Artificial Intelligence & Government

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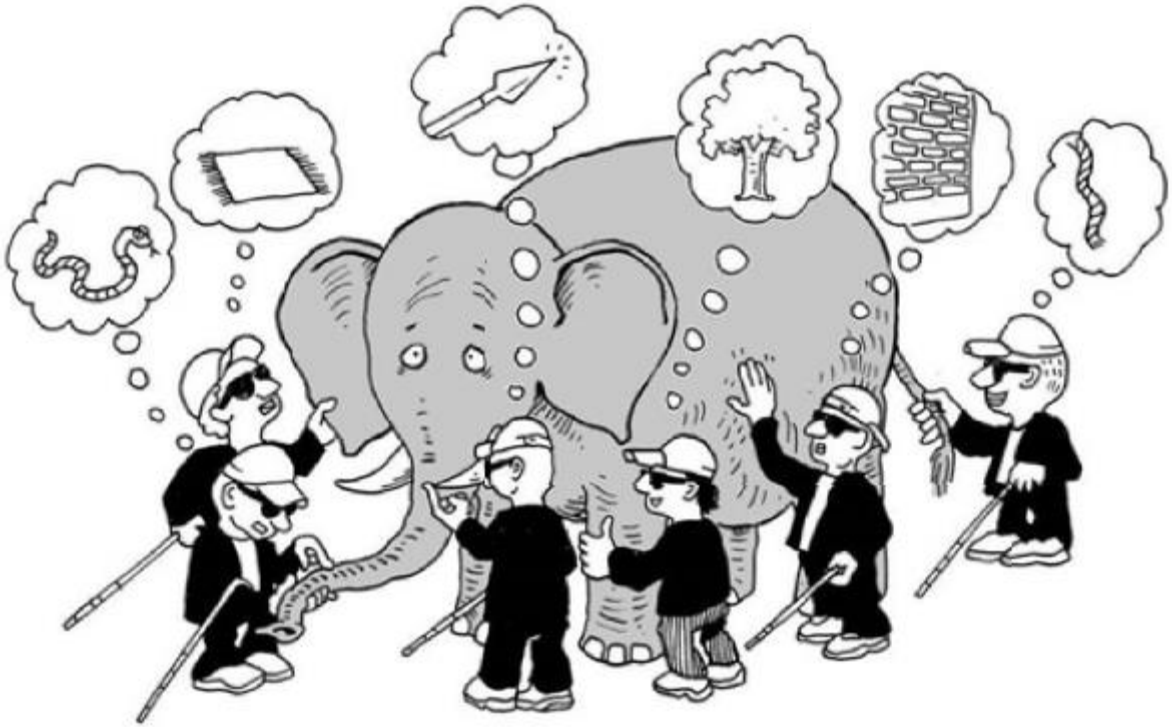
<Books>

- Open Source 2.0(2010)
- Open Source Software: A Survey from 10,000 Feet(2013, Translation Book)
- The Definitive ANTLR4 Reference(2014, Translation Book)
- Agile Technologies in Open Source Development(2015, Translation Book)
- Software Development: An Open Source Approach(2016, Translation Book)
- An Introduction to R for Spatial Analsis & Mapping(2016, Translation Book)
- The Business Model for Open Source Software(2017)

What is the Artificial Intelligence?



"The Blind Men and the Elephant?"

Variety of Definitions of AI

- "A field that focuses on developing techniques to enable computer systems to perform activities that are considered intelligent (in humans and other animals)." [Dyer]
- "The science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." [McCarthy]
- "The design and study of computer programs that behave intelligently." [Dean, Allen, & Aloimonos]
- "AI, broadly defined, is concerned with intelligent behavior in artifacts. Intelligent behavior, in turn, involves perception, reasoning, learning, communicating, and acting in complex environments." [Nilsson]
- "The study of [rational] agents that exist in an environment and perceive and act." [Russell & Norvig]
- …

Definition of Artificial Intelligence(Classification)

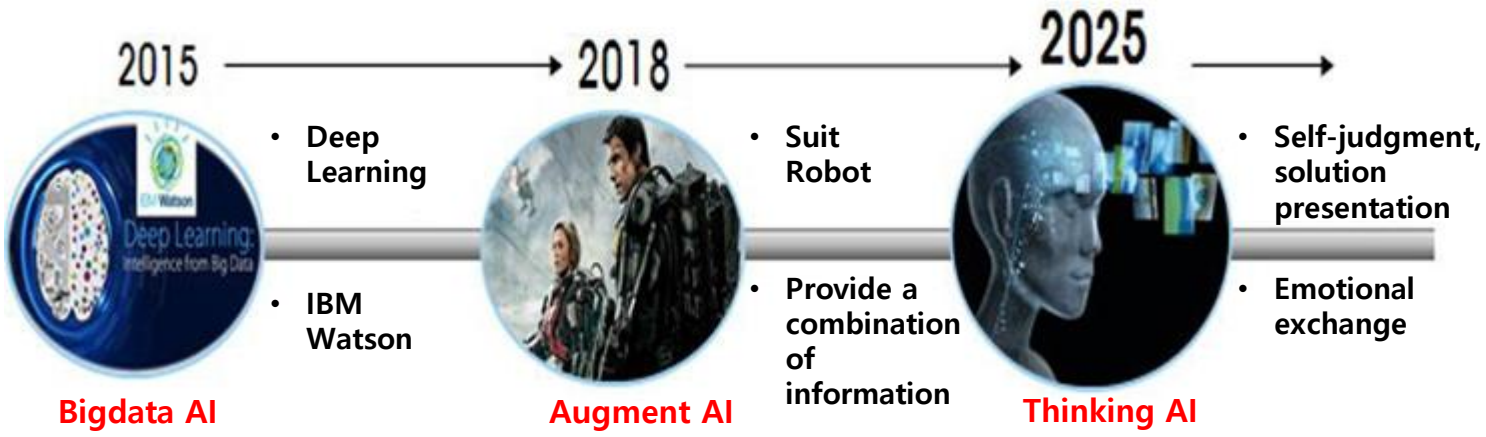
	Strong AI or AGI(Artificial General Intelligence)		Weak AI		
Thought	**Thinking Humanly**		**Thinking Rationally**		
	"[The automation of] activities that we associate with human thinking..." Bellman, 1978	Systems that think like humans	Systems that think logically	"The study of mental faculties through the use of computational models" Charniak & McDermott, 1985	**Definition**
	Cognitive Modeling		Laws of Thought		**Approach**
	Cognitive Science		Logic		**Required Ability**
Behavior	**Acting Humanly**		**Acting Rationally**		
	"The art of creating machines that perform functions that require intelligence when performed by people." Kurzweil, 1990	Systems that behave like humans	Systems that act logically	"The branch of computer science that is concerned with the automation of intelligent behavior." Luger, 2002	**Definition**
	Turing Test		Rational Agent		**Approach**
	Natural Language Processing, Knowledge Representation, Automated Reasoning, Machine Learning, Computer Vision, Robotics		Learning		**Required Ability**
	Ideal		**Rational**		

Classification of Artificial Intelligence Technology

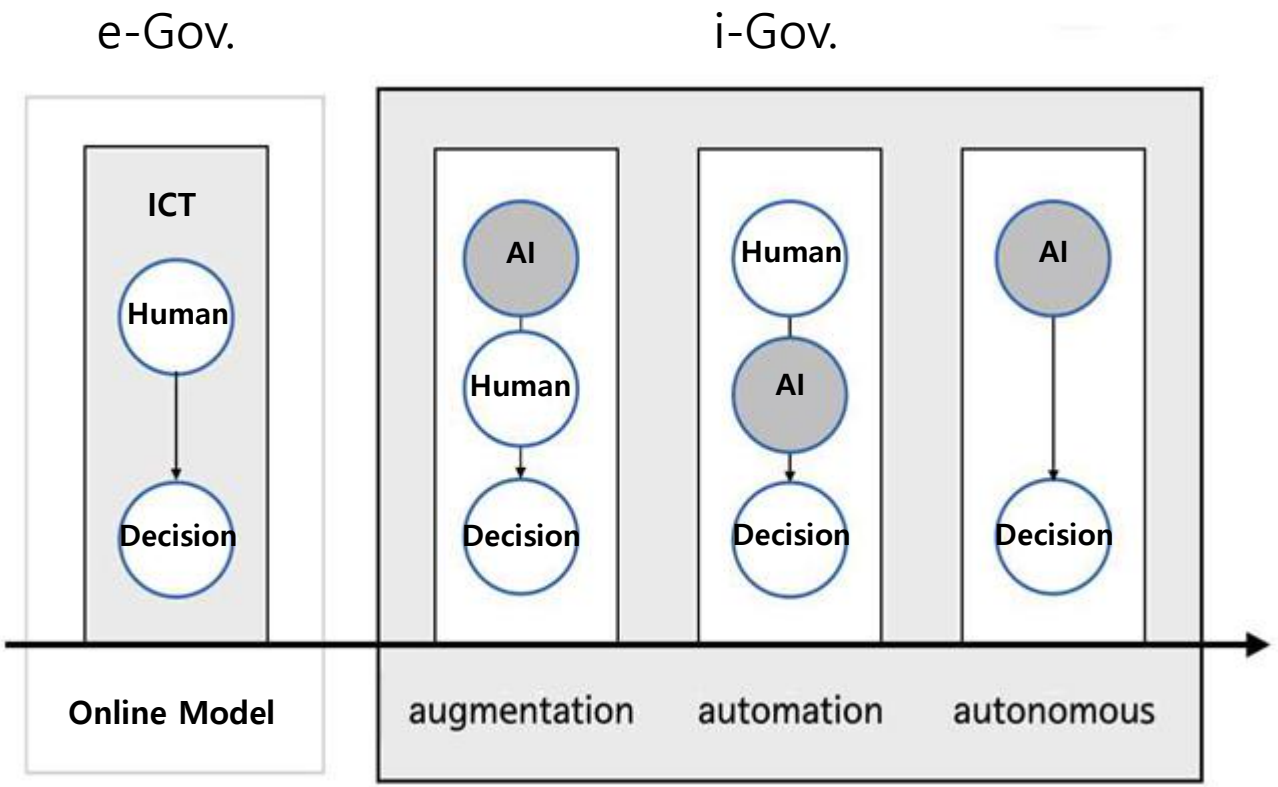
Division	Russell&Norvig(1995)	NIA(2010)	Tractica(2015)	Venturescanner(2015)	BCC(2016)	MSIP(2016)	Remarks
Criteria	Human Behavior /Thought	Technology of Interest	Application of Companies	Classification of AI Companies	Types of Smart Devices	Strategy of Development	-
cognitive computing			◎	◎		◎	
machine learning	◎		◎	◎		◎	Learning intelligence
deep learning			◎			◎	Learning intelligence
Application Interface Prediction			◎				
Natural Language Processing	◎	◎	◎	◎		◎	Language intelligence
Image Recognition	◎(agent)		◎	◎		◎	Visual Intelligence
Speech Recognition			◎	◎(Language translation)		◎	Language intelligence
Pattern(Gesture) Recognition	◎	◎(Pattern recognition)		◎(Gesture recognition)		◎	Visual Intelligence
- Automatic control		◎					
Computer Vision		◎		◎		◎	Visual Intelligence
virtual reality		◎			◎		
Quantum computing		◎			◎(Neural computing)	◎(High Performance Computing)	
Automatic (knowledge) reasoning		◎		◎(Recommendation engine)	◎(Expert System)	◎(Story compression / creation)	Emotional intelligence
- Cybernetics		◎					
- Data mining		◎					Language intelligence
- Intelligent engine		◎					
Smart robot		◎(Robotics)		◎	◎		
- Semantic Web		◎					
Virtual assistant				◎	◎		
- Embedded SW					◎		
unstructured DBMS						◎	
supercomputer						◎	
Neuromorphic chip						◎	
sensor						◎	
neural engineering						◎	

Evolution of Artificial Intelligence

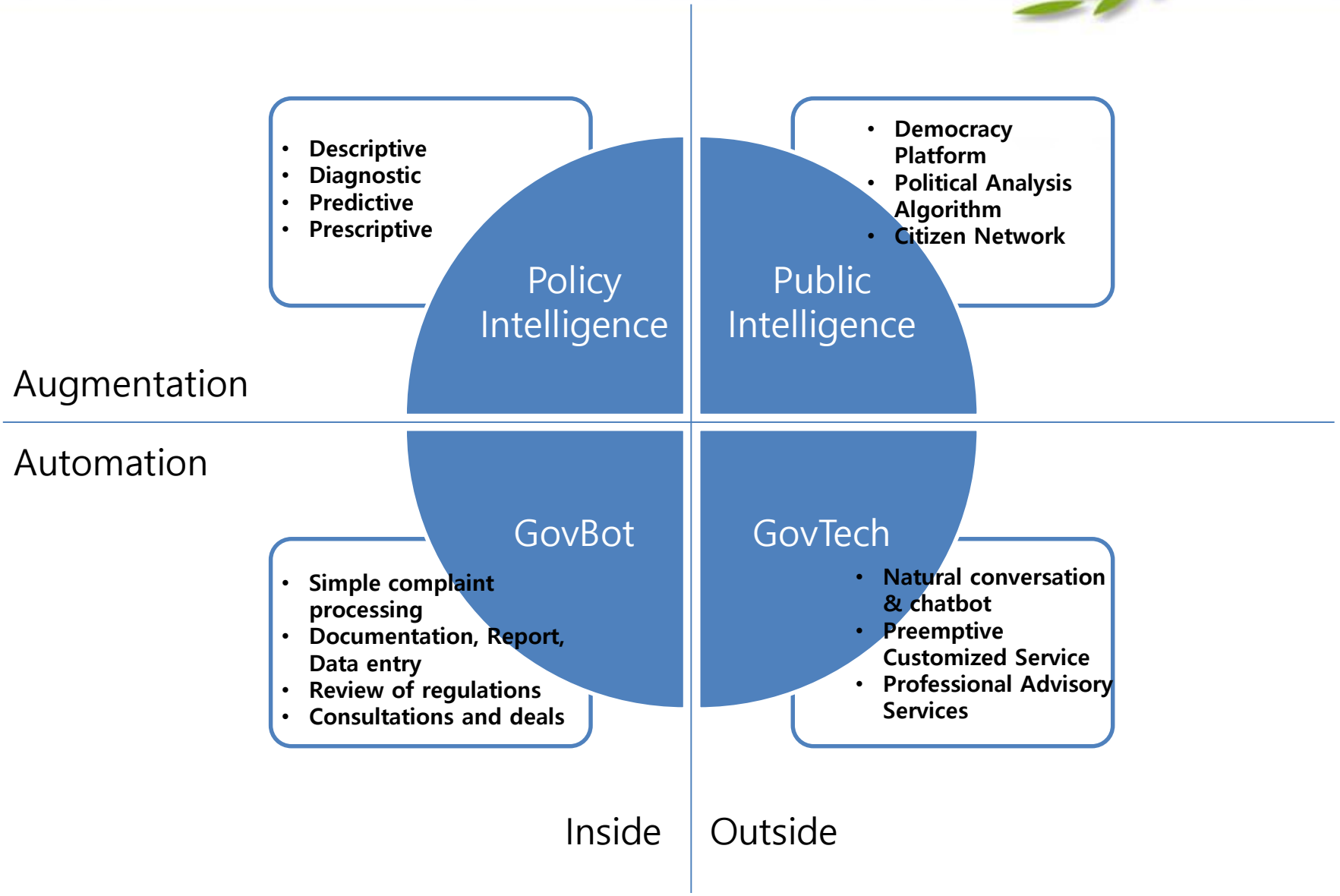
AI Technology	Contents
AGI(Artificial General Intelligence)	• Beyond special-purpose artificial intelligence for various applications (IBM Watson, DeepMind, AlphaGo)
Human-like AI	• Learning through few cases (such as medical students studying at the surgery site only)
Multi-modality Machine Learning	• Extract knowledge from various types of data such as text, space, and graphs
Active Learning Algorithm	• AI finds and generates necessary data by itself
High-performance Language Processing	• Understanding human language in various situations(noise, inaccurate pronunciation, etc.), contextual, emotional reasoning



Government of the Artificial Intelligence Age

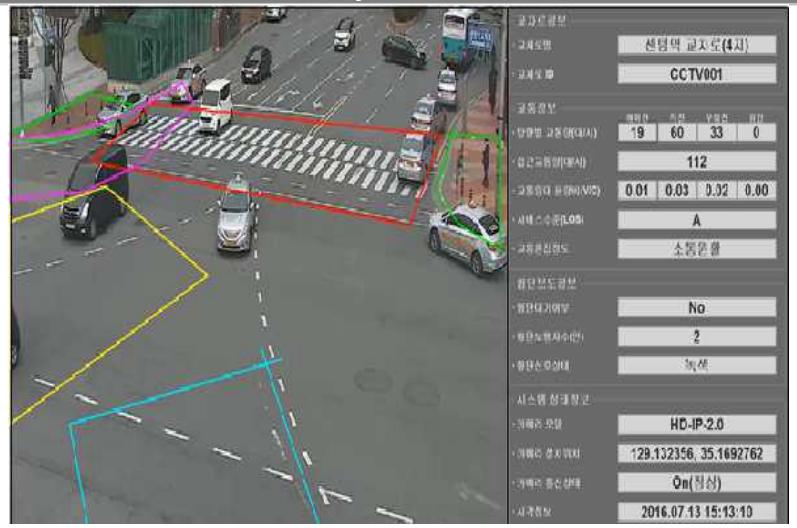


Structure of Intelligent Government



Application Examples of A.I.(Korea, Government)

Traffic Congestion Demand Prediction using AI Image Analysis(Busan)



Prediction of Traffic Demand through Deep Learning(Korea Railroad Research Institute)

Output node : 각 (노선-정류장), (노선-정류장) 간의 승하차 수요수준(등급)

(동작01, 상도역) - (동작01, 이화약국)
(동작01, 상도역) - (동작01, 중앙대학교 후문)
(동작01, 상도역) - (동작01, 중앙대학교 중문)
...

	동작01, 이화약국	동작01, 중앙대학교 후문	동작01, 중앙대학교 중문	...
동작01, 상도역	24.2	461.6	150.8	...
...	...	...	...	...

Output node

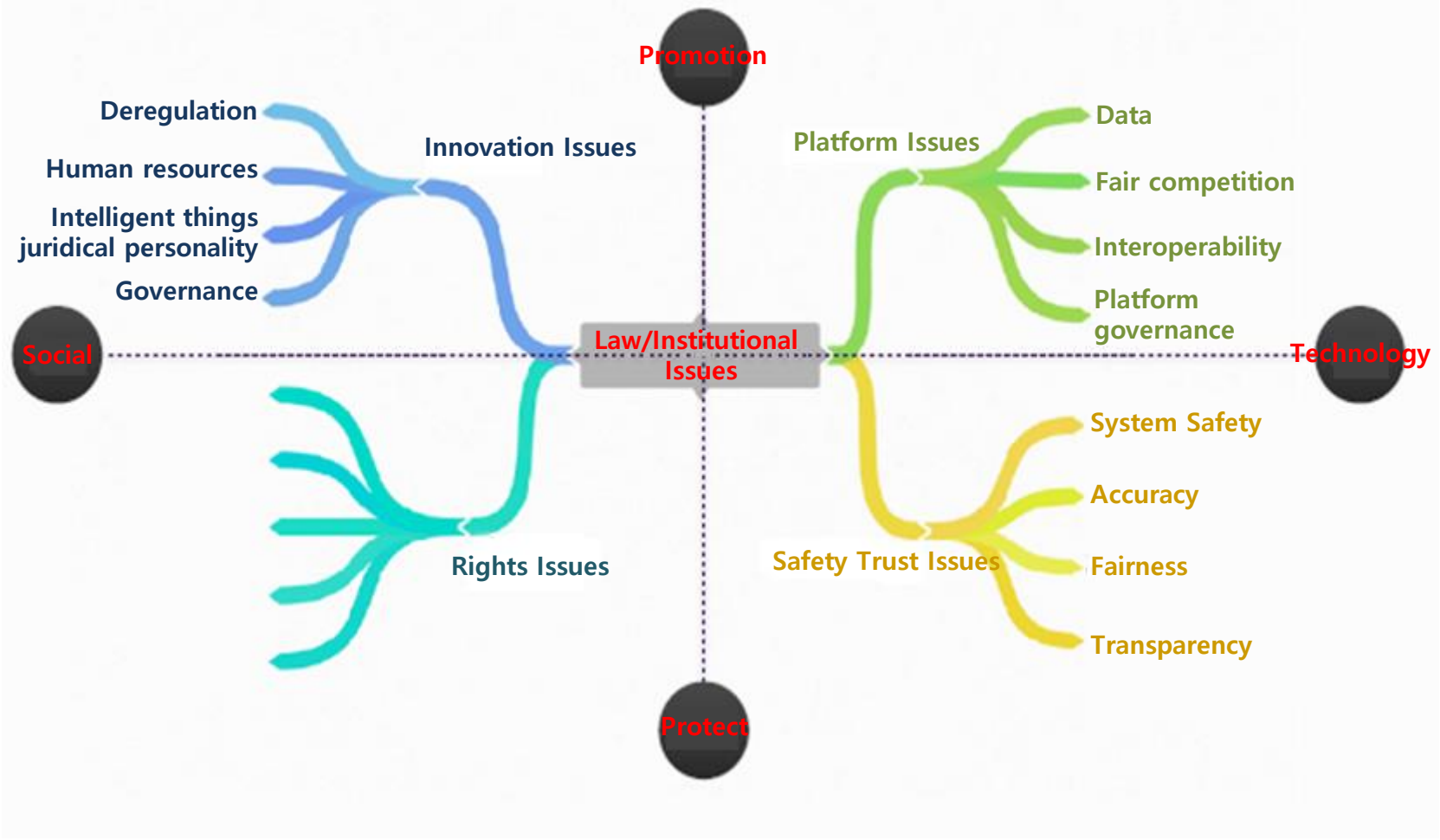
Input nodes : 각 (노선-정류장), (노선-정류장) 간의 특성변수 (152개)

- 노선 관련 변수
  배차빈도
- 정류장 관련 변수
  환승 가능 노선 수, 환승 가능 배차빈도
  정류장 주변 연상면적 (반경 250m 이내)
- 노선-정류장 간 관련 변수
  정류장 간 통행거리
  정류장 간 타노선과의 경쟁도

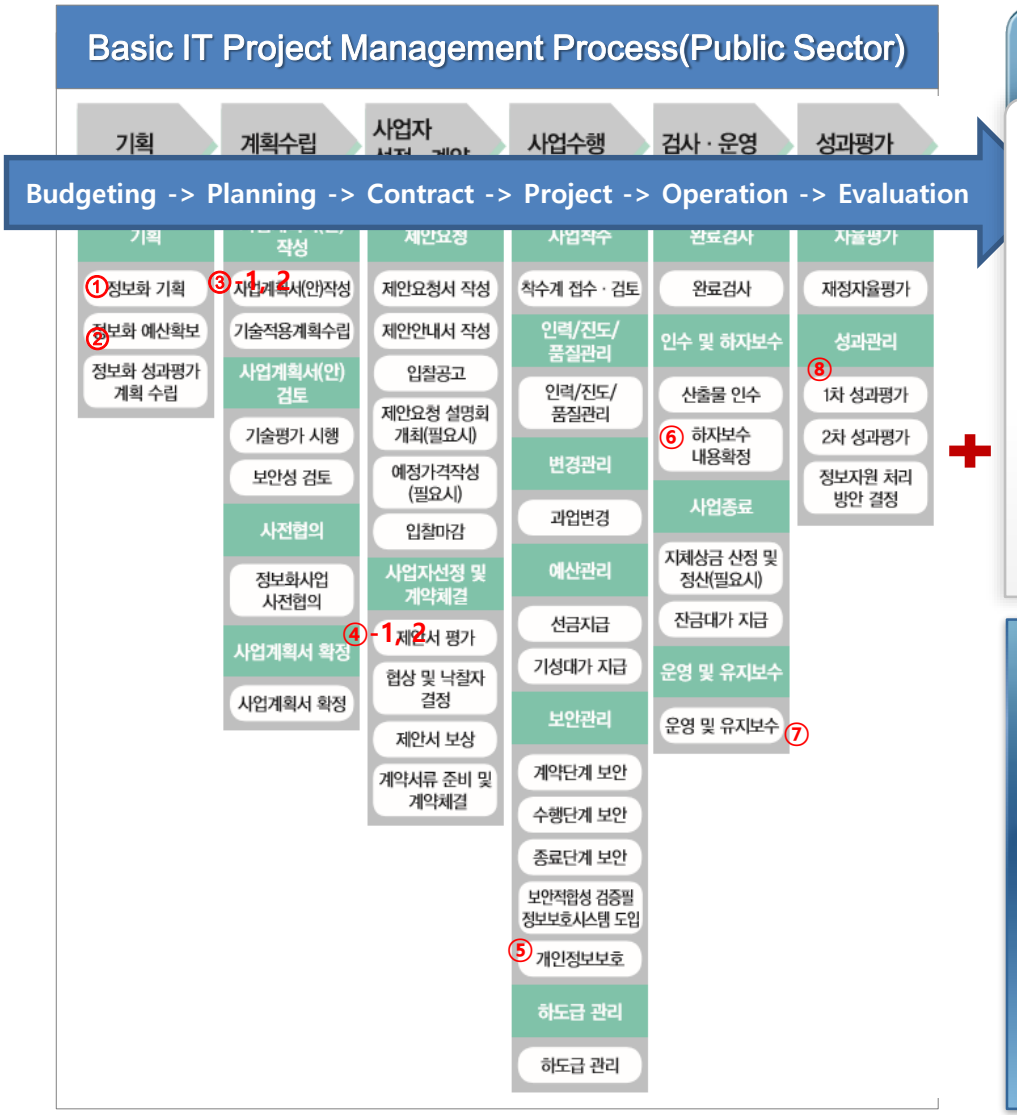
Large-scale Waste Disposal Service using Image Recognition(Eunpyeong-gu, Seoul)

Intelligent Counseling System,ChatBot(Daegu)

Law/Institutional Issues of Intelligence Society



eGovFrame and Open Source Software



Acts ...

Law
- Personal Information Protection Act and 32 others

Instruction
- Information security guideline 6 other

Contract Specifications
- 10 contracts for cooperative contract operation

Notice
- National Informatization Basic Guidelines and 18 others

Commentary and Manual
- SW business price calculation guide and 23 others

Issues

① Favorable cost-oriented preference

② COSMIC-FFP requires a business accounting standard model.

③-Click here for information on the quality of one piece of data and artificial intelligence.

③-2 Restrictions on support for large companies

④-1 Need to use the artificial intelligence technology to evaluate the goodwill and to operate the pool

④-2 Research on technology field based on artificial intelligence

⑤ Items necessary for utilizing data such as personal information protection problems

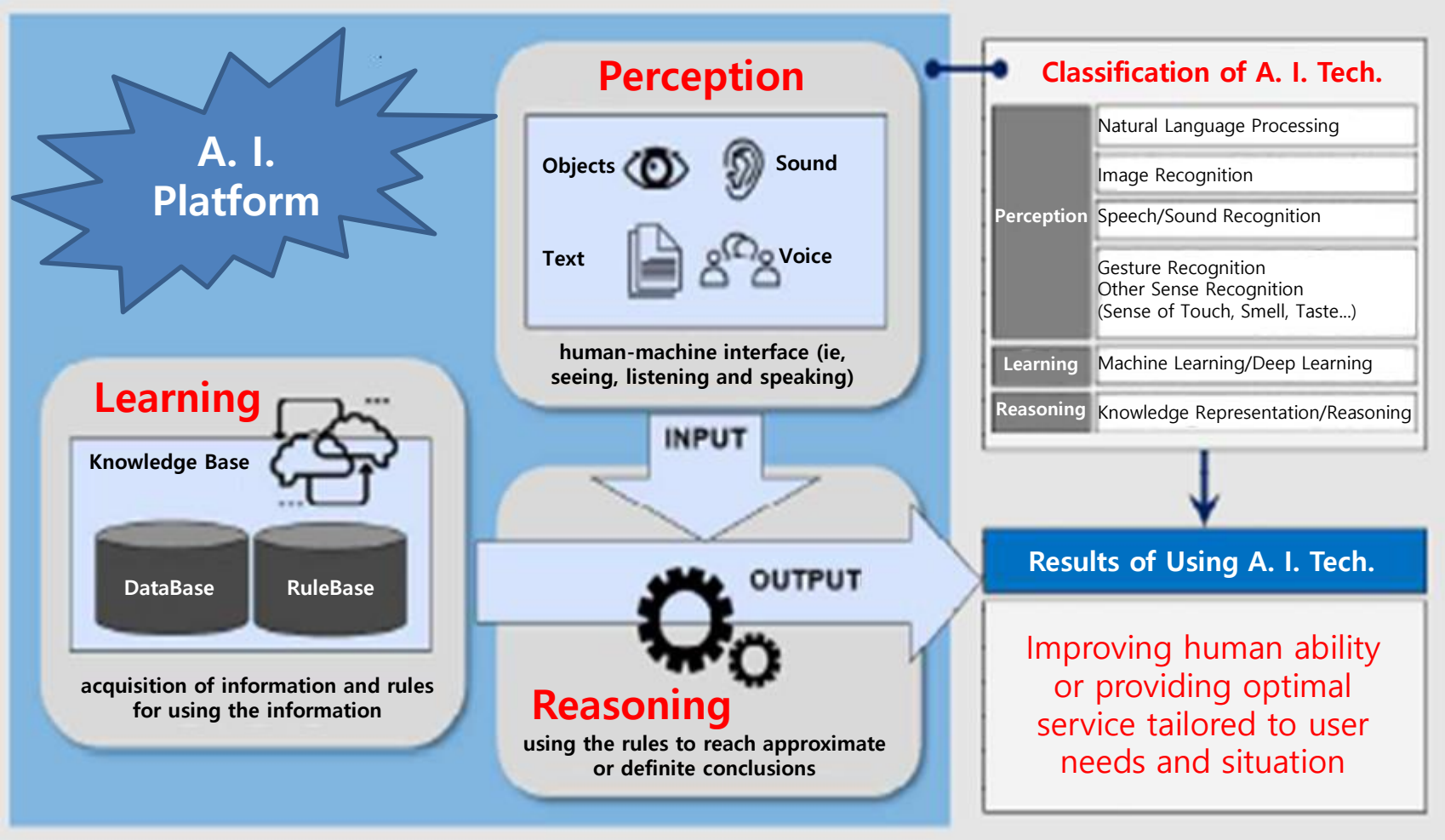
⑥ ⑦ earthquake and operation / maintenance and improvement plan

⑧ Operational performance measurement index (work structure diagram)

Why Did Google Open Artificial Intelligence Platform?

Enterprise	When	Technology
eBay	2015.02	Pulsar(Realtime Analytics Platform)
LinkedIn	2015.06	Pinot(Realtime Analytics Platform)
Aribnb	2015.06	Aerosolve(Machine Learning SW)
Microsoft	2015.11	DMLT(Distributed Machine Learning Toolkit)
	2016.01	R Open(Statistical Analysis & Data Science)
	2016.03	Bot Framework(ChatBot SW Framework)
Google	2015.11	TensorFlow(AI Engine)
	2016.05	SyntaxNet(Natural Language Learning Neural Network Framework)
	2016.12	Embedding Projector(Interactive Visualisation Tool)
Samsung	2015.11	Veles(Deep Learning Platform)
Netflix	2015.11	Spinnaker(Multi-Cloud Platform)
	2016.12	Conductor(Micro Service Orchestrator)
Baidu	2016.01	Warp-CTC(Connectionist Temporal Classification, Speech Recognition SW)
Amazon	2016.06	DSSTNE(Deep Scalable Sparse Tensor Network Engine, Deep Learning Framework)
Kickstarter	2016.12	Android, IOS App

Three Major Technologies of Artificial Intelligence - “Learning, Reasoning, Perception"



Lessons from the e-Government Standard Framework

Function Design
- Define basic functions and architecture
  - ✓ Analyze **3 big vendor's frameworks** and **e-Gov. projects** from 2004 to 2007
  - ✓ **54 functions** and **219** common components

Policy Setting
- Define Open Source Selection Policy
  - ✓ **Open Source Evaluation Process**
  - ✓ **License with no restriction on distribution and usage**

Logical Test
- Evaluate candidate open sources(175)
  - ✓ **Functional/non-functional** requirements
  - ✓ Constraints **for integration and interfaces**

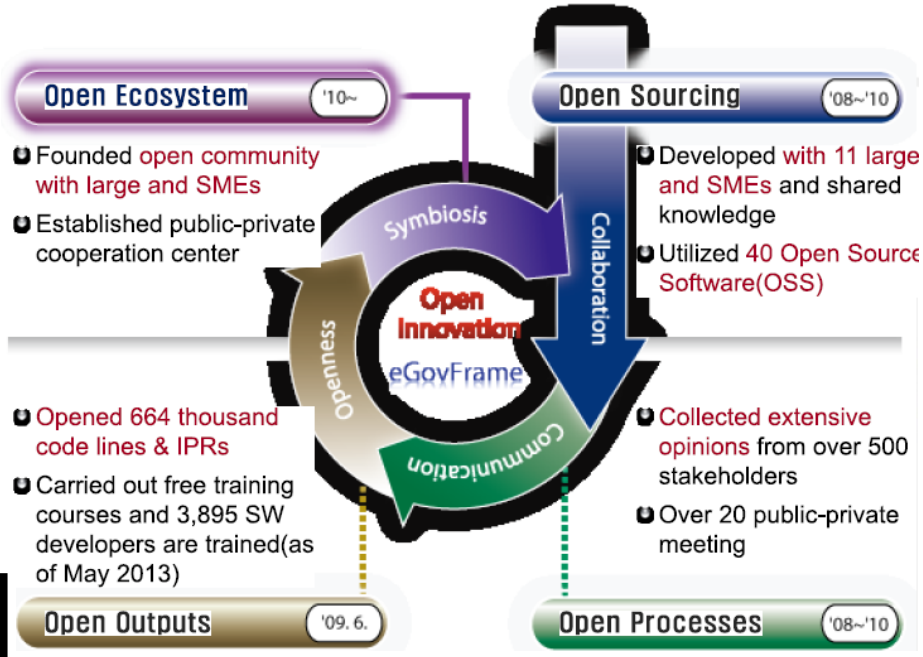
Physical Test
- Physically test candidate open sources(85)
  - ✓ **Basic functions**
  - ✓ **Non-functional requirements**(SW Quality)

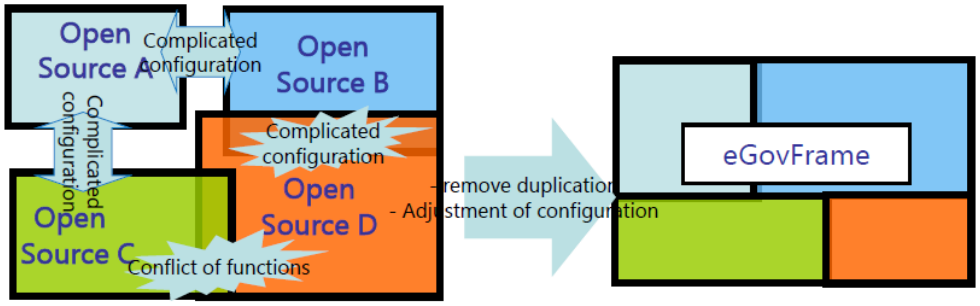
Best Open Source Selection

Final Result

40 open sources selected

[Major open sources]
- Biz. transaction : **Spring & 22**
- Data : **ibatis, Hibernate &1**
- Development tool : **Eclipse & 3**
- Test tool : **Junit & 5**
- Distribution tool : **Maven & 1**
- Configuration Management tool : **Subversion & 1**





<Combination of open source frameworks>

<eGovFrame>

OSS*) : Open Source Software

Conclusions

Q & A

THANK YOU!