

The Future of Work

9:00 – 10:15am

June 14, 2019



PRESENTERS



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The Future of Work

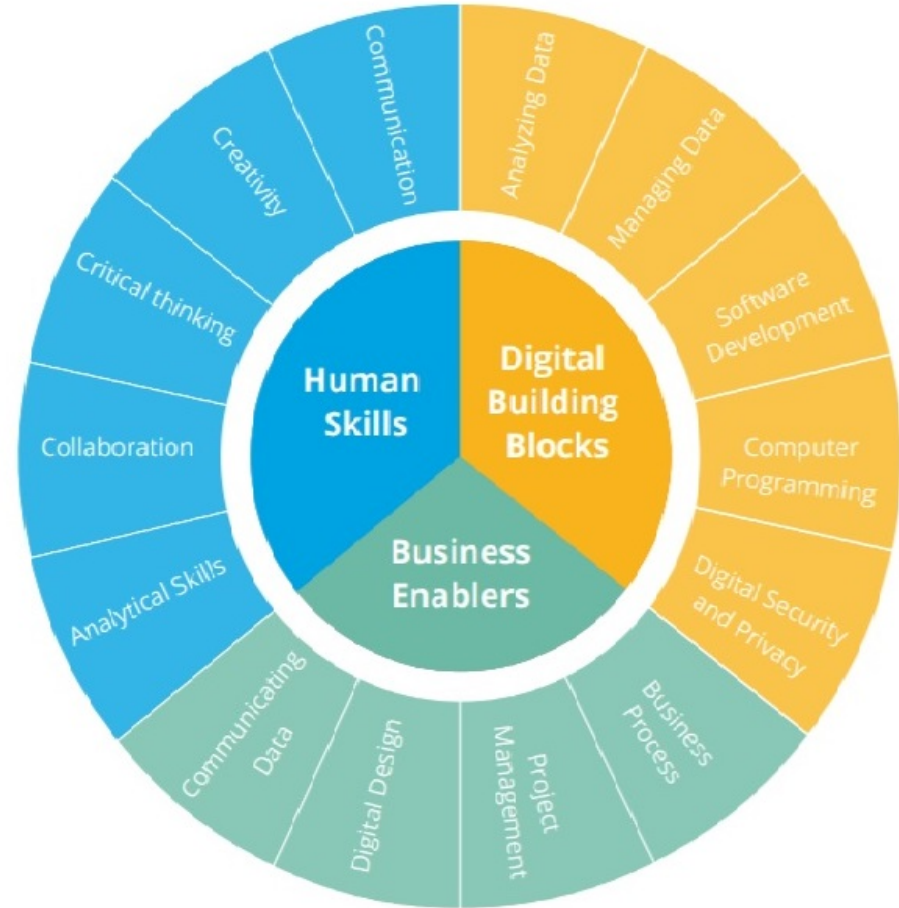
Joylin Kirk
*Burning Glass
Technologies*

OVERVIEW

1. Building your skill foundation
2. Adding transferrable skills
3. Life long learning for the hybridization of jobs












































Foundational Skills of the Digital Economy

- Human skills
- Business enablers
- Digital building blocks



Demand for Foundational Skills

- Spans all ability levels
- Opportunities for further learning
- Increased job mobility

Digital Building Blocks		Business Enablers		Human Skills
Foundation Skill Area	Total Openings: 2017	Growth: 2012-2017	Share of Openings Outside IT and Analysis Job Families	Average Salary Premium
Managing data	 3,527,740	 24%	 29%	14%
Software development	 3,326,192	 44%	 21%	34%
Computer programming	 2,571,728	 35%	 15%	38%
Analyzing data	 1,320,678	 68%	 58%	7%
Digital security & privacy	 895,547	 75%	 28%	17%
Business process	 3,215,648	 18%	 70%	19%
Project management	 2,354,230	 21%	 68%	21%
Digital design	 1,427,981	 2%	 54%	2%
Communicating data	 147,219	 323%	 32%	17%
Communication	 5 million  9,185,978	 27%	 85%	-
Critical thinking	 3,666,249	 31%	 73%	-
Collaboration	 3,480,175	 46%	 82%	-
Analytical skills	 2,395,145	 24%	 78%	-
Creativity	 1,217,062	 23%	 80%	-

Transferrable Skills

SKILLS	TOTAL OPENINGS	RANK
Communication	8,657,707	1
Problem Solving	5,776,671	2
Collaboration	4,997,561	3
Creative and Critical Thinking	4,543,580	4
Customer Service	3,831,705	5
Organizational Skills	3,174,456	6
Sales	2,744,465	7
Microsoft Excel	2,737,512	8
Physical Abilities	2,669,991	9
Scheduling	2,655,007	10
Ethical Reasoning and Mindset	939,987	31
Leadership	899,359	32
Accounting	826,711	33

Entry Level Occupations

- 78% of all high paying entry level jobs
- 0-2 years of experience
- >1 transportable skill

OCCUPATION	SHARE OF OPENINGS REQUESTING TRANSPORTABLE SKILLS	MEDIAN ENTRY-LEVEL SALARY	MEDIAN SALARY FOR ALL EXPERIENCE LEVELS
Financial Analyst	79%	\$60,000	\$68,000
Network Administrator	74%	\$65,000	\$74,000
Business Analyst	72%	\$66,000	\$77,000
Auditor	71%	\$65,000	\$74,000
Data Analyst	71%	\$60,000	\$68,000

Hybridization

THE EMERGENCE OF A HYBRID GENOME

Accountant

ACCOUNTING

Accounting
Account Reconciliation
General Ledger
Financial Statements
Generally Accepted
Accounting Principles
Financial Reporting
Balance Sheets

SOFT SKILLS

Communication Skills
Detail-oriented
Excel

+23%

Since 2013

Data Scientist

PROGRAMMING

Python
SQL
Hadoop
R

DATA SKILLS

Data Visualization
Tableau
Excel
MapReduce

BUSINESS SKILLS

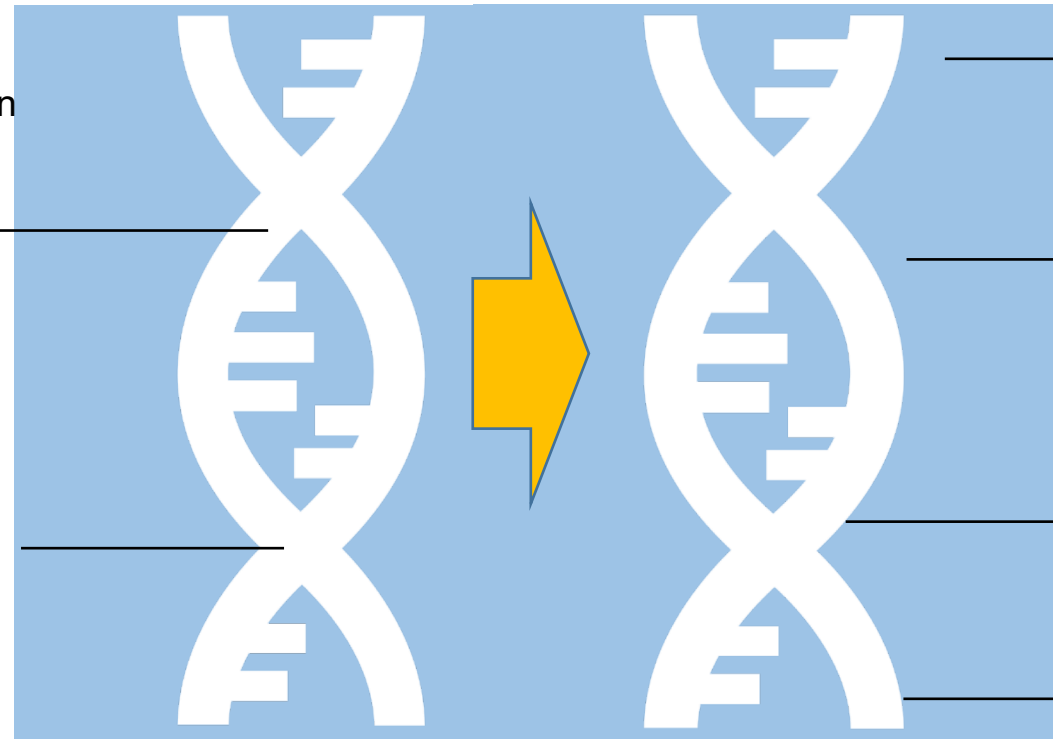
Predictive Models
Business Process
Economics
Strategic Planning

SOFT SKILLS

Problem Solving
Writing
Teamwork

+598%

Since 2013



Disruptive Skills- Not always new skills

Skills spread over time

Occupations with at least 10,000 postings requesting creativity skills

2018

Product manager, computer systems engineer, network engineer, program manager, general manager, human resources specialist

35 occupations

2015

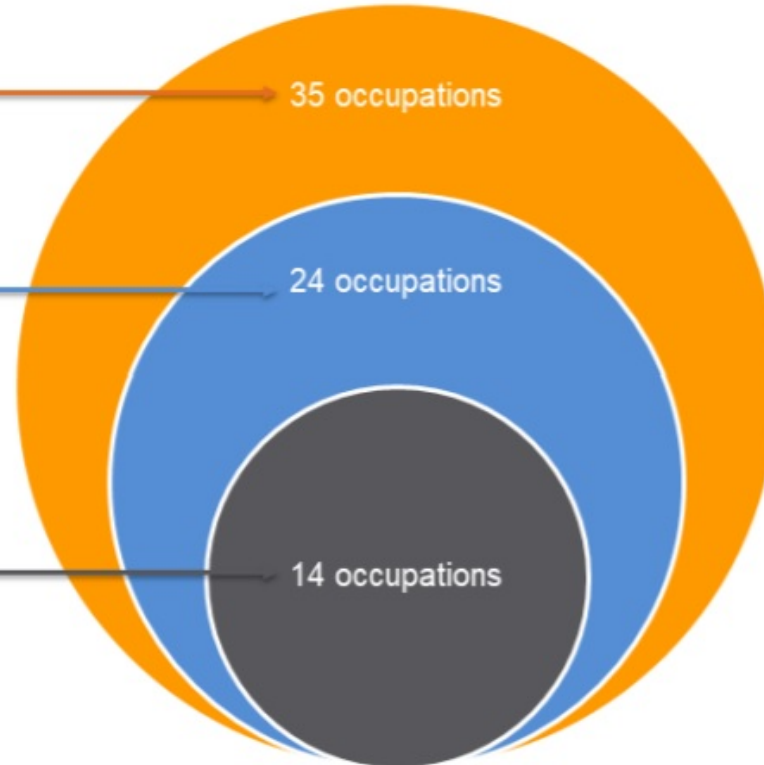
IT project manager, systems analyst, public relations specialist

24 occupations

2012

Software developer, marketing manager, retail store manager, restaurant supervisor, marketing specialist, business analyst

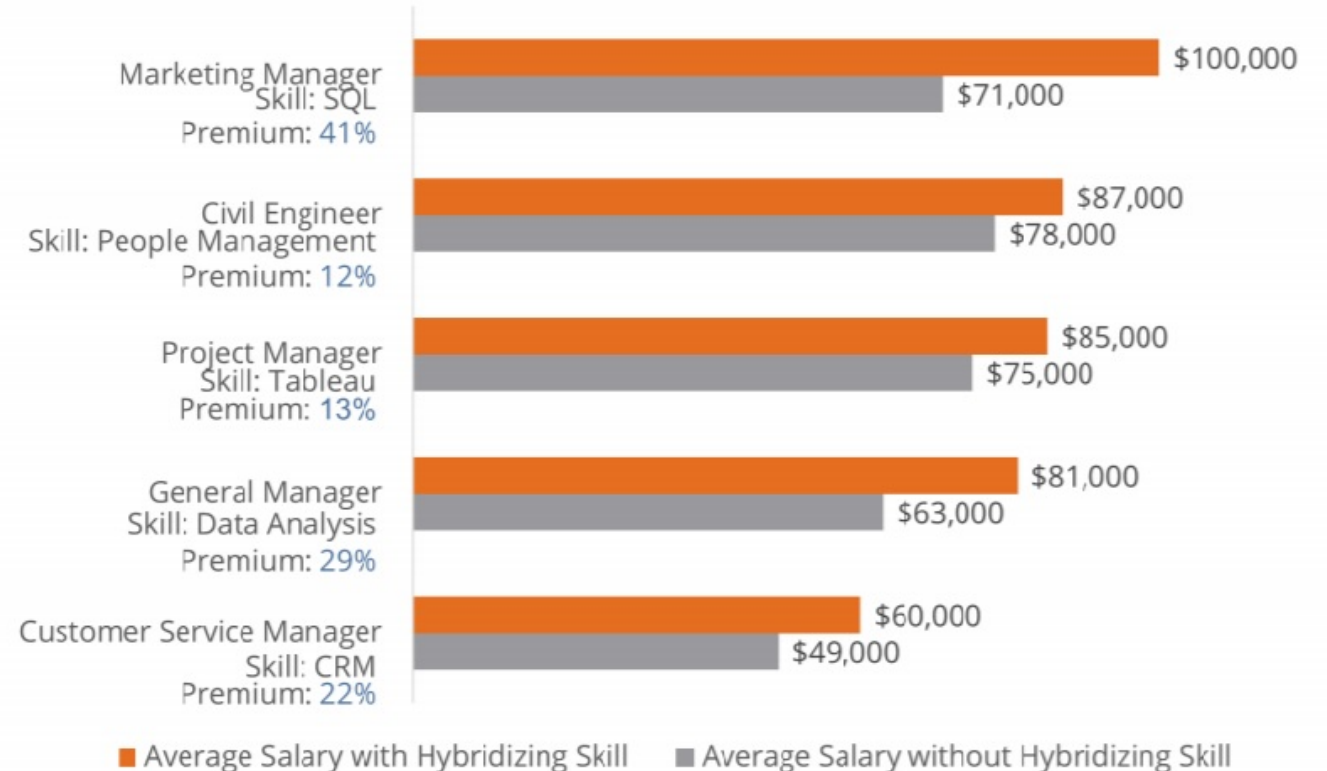
14 occupations



Hybrid Salary

The hybrid salary premium also bears out in traditional roles that now require new skills

Job Salaries with and without Hybridizing Skills



Recommendations

- Recognize the essential skills
- Build teaching and learning around these skills
- Emphasize the balance between skills
- Require students to demonstrate skills
- Coordinate with employers for job skill development



James Tracy

Two Questions:

1. What can we confidently assert will remain uniquely human value contributions to collective human/machine intelligence 10-20 years out?
2. How do we reverse engineer those into today's K-12 curriculum?



James Tracy

- STEM to STEAM to THAMES
- Re-centrality of Humanities
- A New Kind of Humanities
- A new relationship to information
- 3 C's Economy (Creating, Cyber-curating, Caring)

NSF ITEST PI and Evaluator Summit
Living, Learning, and Working in the Digital Age
June 13 – 14, 2019

Diversity and Ethical Implications of Advances in Artificial Intelligence (AI)

Unintended Consequences on Steroids

STORYLINE

Unintended Consequences on Steroids

The Ripple Effect of **AI** Due to the Lack of
Transparency in Datasets, Algorithms and more!

OVERVIEW

1

The Arrival of AI: Already Transforming How We Live – Learn and Work

2

Understanding Ethical Risks – Blind Spots – Bias & Inequity in AI

3

Major Collateral Damage: The Ripple Effect of AI Due to Lack of Transparency in Datasets & Algorithms

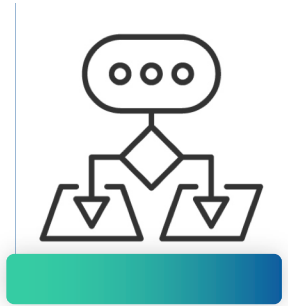
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Better Together: Humans + Machines

5

Possible Solutions!

ARTIFICIAL INTELLIGENCE IS BUILT ON **THREE** FOUNDATIONS:



Algorithms



Data

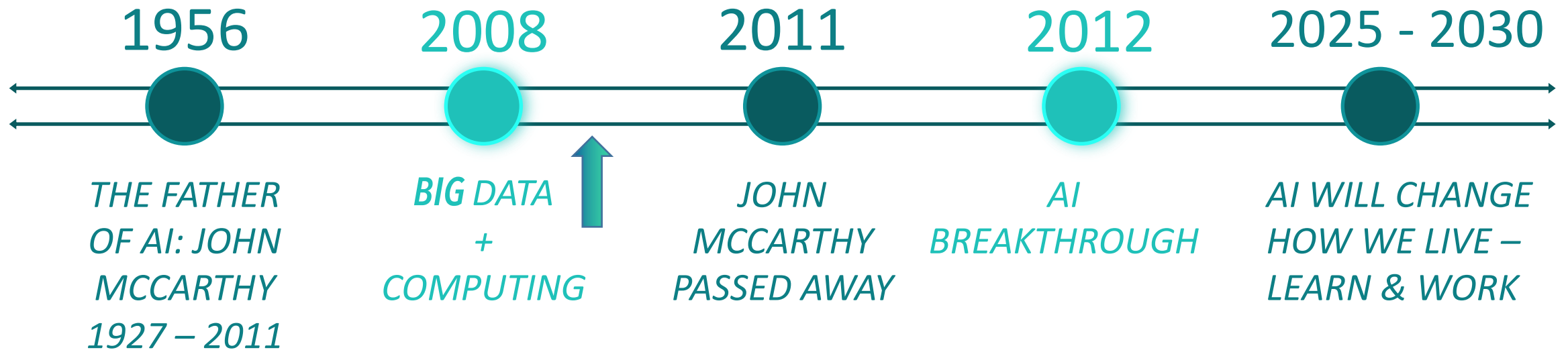


Computing power

*Artificial Intelligence at its core, is a byproduct of **algorithms** and **data**.*

And Why the Dataset Matters!

Artificial Intelligence



AI: Systems/Machines mimicking human skills such as vision, listening, reasoning and moving

Artificial Intelligence

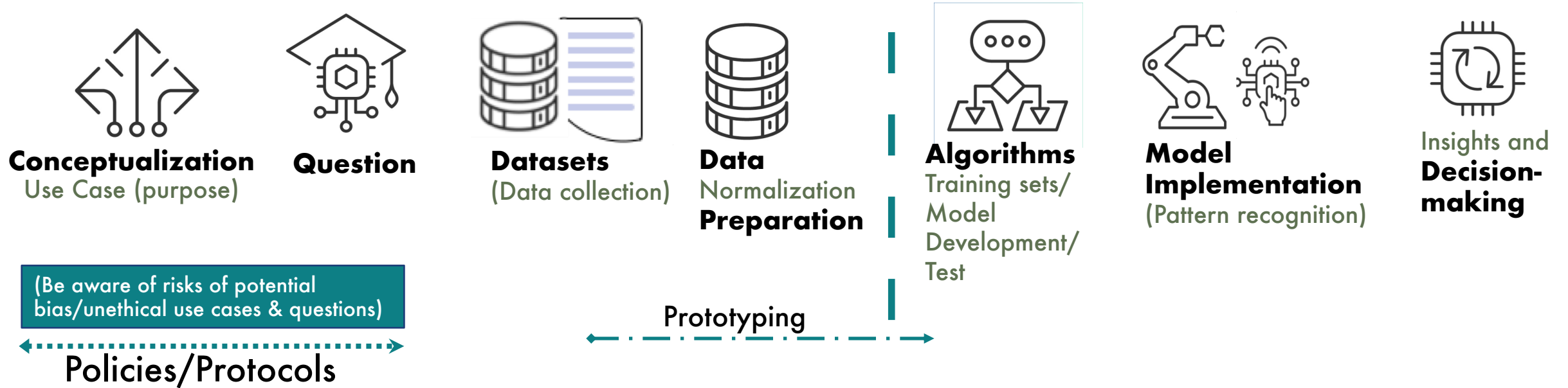


- **Machines** - Reasoning/thinking like **humans**
- John McCarthy created the standard: **AI programming language (Lisp)** – is still being used today (from search engines, recommendations and credit card fraud detection)

* Alan Turing presented first lecture on intelligent machines (1947)

AI Project Life-cycle

7 Key Steps



How AI Bias & Unethical Issues Could Happen



Internal Policies



How You Define Fairness



Unknowns unknowns



Lack of Transparency

BUILDING RELIABLE & REPRESENTATIVE DATASETS

A Look at the Challenge

The conundrum of sourcing reliable, relevant and accurate data:

- Over **2.5** exabytes of data is created every day
- Less than **5%** of the available unstructured data is being used
- **70% - 80%** of an analyst's time is spent on data cleaning/preparation
- Data construction/derived attributes
- Selecting/Evaluating historical data (historical inequities...)

The Risks of Algorithms Generated Datasets

Unreliable Dataset: Major Collateral Damage

1

Gender Inequity/Discrimination/
Biases/Unfairness

2

Erosion of **Privacy & Trust**

3

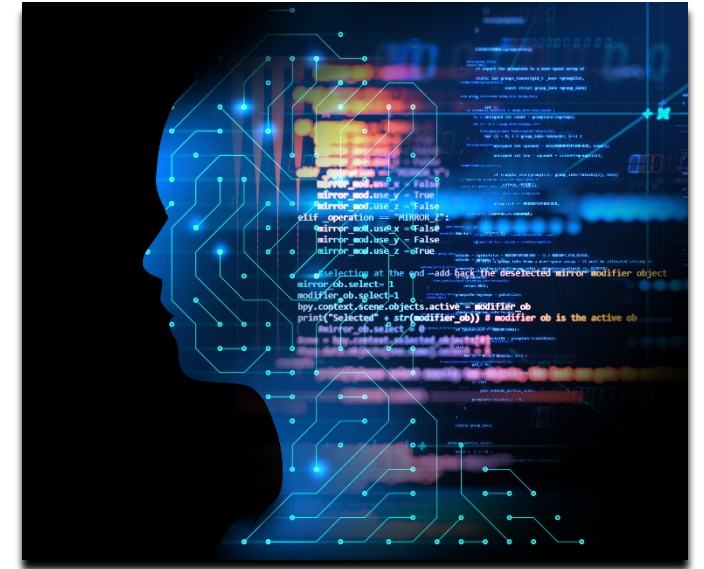
Life Altering Impact: can cause irreparable harm (Ex: bias in financial services & justice)

4

Diversity Recruiting (STEM – Pipelines)

5

Poor Accountability



Unreliable Dataset: Major Collateral Damage...

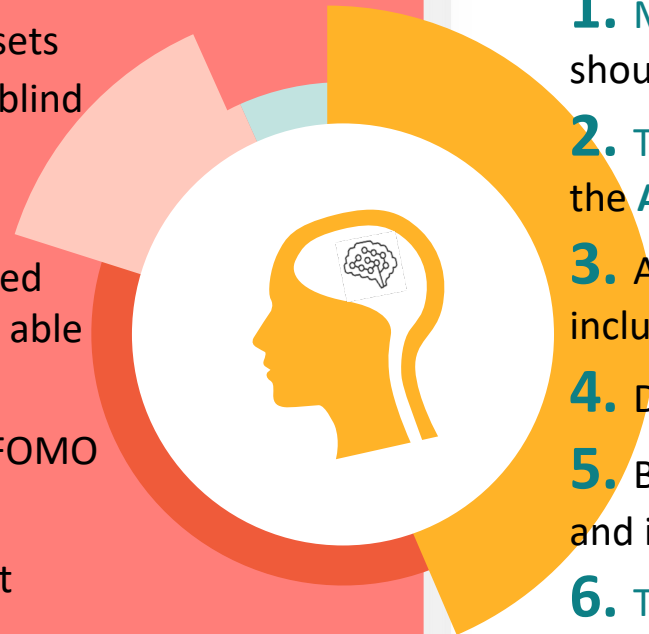
Datasets that are used to **train** AI systems are **not inclusive** and often do not reflect the population/object/environment of the systems they are designed to serve...

- The **Quality** of **data** that we use to train artificial intelligence could **alter the course of history** for generations to come ...

Addressing the Bias Within AI: The Path Forward

What seems to dominate the landscape

1. Using unreliable/unrepresentative datasets and writing algorithms to fix potential bias/blind spots
2. Creating systems or building bots and considering plans to deal with the unintended consequences later – who says you're to be able to fix it (Ex: data privacy)
3. Driven by speed to market because of FOMO (fear of missing out)
4. Just because you can build it — does not mean you should
5. Winner takes all mentality, ignoring collateral damage



Options to consider

Adopting Steps to Improving Transparency in AI:

1. **Methods and processes** that are used to build systems should be **available** to an entity or academy for auditing
2. **Talent Management:** (hiring and investing in **diversifying** the **AI field**)
3. All **AI Projects** should develop **quality control** protocols, including pre-processing and data privacy procedures
4. Designing **Inclusive Systems**
5. Building **Representative Datasets** (reflecting the diversity and inclusiveness of the real-world)
6. **Third Party Testing/Auditing** entity to assess commercial AI systems
7. Add **Digital Signatures** on products that meet ethical standards

Where Do We Go from Here?

AI
by humans
for humans

Humans + Machines

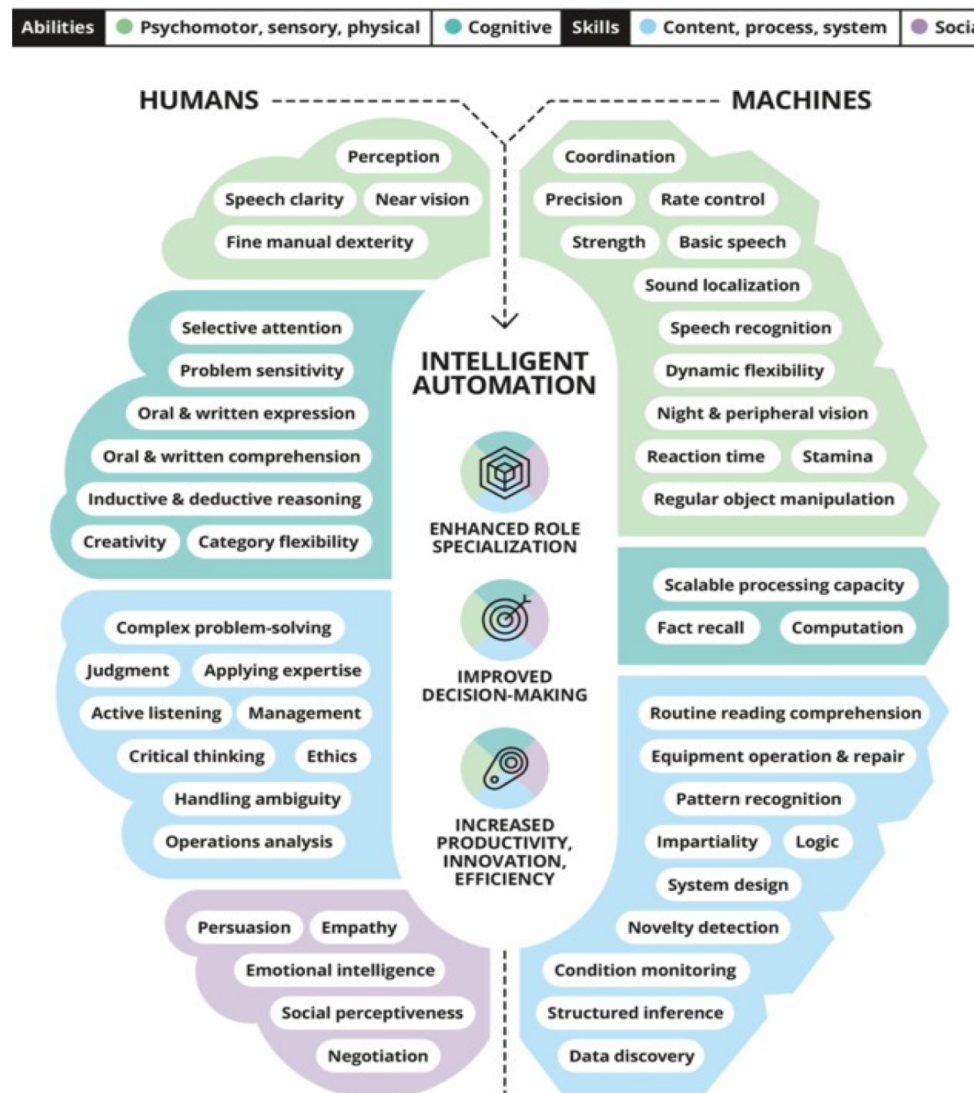


"Better Together. Understanding this key attribute and finding the equilibrium between humans + machines remains a serious equation that smart enterprises need to resolve in order to stay viable in business."

- Journal Joseph

Figure 1. A new mind-set for the no-collar workforce

Humans and machines can develop a symbiotic relationship, each with specialized skills and abilities, in a unified workforce that delivers multifaceted benefits to the business.



Sources: Deloitte LLP, *Talent for Survival: Essential skills for humans working in the machine age*, 2016; Deloitte LLP, *From brawn to brains: The impact of technology on jobs in the UK*, 2015; Jim Guszczka, Harvey Lewis, and Peter Evans-Greenwood, *Cognitive collaboration: Why humans and computers think better together*, Deloitte University Press, January 23, 2017; Carl Benedikt Frey and Michael A. Osborne, *The Future of Employment: How Susceptible are Jobs to Computerisation?*, University of Oxford, September 17, 2013; O*NET, US Department of Labor.

AI: The Fate of a Nation

K-12 and AI Readiness

As Educators, Principal Investigators, Researchers, Managers, Parents:
**What Are You Willing to Do to Avoid A Future of Unintended
Consequences?**

CONTACT

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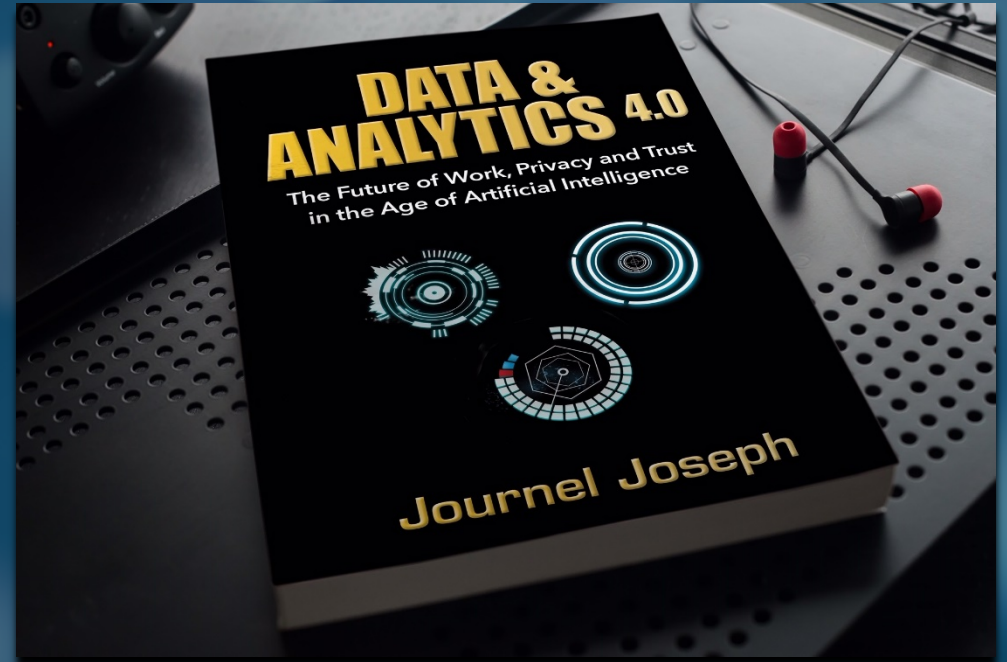
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THANK YOU!
