# MIND AI

# A New Paradigm in AI
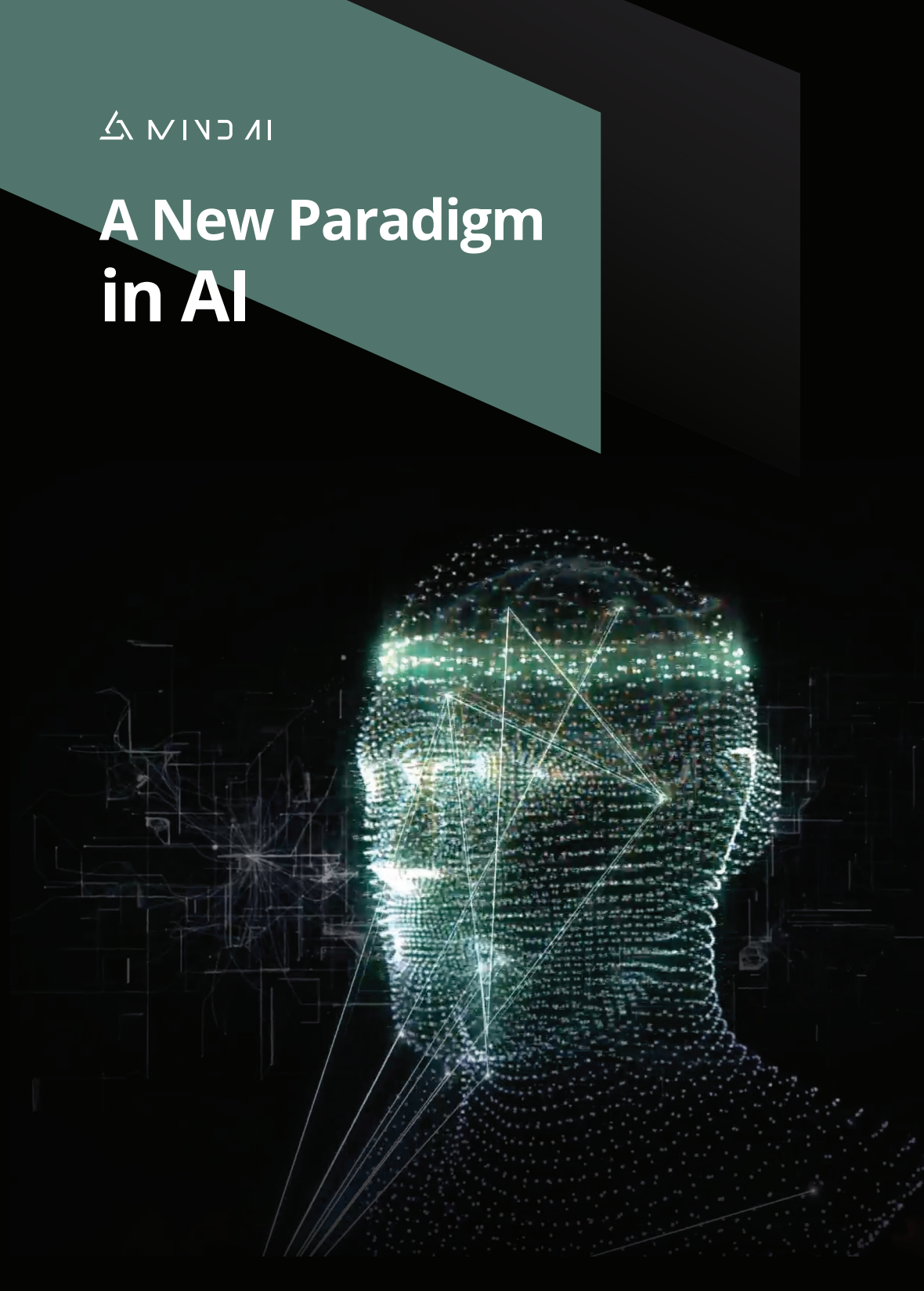
# Table of Contents

## Abstract

Mind AI was created to offer an entirely new approach to artificial intelligence. Rather than building an architecture that requires hyperparallel processing, supercomputers, and massive amounts of data, it is building its core reasoning engine based on an internationally patented, completely new data structure called a 'canonical'. It is a new paradigm in symbolic AI.

Mind AI is an artificial intelligence engine that converts natural language into novel data structures to perform human-like reasoning. The technology behind Mind AI is a basic unit of reasoning called the canonical, which can model anything that can be put into natural language within its structure. We call canonicals units of reasoning because they embody the three types of logical reasoning that humans utilize to solve problems and answer questions: deduction, induction, and abduction.

## Scientific and Technological Innovation

We are developing a new paradigm of artificial intelligence. From answering the most fundamental concepts, like "what is information?" to "how do you model reasoning?" We have created new structures that aim to disrupt the fields of Natural Language Understanding and Natural Language Reasoning. DARPA calls it the "third wave of AI", or "contextual adaptation", where the current technologies, based on Deep Learning paradigms, make up the second wave. We don't aim to replace those second wave systems, but act like a CPU of AIs, by which our higher-level reasoning utilizes these other systems like a computer has a monitor or speakers.



Canonical
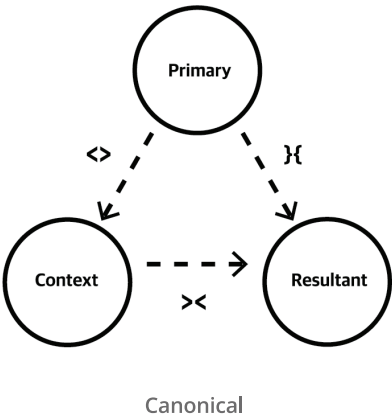
# Future Objectives

Mind AI aims to become the AI CPU in industries (B2B) where AI is used. Mind AI is to provide an API (Application Programming Interface) to charge based on the usage of that API. This is similar to the method of charging according to data and voice usage in mobile communication companies.

The service through artificial intelligence that understands human language and makes logical inferences has an immeasurable possible value and can be applied to all conceptual areas. When so applied, the usage of the API has unlimited potential. For example, when applied to a customer support chatbot, all inquiries from customers are answered through the API of Mind AI, growing the usage of the API exponentially as the number of customers who converse increases.

## Short Term (B2B Business)

- Provide Mind Expression Infrastructure for constructing Conversational AI to Telecommunication companies (T-Mobile, Verizon, AT&T, Vodafone, etc.) in English.
- After the True Mobile project, we will develop Thai and Korean packages for the Mind Expression and Conversational Reasoning AI Engine, and provide Mind Expression Infrastructure to other partners and industries in Thailand and Korea.

## Long Term (B2B & B2C Business)

- Expand the Conversational Canonical model and ontology for common sense, expanding to more industries (B2B) and products that anyone can configure as Conversational AI (B2C).
- As the ontology increases and its contents deepen, the ability of the reasoning engine improves, and ontology acquisition is crowdsourced through incentive programs.
- By delivering API as open-source, it can be easily used in the global development community to build an ecosystem that can build new platforms with innovative ideas.

# Differentiation

### Transparency

- Google Dialogflow and other competitor products have a configuration that responds to one intent. For example, let's say the meaning of the intent is "Mobile Usage". In order to classify this intent, generally, more than 10 to 100 similar expressions are needed. The reason being, when trying similar phrases that had the same obvious meaning to humans, the machine did not pick up on that meaning. And when creating intents, without transparency, when some unexpected phrase does not work, there is no way to find out exactly why it didn't work.

- Mind AI understands the user's intentions based on meaning through reasoning, not mathematical probability-based intent classification. Understanding the sentences' logical meaning, the entire process of reasoning from the user's input to the classification of logical meaning is transparent.

### Intent Classification without a Subject & Disambiguation

- Competitors' products cannot figure out which subject intent should be activated when the user inputs "I have a problem", for example. You can duplicate the additional logic to handle this disambiguation for each intent it could resolve to, but that adds another problem with reconfiguring this additional logic every time you add a new intent.

- Mind AI solves the problem with abductive reasoning, semantic distance and user verification. This is because the models are composed of sentences of logical meaning and is not based on the intent model. For example, if the composed problems are "TV problem" and "Internet problem", the logical forms that can have a "problem" are "TV" and "Internet". If they want "Internet", Mind AI will understand what "problem" is specifically being solved by verifying with the user.

### Context Hopping

- When competing products are talking about TV problems, for example, if we then talk about Internet problems, they lose the context of the existing TV problems if we try to talk about TV problems again. This is because only one intent is active at a time.

- As it is mentioned in the adaptive learning below, Mind AI is not a model in which conversations are made only according to the flow by creating a flow based on intent. Switching between contexts is made based on the Context (lower left node) within which our Canonical model already exists.

## Adaptive Learning

- Competitors' products experience great difficulties when new content is added to the user's troubleshooting manual or when the flow needs to be changed. This is because it is necessary to propagate all the effects of the new content on the existing flow, and also check whether that content is properly classified.

- The method of Mind AI is that we understand a written manual in a logical form, creating logical structures between these contents, and processes it through reasoning. This is not the way chatbot developers or designers configure flow, but how a user problem is naturally, logically configured. Enter the written manual. Mind AI's inference engine converts the manual into Canonical structures to grasp the meaning and outlines the logic through inference.

## New Symbolic Paradigm

- It combines the strengths of both Symbolic AI and Neural Network AI, and no other company has this structure as the means by which to represent artificial intelligence. We are unique in this space.

## Natural Language Reasoning

- Many AI companies, including IBM Watson, do natural language processing, but Mind AI is the first in natural language reasoning. This is a logical reasoning method that accurately understands all contexts in a completely different way from the approaches of existing AI companies. They try to understand by inferring the approximate meaning by applying patterns or rules.

## Augmented Topological Network

- When a network is formed by applying the semantically fragile structure of the existing symbolic AI to the Canonical structure of Mind AI, different words and contexts with the same meaning exist on the network with the same semantics.

## Linear, Qualitative Process

- It is not a method of grasping an approximate context through a tagging technique for a specific word, but continuous, logical reasoning that relates meaning to meaning according to the Canonical network structure.

## Human-understandable Logic

- Because the Canonical structure of Mind AI takes a form that humans can understand, the causal relationship between cause and effect can be traced back through the Canonical network structure.

## Don't Need Tons of Data

- Mind AI accepts education in human language, and constructs an ontology with single data statements, and performs logical reasoning based on that data. Therefore, unlike existing AI, it does not require vast amounts of training.

## Any Language

- Since Mind AI's model grasps meaning based on symbols, it can be applied to all languages used by humans.

## Universal

- Unlike existing AI models that can only be applied to specific domains and problems, Mind AI's model can be applied to all areas that humans can understand.

# Mind Expression: Conversational AI Iaas

### What is Mind Expression?

- Mind Expression is a Conversational AI Infrastructure as a Service (IaaS) for the development of Conversational AIs (also known as "chatbots")
- With a context-aware development interface, a developer can easily create complex conversation flows and test them immediately in the Sandbox
- With a single, simple public API access, integration with any front end is easily interfaced
- Developers can easily add specific knowledge from their own organizations and use it immediately

### Why Mind Expression is different

- Unlike every other chatbot platform, our Conversational AI Builder does not rely on a machine learning (ML) framework to properly match a chatbot user's "intent"
- Mind uses a new Symbolic Paradigm, which overcomes the problems of the older, first-generation symbolic models, solving the problems of brittleness and adaptive learning
- Mind doesn't rely on Big Data; we do not train our model, we educate it
- Neural network (NN) and Machine learning (ML) models are not made to reason: they only spot patterns, and they don't know why something made "sense" to them or not, whereas Mind understands what's going on and why

### What Mind Expression can do better

- Since we are not dependent on training phrases, the ease of setup is unparalleled, and the development time is only a fraction of the ML models used by everyone else
- Other systems use training phrases (one after another after another) to train their "intents", whereas Mind just requires one logical statement to teach the meaning of what the developer wants to handle
- As the components and actions that make up the flows are available in a context-aware development environment, the developer can easily add what is logical at every step of the building process
- Interfaces to enterprise back-ends & fulfillment are easily configured without the need for any programming skills to develop them

**What only Mind Expression can do**

- Transparency: it is well known ML/statistical/NN implementations are "black box" technologies

  – In contrast, the primary model we utilize, the Canonical, is modeled to be understood by both a human being as well as a machine, so transparency is available at every level

  – Our model is a Cognitive model: the phrases are understood logically, and are logically related to other parts of the ontology by their meanings

  – In other words, the other systems only approximate meaning, whereas we deal with actual meaning, that makes sense to everyone

Check payment history

Which product would you like to see?

Chocolate

Sorry, I don't understand.

AI ACTION DETAILS

**Conversation Model**
How AI Responds

! **Fallback**
Irrelevant customer input

- No other platform gives the capability of Context Hopping, which is available by default in any conversation flow created by the developer: no extra setup is required

  – What is available in other platforms is a set of very rudimentary connections that are arbitrarily connected, and whose context is lost unless specifically programmed into the chatbot model that is being developed

  – Hopping means jumping from point to point in a subject and between subjects, where no context is lost in between the "hops"

  – Where there is more context is needed to properly enter a new state, we automatically go to where the required information is collected

  – Another related feature is "arbitrary entry points", which are like hopping into a flow from nowhere; these are also provided without additional setup

- Since everything is logically understood, transfer of knowledge is built-in

  – Between domains, ontology that is understood by a certain context can be translated into other contexts for different domains (analogical reasoning, based on the cognitive model of abductive, deductive, and inductive reasoning)

  – Between languages, as we work with meanings, what works in one language will work the same way in another language
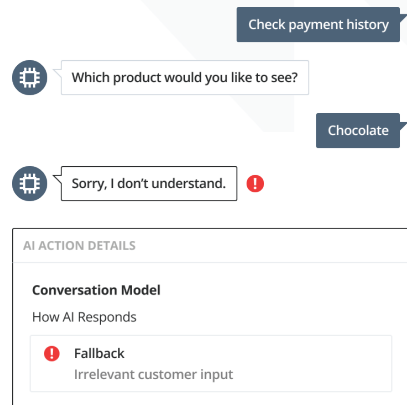
## Why a developer should use Mind Expression

- Along with the ease of setup, what is built is more accurate, too, than the ML/NN models available
- You can easily insert new states where they logically fit (guided by our context-aware UI), and you don't have to worry if you've done something wrong in the setup
- All changes cascade so the new flow is assimilated without any hand-rewiring
- Context hopping is automatic, and it does not need to be configured, because everything has a specific purpose, and the context is kept throughout the conversation
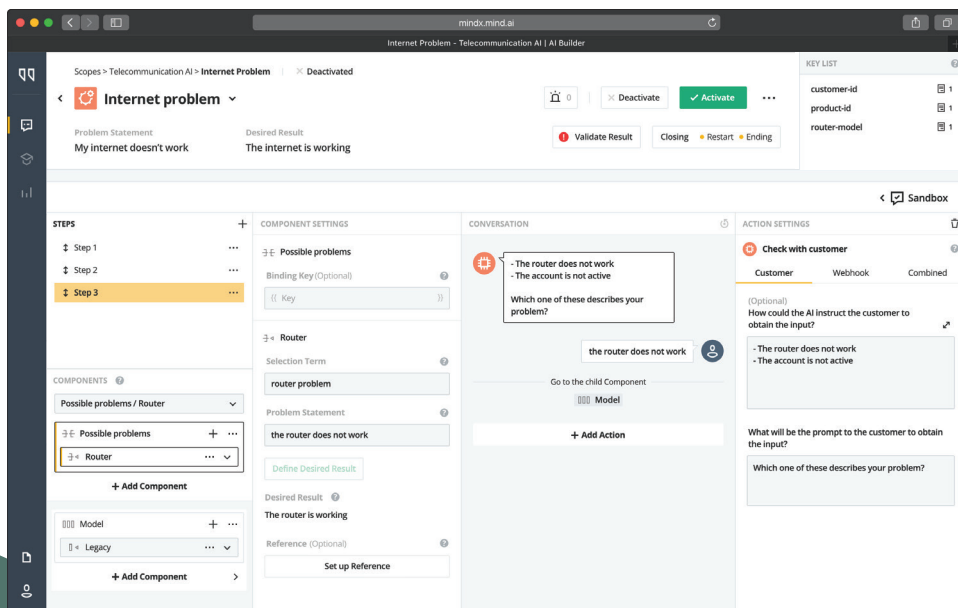




## MIND EXPRESSION

**Learn more about Mind Expression**

mindx.mind.ai

# Accolades

## May 2021

TiE50 Winner organized by TiEcon 2021



2021 Innovation Company's Technology Innovation Winner



## April 2021

Awarded '2021 Korea's Most Influential CEO'



## December 2020

Mobile Innovation Award Winner



## November 2020

TV Chosun Management Grand Prize 2020 in 4th Industrial Revolution



Minister's Grand Prize in Innovation



AI Unicorn Battle in Asia & Australia Winner



## October 2020

Invited to several startup accelerators



## September 2020

2020 Korea Most Innovative Company Grand Prize Winner



Invited to the Start-up Festival under the track of the WKF 2020



## July 2020

Korea AI Startup Wars Award Winner



## January 2020

2020 Brilliant People & Brand Awards Winner



## December 2019

2019 Korea Most Innovative Company Grand Prize Winner



## November 2019

2019 Grand Prize for Artificial Intelligence in Korea

# MIND AI

## Contact Us

| | |
|---|---|
| PHONE | +82-70-8622-8711 |
| EMAIL | info@mind.ai |
| WEB | www.mind.ai |