

# Data Sciences

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## Agenda:

- What are Data Sciences?
- Preparing for Career in it

# What are Data Sciences?

ie What is Artificial Intelligence? Machine Learning? Deep Learning?

“Houston, we have a problem!!”

# The Problem

- Every company is claiming to be working in AI-ML
  - Is it so?
  - What exactly is AI (ML)?
  - What is not AI?
- Or is it just a plain BIG hype?

# What's at the core?

- behind problem solving?
- behind writing software algorithms?
- solving research problems?

# Desire

- To find a “function”
- To find a relation
- To find a transformation
- To build a model
- From given inputs to desired outputs.

That's it!!

# Functions

- Some functions are straight forward
- “In summer, ice-cream sale goes up”
- Cause and effect
- Relation (function, Mathematical model) is found out
- Here, simple rule-based programming suffices



# Functions

- But some functions are complex
- “More you put efforts, your business flourishes.”
- Cause and effect again, but the relation is far to complex
- Too many variables
- Here, simple rule-based programming not humanly possible.
- Lots of research needed to produce equations.

$$E = mc^2$$

- What's this? a function?
- Input variable(s)?
- Output variable(s)?
- Parameters?
- How's the relation? linear?

# Functions

- But most real-life functions are not deterministic
- Some are probabilistic, some non-linear.
- “Detecting if the tumor is benign or malignant”
- “At any state in the game of chess, what's the next move?”

# Chess: Next move?

- Needs extreme expertise
- Needs “intelligence”
- How do you get that?
  - Built by lots of training.
  - By studying lots of past games.
- This is how Humans build intelligence

# Intelligence

- Can machine (software/program) also do the same?
- Can it play chess?
- Can it build intelligence?
- By looking at past experiences (data),
- Training Data: games played, moves used, etc.

Yes, it can!! That's Artificial Intelligence.

# Intelligence

- Ability to think various domains
- Ability produce something new
- Ability to detect the unseen
- Ability to enhance knowledge (rules, patterns)

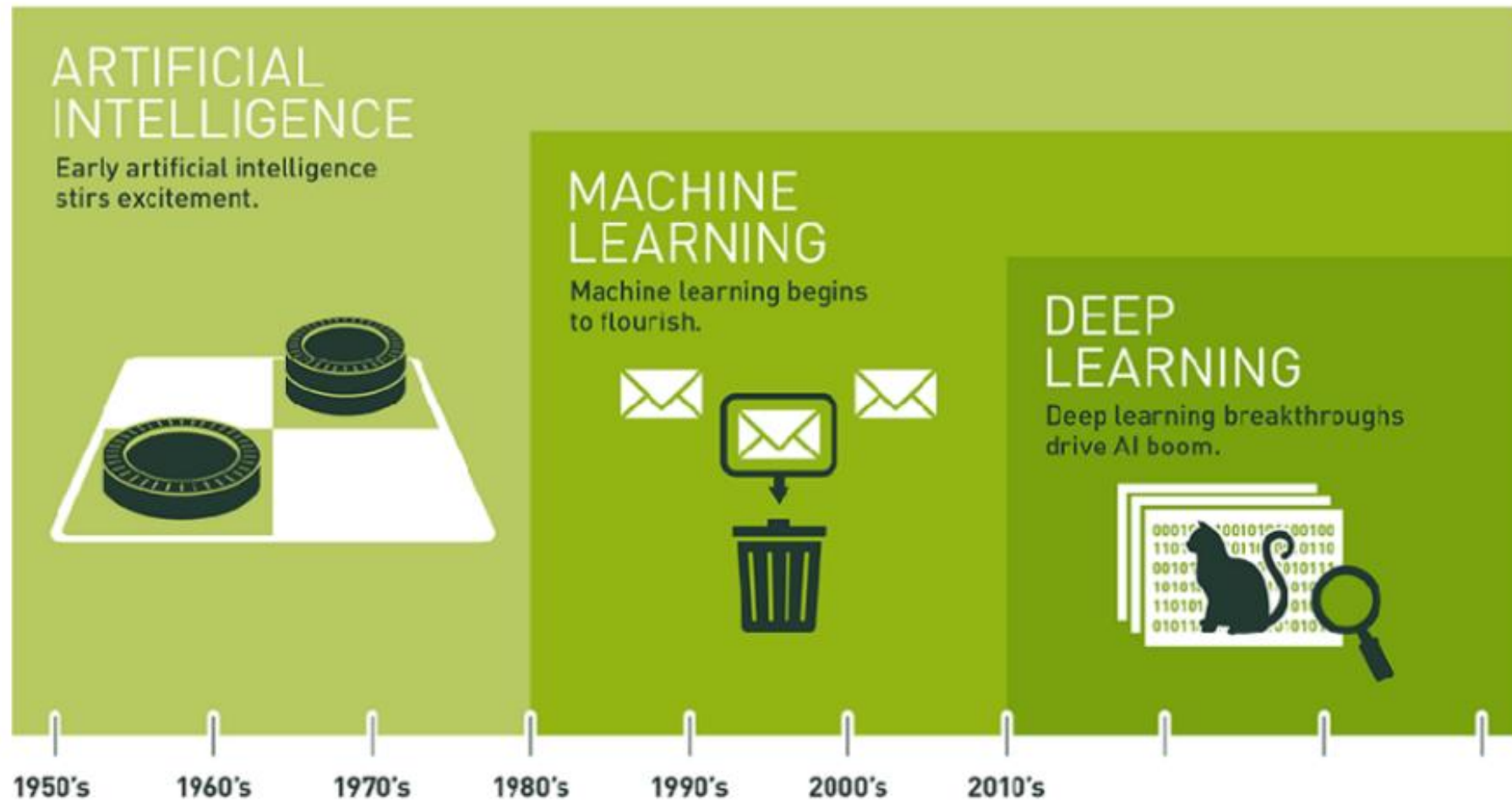
All these, AI has started doing. The AI era has arrived!

# Artificial Intelligence

- Artificial intelligence seems to have become ubiquitous.
  - Replying to our emails on Gmail
  - Learning how to drive our cars,
  - Sorting our holiday photos.
  - etc.

Too good to be true, isn't it, sort of Magical !!

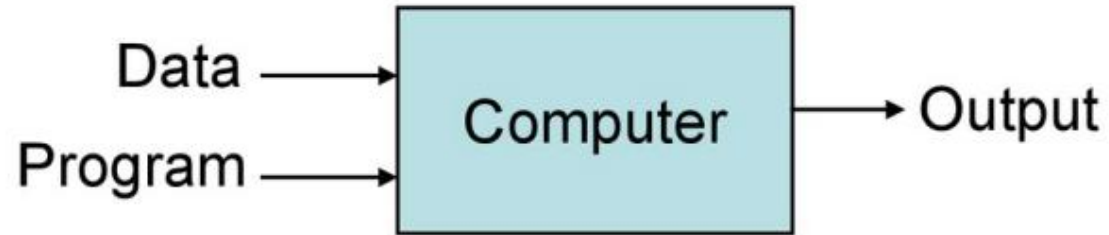
# Relationship between AI, ML, DL



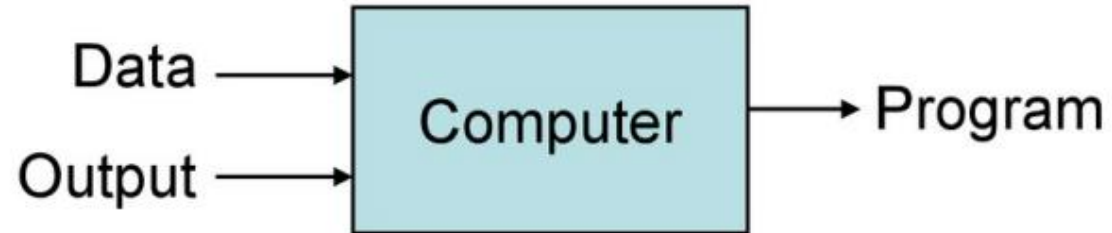


# Traditional vs. Machine Learning?

## Traditional Programming



## Machine Learning



# Why Machine Learning?

- Problems with High Dimensionality
- Hard/Expensive to program manually
- Techniques to model 'ANY' function given 'ENOUGH' data.
- Job \$\$\$

# Why now?

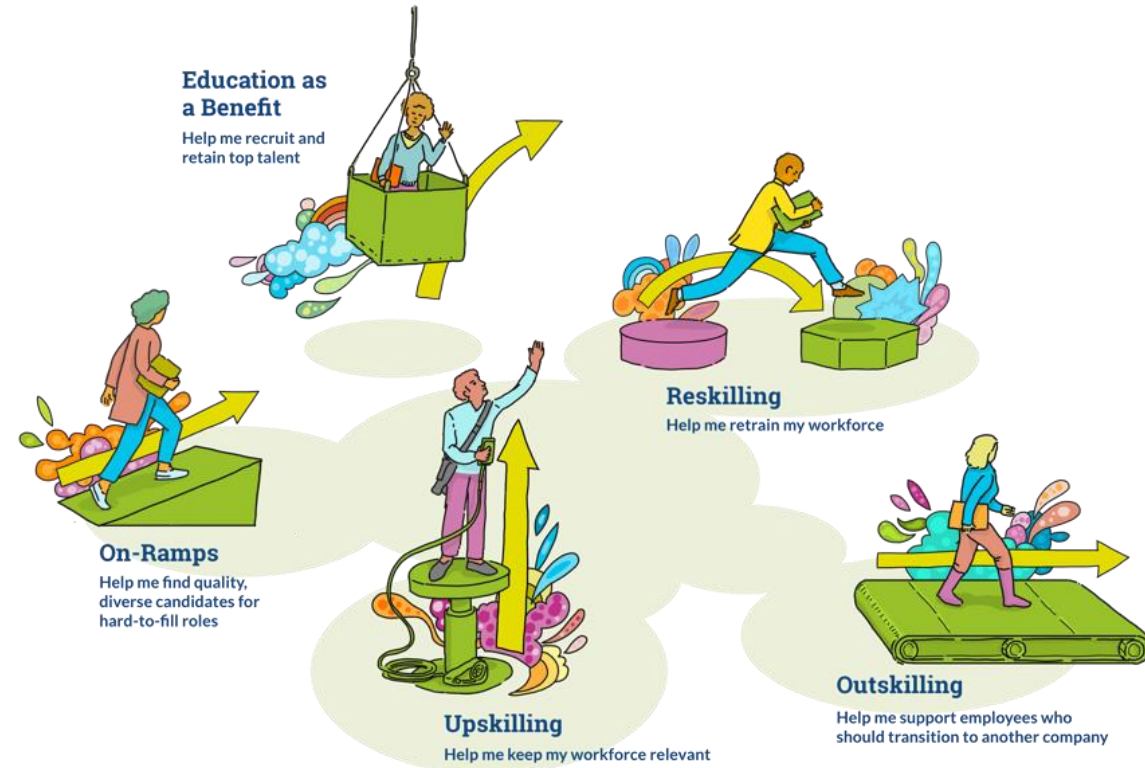
- Flood of data (Internet, IoT)
- Increasing computational power
- Easy/free availability of algorithms
- Increasing support from industries

# Preparing Career in Data Sciences

May be too early... well, may be not!!

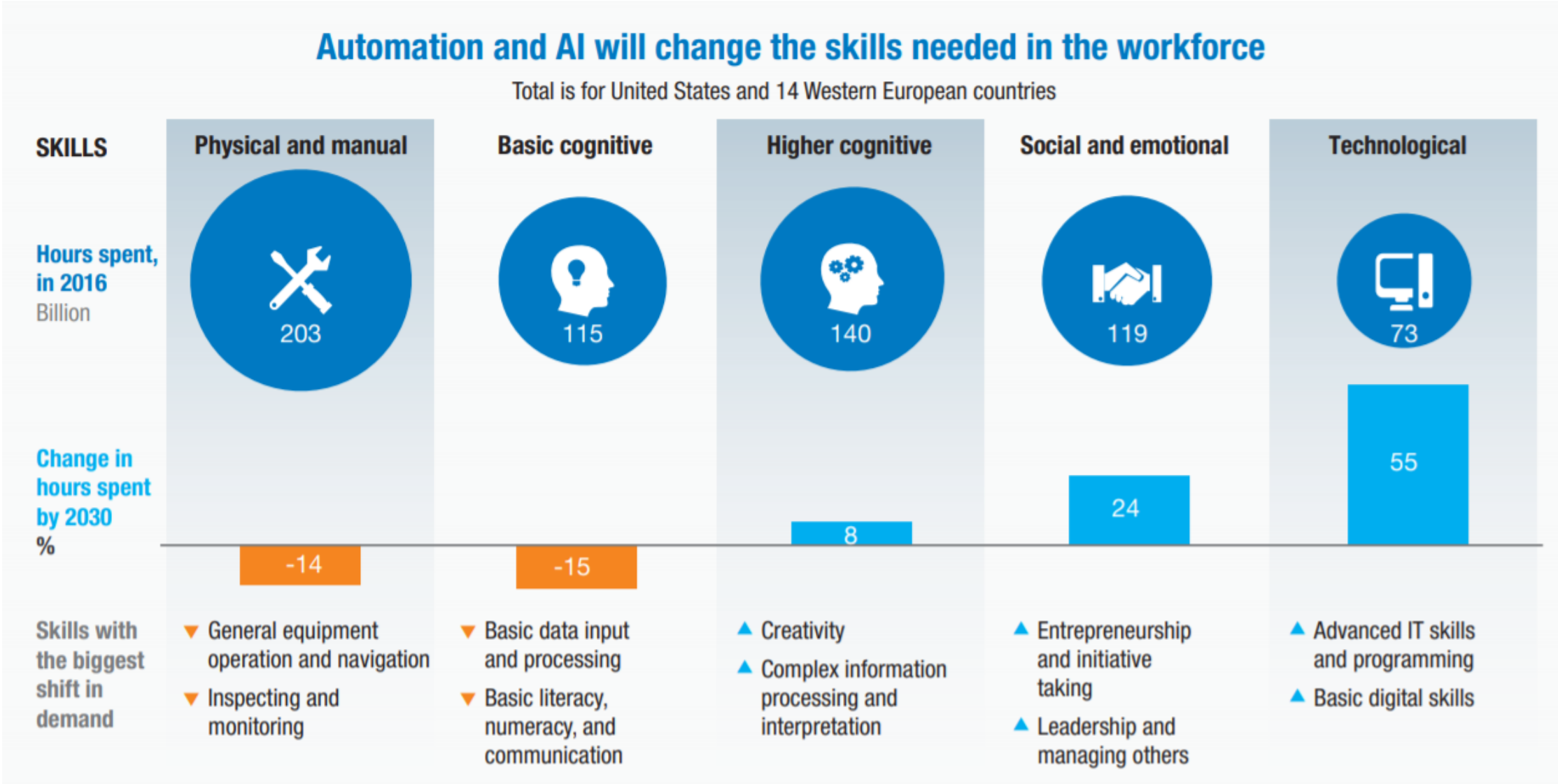
# Current State

- 44% of US workforce < \$18K/yr (< poverty line), works 80-100 hrs/week
- Automation CAGR 7% (as per BCG), to reach \$114B by 2025



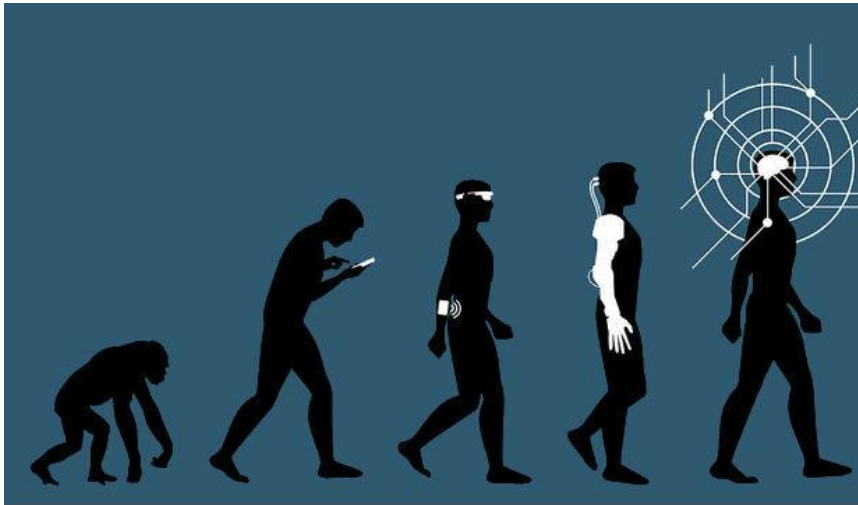
Source: As Pressure To Upskill Grows, 5 Models Emerge – Forbs.com

# McKinsey Global Institute Report – Discussion Paper 2018



# Examples

- Less mechanical, automatable
  - Bill and account collectors
  - Data entry operators
  - Computer network support
  - Secretaries and administrative assistants
  - Insurance sales agents
  - Office clerks

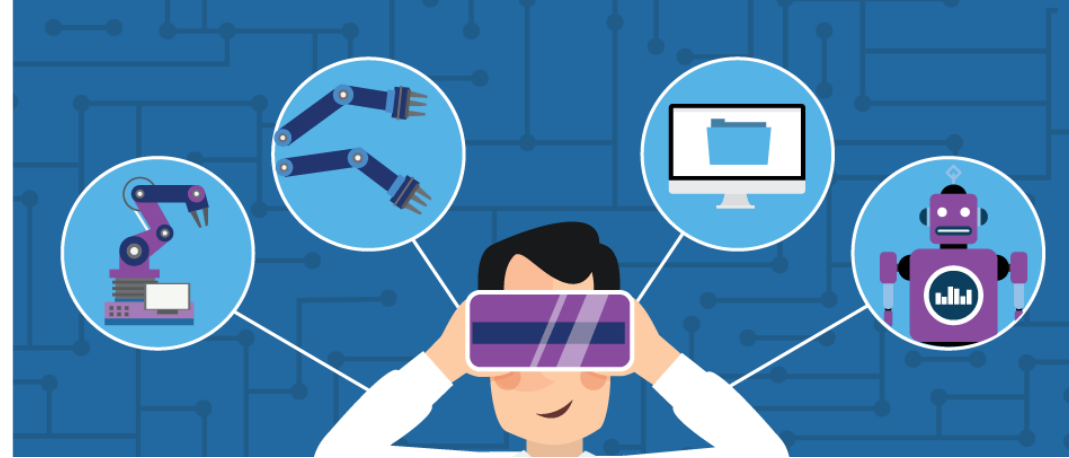


- More Cognitive, Creative, Human
  - Software developers
  - Customer service representatives
  - General and operations managers
  - Human resources managers
  - Personal finance advisors
  - Psychologists
  - Artists
  - Sportsman
  - Researchers
  - Nurses, care

Source: The Simplistic Debate Over Artificial Intelligence – Preston Estep

# Changes

- Technological
  - AI deluge
  - Digitization -> Data + APIs
  - Remote \*



Source: Rise of the Chatbots: How AI Changed Customer Service – Salesforce.com

- Social
  - Over interaction + isolation
  - Obsolete roles, emergence of new
  - Lifelong re-skilling
- Financial
  - Widening gap
  - Flatter world
  - Gigs over jobs



# Examples

- Technological

- Medical: diagnostics, drug discovery, pharmaco-vigilance
- Digitization -> Legal, Health records,
- Jan Dhan-Aadhaar-Mobile Trinity


- Social

- e Governance, e Education, wider reach
- Push due to COVID
- No geo-restrictions for teachers, IT workers, lawyers...



Source: AI in healthcare – foreseeemed.com

# Examples



Enter search here...

Search

Notific...

Help

Welcome  
CLM Admin

Dashboard

Agreements

Create Agreement

Requests

Create Request

Bulk Upload

My Dashboard > Agreement Management > Details

## Master Services Agreement - ICMMasterServicesAgreement\_104

Agreement

Associations

All

Deviations

Amendments

Commitments

**Clause Discovery** 13

Metadata Discovery

Agreement Clauses

Line Item Discovery

Team

Discovered Clauses Mapped

All(13)

Confirmed(0)

Review Later(0)

Ignore(0)

Not Identified(13)

Sorty By: Label\_Sort\_Docum

notices,preamble

Master Service Agreement This AGREEMENT (the Agreement), is effective as of Feb 6 2018 , by and between JM Global Holding Company, having its principal place of business at 142711 Suite 100 Bellevue, WA (the Company), and SDS Ltd., (Customer), having a mailing address at 123 ABC Blvd, Building 2500, Dallas, USA. This Agreement shall expire on 10/02/2019.

More

Ignore

payment terms

Contractual Terms: Payment Terms: 45 days Projected Deal Value: \$ 1,500,000.00 Terms and Conditions:

non solicitation

Matched Library Clauses

MSAS Non GMA Preamble

THIS ICMTypeofMasterAgreement (Master Agreement) is effective as of ICMMasterEffectiveDate ICMEffdatevalid (the [MISC\_1]) and entered into by an...

More Compare


☐ Track Deviation

Confirm

Review Later

Copyright © 2018 Icertis Inc.

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Contract Management

What got you here, won't get you  
there!!

- **Marshal Goldsmith**

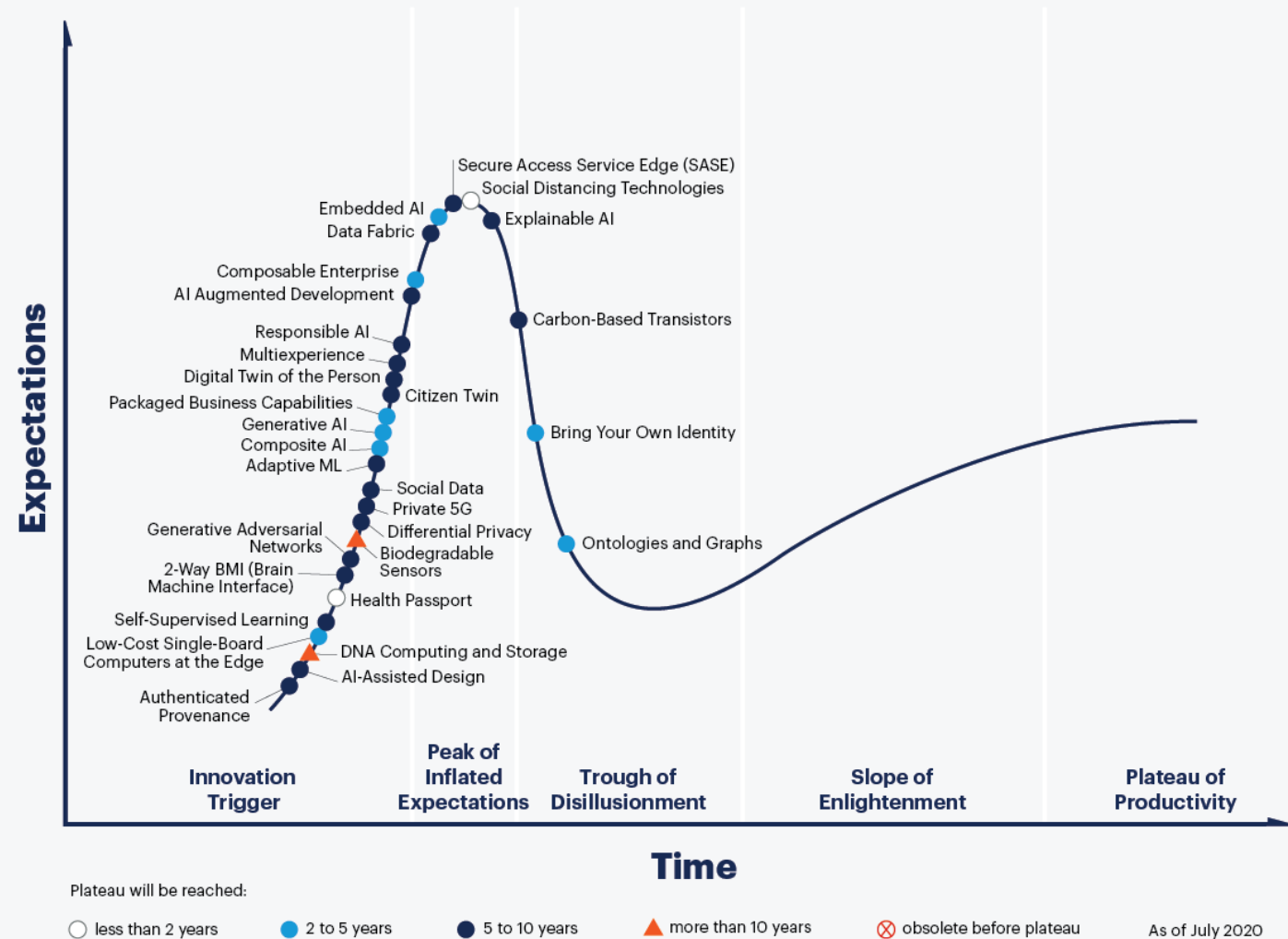
How to prepare?

Well, you can't prepare!!

specifically...

# Upwinds

## Hype Cycle for Emerging Technologies, 2020

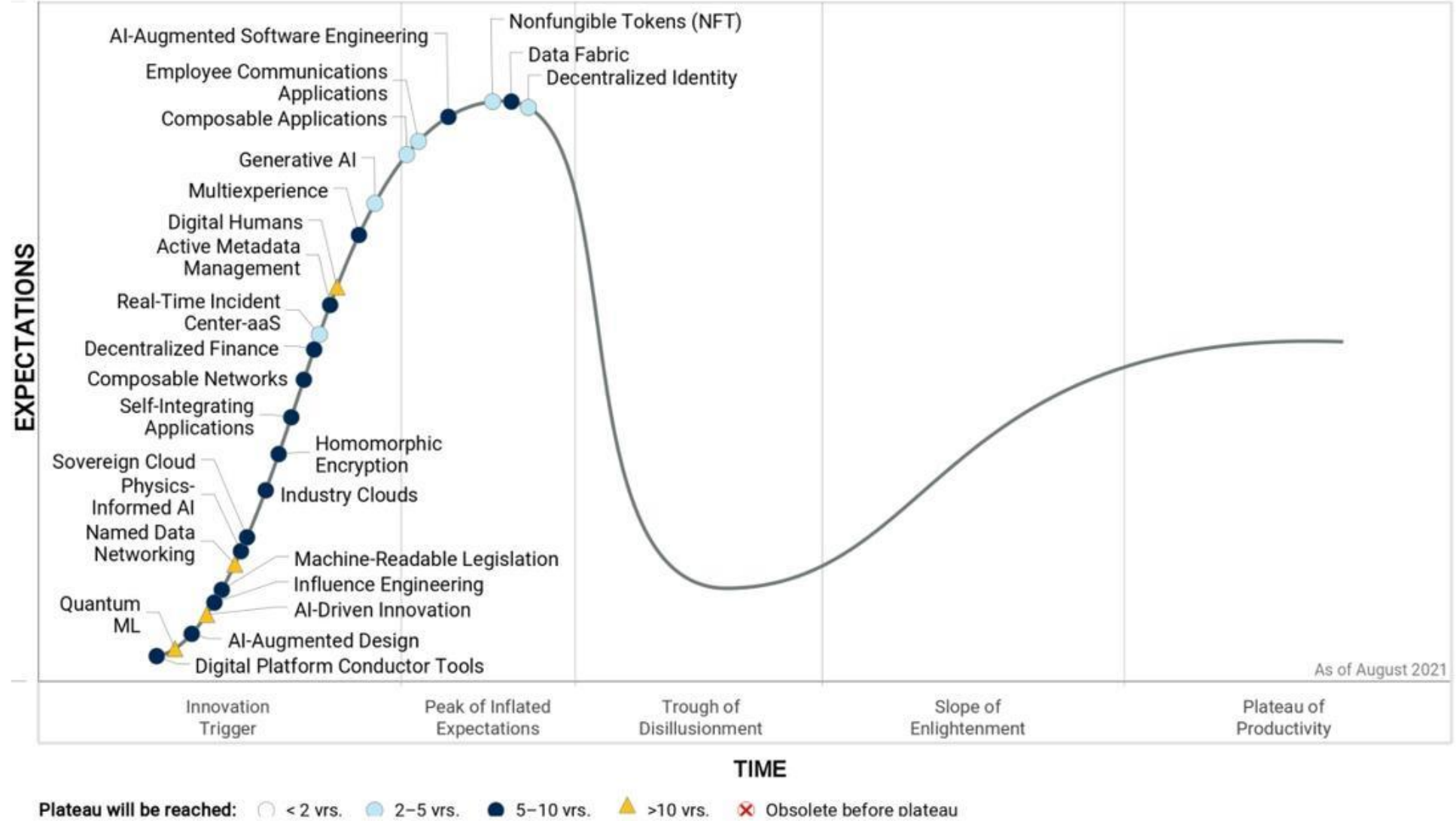


[gartner.com/SmarterWithGartner](https://gartner.com/SmarterWithGartner)

Source: Gartner  
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**Gartner**

# Hype Cycle for Emerging Technologies, 2021



Source: Gartner (August 2021)

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# Ikigai

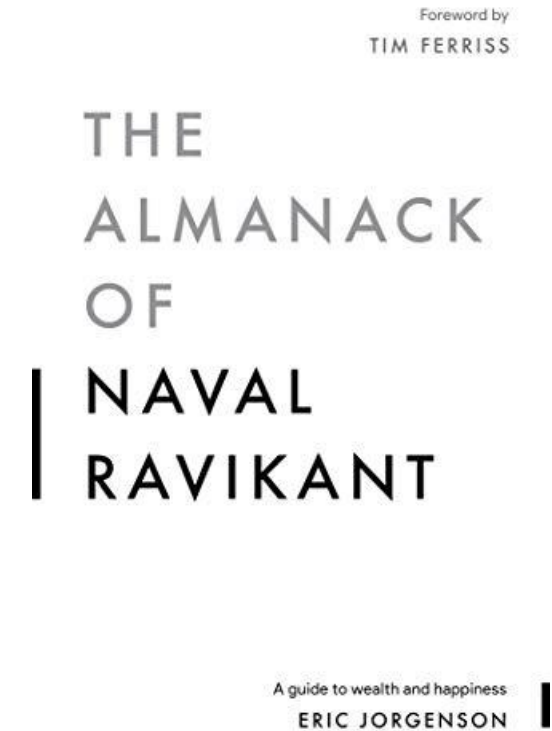


Source: How To Find Your Ikigai And Transform Your Outlook On Life And Business - Chris Myers



# Generic Gyan

- Specific Knowledge
  - Unique, rare combination
  - Un-trainable, un-scalable
  - Acquired thru apprenticeship
- Leverage:
  - Permissioned: Capital, Labor
  - Un-permissioned: Content, code
  - Marginal cost of duplication
- Wealth is a positive sum game



- Own story:
  - Current jobs were not available 10 yrs back
  - Pick difficult problems/domain, Job, RnD
  - If not now, can change later, Mid career change, harder, but possible.

# Thank You

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