ELEMENT AI

DeepTech Artificial Intelligence

Promises and Operationalisation of AI

January 16th, 2020

ELEMENT AI

E AI


ELEMENT AI
Work smarter, together.
We help enterprises operationalize AI so that
people and machines collaborate better.

ELEMENT AI at a glance

JF Gagné,
CEO

15 years leading disruptive decision and data science-based software companies

LinkedIn TOP STARTUPS THE HOTTEST CANADIAN COMPANIES TO WORK FOR NOW · · 2019 · ·

Yoshua Bengio,
Co-Founder

Father of Deep Learning, full Professor at UdeM and Head of Montreal Institute for Learning Algorithms

acm TURING AWARD

3

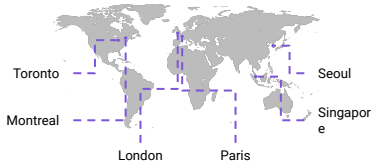
Three years old.
Founded on
Oct. 25 2016

450

450 AI practitioners
100+ Ph.D.s

GLOBAL

HQ in Montreal



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Research Domains: Vision, NLP, Time Series, XAI, Representation Learning, Operations Research

OUR CUSTOMERS

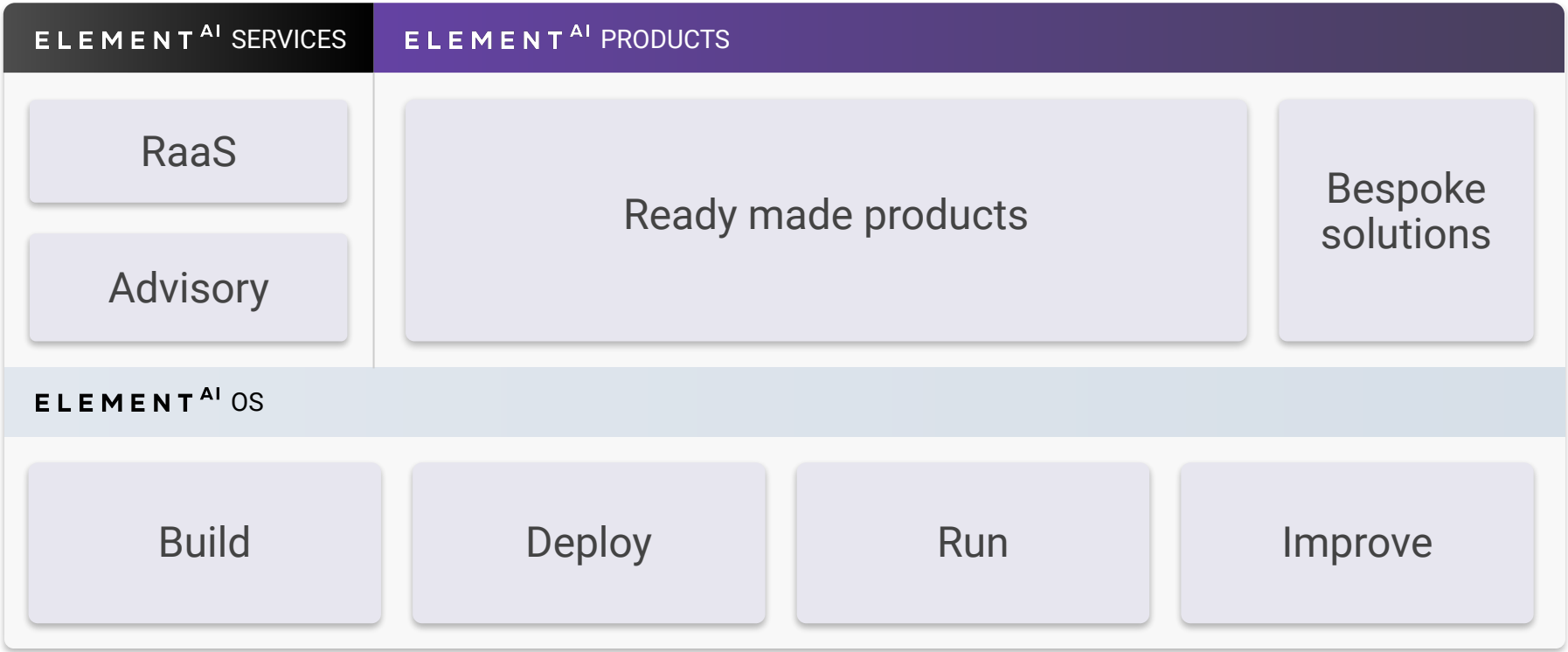
LG GIC GORE MUTUAL › GO FORWARD PORT MONTRÉAL AISIN

BACKED BY LEADING VC, CORPORATE & INSTITUTIONAL INVESTORS

CDPQ McKinsey & Company Data Collective intel Capital Fidelity INVESTMENTS NVIDIA

Generate real impact with AI using end to end solutions that manage the entire AI lifecycle

WHY THIS MATTERS Currently, less than 1 in 10 AI projects make it into production



What is AI?

The ability to solve specific tasks using computer programs that have some of the qualities of the human mind

Digital intelligence

Reasoning

Understanding concepts & relations

Communication

Understand language

Decision making

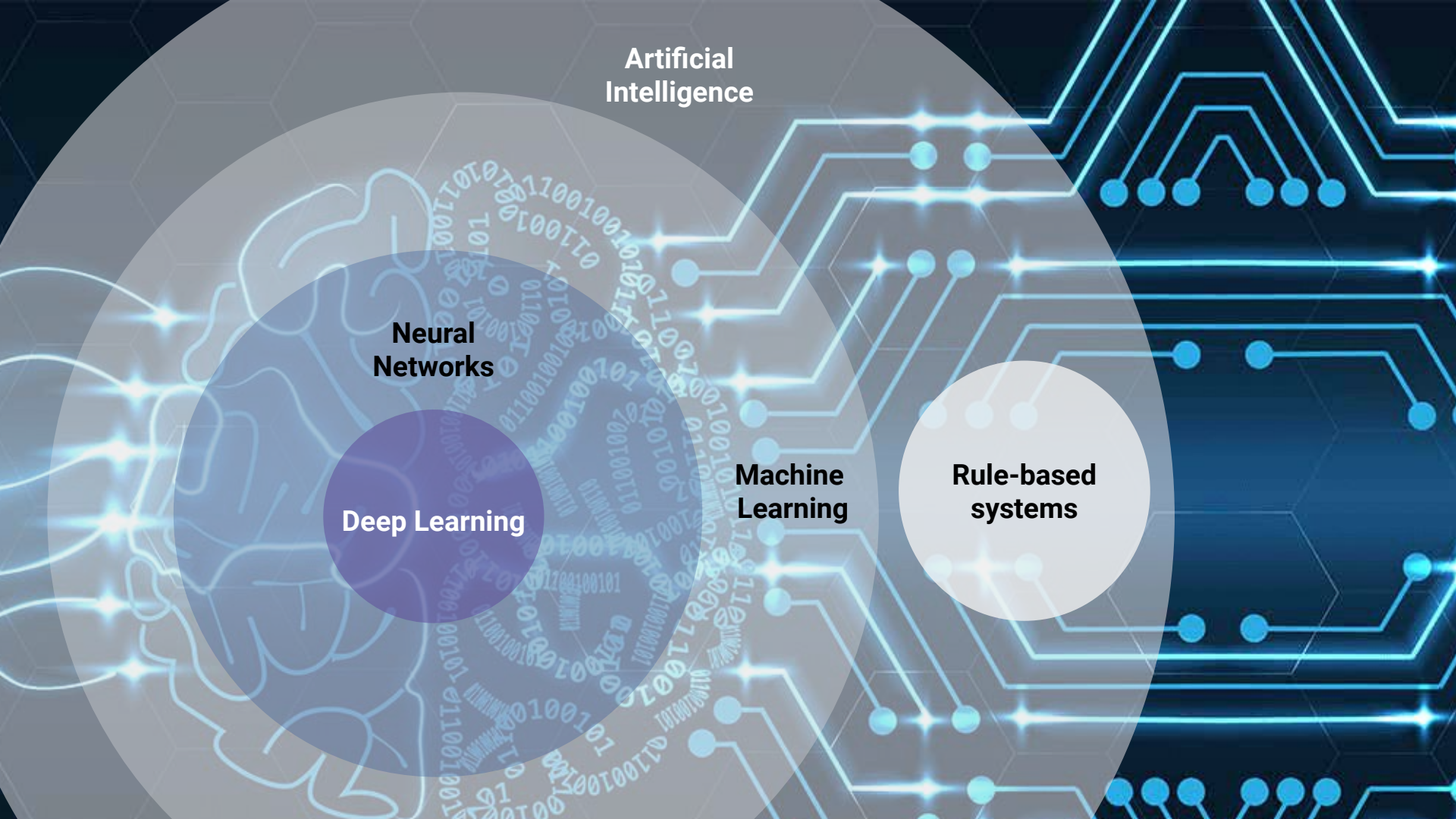
Optimize to specific outcomes

Perception

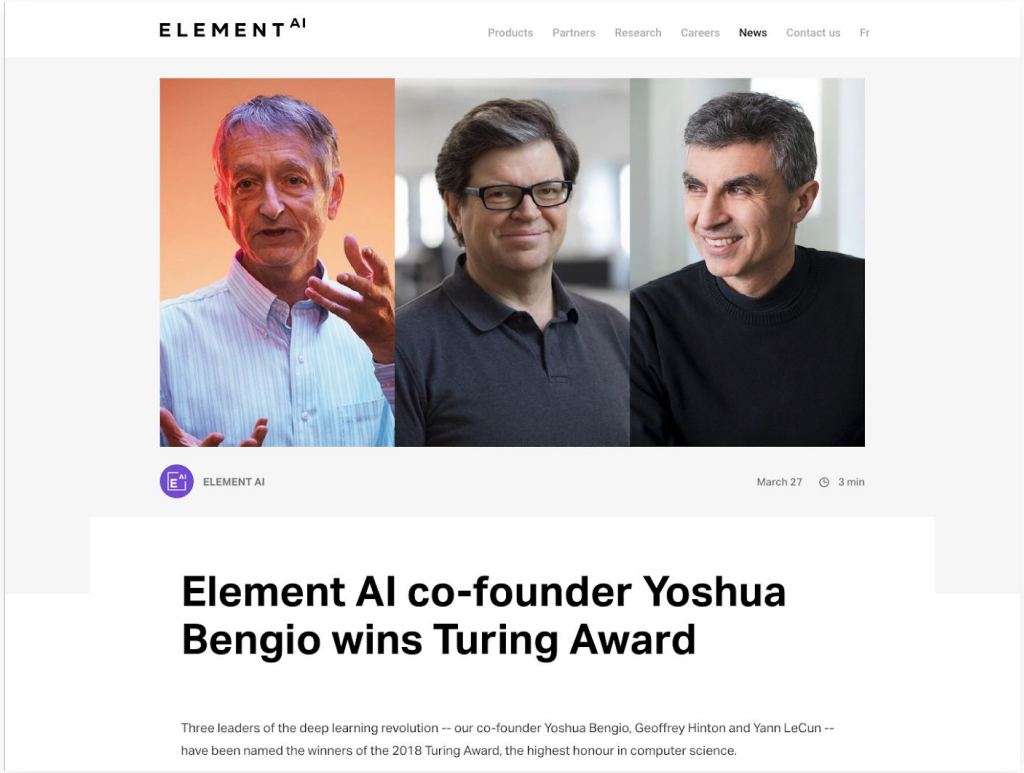
Sensing the world

Interaction and learn

Take actions to achieve goals


Artificial Intelligence
Neural Networks
Deep Learning
Machine Learning
Rule-based systems

AI: Progress on algorithms and on computing power



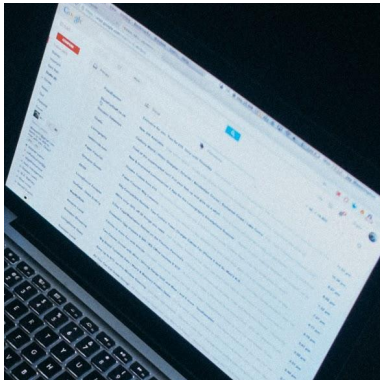
Graphical Processor
(GPU)

Computer Vision

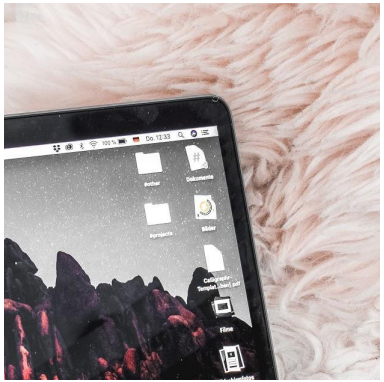
Speech Recognition and Natural Language Processing

Data Processing

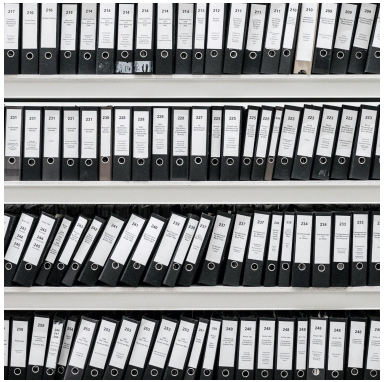
Emails



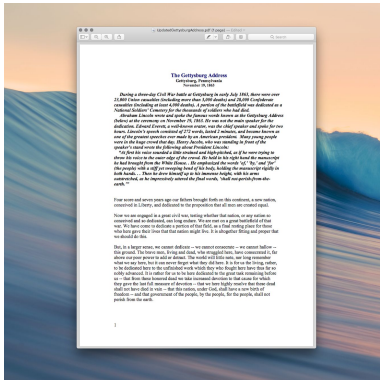
Files



Documents



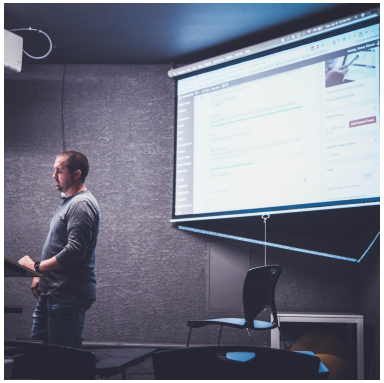
PDFs



Videos

Audio

Presentations



Where is AI today?

AI has made remarkable achievements in gaming...

CHESS - KASPAROV

GO - LEE SEDOL

TEXAS HOLD'EM POKER

STARCRAFT 2

...made in-ways into the world of art...


...and is beginning to impact the world of business.

Retail, CPG/Manufacturing & Supply Chain Use Cases

RETAIL USE CASES

Data Extraction

User Feedback

Contract Compliance

Invoice Insights

Intelligent Prioritization

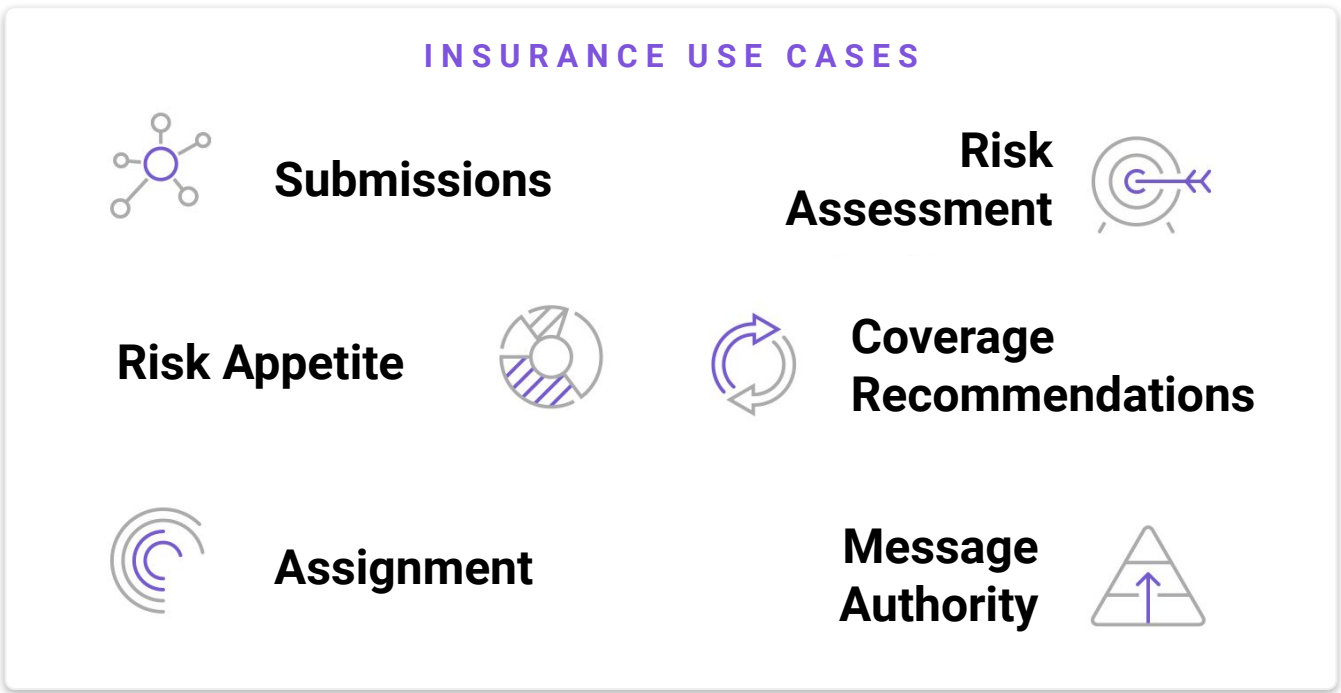
CPG/MFG & SUPPLY CHAIN USE CASES

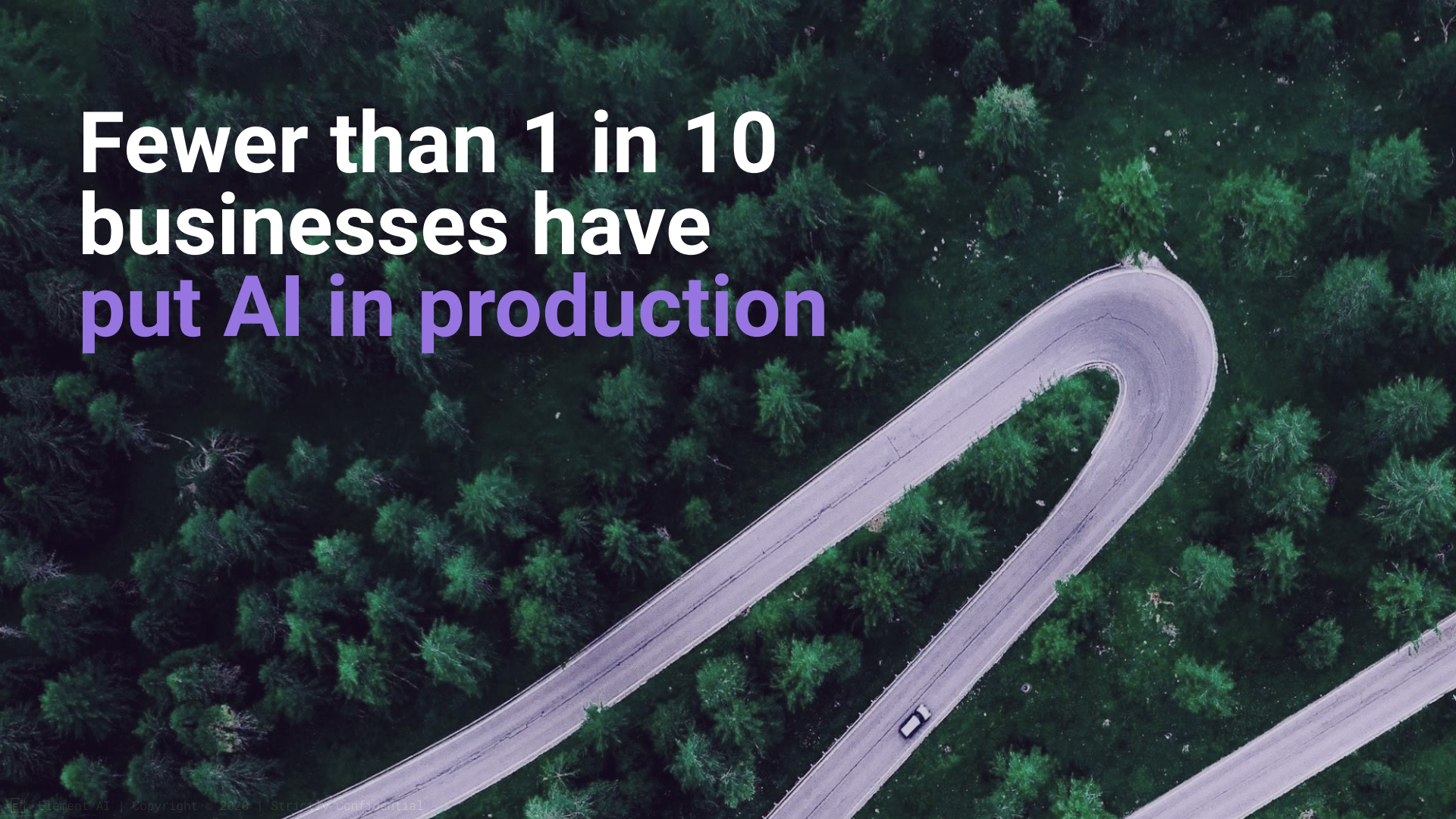
Manual to Digital

Moving Faster

Ever Increasing Accuracy

Insurance Use Cases





Barriers to the operationalization of AI

STRATEGY AND LEADERSHIP

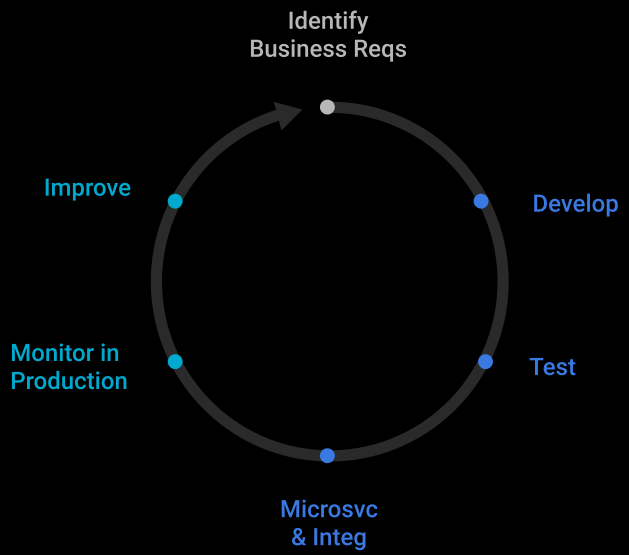
DATA

TECHNICAL FOUNDATION

ORGANIZATION

ETHICS AND GOVERNANCE

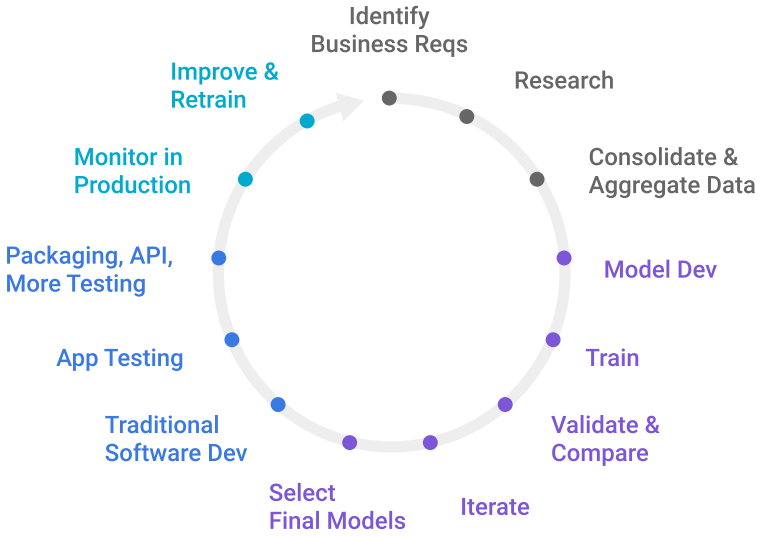
Operationalising AI is much harder than deploying software



Traditional Software DevOps

Business Analyst, Software Developer, Application Architect

VS



AI Model Lifecycle

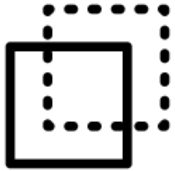
Business Analyst, AI Scientist, AI Developer, AI Architect, Software Developer, Application Architect

To ensure that the AI adopted is ethical, there are **7 key requirements** for AI practitioners

Human Agency and Oversight

Technical Robustness and Safety

Privacy and Data Governance



Transparency

Accountability

Diversity, Non-Discrimination and Fairness

Societal and Environmental Well-Being

Source: EU Ethics Guidelines for Trustworthy AI

Sound **regulation can be an important catalyst** for ensuring ethical, trustworthy AI

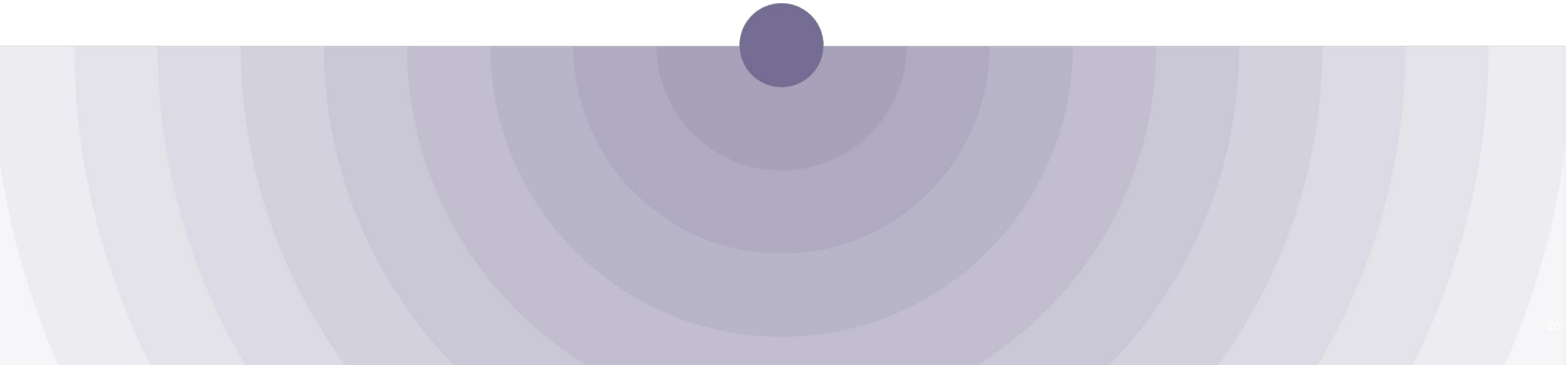
An often overlooked challenge focuses on building AI as part of a bigger system, where system boundaries are identified properly and AI is deployed based on the design of how the system is changed.

Physical common sense

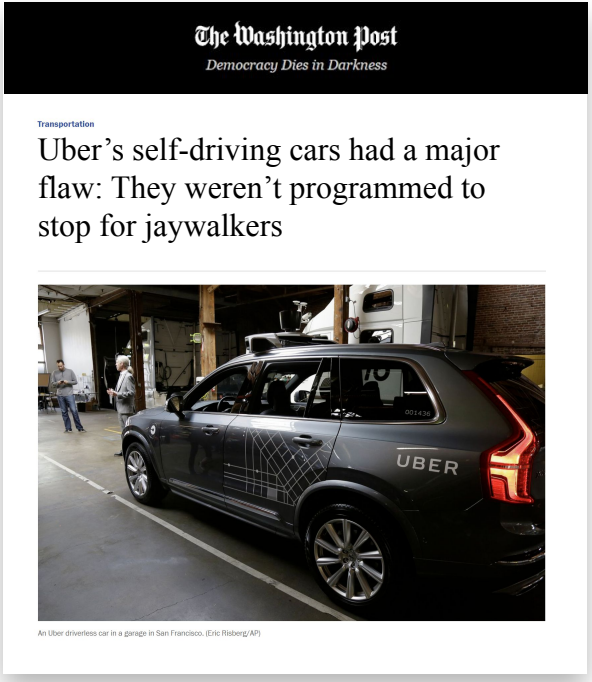
To effectively operationalise AI you need to think about the full lifecycle of an AI model

80% of model lifetime is in post-deployment, yet **95% of the tools and effort** address only **pre-deployment**

Current tools are unable to model the much larger system models are deployed into, which involves **many stakeholders and varied interests**



Example 1: Self Driving Car Accident



The Washington Post

Democracy Dies in Darkness

Transportation

Uber's self-driving cars had a major flaw: They weren't programmed to stop for jaywalkers

An Uber driverless car in a garage in San Francisco. (Eric Risberg/AP)

Source: Washington Post

System design is hard even for highly sophisticated AI teams

System boundaries excluded pedestrians except at intersections and crossings

System boundaries were much larger than the AI was designed to address

Example 2: Apple Card / Goldman Sachs

+

Goldman Sachs

Source: New York Times

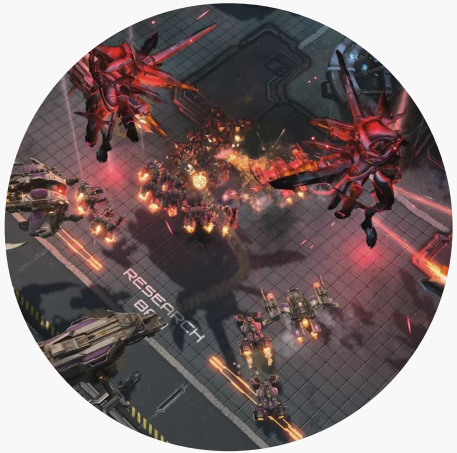
Apple and Goldman Sachs launched a joint credit card which determines credit limits for a user based on an algorithm

Algorithm provided different credit limits to individuals in similar financial situations but of different sexes (i.e husband and wife)

Root cause not publicly known but likely due to not considering the producers of historical training data as part of system

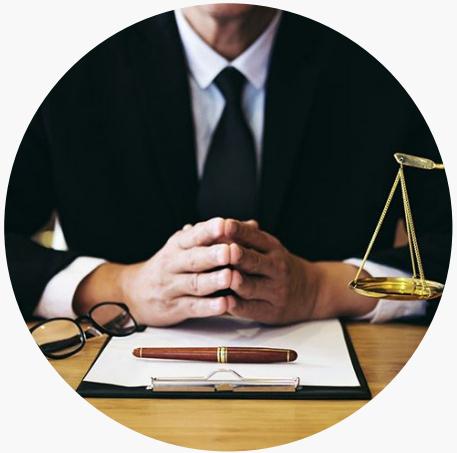
Ambivalence: Fascination vs. Fear

Summary



AI technology has advanced significantly

Companies struggle to move AI past the PoC stage into operations



While AI is nascent, we need to proactively ensure responsible adoption and better system understanding

Announcement of Joint Research Initiative LG E & Element AI - “Levels of AIX” - CES 2020

Level 1

Efficiency

AI **facilitates** specific functions with systems and devices, making user interactions more efficient and effective

Level 2

Personalization

AI uses **pattern learning** to recognize, optimize and personalize functions in order to improve & simplify interactions for users

Level 3

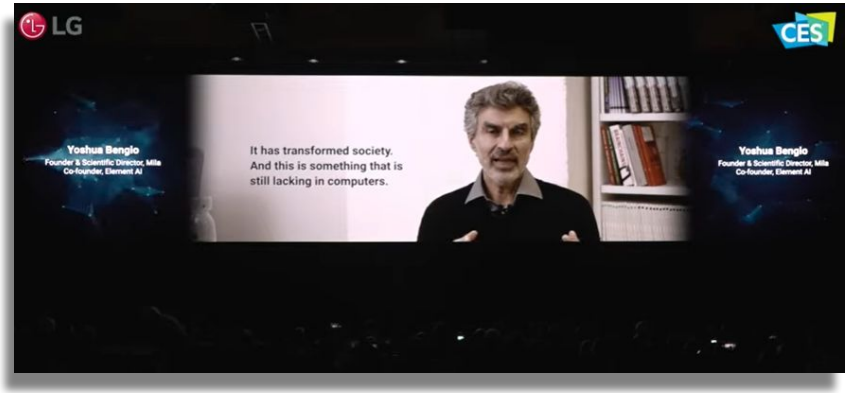
Reasoning

AI uses **causality learning** to understand the cause of certain patterns and behaviours, this information is used to predict and promote positive outcomes for users

Level 4

Exploration

AI uses **experimental learning** to continuously test, learn and improve, seamlessly adding value to users' lives by uncovering new inferences & enabling a deeper union



[LGE-EAI AIX Framework Infographic - English - Final.pdf]

LG ELEMENT AI

Levels of AIX: The Future of AI and the Human Experience

Overview

Artificial Intelligence (AI) is impacting the world we live in. It can already be found across the systems, services and devices that we use every day. And while there's been exciting advancements in AI's applications, the AI community lacks a common framework and language for discussing advancements across the variety of domains, such as on the road, at home, at work, and in public spaces.

This is why LGE and Element AI have partnered to research and develop this framework, proposing a shared definition for advancements in AI. Grounded in the imaginative work of foresight and research into the cutting edge of applied AI science and engineering, the framework consists of four clear levels. Each level represents a step-change in capability that will allow AI-powered products and services to provide new benefits to users and society. We believe the future of AI should focus on human-centric design, and so have coined the term AIX - Artificial Intelligence Experience, which we hope will sharpen the public discourse around this important topic.

To make clear what these different levels might mean in practice, we have included four underlying dimensions and considered how AI must remain safe and trustworthy at every stage.

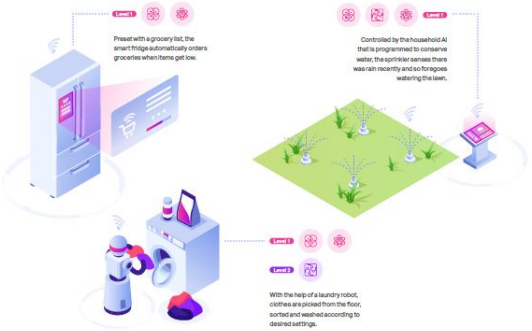
Unlike previous waves of automation that reshaped human spaces and workflows to integrate machines, we believe the transformative potential of modern AI is to reverse this trend. By creating devices, systems, spaces, and infrastructure that adapt to people and their needs, increasingly sophisticated AI can help unlock a new wave of growth in productivity and well-being.

This is a lofty vision, and we recognize that building human-centric commercial AI solutions will require expertise and effort from the entire AI ecosystem. We believe the collaboration between Element AI and LGE that produced this framework represents a model for fruitful partnership, and hope others take up this AIX framework to drive research and development of the next generation of AI-powered products and services.

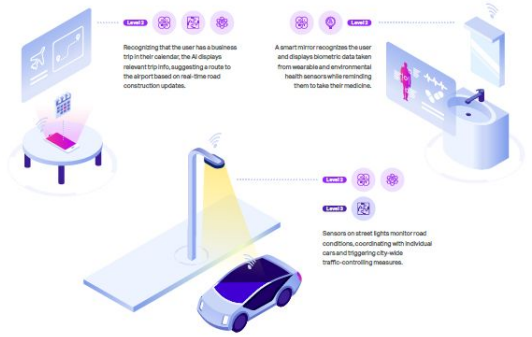
Here are the four generations and their defining traits:

	Level 1	Level 2	Level 3	Level 4
Names	Efficiency	Personalization	Reasoning	Exploration
Definitions	AI **facilitates** specific functions with systems and devices, making user interactions more efficient and effective	AI uses **pattern learning** to recognize, optimize and personalize functions in order to improve & simplify interactions for users	AI uses **causality learning** to understand the cause of certain patterns and behaviours, this information is used to predict and promote positive outcomes for users	AI uses **experimental learning** to continuously test, learn and improve, seamlessly adding value to users' lives by uncovering new inferences & enabling a deeper union
Pervasiveness In Our Lives	Familiar Systems & devices that utilize AI are appearing in user's everyday lives	Common AI is optimizing most devices at the edge and most systems through the cloud	Universal AI is everywhere and interconnected for the benefit of all devices and systems	Foundational AI forms a core component of the infrastructure for all devices and systems in society which share and learn collectively.
Environmental Awareness	Perceives Perceives specific, pre-defined information and acts on it accordingly to increase its efficiency	Recognizes Recognizes patterns and uses them to make better predictions to increase relevance for users	Understands Understands the patterns and principles across systems in order to meet predefined missions. Uses reasoning to respond to new situations by applying unique approaches	Explores Seeks to test and validate the underlying conditions of a situation by analyzing data from a broader set of external sources to inform its inferences
Collaboration	Independent Works alone or relays commands from one system to another	Connects Connects with other devices within a user-controlled system so that the user can use one device to control others	Coordinates Understands the larger interconnected system and the function of different devices and shares learning outcomes to achieve a broader mission	Orchestrates Identifies gaps in data and user understanding then orchestrates across internal and external systems to find and apply new knowledge as it scrutinizes and optimizes its hypotheses
User Understanding	Agent Perceives user inputs and logs past inputs	Assistant Recognizes and distinguishes users and their unique behaviours and preferences	Companion Interprets the user's mood from contextual understanding of multiple data points and reasons about social relations to predict and support how users will interact	Sage Understands how to influence users - enabling them to trust new information and approaches by providing evidence, nudging behaviours in service of a broader purpose
Autonomy	Task-oriented *One-off actions* Can execute specific commands within specific parameters to achieve a specific task	Goal-oriented *Multiple actions* Works out various options for achieving a given goal and presents them to the user for selection or is pre-programmed to efficiently meet the desired goal	Mission-focused *Long-term actions* Understands users and its environment in order to predict, recommend and execute solutions to assigned missions	Purpose-driven *Exploratory actions* Using local context and external sources of knowledge, it balances users' competing needs and interests and is able to take creative approaches to influence user behaviours, whilst in service of the user's ultimate purpose

Level 1



Level 2



Thank you.

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