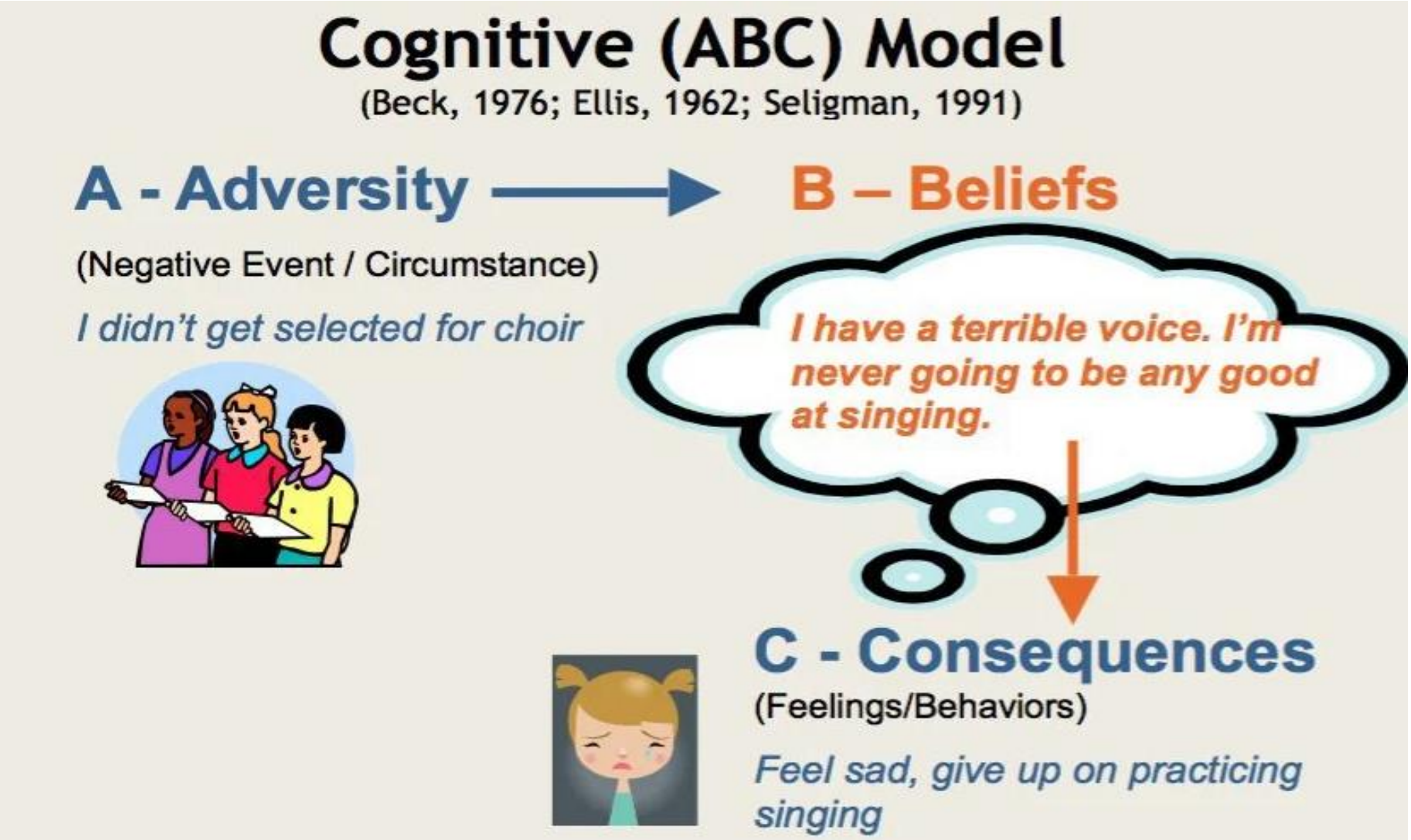


Figure: Alternative model for cognitive computing

Source: https://images.app.goo.gl/E6oKFXC9byHrRo9i9

Self evaluation: Exercise 24

- To continue with the training, after learning the various steps involved in cognitive analytics and Watson machine learning, it is instructed to utilize the concepts of cognitive machine learning algorithms to perform the following activity.

- You are instructed to write the following activities using Python code.

- Exercise 24: Natural Language Processing

Cognitive computing business approach with IBM Watson (1 of 2)

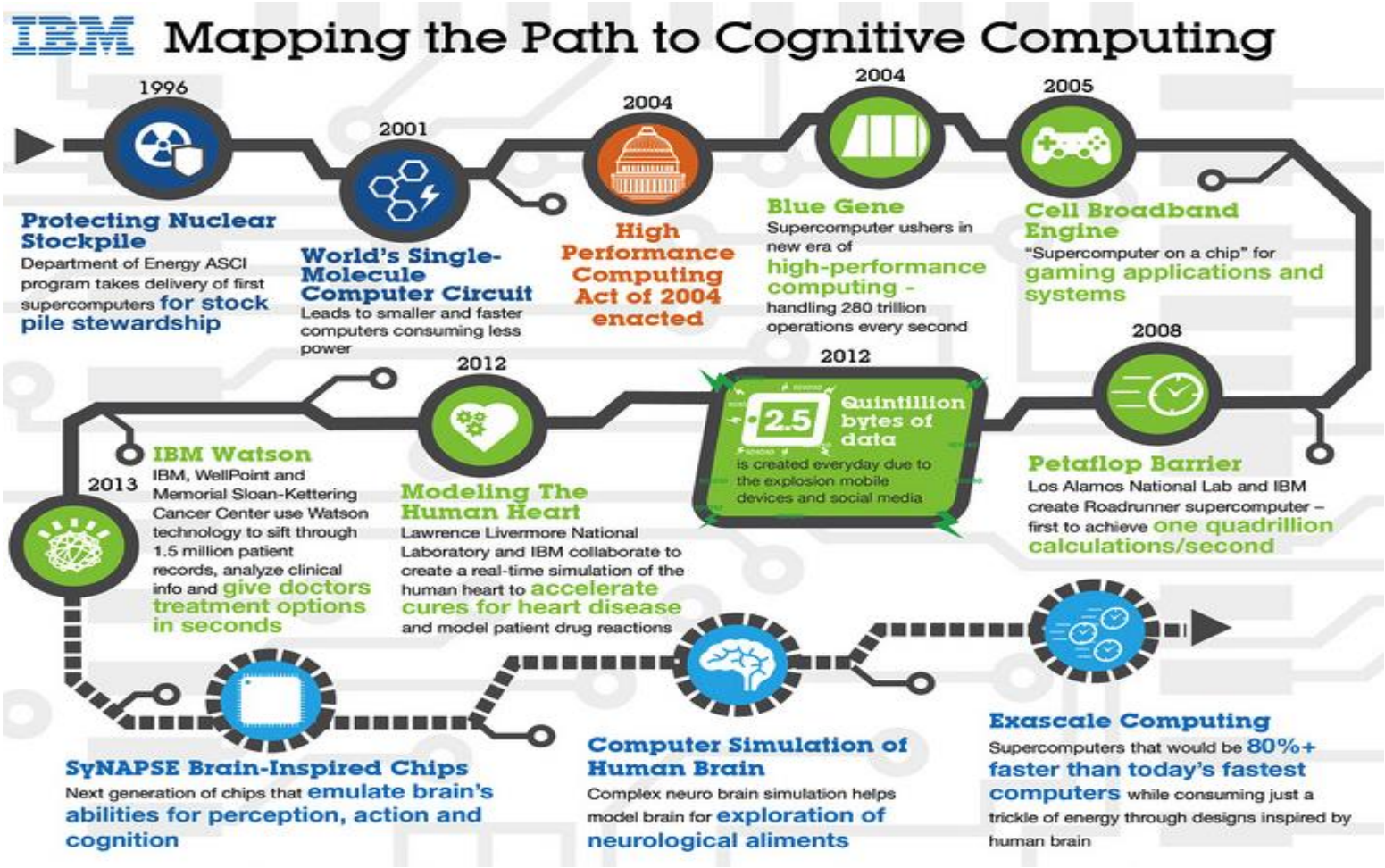


Figure: IBM Watson with cognitive computing

Source: https://images.app.goo.gl/so66p7ycfJd4iyP47

Cognitive computing business approach with IBM Watson (2 of 2)

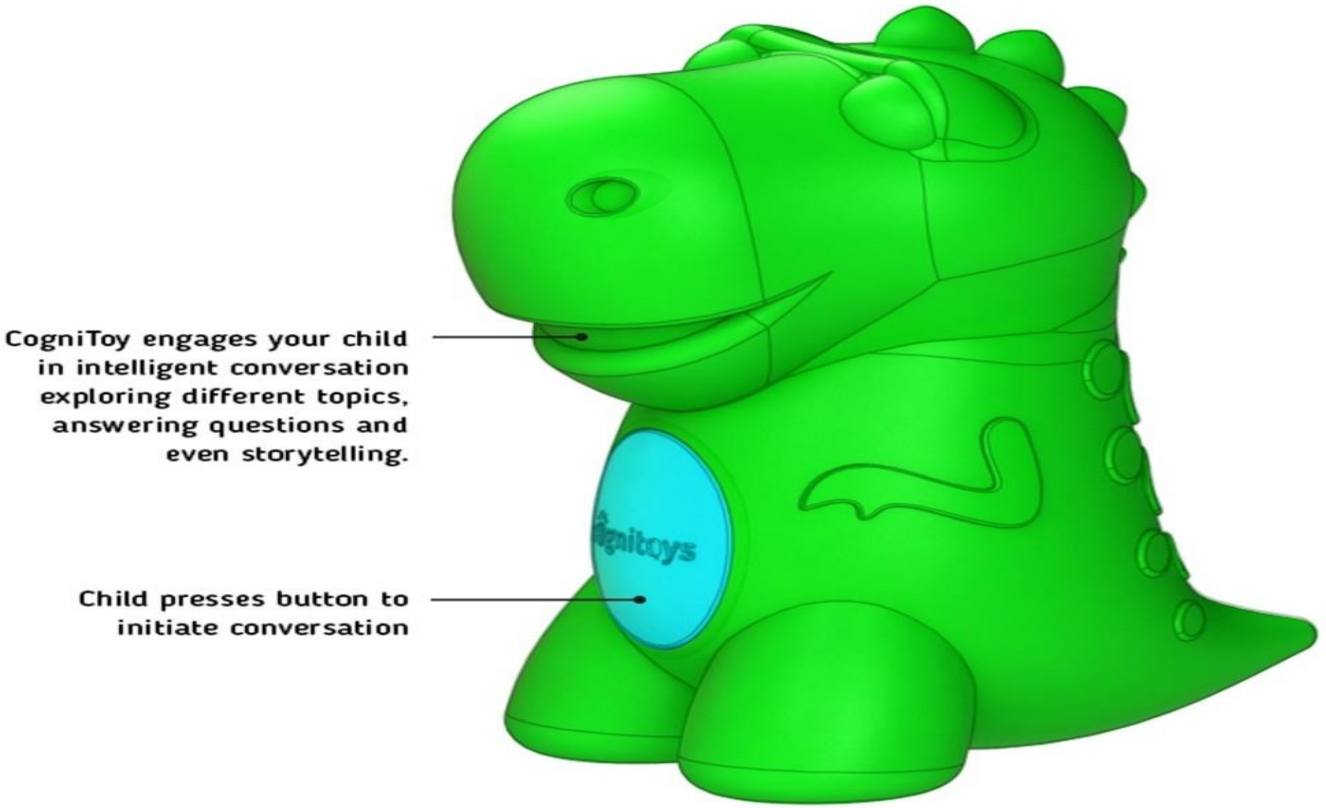


Figure: CogniToy

Source: https://images.app.goo.gl/riMS8CPezXbDBznf9

A new cognitive era for business applications with Watson (1 of 2)

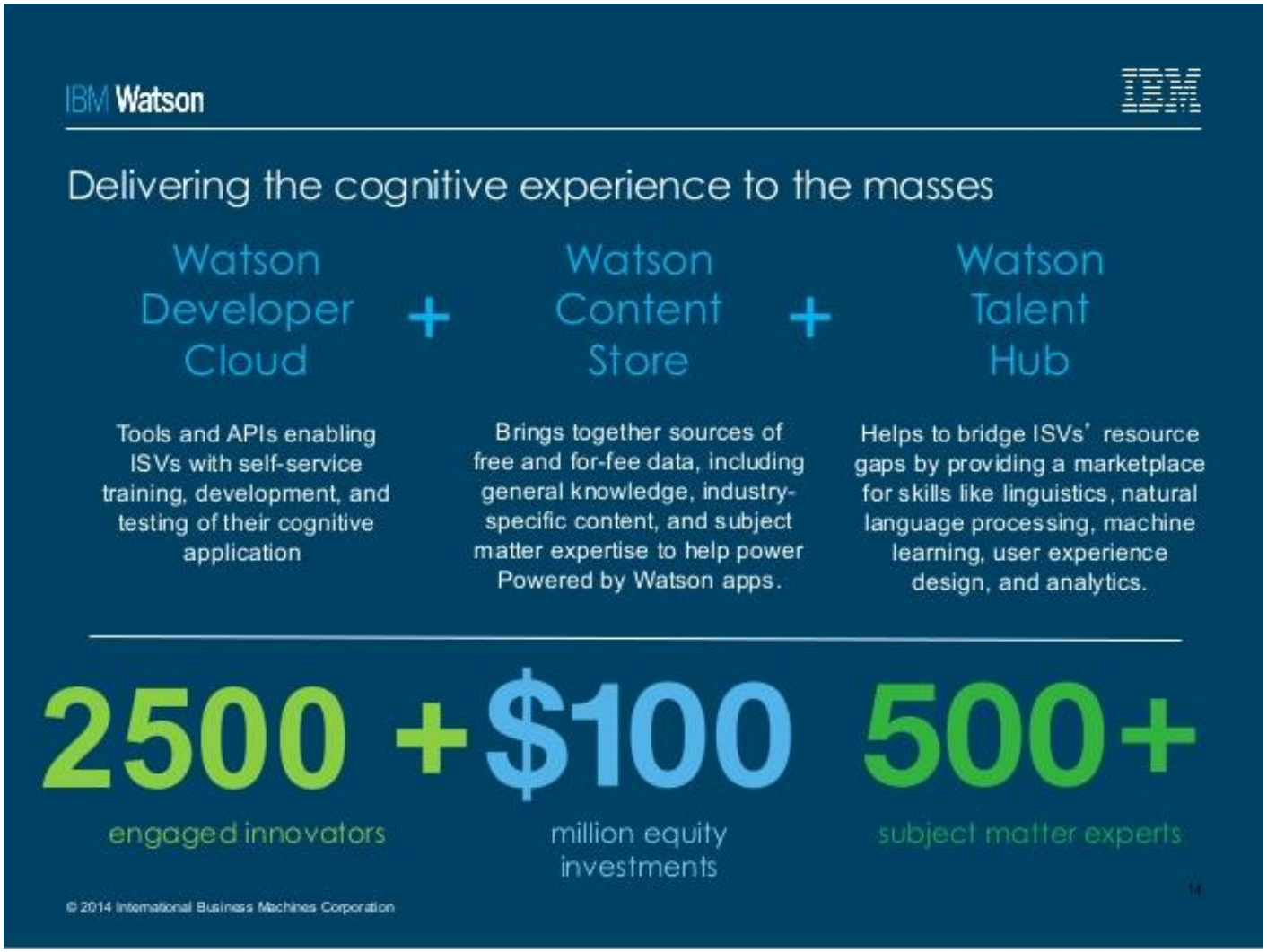


Figure: Cognitive era with watson

Source: https://images.app.goo.gl/sCuf3dgLyqDp9uae6

A new cognitive era for business applications with Watson (2 of 2)

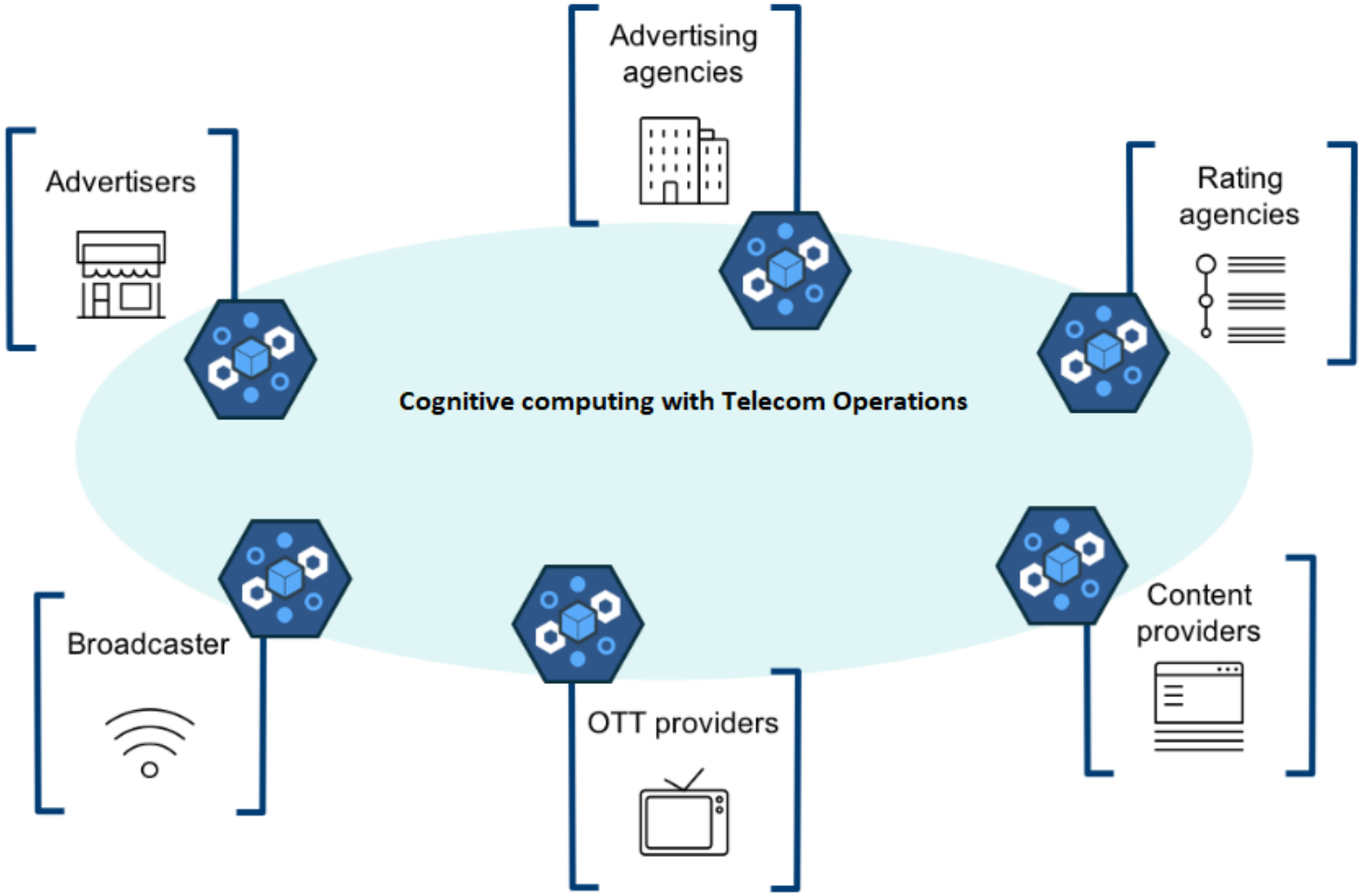


Figure: Cognitive in Telecom

A new cognitive era for business applications with Watson (3 of 3)

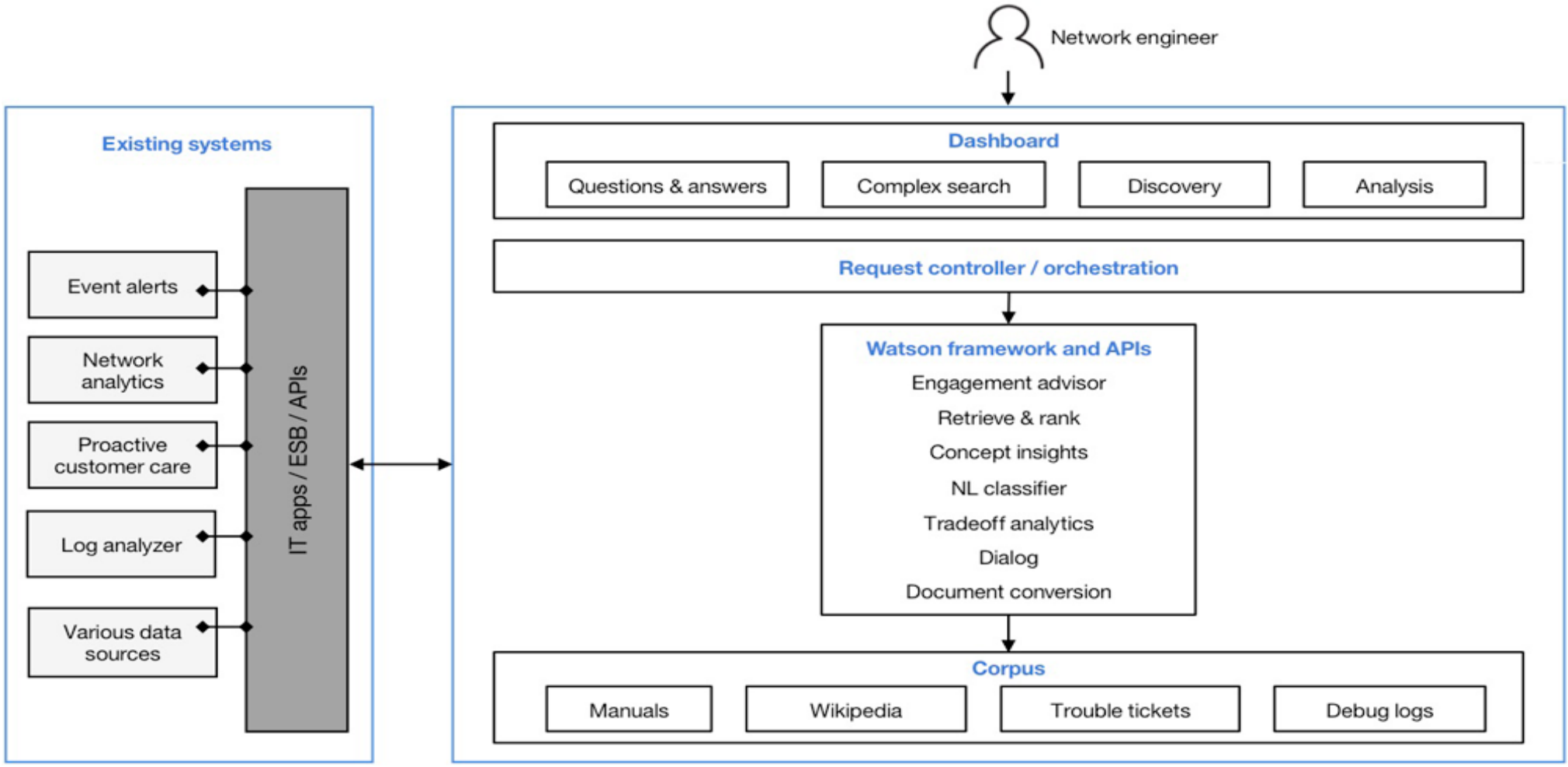


Figure: API and Framework

Source: https://images.app.goo.gl/LZaGHCbzwKuSkh56A

Example: Self-service agent-device doctor (1 of 2)

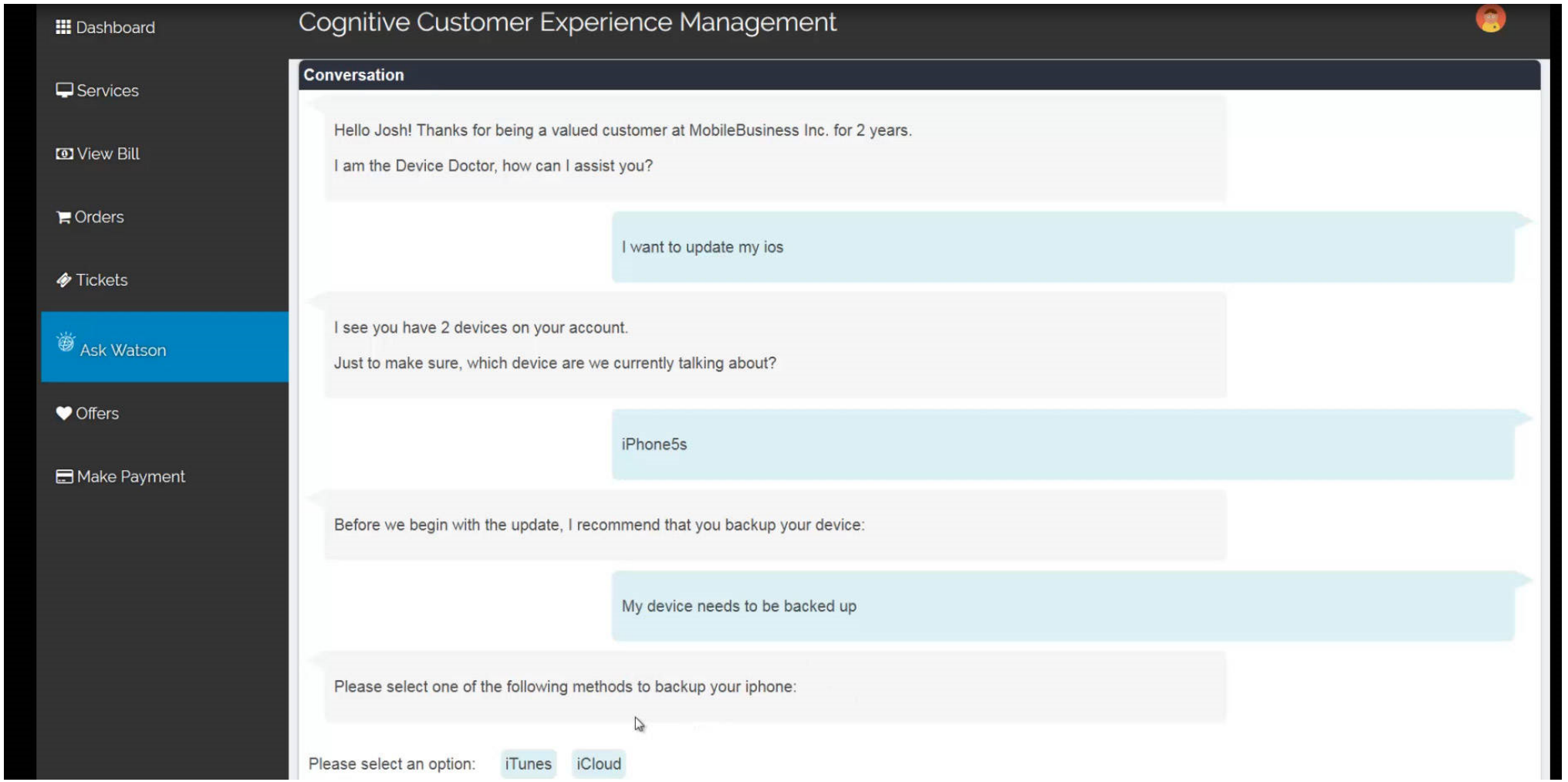


Figure: Watson Customer Experience

Source: http://www.redbooks.ibm.com/ sg248387

Example: Self-service agent-device doctor (2 of 2)

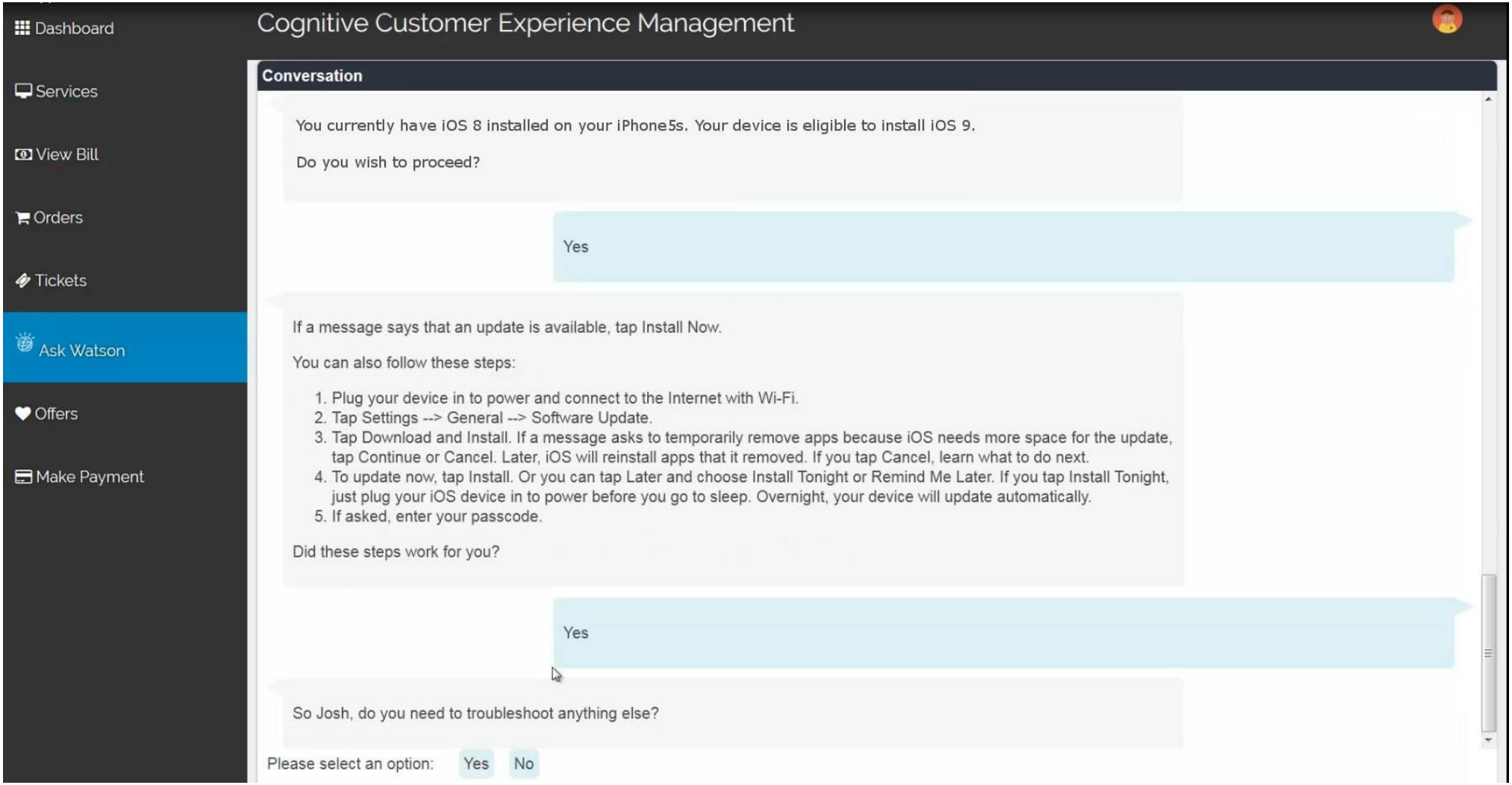


Figure: Cognitive customer experience management dashboard

Source: http://www.redbooks.ibm.com/ sg248387

Example: Network operations (1 of 2)

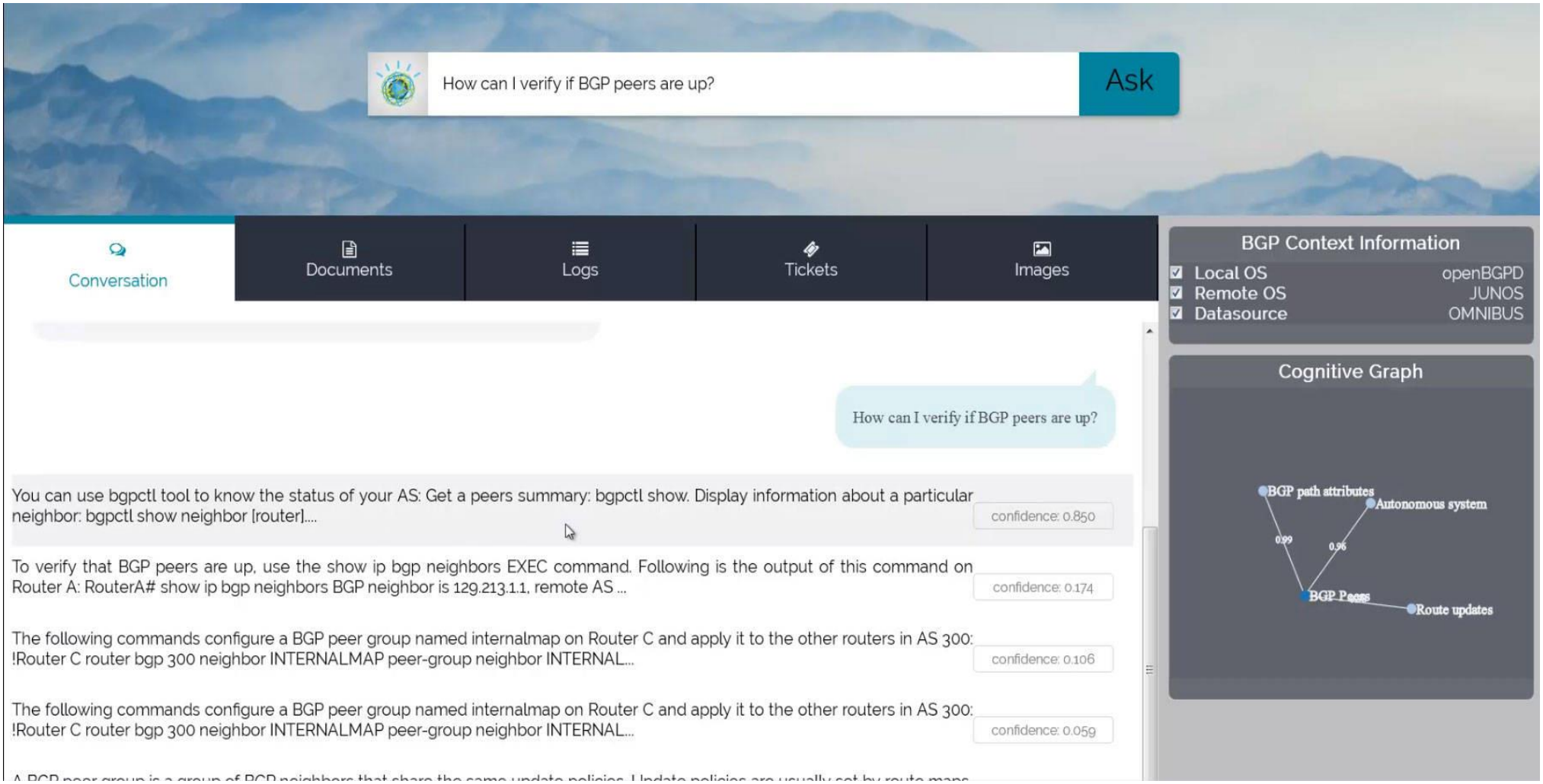


Figure: Network Operations
Source: http://www.redbooks.ibm.com/ sg248387

Example: Network operations (2 of 2)

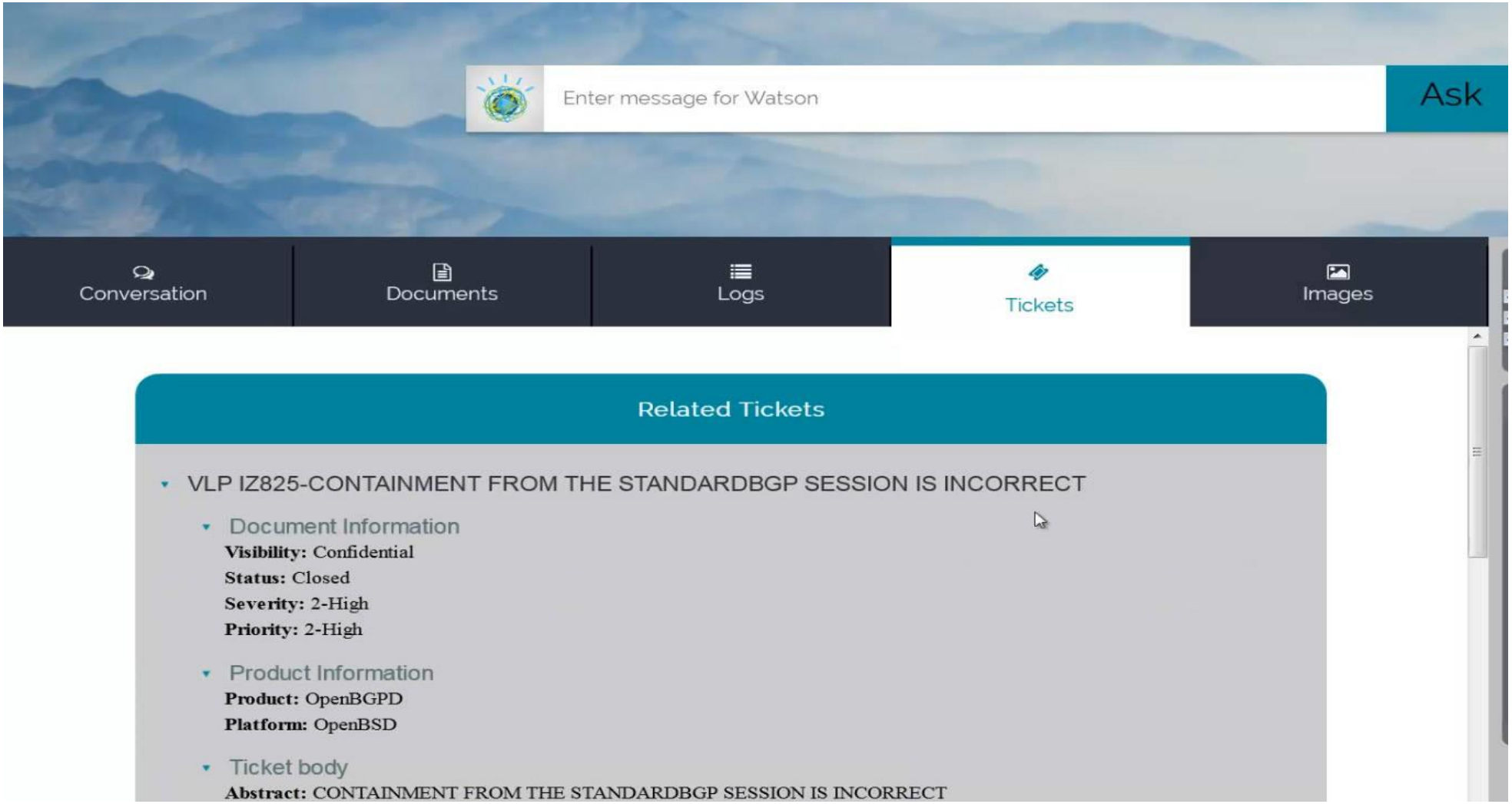


Figure: Network Operations

Source: http://www.redbooks.ibm.com/ sg248388

Example: Network operations (3 of 3)

Figure: Network Operations for services

Source: http://www.redbooks.ibm.com/ sg248387

Example: Personalized TV (1 of 2)

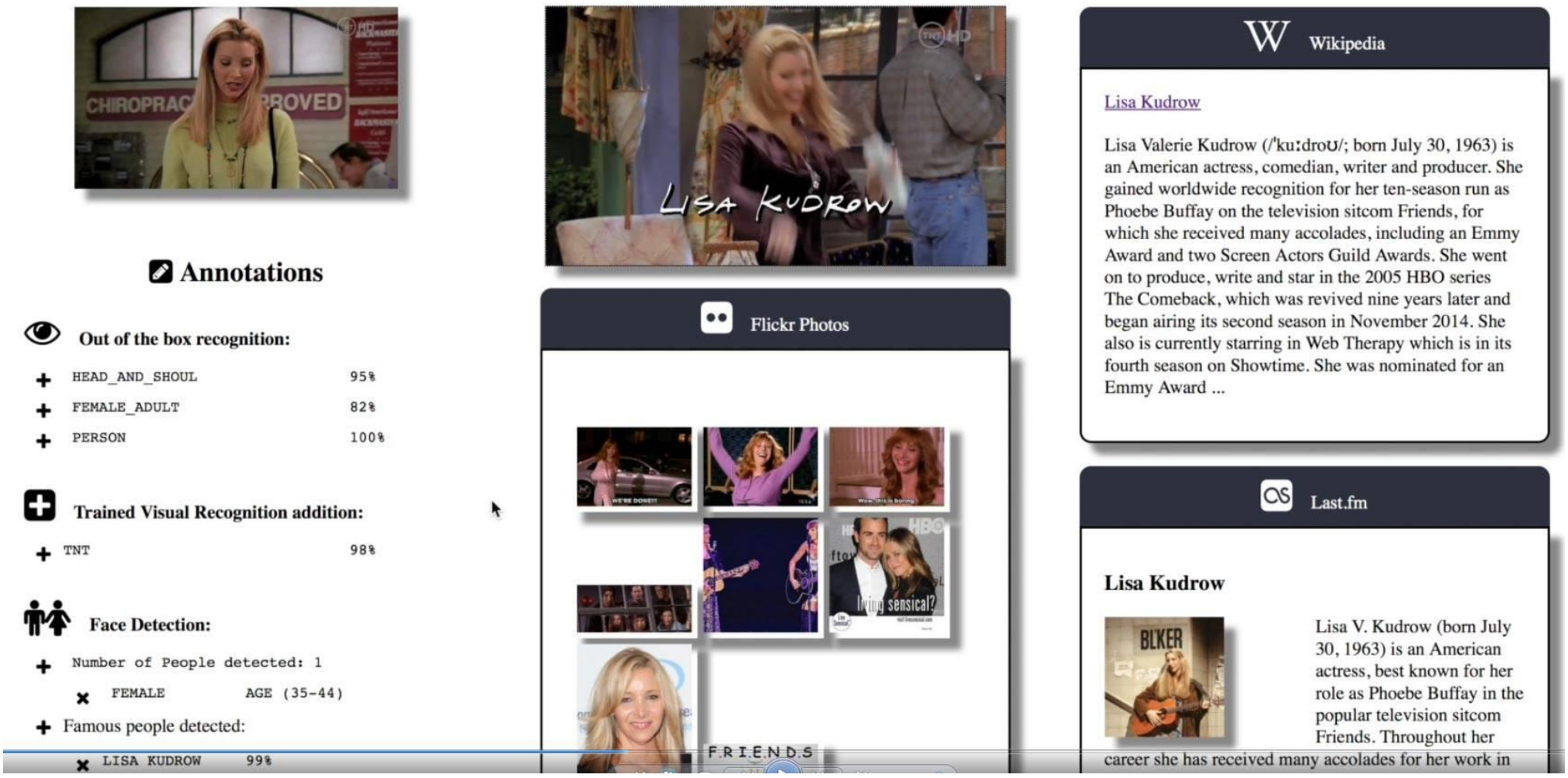


Figure: Personalized TV

Source: http://www.redbooks.ibm.com/ sg248387

Example: Personalized TV (2 of 2)

- Actor 1: You created an account using my email account.
- Actor 1: This is not my accoun
- Actor 1: How can I delete this account?
- Actor 2: No. I did not.

Chatbot: Conversation service for IBM Watson (1 of 2)

Figure: Chatbot: Conversation service for IBM Watson

Source: https://images.app.goo.gl/W1rNLpsJxhi6YBcp9

Chatbot: Conversation service for IBM Watson (2 of 2)

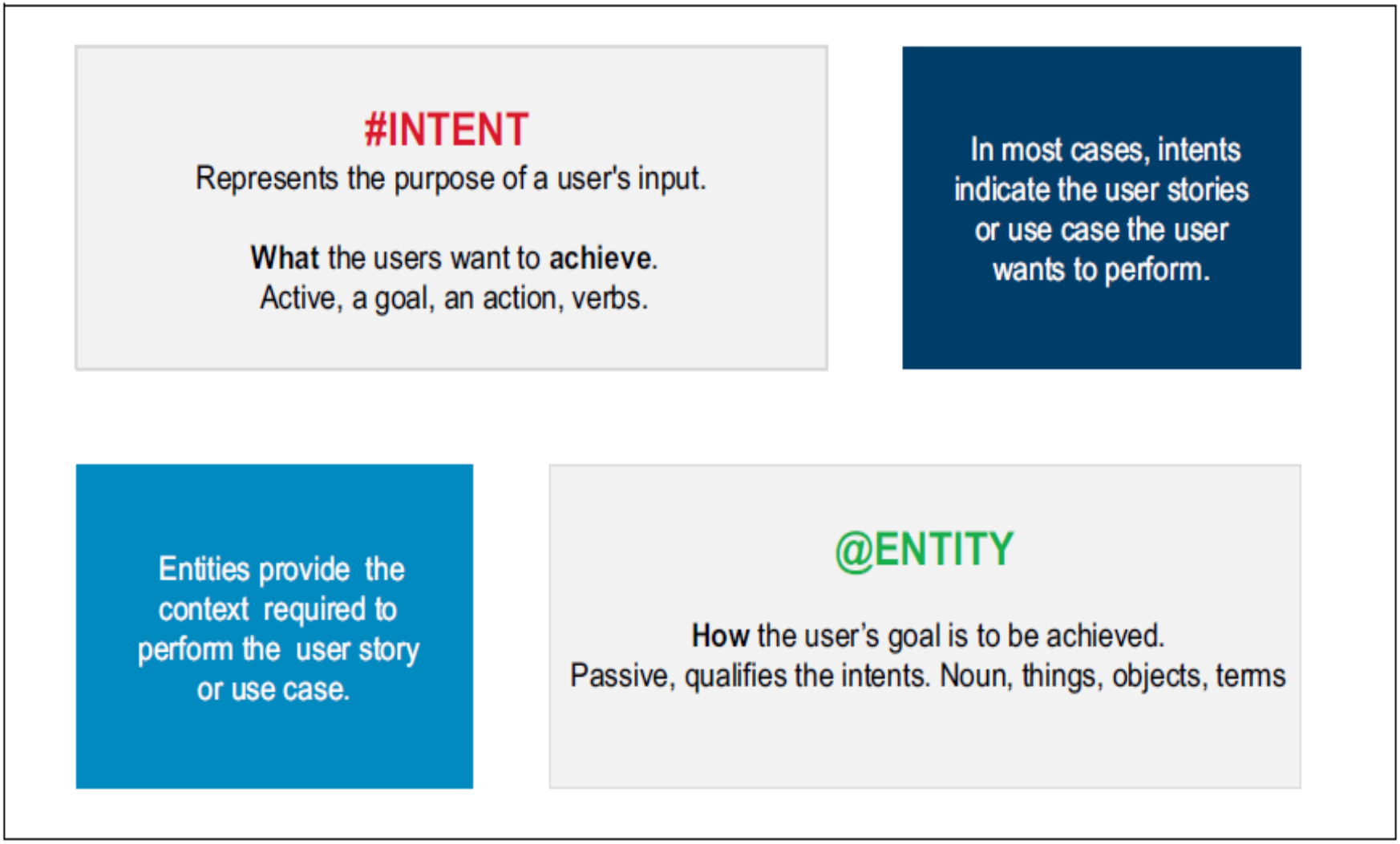


Figure: Intent and entity definitions

Source: http://www.redbooks.ibm.com/ sg248387

Dialog node

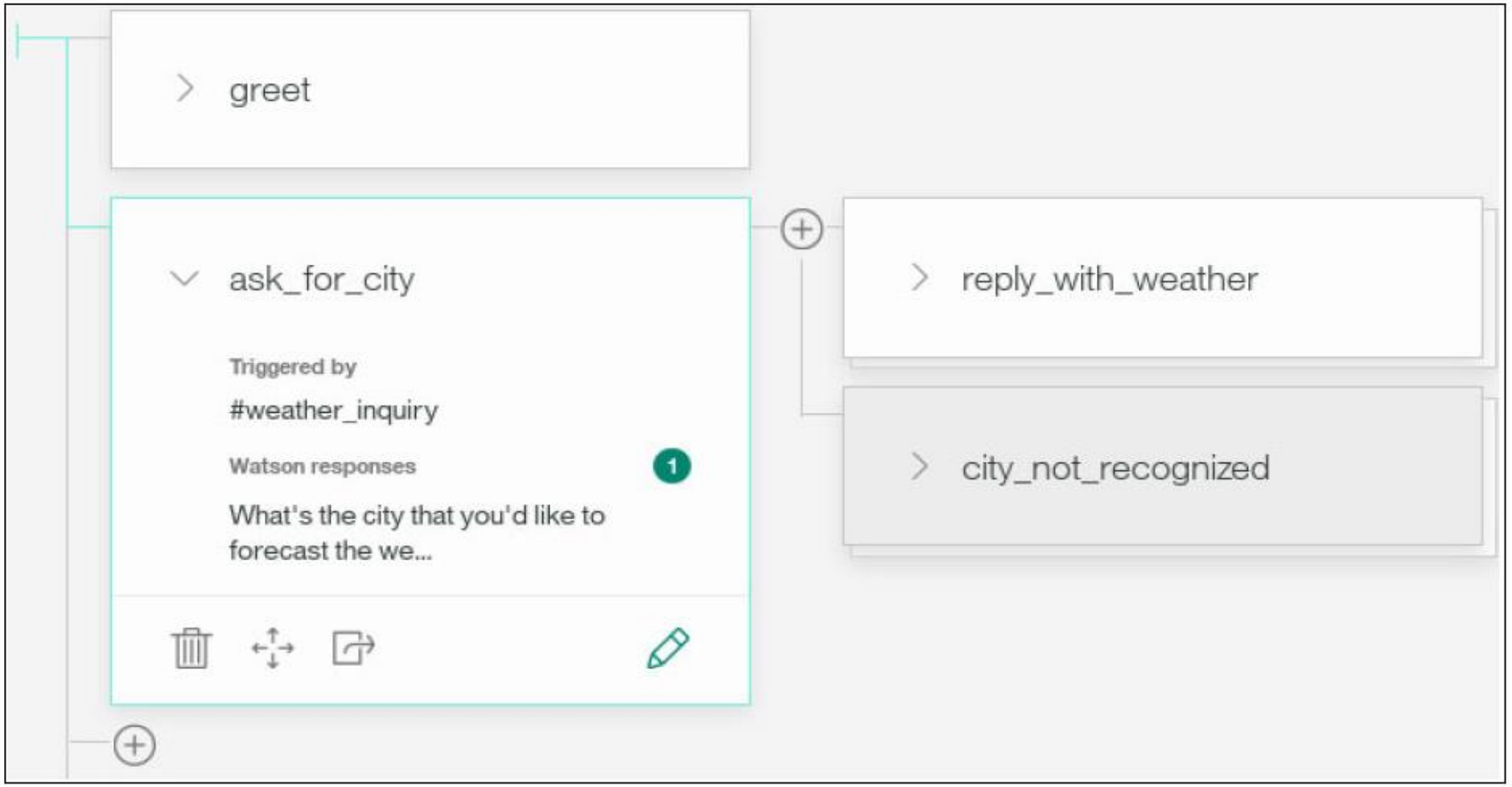


Figure: Example of dialog flow

Source: http://www.redbooks.ibm.com/ sg248387

Context

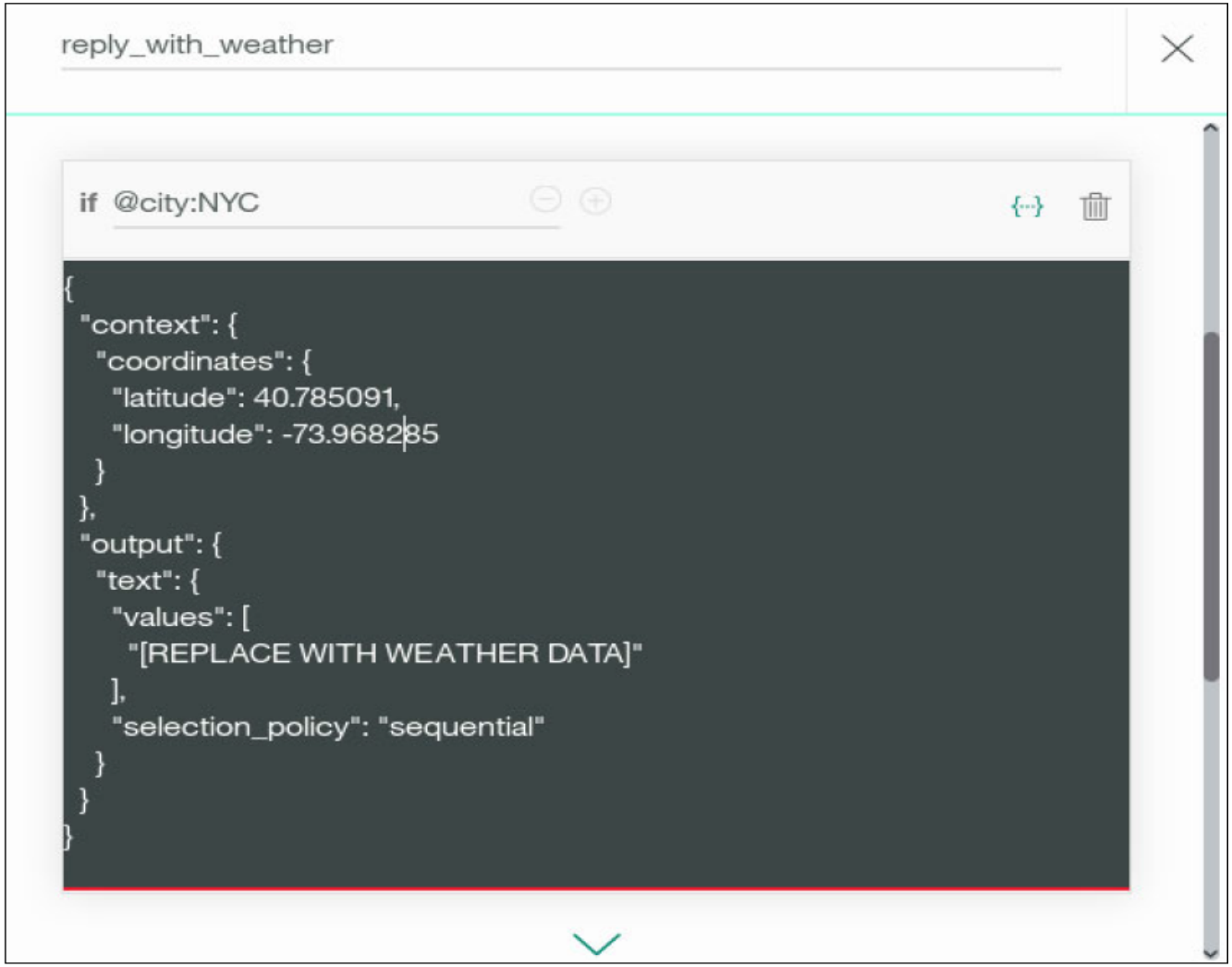


Figure: setting the NYC coordinates

Source: http://www.redbooks.ibm.com/ sg248387

Conversation turn

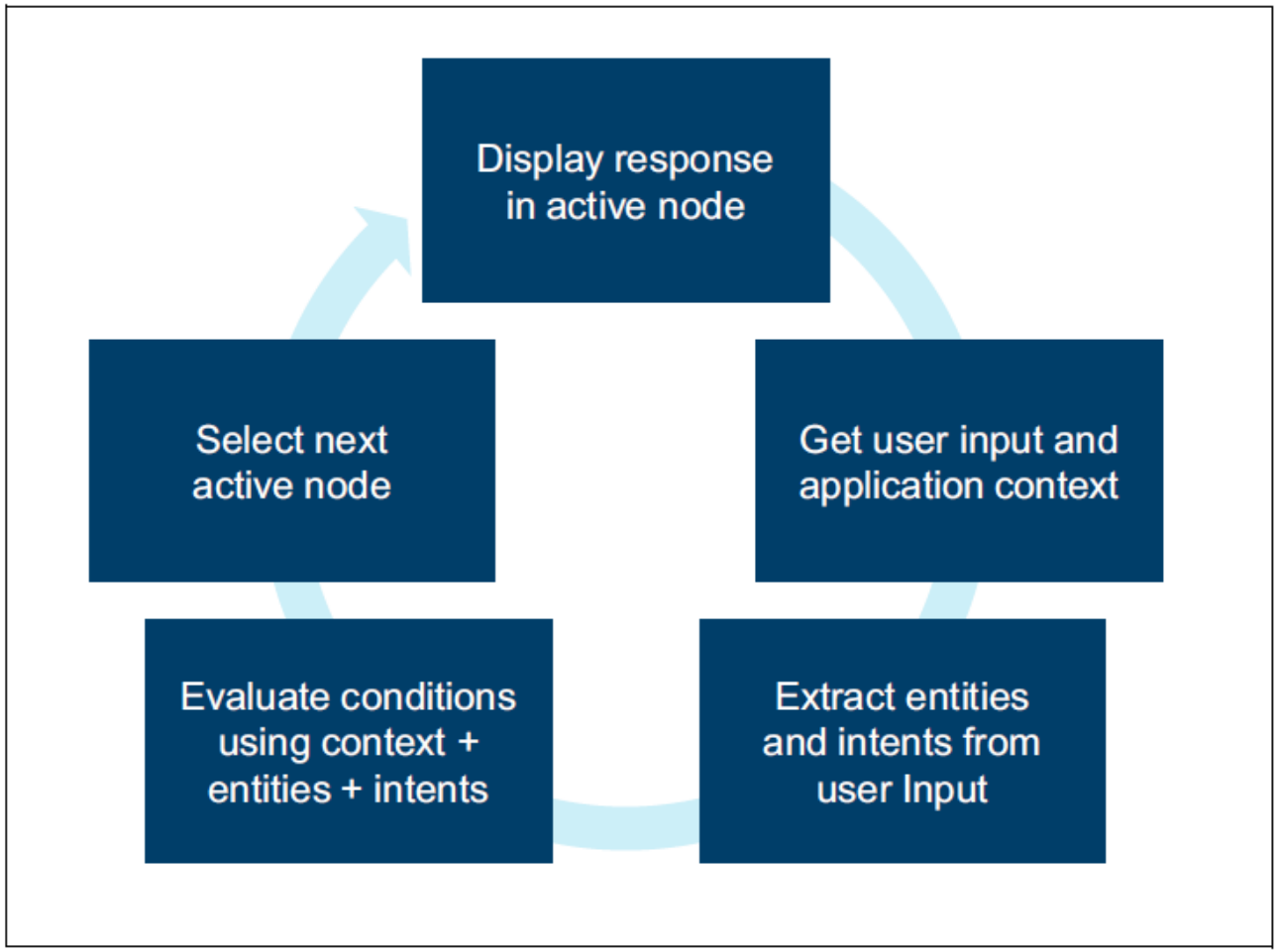


Figure: Conversation turn

Source: http://www.redbooks.ibm.com/ sg248387

Typical conversation flow

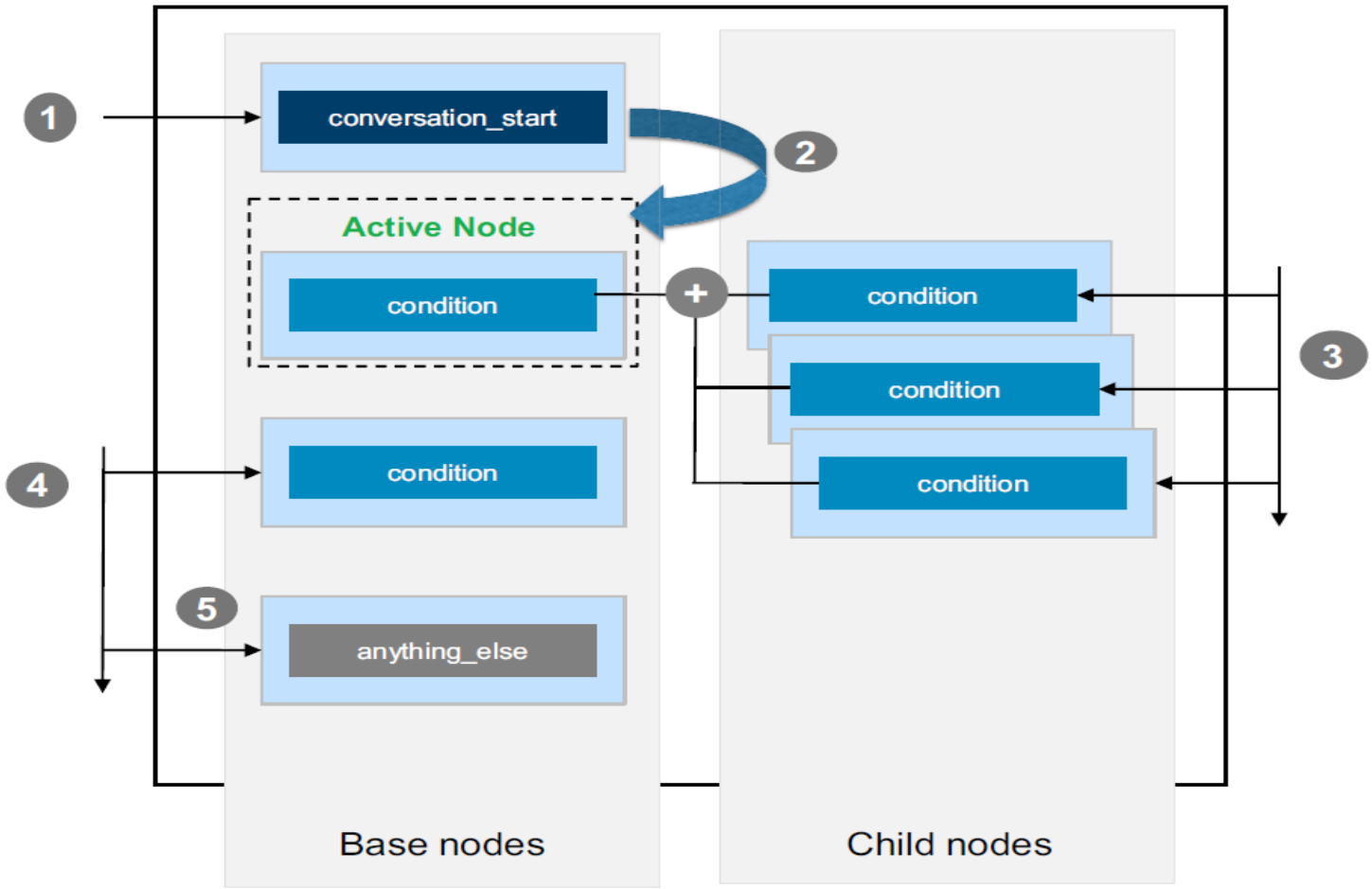


Figure: Next active node selection criteria

Source: http://www.redbooks.ibm.com/ sg248387

Conversation service workspace (1 of 2)

The following stages include the use of the conversation service:

- Creating a Watson Conversation service instance
- Launching the Conversation tool
- Working with a workspace
- Adding intents
- Adding entities
- Building a dialog

Conversation service workspace (2 of 2)

- **The growing complexity in providing customer experience**

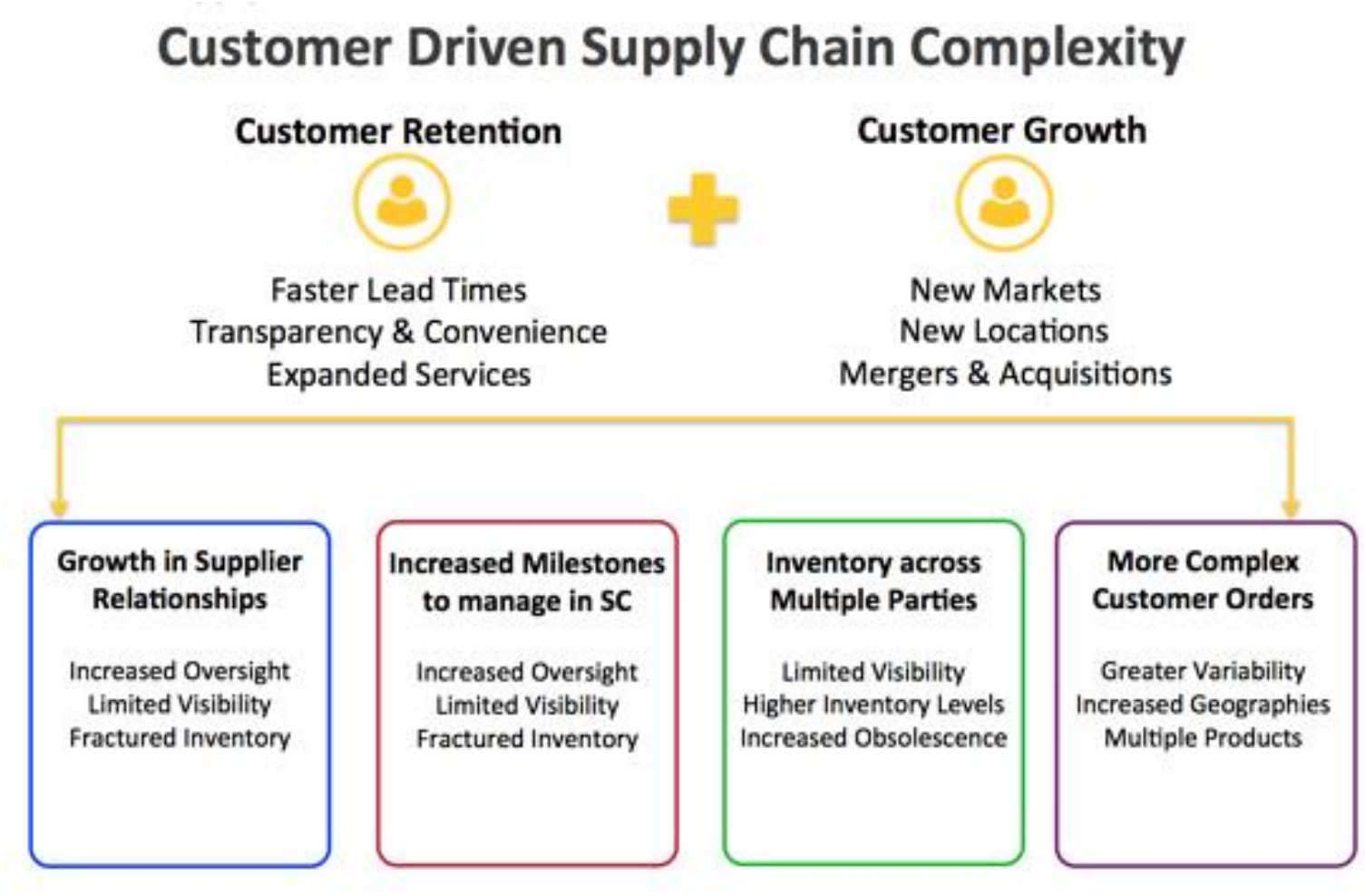


Figure: Customer SCM experience

Source: https://images.app.goo.gl/b2NPi4hqCCvumbLY8

Conversation service workspace (3 of 3)

Areas of Deployment	Type of cognitive technology	Sample use cases
Hyper relevant shopping journeys	Using techniques like machine learning, natural language processing (NLP), speech recognition to enhance better experience and productivity	▪ Product recommendations in online shopping ▪ Personalized promotions ▪ Associates interacting with chatbots for checking product availability
Insights driving hyper efficiency	Cognitive techniques e.g.; computer vision and/or machine learning used in areas of scarce knowledge to get insights resulting in tremendous business value	▪ Labor utilization and optimization ▪ Optimal inventory determination to prevent stock outs ▪ "Share of shelf" insights for competing products ▪ Cognitive intelligence for energy efficiency

Figure: Cognitive computing in Retail
Source: https://images.app.goo.gl/QMsdyzjuot9xwa6F9

Cognitive computing with IoT (1 of 2)

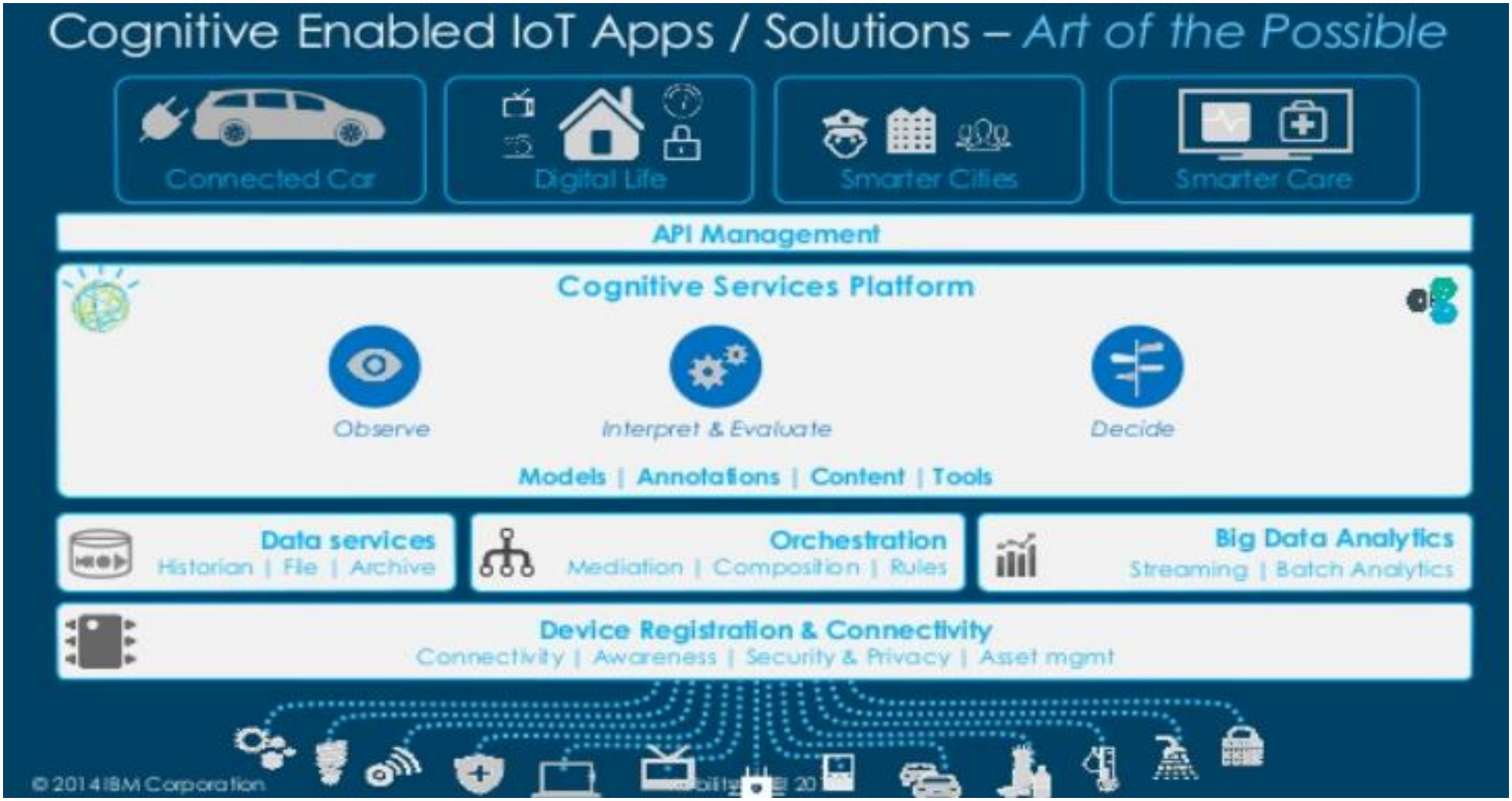


Figure: IOT Apps with cognitive computing

Source: https://images.app.goo.gl/QpNacxXC9ZW6aAyR7

Cognitive computing with IoT (2 of 2)

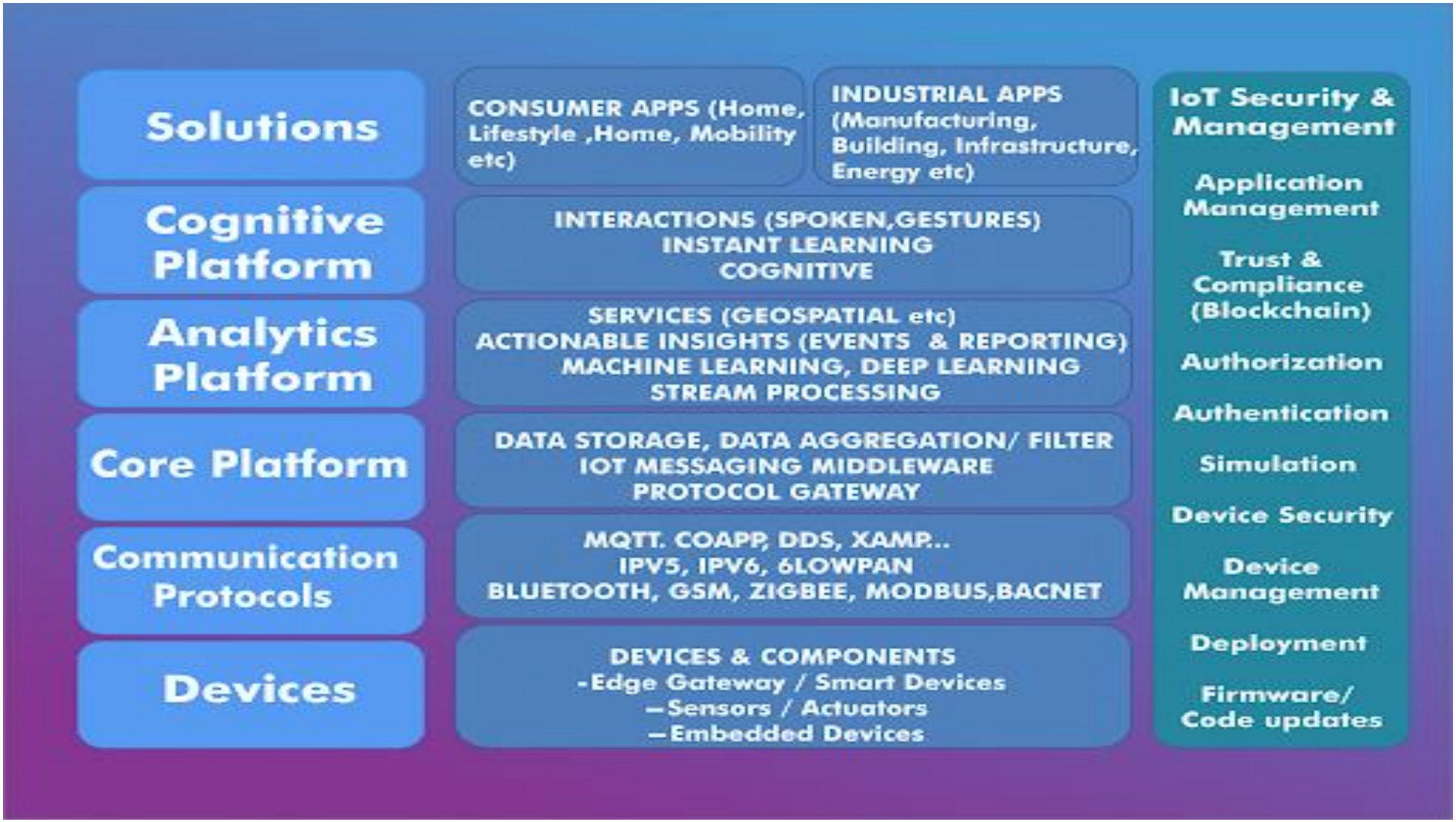


Figure: IOT core and Architecture

Source: https://images.app.goo.gl/GANsWqeFoJDw5VbN8

Technologies driving cognitive manufacturing (1 of 2)

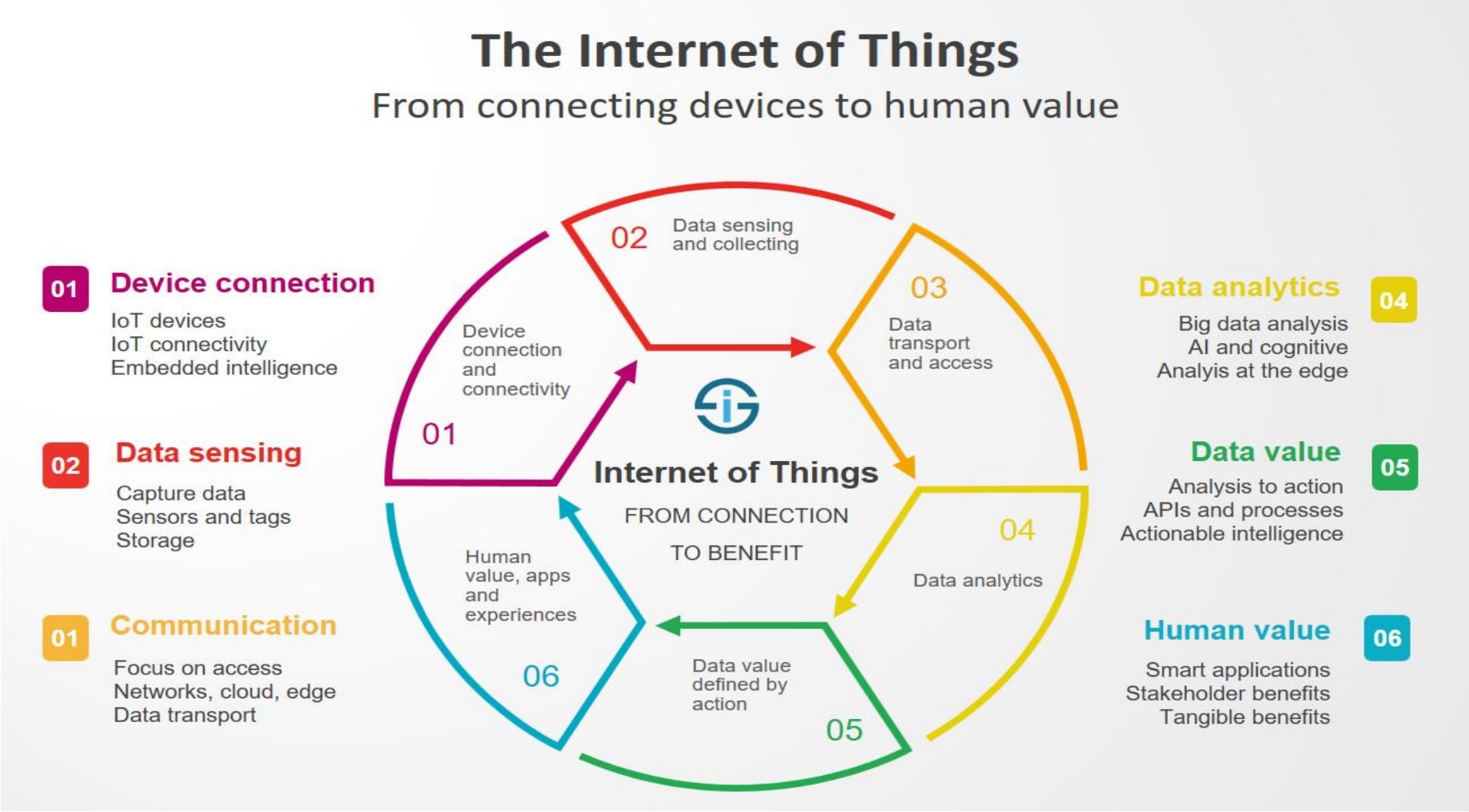


Figure: IOT Overview

Source: https://images.app.goo.gl/hn2LVPJq85NBpj2c6

Technologies driving cognitive manufacturing (2 of 2)

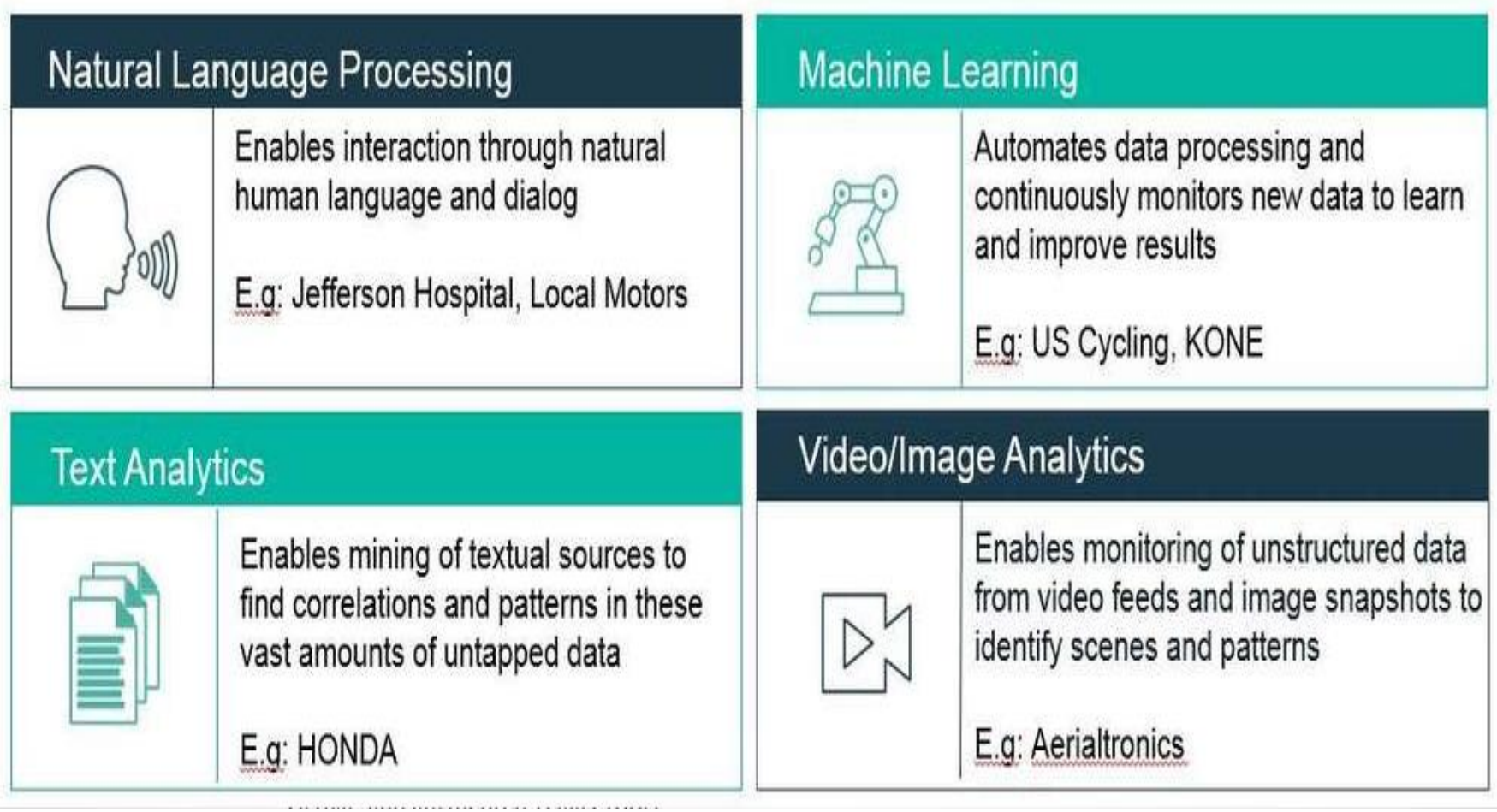


Figure: IOT with cognitive analytics

Source: https://images.app.goo.gl/4x9h9gnxwuAZdLKE9

Cognitive Industry 4.0

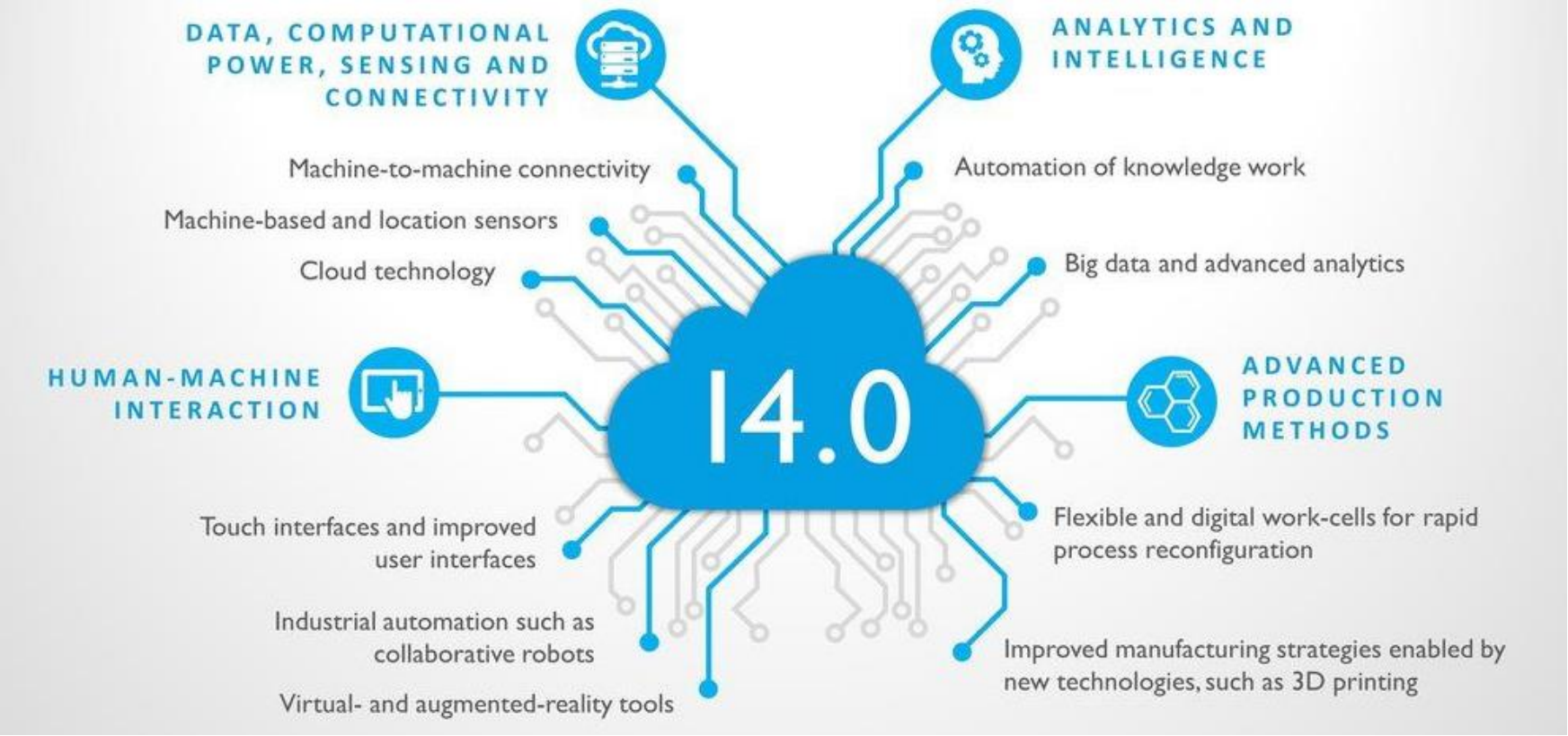


Figure: Industry 4.0

Source: https://images.app.goo.gl/23UGm4URXGDrfiUp9

Brain-computer interface with cognitive computing (1 of 2)

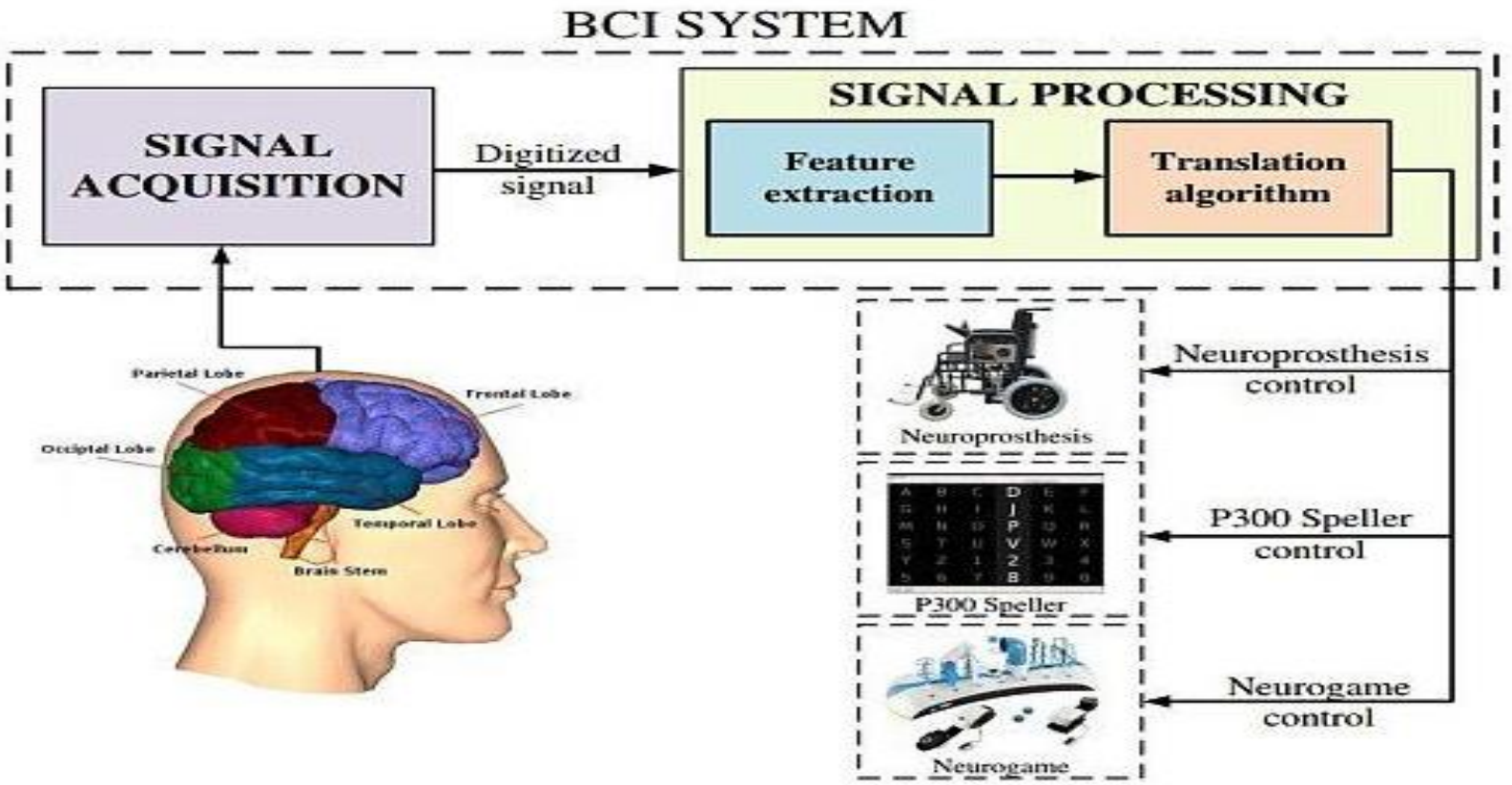


Figure: BCI System

Source: https://images.app.goo.gl/vSEqWDAe21XS1Rqq5

Brain-computer interface with cognitive computing (2 of 2)

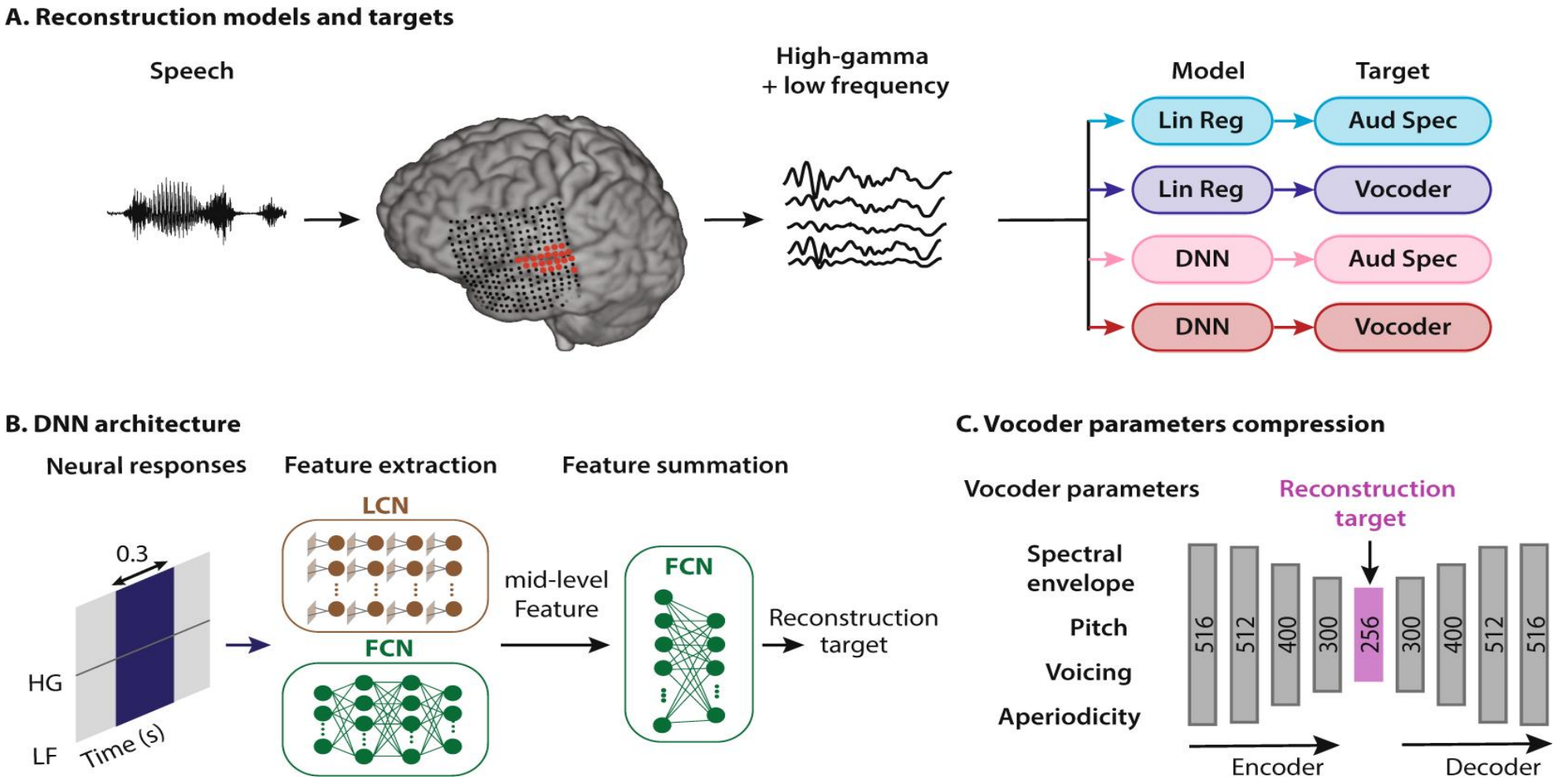


Figure: Human BCI research with cognitive Analytics

Source: https://images.app.goo.gl/A3DgZFiVrnxQn57v7

Brain-computer interface with cognitive computing (3 of 3)

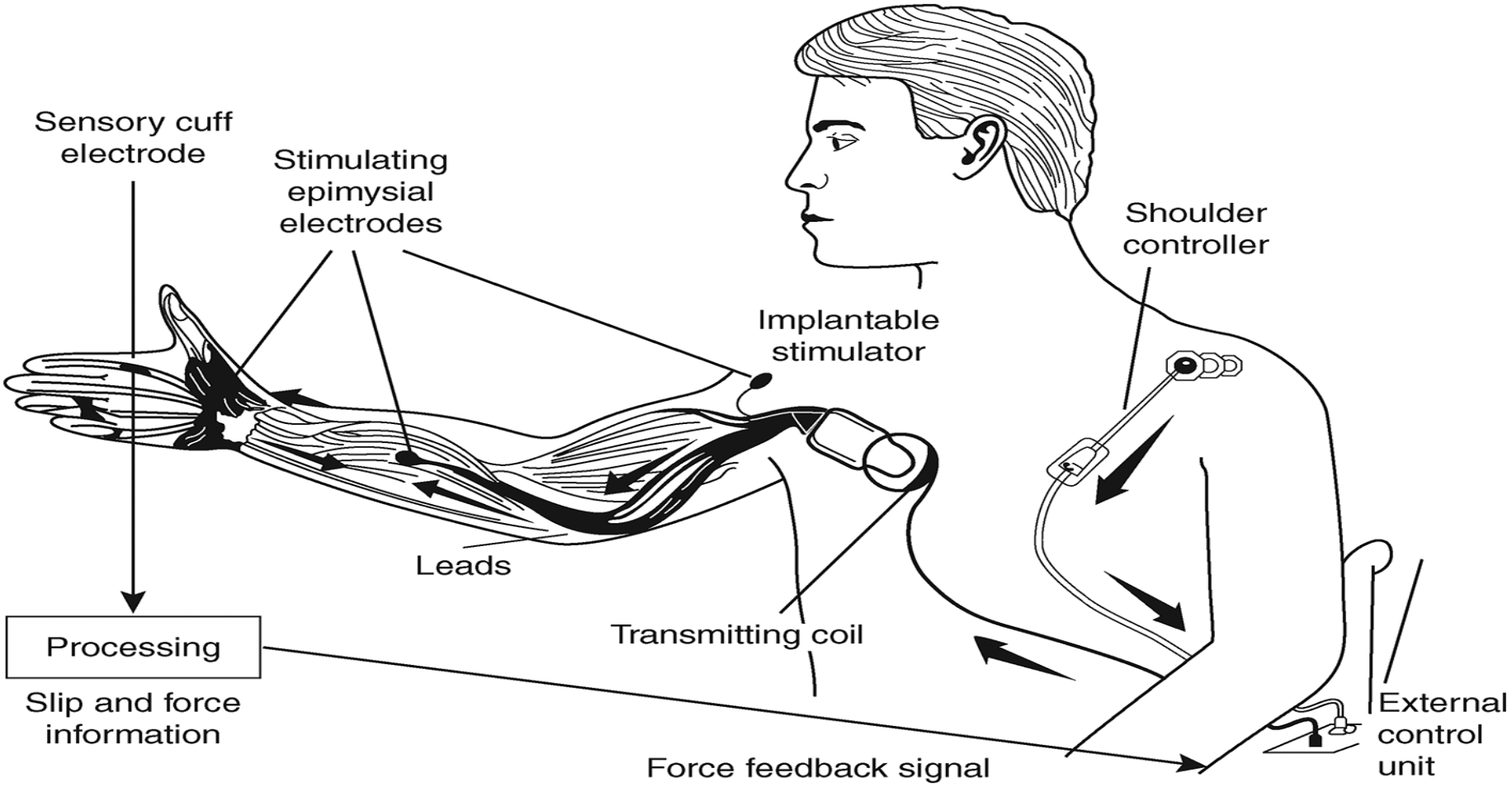


Figure: Motor neuroprotheses for BCI

Source: https://images.app.goo.gl/szkYQK1UEEznX2xT9

Brain-computer interface with cognitive computing

- It is applied to the inside the skull but outside the grey matter.
- It lowers risk of forming scar-tissue in the brain

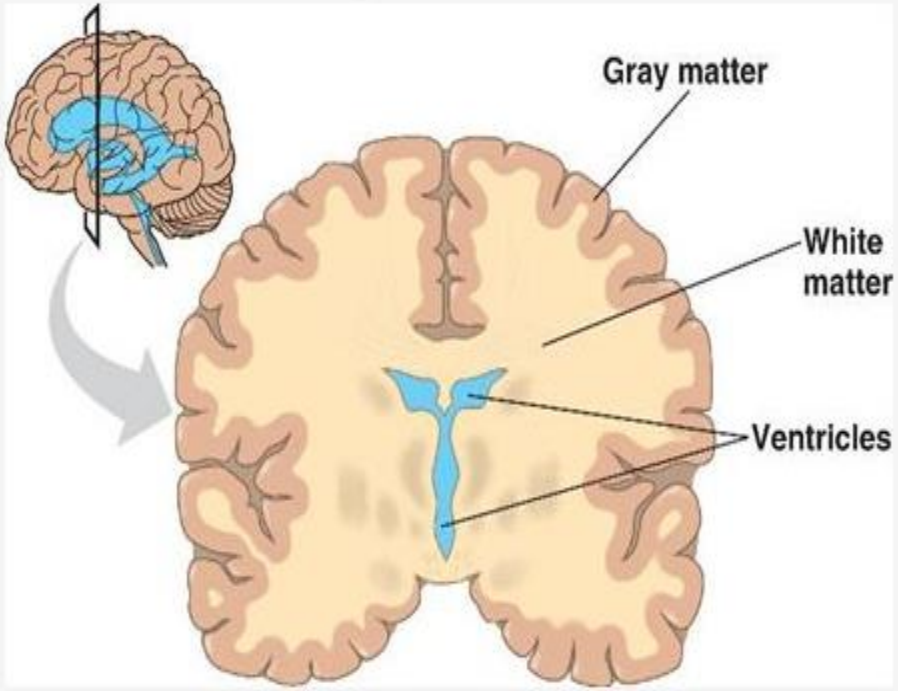


Figure: Partially invasive BCIs

Source: https://images.app.goo.gl/KLWcBtNVYYATsEf8A

Use Case: Brain - Computer interface

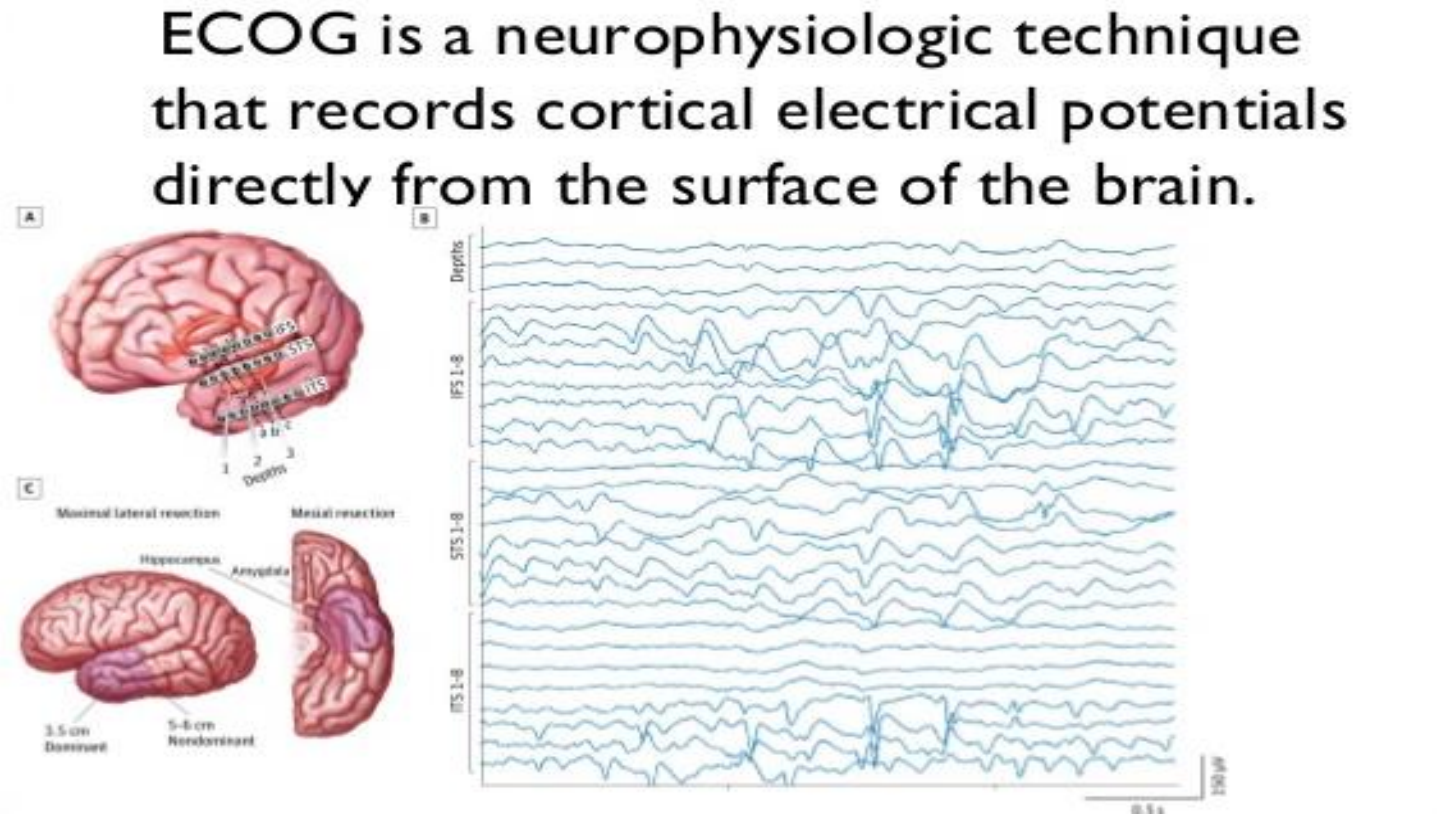


Figure: ECOG definition

Source: https://images.app.goo.gl/4Mu12TrtNB5nnTt19

Pandemic analytics: How cognitive analytics is helping us combat COVID-19

IBM ICE (Innovation Centre for Education)

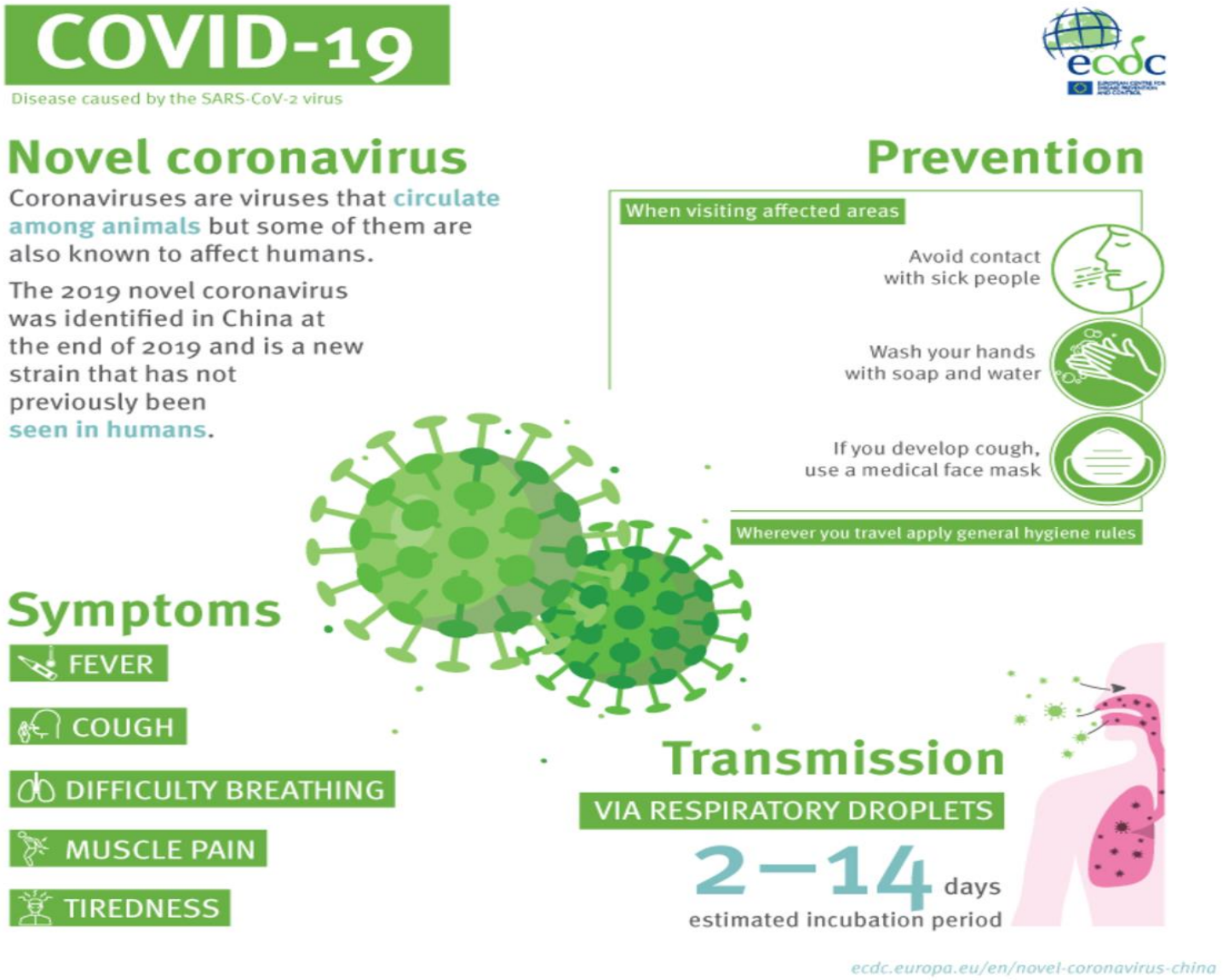


Figure: COVID 19 overview

Source: https://images.app.goo.gl/i9nTsNSZDLbABHXS8

Self evaluation: Exercise 25

- To continue with the training, after learning the various steps involved in cognitive analytics and Watson machine learning, it is instructed to utilize the concepts of cognitive machine learning algorithms to perform the following activity.

- You are instructed to write the following activities using Python code.

- Exercise 25: Chatbot.

Checkpoint (1 of 2)

Multiple choice questions:

1. The stored learning from an organization's history that can be used for decision-making and other purposes best describes:
   a) Organizational learning
   b) Tacit knowledge
   c) Knowledge warehouse
   d) Organizational memory

2. Who will use their own IoT business models for smart city?
   a) PaaS
   b) SaaS
   c) IaaS
   d) Service provider

3. Which possibility automatically communicates with other vehicles?
   a) Transportation and logistics
   b) Energy and utilities
   c) Automotive
   d) Connected supply chain

Checkpoint solutions (1 of 2)

Multiple choice questions:

1. The stored learning from an organization's history that can be used for decision-making and other purposes best describes:
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Checkpoint (2 of 2)

Fill in the blanks:

1. In order to promote _____ the government should employ more management.
2. ITS stands for _____.
3. A smart city _____ center is envisaged as an important part of the generic IoT platform to unify the organization.
4. NLP is the part of _____.

True or False:

1. Does information resource management need to be integrated into market management? True/False
2. The use of RFID in product logistics may realize automatic acquisition of logistics information. True/False
3. Smart city is based on IOT Sensors and devices. True/False

Checkpoint solutions (2 of 2)

Fill in the blanks:

1. In order to promote **eGovermnent related** the government should employ more management.
2. ITS stands for **Intelligent Transportation Services.**
3. A smart city **Integrated Information** center is envisaged as an important part of the generic IoT platform to unify the organization.
4. NLP is the part of **Text processing.**

True or False:

1. Does information resource management need to be integrated into market management? **True**
2. The use of RFID in product logistics may realize automatic acquisition of logistics information. **True**
3. Smart city is based on IOT Sensors and devices. **True**

Question bank

Two mark question:

1. What is smart city?
2. What are the component of smart city?
3. What are the security factor for smart city?
4. What is Law enforcement issue?

Four mark question:

1. Describe COPLink project.
2. What is area energy management solution for smart city?
3. What is the knowledge Management?
4. What is Quantum Architectures ?

Eight mark question:

1. Explain Knowledge Management Architecture.
2. Explain Emerging Cognitive Computing Areas.

Unit summary

Having completed this unit, you should be able to:

- Learn the concept of smarter cities of cognitive computing in Government
- Gain knowledge on emerging cognitive computing
- Gain an insight into areas & future applications for cognitive computing