OF ECONOMIC DISRUPTION AND ARTIFICIAL INTELLIGENCE –

AI and the Future of Business

Cambridge: February 6th, 2018

Hans-Christian "Chris" Boos, arago, @boosc

AGENDA

1   1.1 Challenges for the established economy
1.2 Deep Dive into AI
1.3 How Arago's AI HIRO^{TM} works

2   Entrepreneur Journey

BUSINESS PEOPLE HAVE GOALS.

ENGINEERS HAVE PROBLEMS.

3

BUSINESS PEOPLE EXECUTE PLANS.

ENGINEERS WRITE PROGRAMS.

CHALLENGES FOR THE ESTABLISHED ECONOMY

DISRUPTION.

THE PLATFORM COMPANIES' CASH POSITION
Lots of cash to invest with no urgency
to prioritize budgets.

THE ESTABLISHED COMPANIES' CASH POSITION
Very little cash to invest, high pressure through
external stakeholders (capital market, customers etc.).

$

$

total revenue

*margin expected by/
returned to market*

total cost

available cash

available cash

cost of revenue

cost of revenue

DISINTERMEDIATION.

arago
THE SUM OF EXPERIENCE
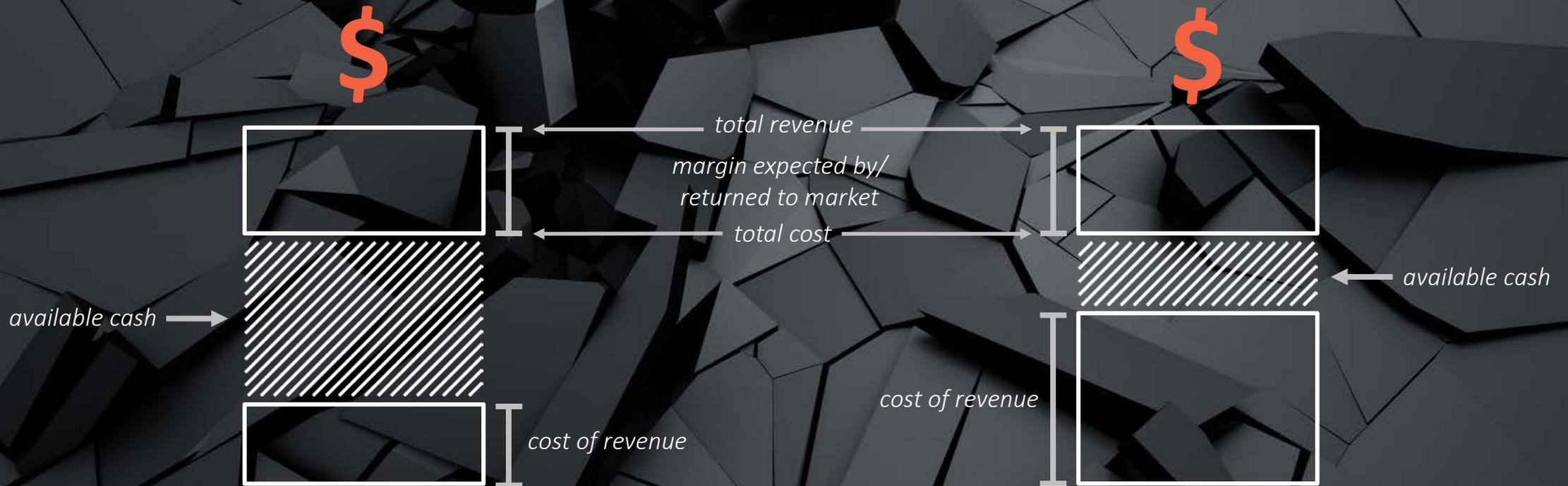
IN THE PAST:
DIRECT CUSTOMER RELATIONSHIP

Brand influences customers to buy their products/services

RETAIL

CUSTOMIZED ADVERTISING, IN-/OUTBOUND

E-COMMERCE

BRAND NO. 1

BRAND NO. 2

BRAND NO. 3

Customers choose platform

Customers choose goods and services from platform

Brand offers its products/services on multiple channels
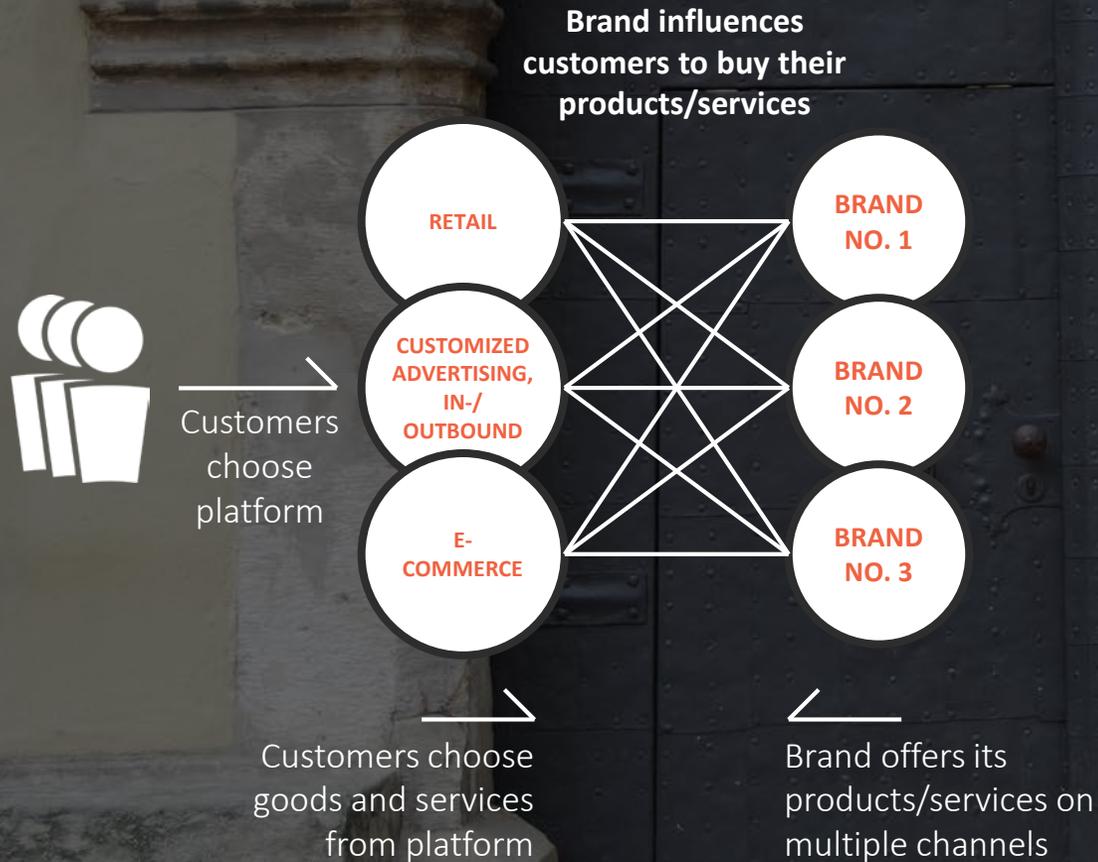
TODAY:
POINT OF SALE MOVES INTO THE PLATFORM

Platform will always satisfy the customers to keep them from switching

Customers choose an AI assistant platform!

How can I help you?

Need something?

BRAND NO. 1

BRAND NO. 2

BRAND NO. 3

Platform chooses goods/services from the brand based on the customers' preferences

7
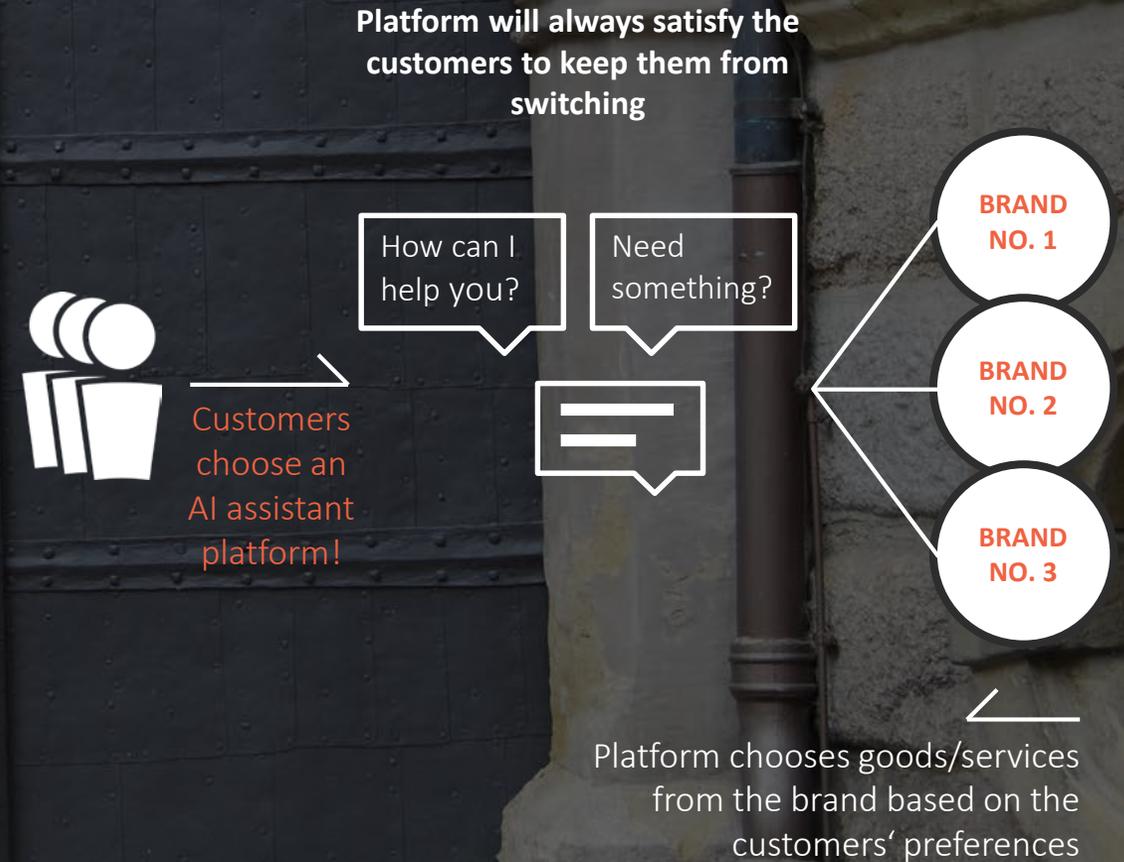
REQUIREMENTS FOR SURVIVAL.

STRONG BRAND

INNOVATION

**SERVICE**

HOW TO THRIVE.

CHANGE OF BUSINESS MODEL FROM LINEAR TO EXPONENTIAL

PLATFORM COMPANIES THINK BIG

Platforms are exponential and think big regarding their targets for improvement. They choose to start disrupting industries that touch billions such as healthcare, transportation, communications, energy, finance and telecoms.

AI IN THE CORPORATE TOOLKIT

AI is one of the tools – potentially the only one – in the corporate toolkit to help overcome these competitive threats AND make use of the strong side of established players: **THEIR EXPERIENCE**.

turning exponential
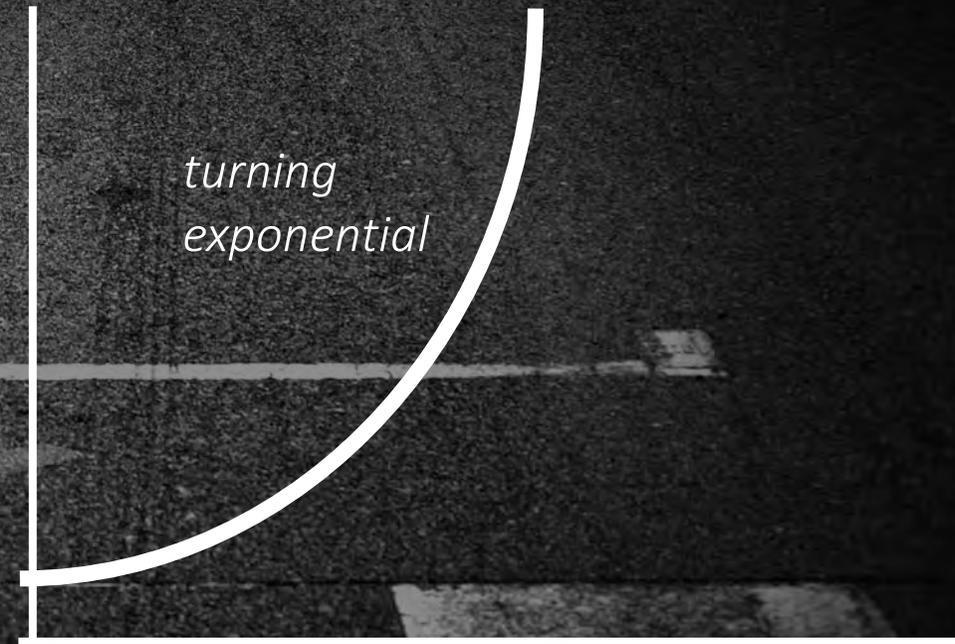
THE FUTURE OF BUSINESS:

ANYTHING THAT IS A PROCESS CAN AND WILL BE RUN BY AN AI.

DEEP DIVE INTO AI

THE CORE DIFFERENCES BETWEEN MARKETING AND SCIENCE (OR HYPE AND REALITY)

1. MACHINES DO NOT UNDERSTAND.

# 2. MACHINES DO NOT HAVE HUMAN-LIKE BRAINS.

# 3. MACHINE LEARNING IS NOT EQUAL TO AI.
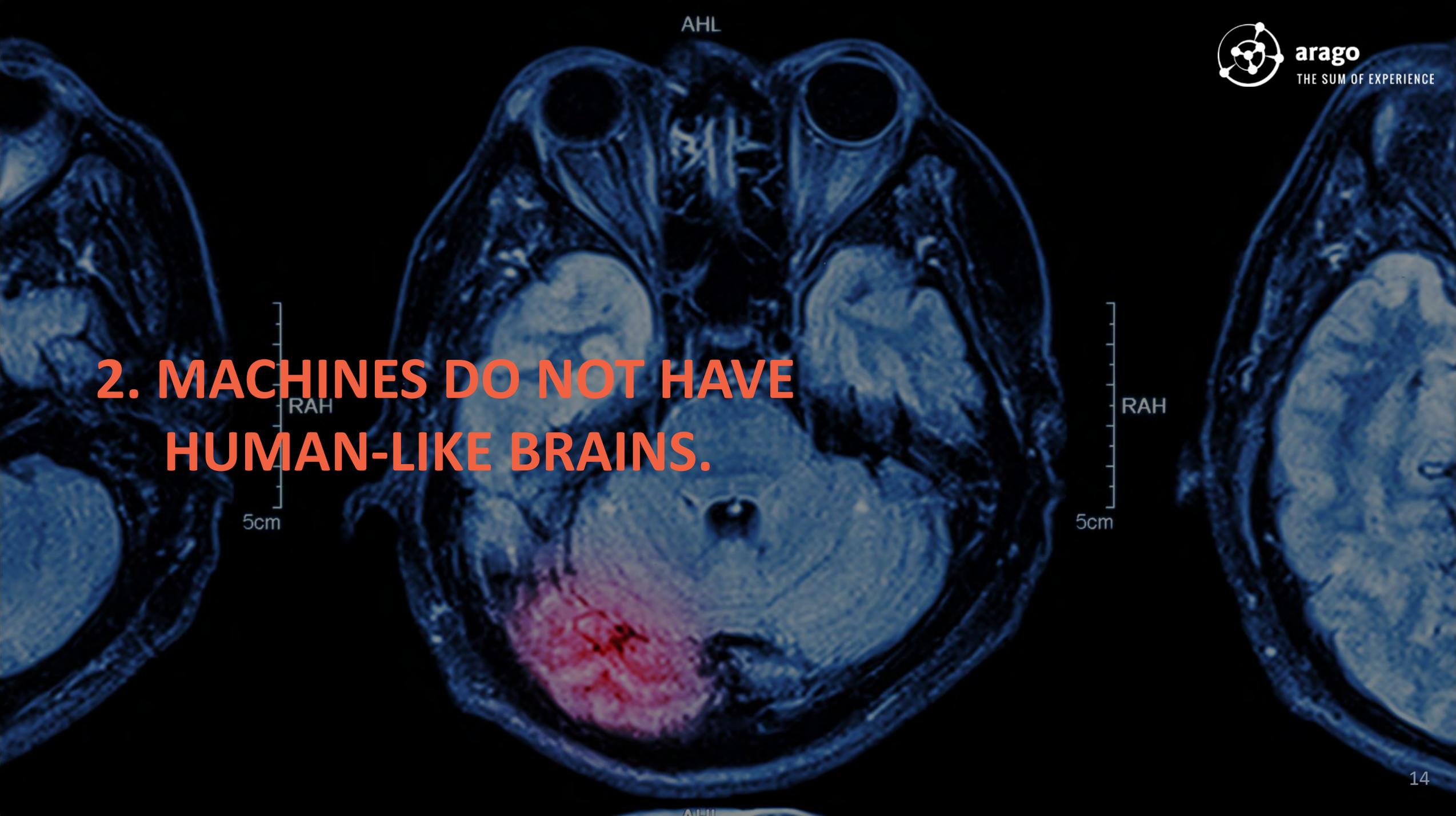
THREE TYPES OF AI.
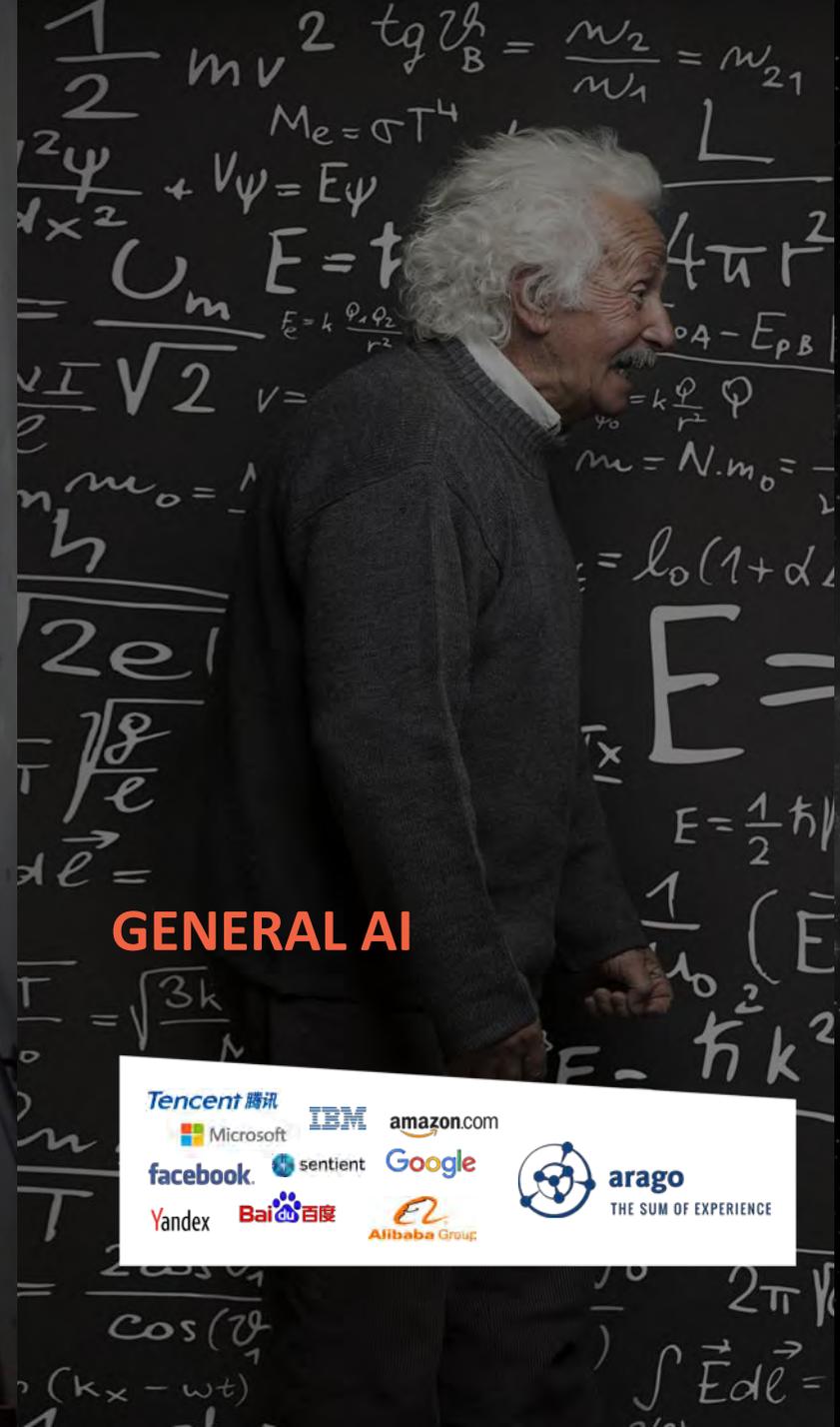
NARROW AI
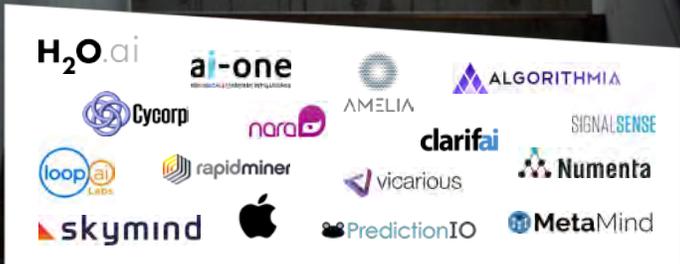
GENERAL AI

SCI-FI STORIES

?

THE FOUR PILLARS OF BUILDING A GENERAL AI.

arago
THE SUM OF EXPERIENCE

Powering the AI with compute, storage and other resources.

COMPUTE

DATA

Perpetually filling the AI with **understanding of its environment** and **experience.**

GENERAL AI

Providing the AI with the necessary **intelligence**, performance and efficiency.

ALGO-RITHM

PEOPLE

Developing, improving and refining the AI, its environment and necessary algorithms.

17

ARTIFICIAL INTELLIGENCE EXPLAINED.

arago
THE SUM OF EXPERIENCE

MACHINE LEARNING

LANGUAGE PROCESSING

MACHINE REASONING

GENETIC ALGORITHMS

Artificial Intelligence Explained
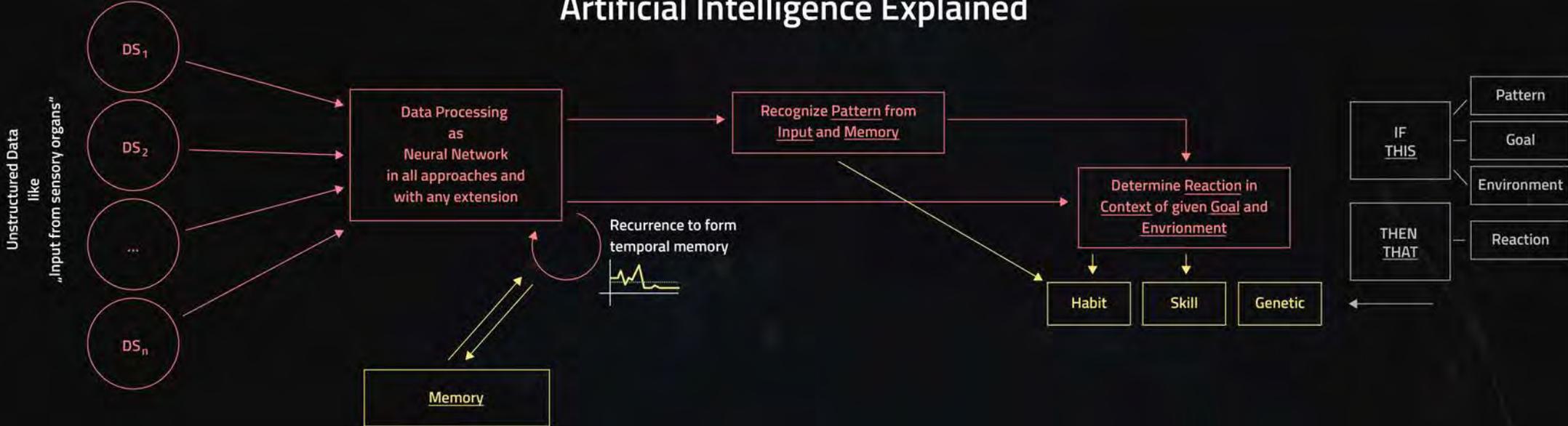
Unstructured Data like „Input from sensory organs"

DS$_1$

DS$_2$

...

DS$_n$

Data Processing as Neural Network in all approaches and with any extension

Recurrence to form temporal memory

Memory

Recognize Pattern from Input and Memory

Determine Reaction in Context of given Goal and Envrionment

Habit **Skill** **Genetic**

IF THIS

Pattern

Goal

Environment

THEN THAT

Reaction

Animal - Pattern based instinctive activity abstract constructs for interfacing

Human - Dynomically planned multi-goal activity

Artificial Intelligence Explained

Artificial Intelligence Explained

Unstructured Data like „Input from sensory organs"

- DS_1
- DS_2
- ...
- DS_n

Data Processing as Neural Network in all approaches and with any extension

Recognize Pattern from Input and Memory

Determine Reaction in Context of given Goal and Envrionment

Recurrence to form temporal memory

IF THIS
- Pattern
- Goal
- Environment

THEN THAT
- Reaction

Habit | Skill | Genetic

Experience

Memory

Concepts

Language

Consious Knowledge

Context sensible Knowledge Pool

IF THIS	THEN THAT

Pattern based behavior

Kontext

Goal Assumption

Data Processing as Hybrid Reasoning System or General Problem Solver

Dynamic Sequence of Action from Knowledge Pool to create individual Solution

Explanation

Alternative action

Step-by-step Solution building with respect to Dynamic Context Model

Animal - Pattern based instinctive activity abstract constructs for interfacing

Human - Dynomically planned multi-goal activity

THE HOTEL CALIFORNIA EFFECT.

Consumers give data
back in return

offer (partly free) services
to the consumers

Build their own General AIs
on the consumers' data.

GENERAL AI
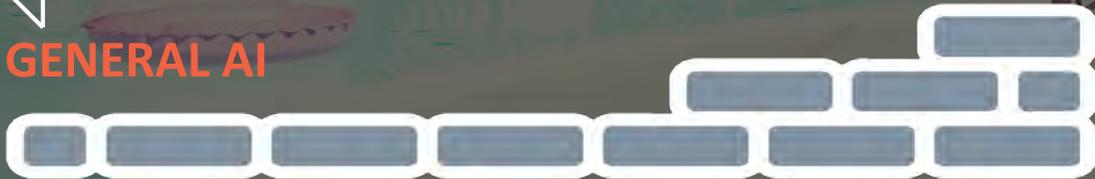
ESTABLISHED COMPANIES
do not have access to these General AIs without
endangering their very existence.

ESTABLISHED COMPANIES NEED A DATA POOL THEY CAN BUILD ON.

Established companies collect every piece of data within the company.

Independent (partly) shared data pool
Own IP is under control and protected under European law.

Give data to a secure and independent intermediary.

Get access to a shared pool of aggregated organized data.

Use data and the neces-sary technology to build their own corporate AI.

Give new data to the shared data pool.

The established companies' **General AI**.

New business models, offerings, services.

BY THE WAY:

AI AND DATA PROTECTION
DO NOT CONTRADICT EACH OTHER.

COMPETING WITH THE INTERNET GIANTS IS POSSIBLE.

arago
THE SUM OF EXPERIENCE

INTERNET GIANTS

As an example for the Internet giants, Google's first commercial application of AI was datacenter optimization. Google plays GO etc.

THE VERGE

Google uses DeepMind AI to cut data center energy bills
The AI successfully reduced power consumption by 15 percent overall (July 21, 2016)

WIRED

In a Huge Breakthrough, Google's AI Beats a Top Player at the Game of Go *(January 21, 2016)*

ARAGO

To compare, Arago has started with AI-based datacenter automation, driving the commercialization of its AI Platform HIRO™. Arago plays Civilization etc.

Frankfurter Allgemeine
ZEITUNG FÜR DEUTSCHLAND

With Artificial Intelligence Out of the Platform Trap
(November 12, 2016)

PCWorld

Arago teaches an AI to play games, the better to manage IT systems // *When Arago taught its Hiro™ IT automation system to play a Civilization-like strategy game, it learned how to make IT more fun (December 6, 2016)*

As the algorithm teams are relatively small, **Arago is par with the Internet giants on algorithms.**

HOW ARAGO'S AI HIRO™ WORKS

A POWERFUL SEMANTIC GRAPH IS AT THE CORE OF THE HIRO™ PLATFORM.

arago
THE SUM OF EXPERIENCE

HIRO™ Know-ledge Core

Open Graph Protocol	**APIs**	Stream Processing		
Advanced IAM	**Data & Access Security**	Excryption & individual access control		
On Graph Computing		Time series processing, CEP, Stream Processing		
Graph Algorithms	**Data Processing**	Centralized Machine Learning	**EUROPEAN DATA PROTECTION**	
Graph Query		Centralized Analytics		
Evolving Ontology	**Data Store**	Special modules for time series, BLOBS, …		
Semantic Graph		Semantic Search		

HIRO™ Knowledge Core gives the **power of a data pool to established companies** while they are fully **retaining control, ownership, security of their data**.

KNOWLEDGE IS STORED EXPERIENCES OF EXPERTS FED TO THE AI WHERE IT IS NEEDED TO SOLVE PROBLEMS.

HIRO™ Commu-nity & Portal

REAL

Knowledge is taught in step-by-step teaching of actually executed tasks by asking experts "How" and "Why did you do that". Every single step is stored in a Knowledge Item (KI).

CONTEXTUAL

The HIRO™ engine deals with context and allows overlapping, contradicting knowledge in an ambiguous environment described by partly wrong and unpredictable information.

REUSABLE

80% re-use within organizations and 33% across organizations.

+ EXPONENTIALLY EFFECTIVE!

The number of possible permutations grows exponentially with added knowledge.

29
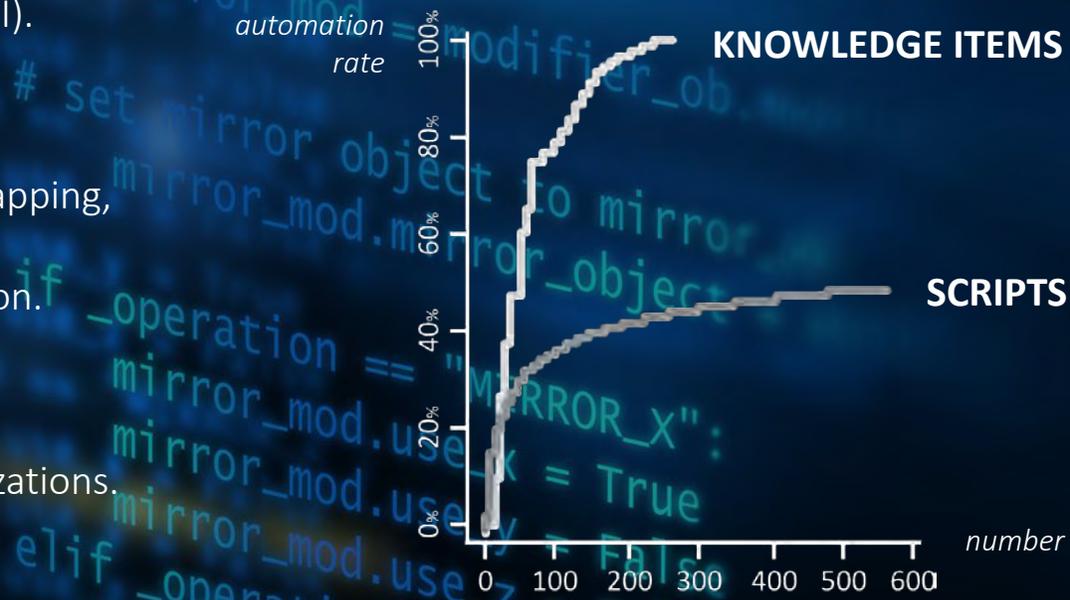
DYNAMIC REASONING ALLOWS THE HIRO™ ENGINE TO APPLY KNOWLEDGE LIKE HUMANS WOULD.

arago
THE SUM OF EXPERIENCE
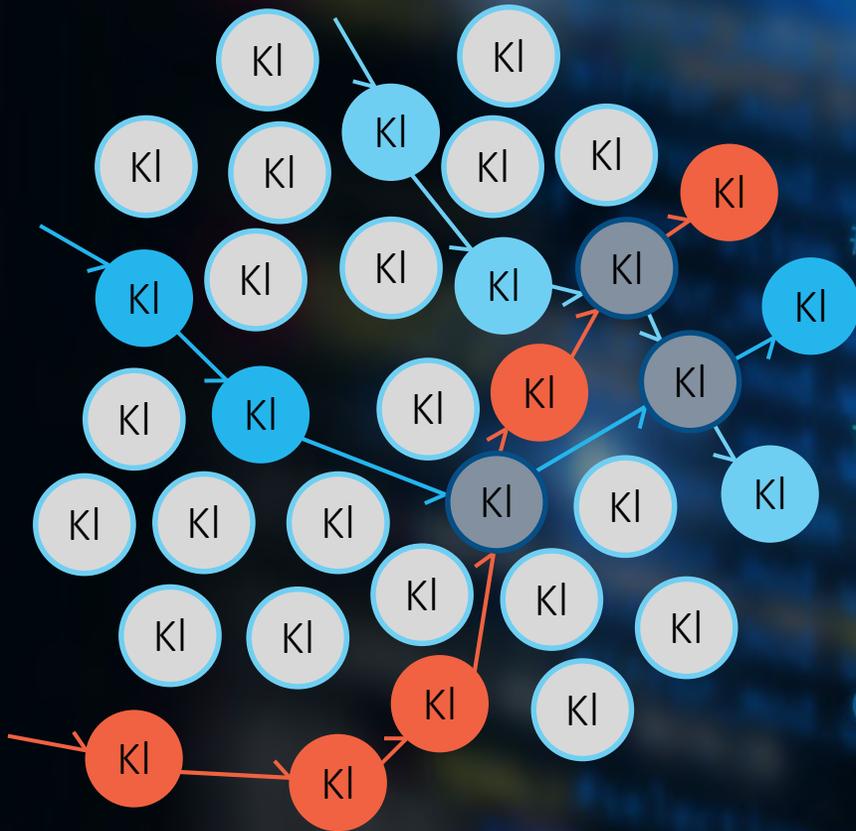
HIRO™
Engine

- HIRO™ engine **uses experience to create, execute and optimize individual solutions** for each given task.
- HIRO™ uses **machine reasoning** to create and follow a strategic plan and execute a solution and **machine learning** to handle ambiguity, overlap, contradiction or incorrect data in context and knowledge itself.

HIRO™ UNDER THE HOOD.

- HIRO™ Service
  - STORY
  - PROJECTS
  - CONNECTOR
- AI Journey
  - EXPLORE
  - IMPLEMENT
  - INTEGRATE

COMMUNITY
ENGINE
LEARN
EXECUTE
CONTROL
OPTIMIZE
PORTAL
LEARN IN KNOWLEDGE CORE

THE JOURNEY FROM LINEAR TO EXPONENTIAL.

arago
THE SUM OF EXPERIENCE

GET YOUR ACT TOGETHER

INTRODUCE A TROJAN HORSE

SET RESOURCES FREE (MONEY AND PEOPLE)

COLLECT DATA

GENERALIZE AI

THINK ABOUT NEW BUSINESS MODELL

SWITCH TO NEW BUSINESS MODEL

NOW

+ 2-3 YEARS

THE FUTURE OF BUSINESS:

ANYTHING THAT IS A PROCESS CAN AND WILL BE RUN BY AN AI.

LEARNING BY OBSERVATION.

VS.
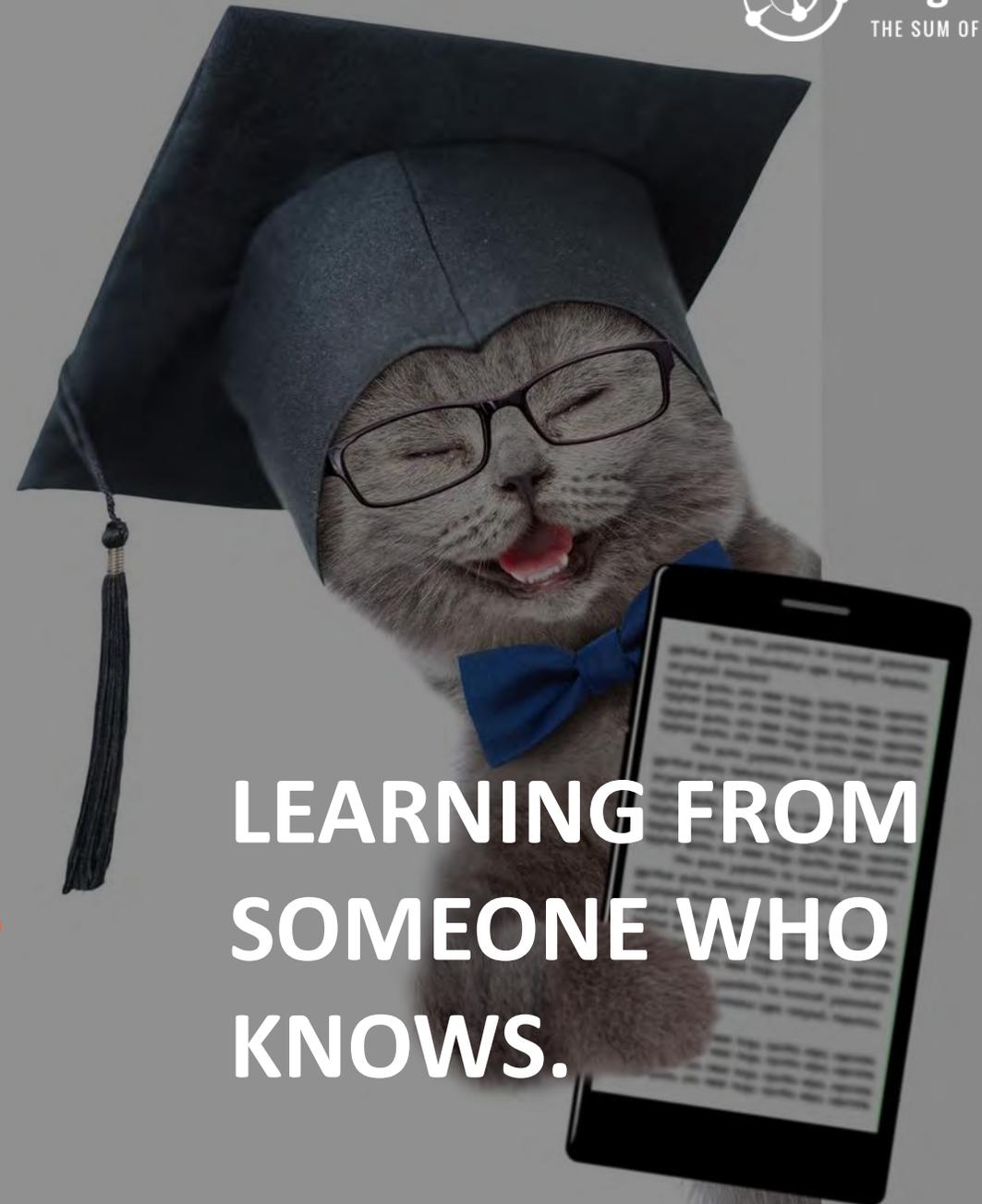
LEARNING FROM SOMEONE WHO KNOWS.

arago
THE SUM OF EXPERIENCE

FULFILLING THE PROMISE OF
AI MEANS

MAKING EXPERIENCE EXECUTABLE.

ENTREPRENEUR JOURNEY

THE FOUR TYPES OF TECH

arago
THE SUM OF EXPERIENCE
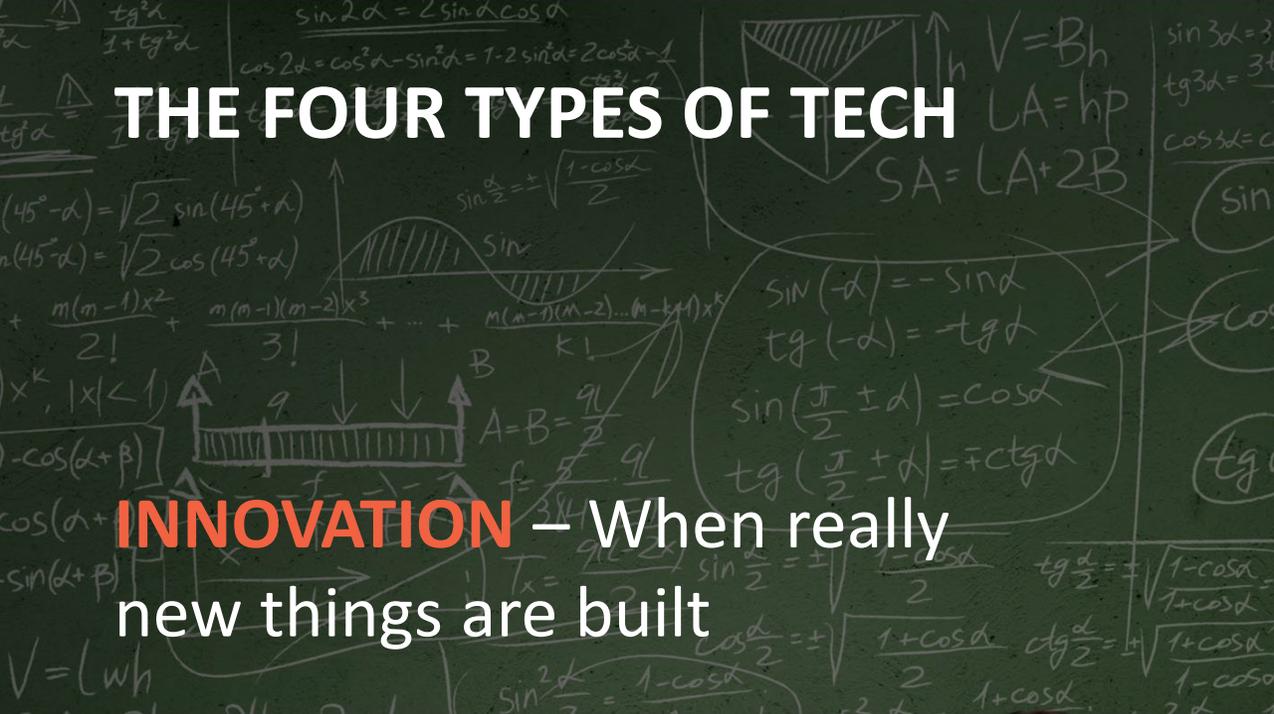
INNOVATION – When really new things are built

ITERATION – When interesting things are improved

DISRUPTION – When things are used to shake up markets

COMMODITY – When things are used by everyone
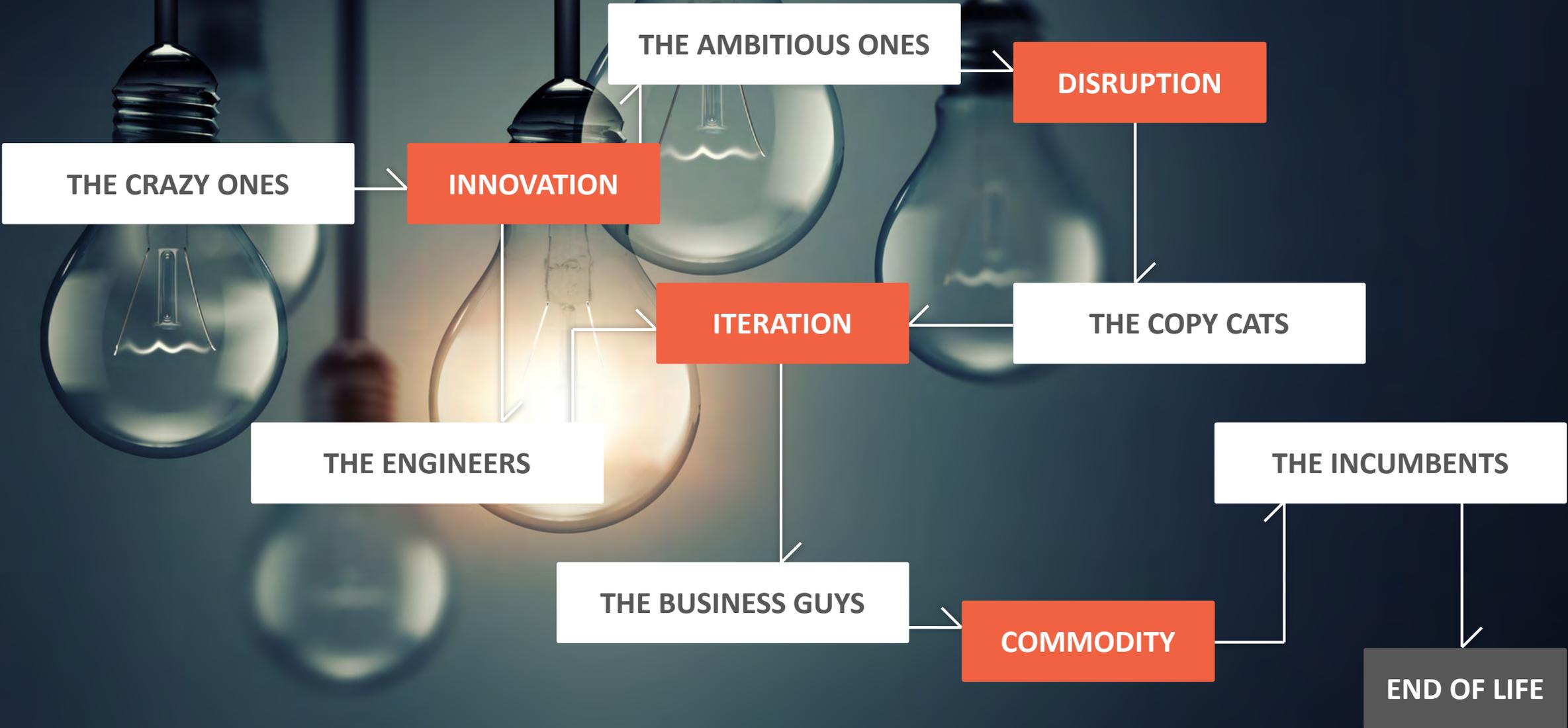
THE BEST DEALS ARE IN DISRUPTION ...

... BUT DISRUPTION OFTEN FAILS
OR IS KILLED BY THE "BUSINESS GUYS"

(TRYING TO MAKE IT BEHAVE LIKE ITERATION)

MOST MONEY GOES INTO THE COPYCATS …

BECAUSE IT IS EASY TO UNDERSTAND, …

HAS A PROVEN BUSINESS MODEL …

… AND MAKES THE REALIZATION OF HAVING IGNORED "THE AMBITIOUS ONES" LESS PAINFUL …

SUCCESSFUL INVESTMENT INTO ITERATION NEEDS FANTASTIC "BUSINESS GUYS"

STRANGE THINGS INVESTORS DO

THEY TELL YOU THEY WANT DISRUPTION AND THEN ASK FOR AN EXACT PREDICTION AND TRACKABLE BUSINESS PLAN
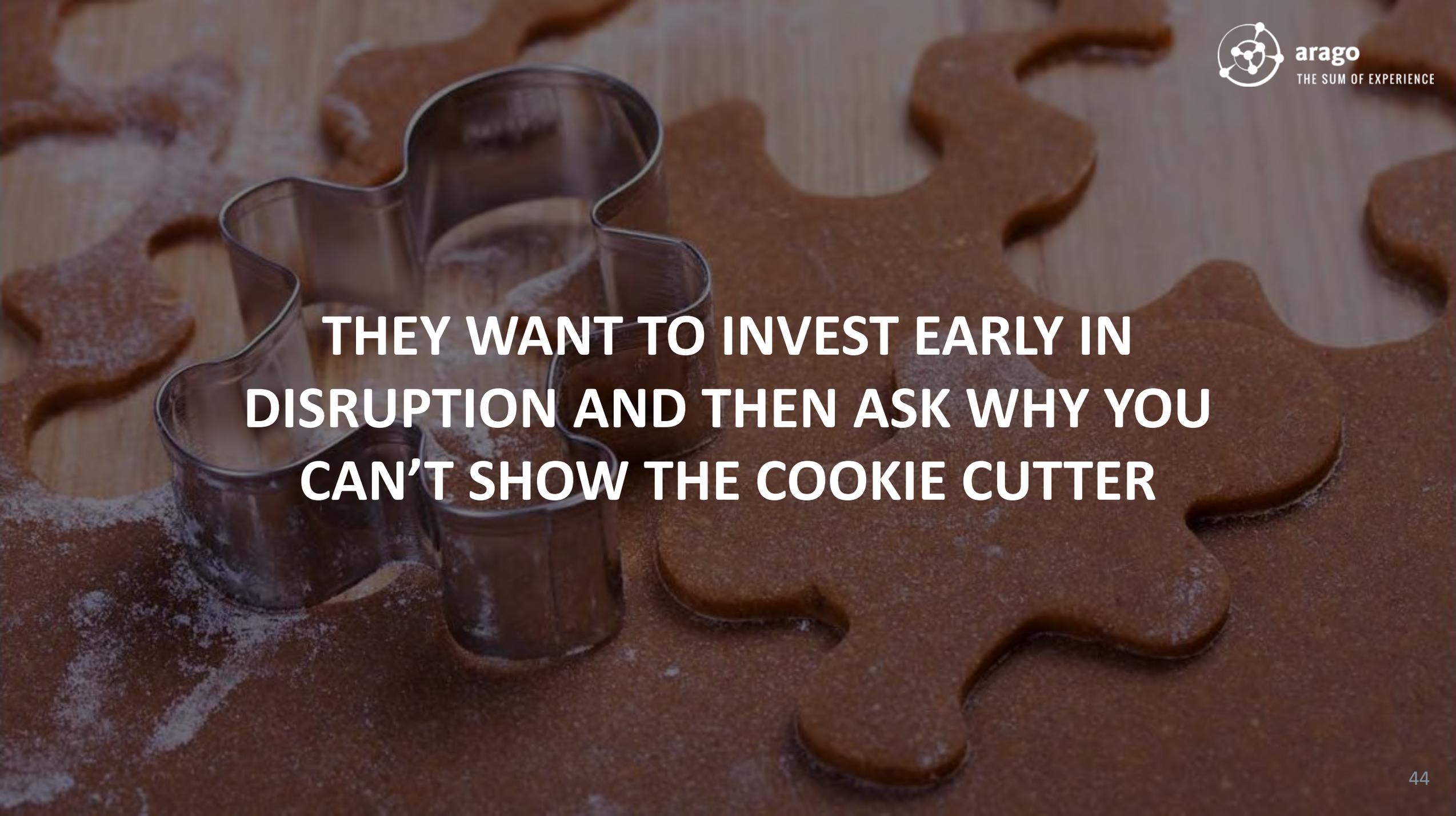
THEY WANT TO INVEST EARLY IN DISRUPTION AND THEN ASK WHY YOU CAN'T SHOW THE COOKIE CUTTER

THEY GIVE WORSE VALUATIONS TO BUSINESSES THAT ACTUALLY MAKE MONEY

**AND WORST OF ALL –
THEY WANT TO HAVE A HIGH TECH VALUATION
BUT CUT COST IN R&D TO INVEST IN SALES**

STRANGE THINGS ENTREPRENEURS DO

PUT NETWORKING ABOVE PRODUCT

ASK FOR CRAZY VALUATIONS
BEFORE ANYTHING WORKS

ASK FOR CRAZY VALUATIONS ON PURELY LABOR BASED BUSINESS MODELS

SELL STUFF THAT DOES NOT EXIST
TO GET INVESTMENT
AND LOCK EVERYBODY INTO A VICIOUS CIRCLE

AND WORST OF ALL - BUILD UNSUSTAINABLE COMPANIES WITH NO TECH ADVANTAGE WHATSOEVER TO FOLLOW A HYPE

TO INVESTORS

SO, IF YOU WANT DISRUPTION, YOU HAVE TO LIVE WITH THE "AMBITIOUS ONES", HIGHER RISK AND THEN LET IT PLAY OUT

IF YOU WANT A COMPANY THAT IMPROVES A KNOWN BUSINESS, YOU HAVE TO LOVE "THE ENGINEERS" AND "BUSINESS GUYS"

TO ENTREPRENEURS

IF YOUR ARE A GEEK,
DON'T DO THE STUFF THAT HAS BEEN DONE BEFORE,
"THE BUSINESS GUYS" ARE BETTER AT THAT

IF YOU REALLY WANT TO CHANGE THE WORLD, BE PREPARED: IT WILL TAKE A LONG TIME, IT IS A LOT OF WORK AND NO ONE WILL BELIEVE YOU UNTIL YOU HAVE IRREVERSIBLY CHANGED THE WORLD

IF YOUR ONLY PLAN IS TO GET RICH QUICKLY YOU WILL MOST LIKELY BE FORCED TO CHEAT, DON'T START A BUSINESS, PLAY THE LOTTERY

THANK YOU.