APTIMA®
Human-Centered Engineering®

Engineering Human Performance…
…in the Age of AI

Daniel Serfaty
Founder & CEO
Aptima, Inc.

AAAI Virtual Symposium
23-24 March 2020

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Jobs: A Forecast and A Paradox

A two-year study by the McKinsey Global Institute suggests that by 2030, AI and robots could eliminate as many as 30% of the world's human labor, displacing the jobs of as many as 800 million people

Elimination … Replacement … or Transformation?

The more automation/AI we introduce in our lives, the more critical it is to understand our evolving roles as humans

Human Performance Engineering: Optimizing the "FIT"

Mission, Tasks & Work

AI Technology

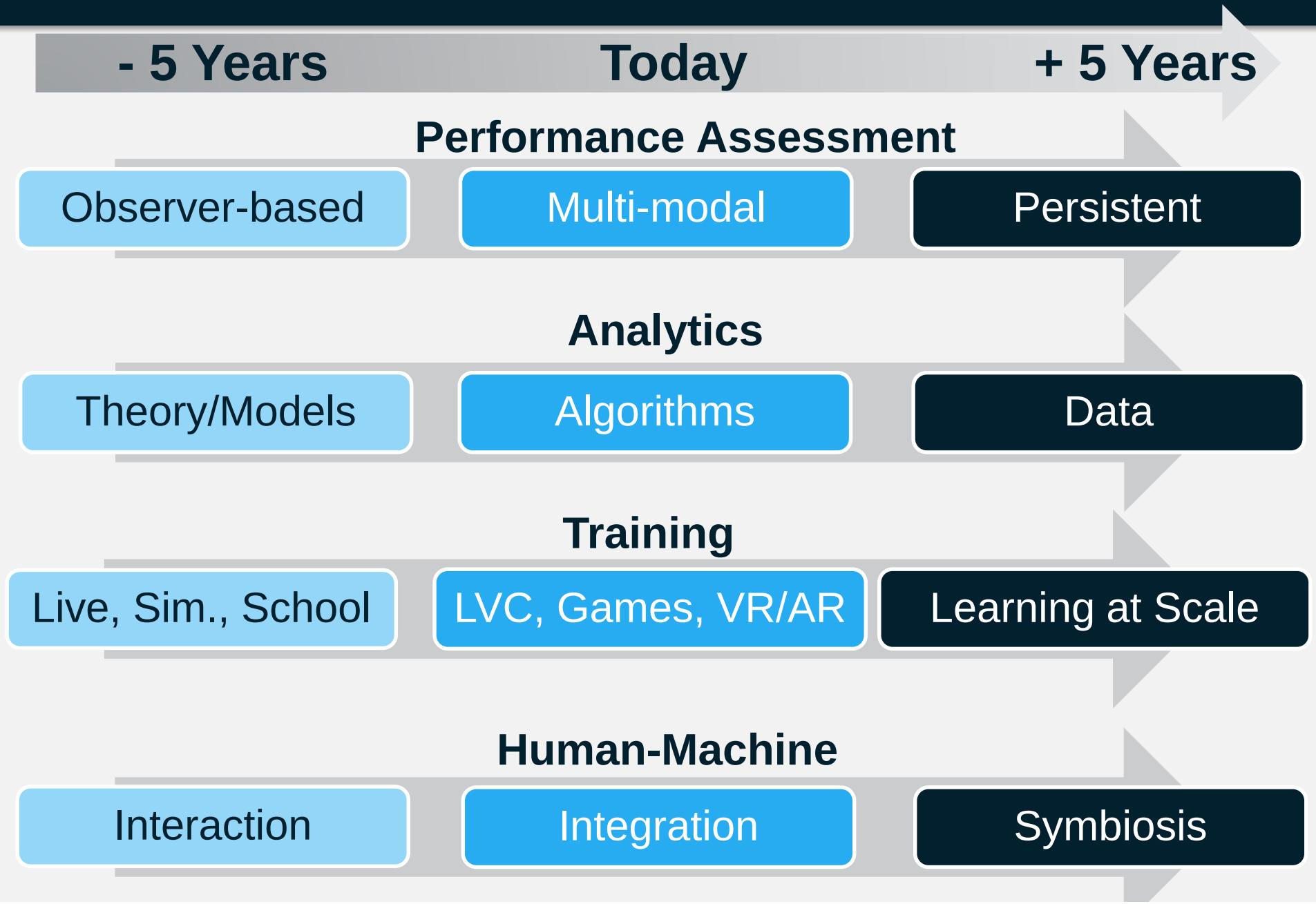
FIT

Humans

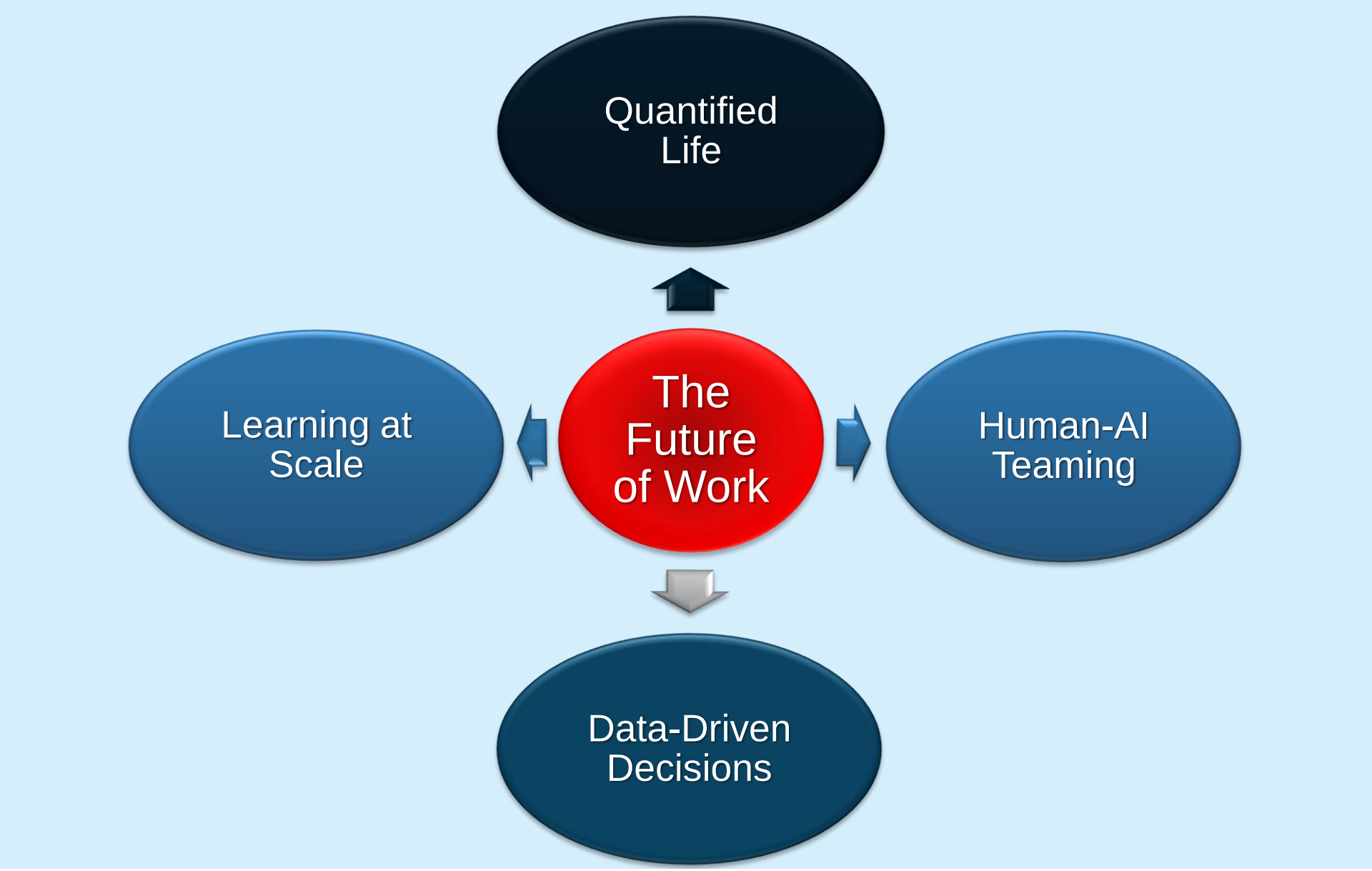
Structures

What does "FIT" mean when technology learns, adapts, & changes?

Human Performance: Four Societal and Market Trends

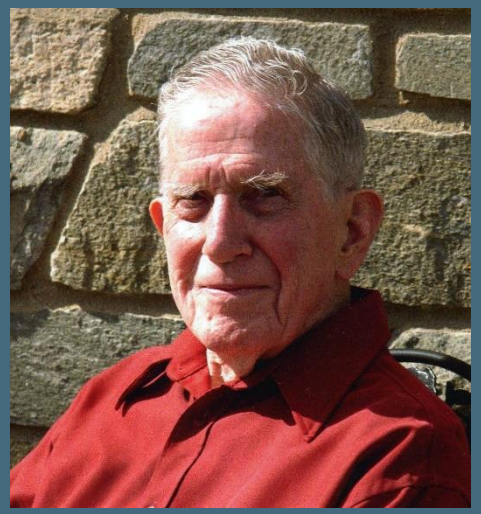


Focus: The Future of Work

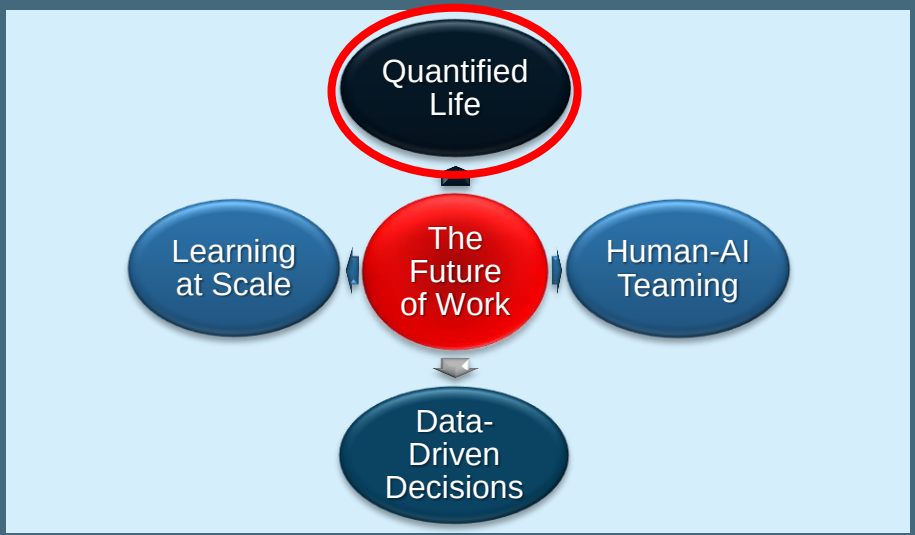


Meaningful Performance Measurement

- *"You can't improve what you don't measure"*
- *"You can't measure what you don't understand"*



LTG John H. Cushman, U.S. Army
(1921- 2017)

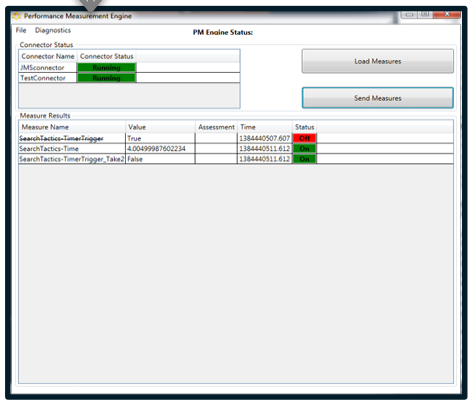


Performance Assessment and Data Analytics

via **HPML***

Measurement Library / Assessment Data / Measure Cueing

ASA™ A-Measure® Server Application

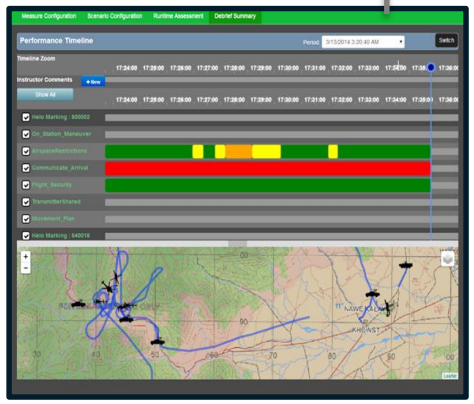


Performance Data Analytics

PM ENGINE™

Observer-Based Measurement

SPOTLITE®



Real-time, AAR, Trend Analysis

Performance DASHBOARD™

- Instructor Operating Station
- Simulator data via HLA, DIS, etc.
- Neurological and Physiological Data
- Comms and Info Dissemination Data

* **HPML**: Human Performance Markup Language standard

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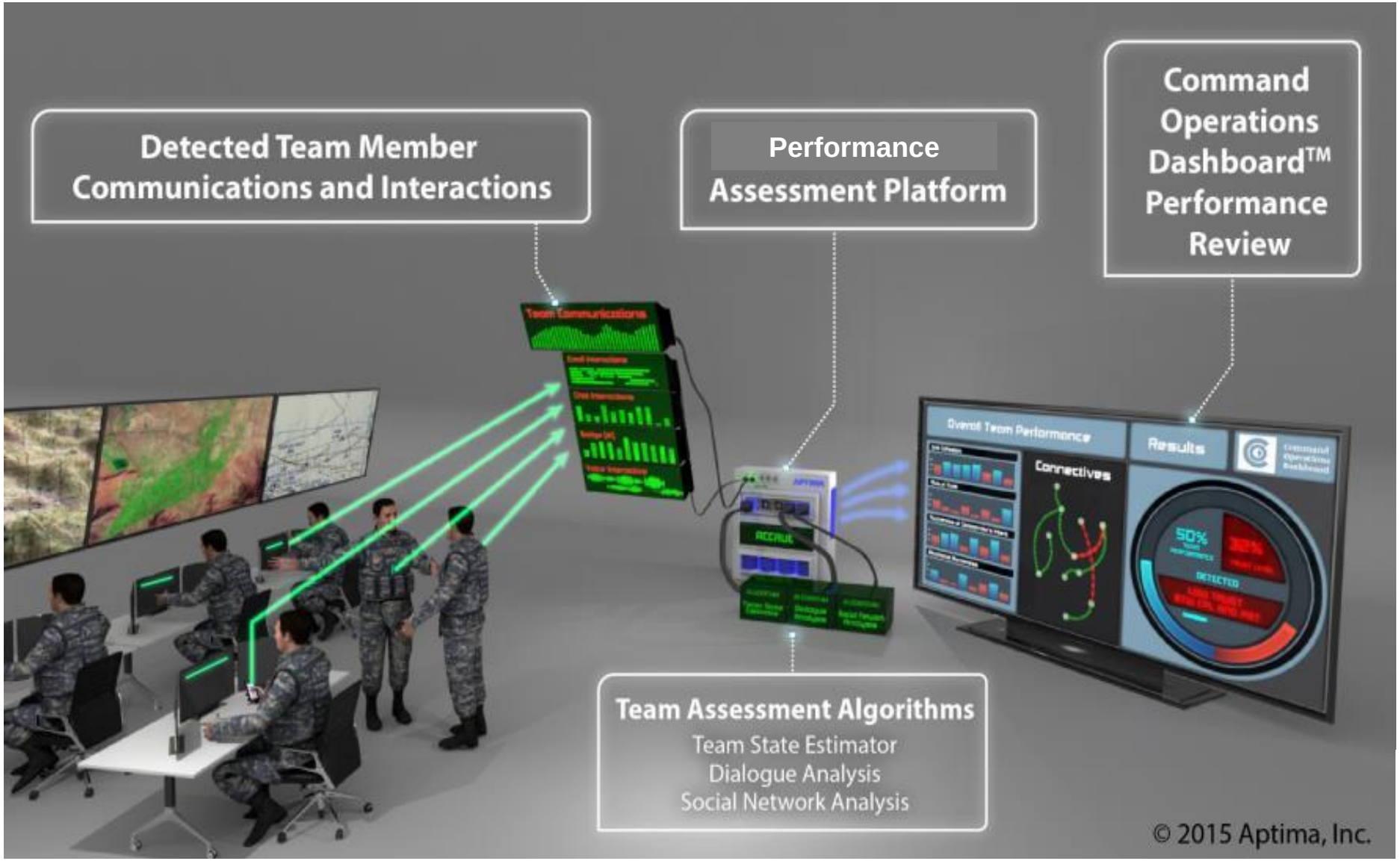
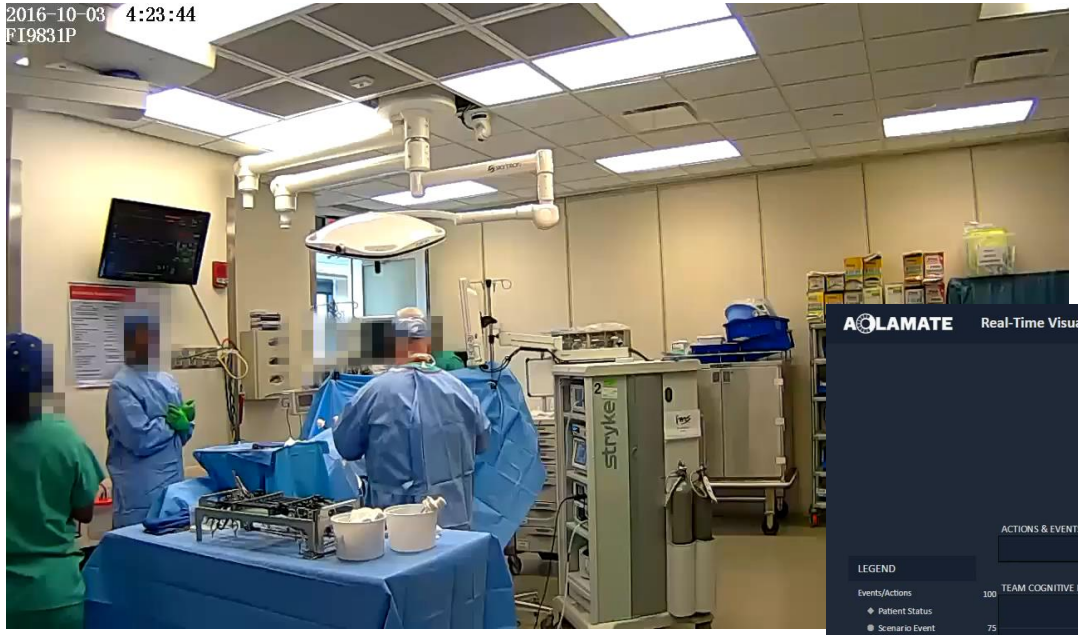
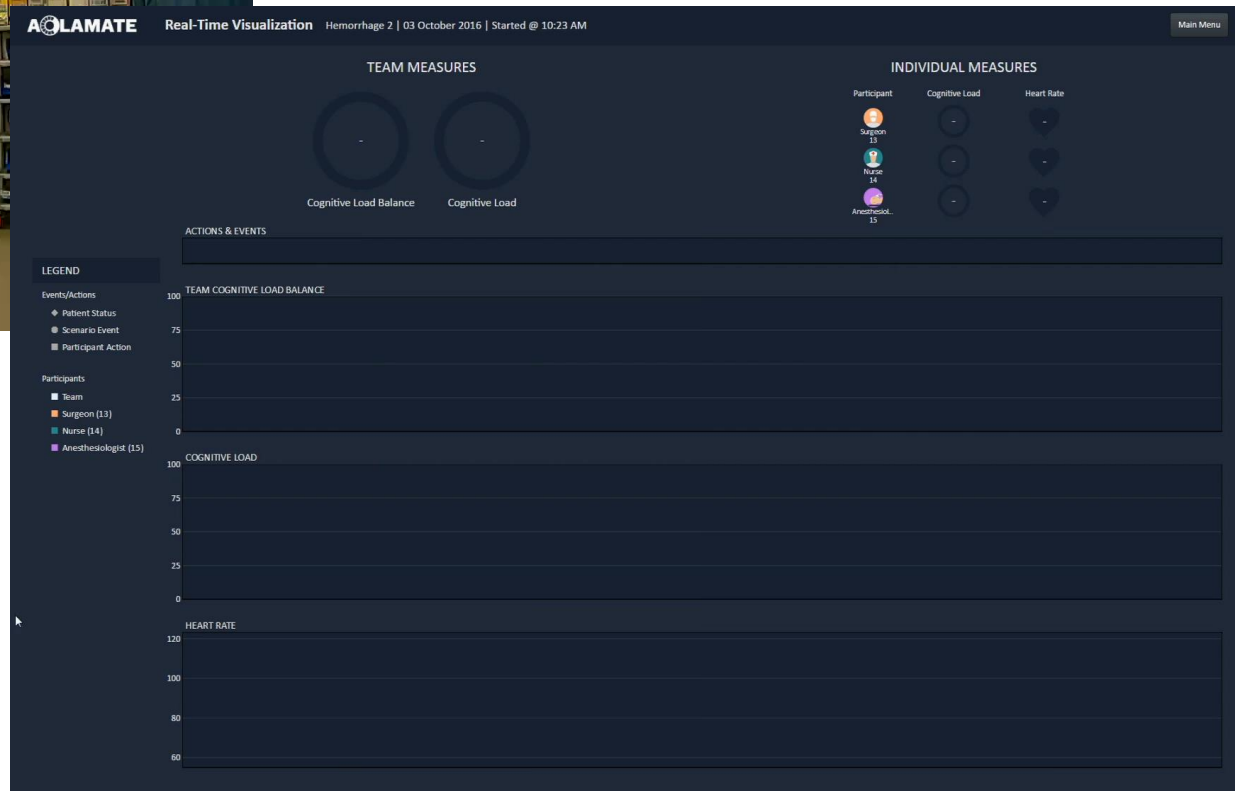
TeamVitals: Sensing an Organization's

SENSE ↔ ASSESS ↔ AUGMENT



Surgical Teams Real-Time Performance





Surgical Team = Surgeon + Anesthesiologist + Nurse(s)

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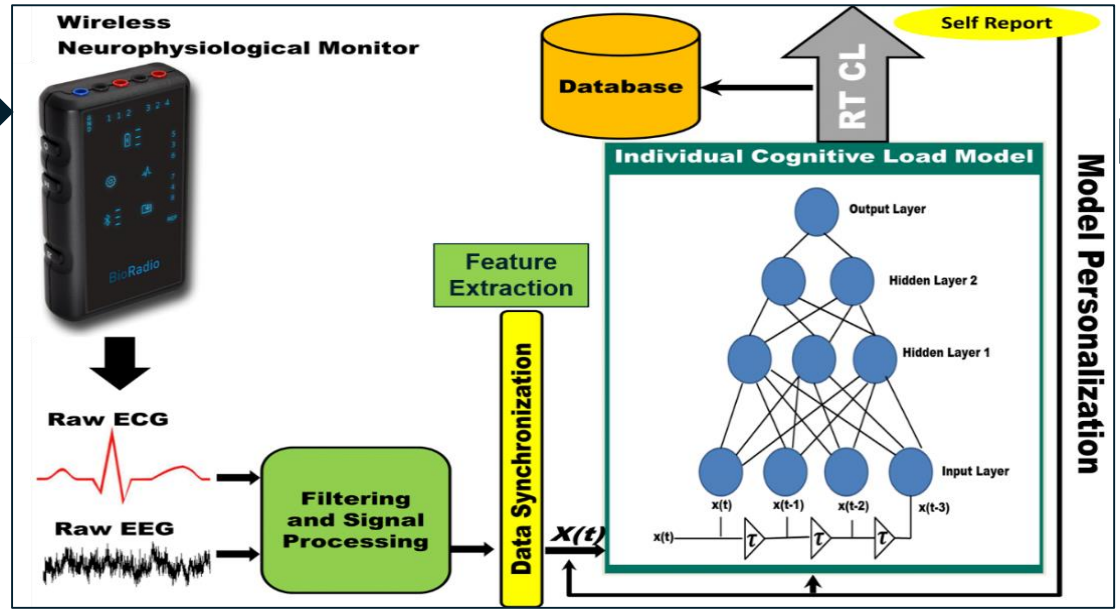
Surgical Team Real-Time Performance: AI Machinery

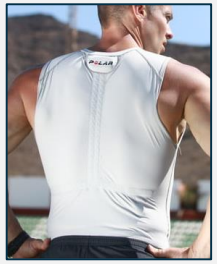


S&T → Field: Confined Spaces Monitoring System

Portable Sensors → Data Networks → Monitoring Station → Alerting & Intervention

Location

Health Signals



Atmospheric Hazards

FIPS VALIDATED 140-2

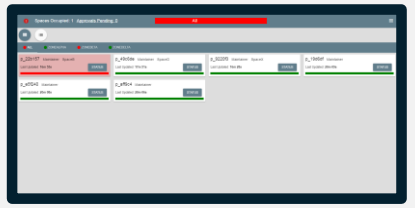
VERIZON 4G LTE

FedRAMP

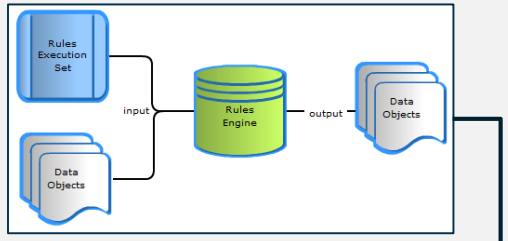
AWS GovCloud (US)

GeoView

Status Overview



Drill-down



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CSMS – Air Force Logistics Command Application

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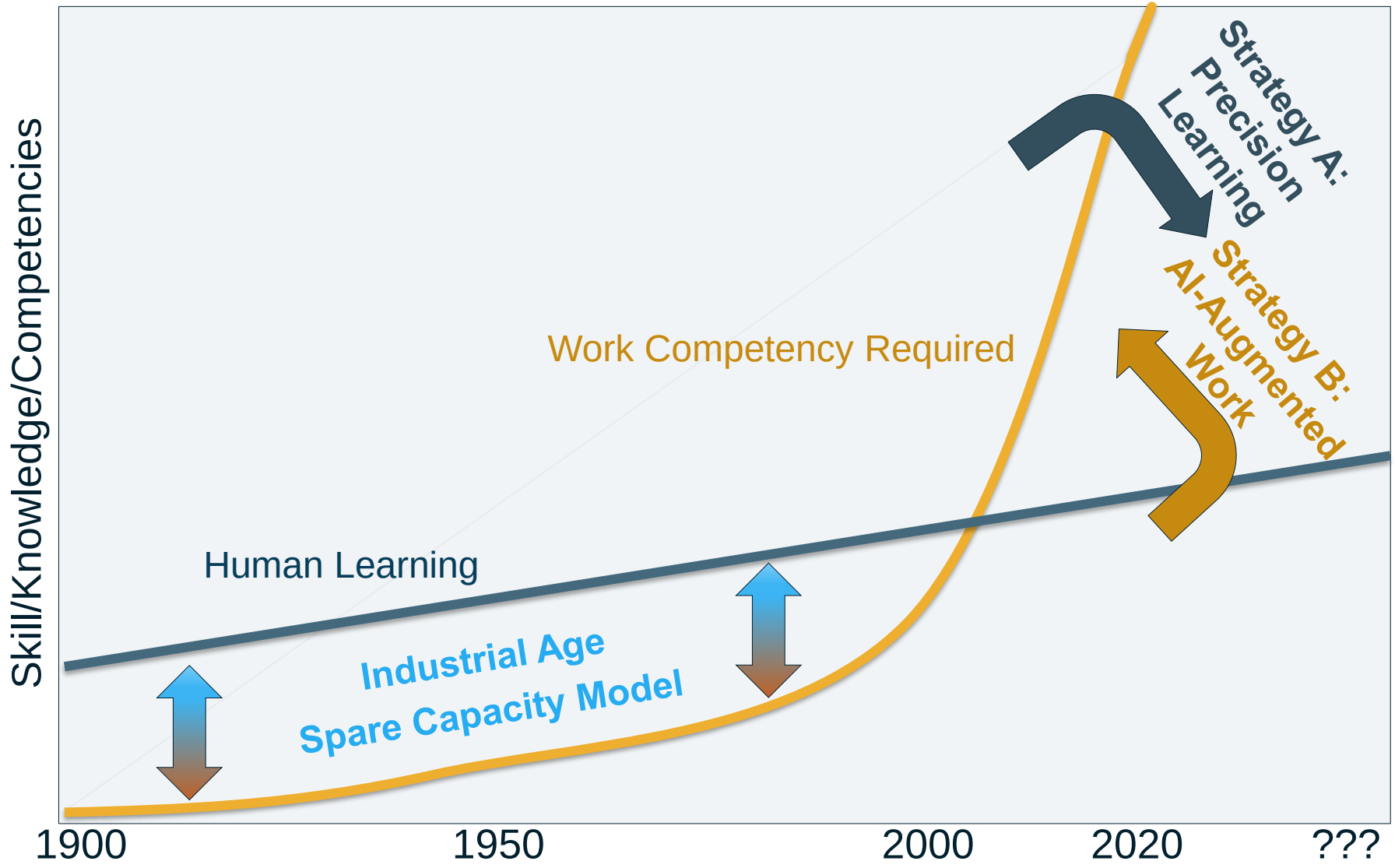
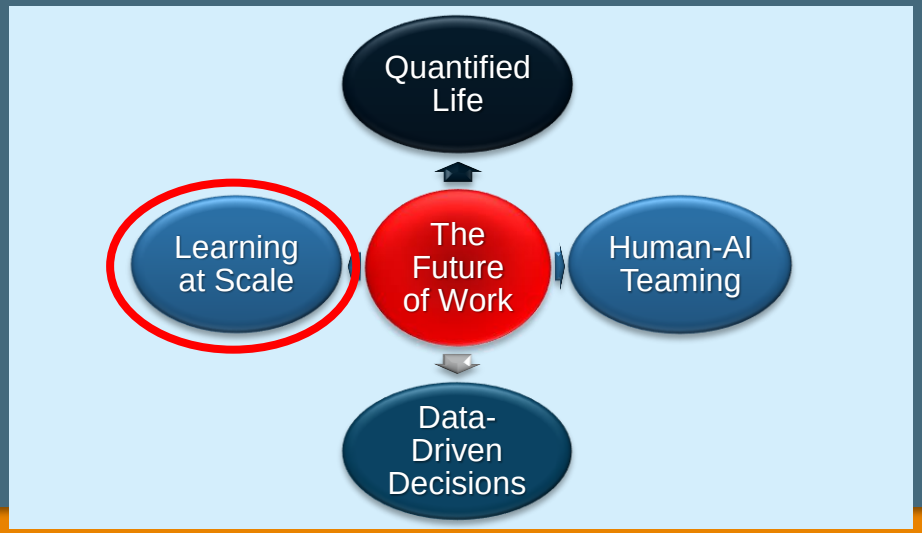
Knowledge Acceleration and Competency Gap



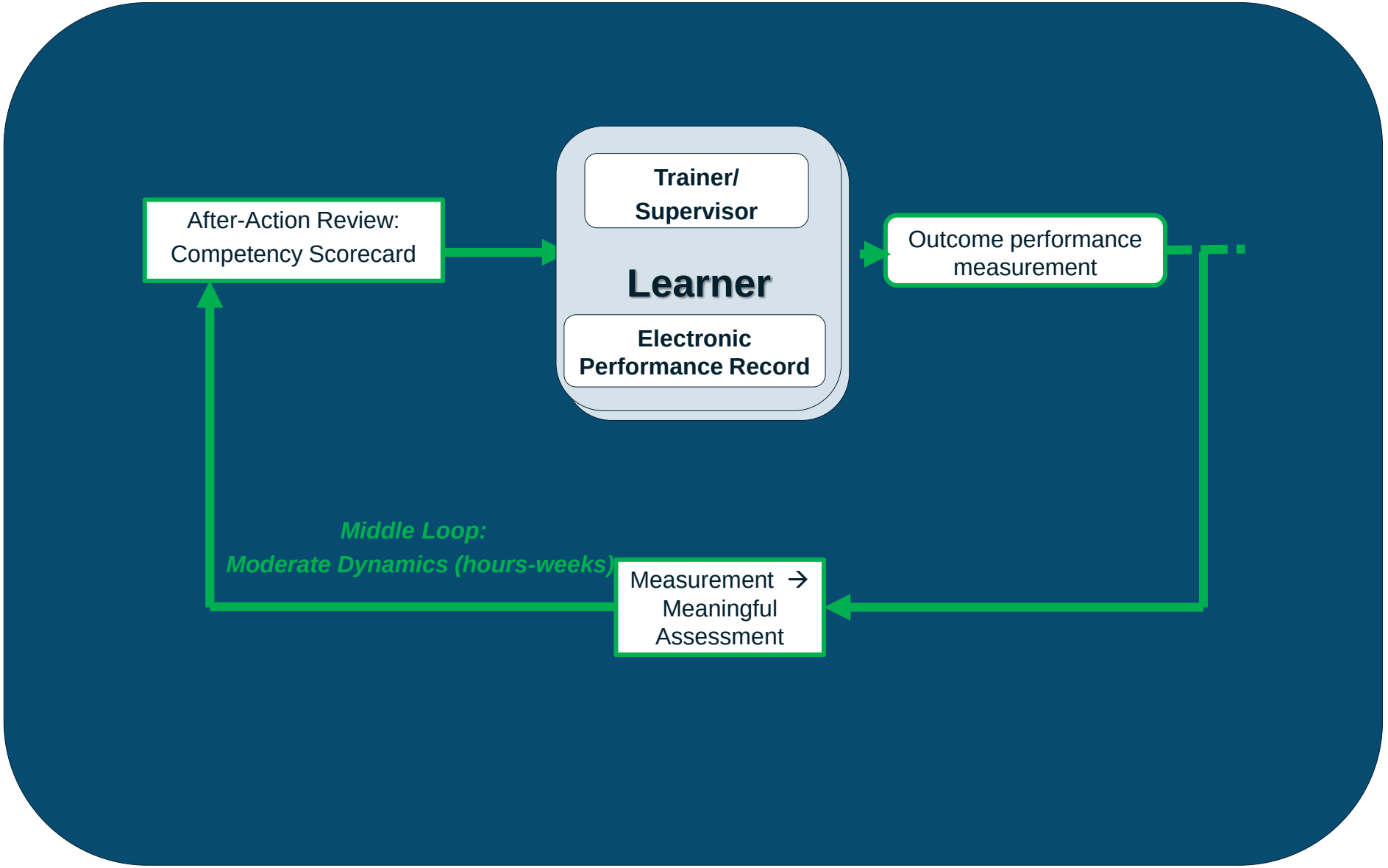
Life-Long Learning

"Traditionally, life has been divided into two main parts: a period of learning followed by a period of working. Very soon, this traditional model will become utterly obsolete, and the only way for humans to stay in the game will be to keep learning throughout their lives and to reinvent themselves repeatedly"

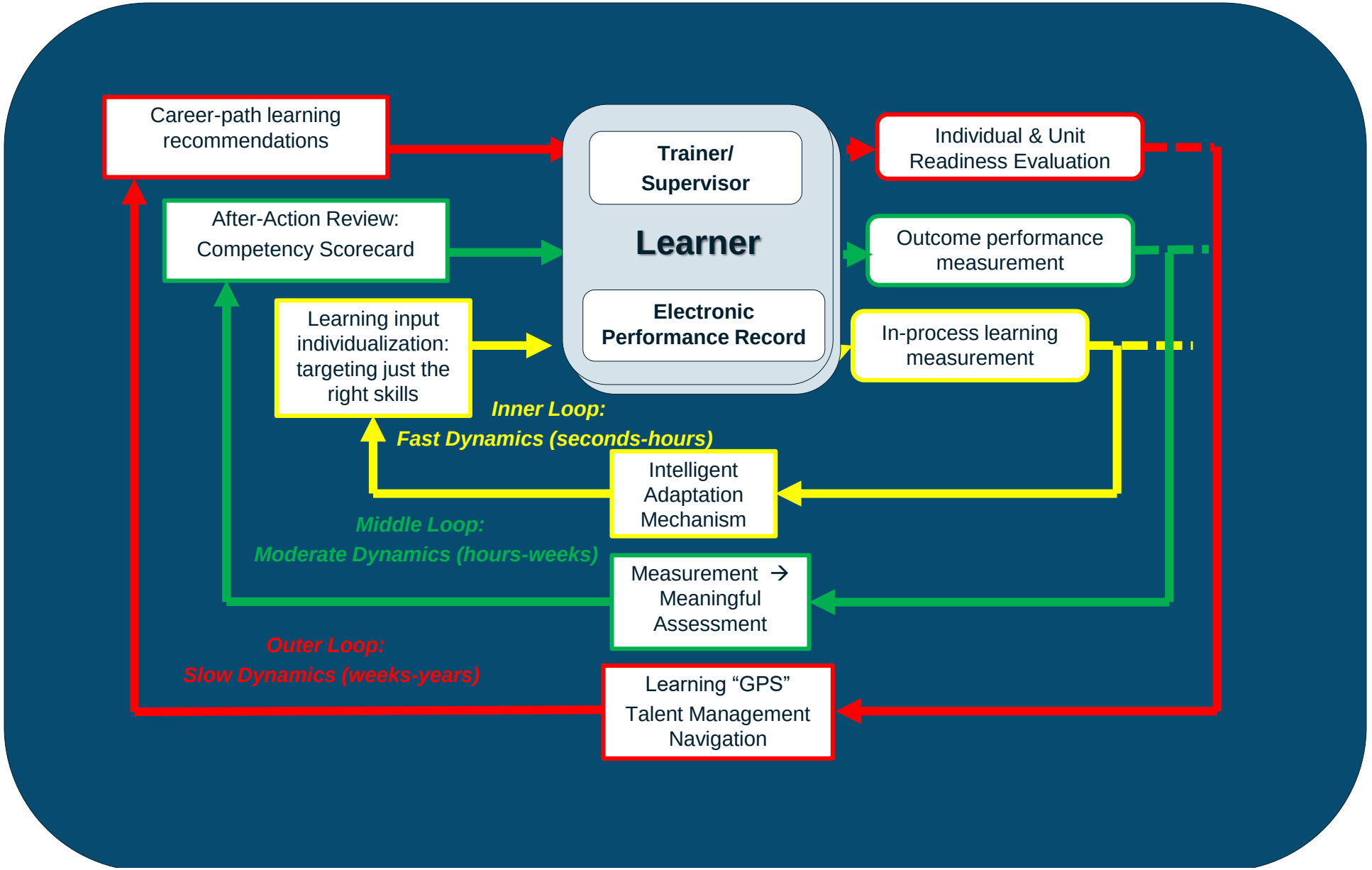
Yuval Noah Harari, *Sapiens* 2014



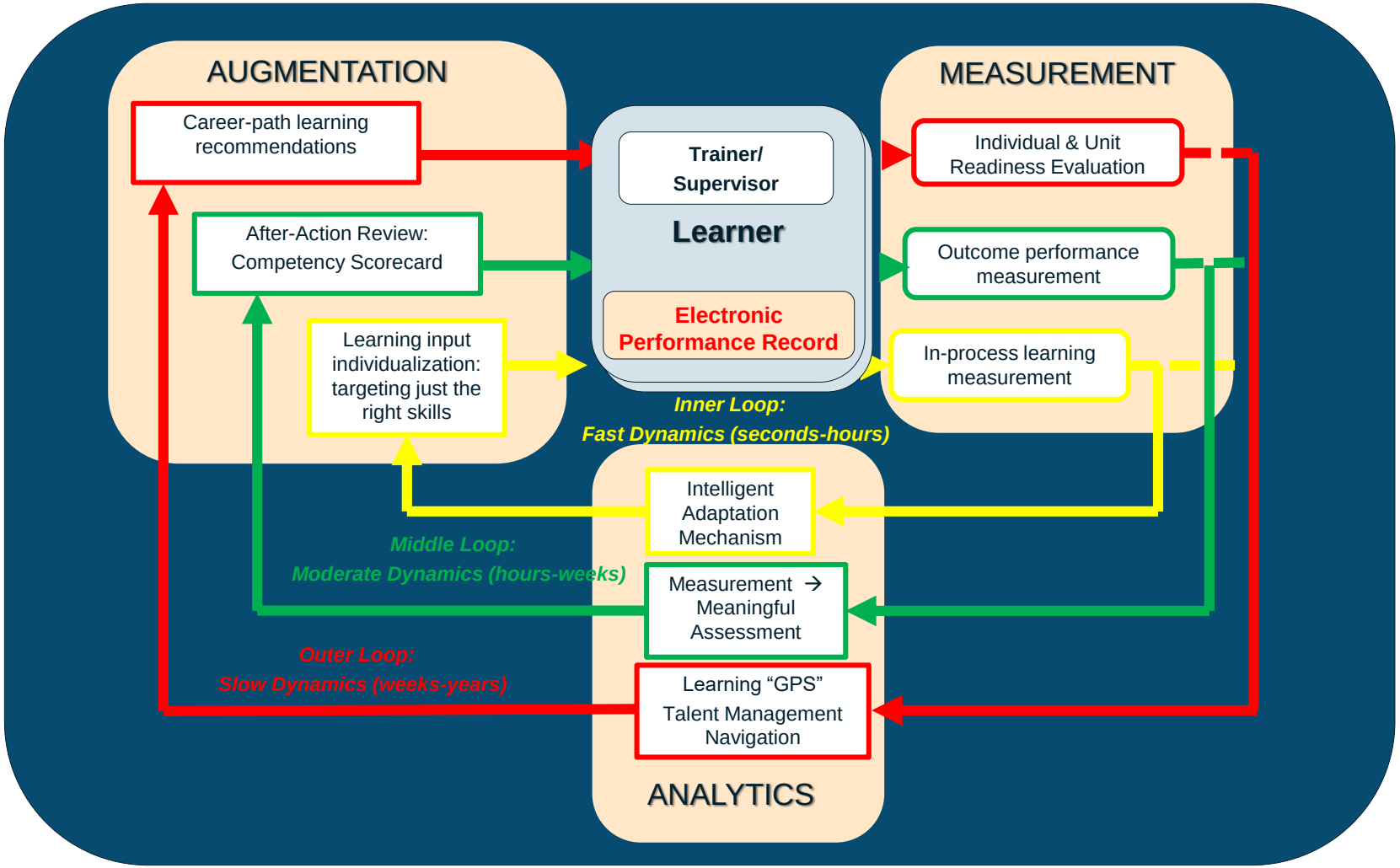
Learning at Scale: Closing the Learning Loops



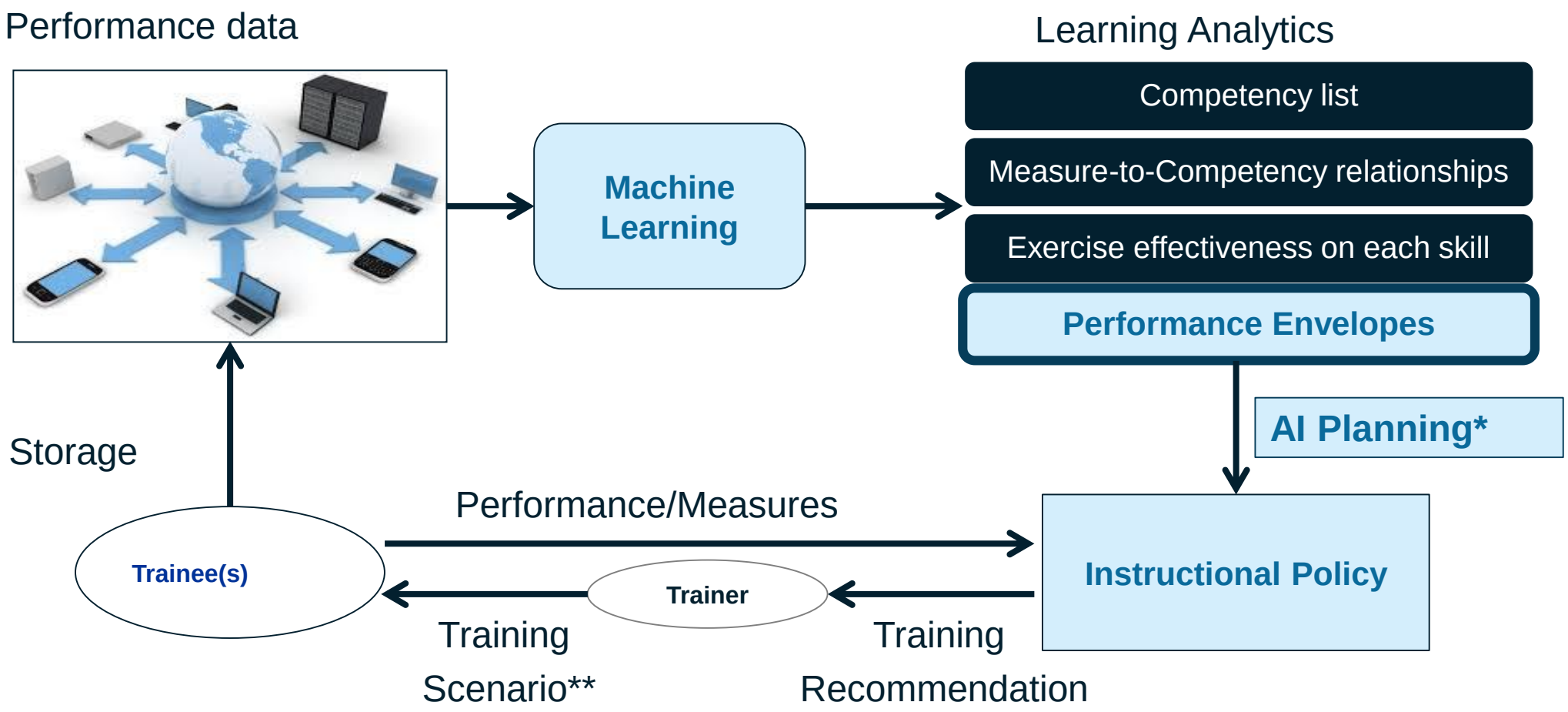
Nested Learning Dynamics



Optimizing Enterprise Performance Through Life-Long Performance Management



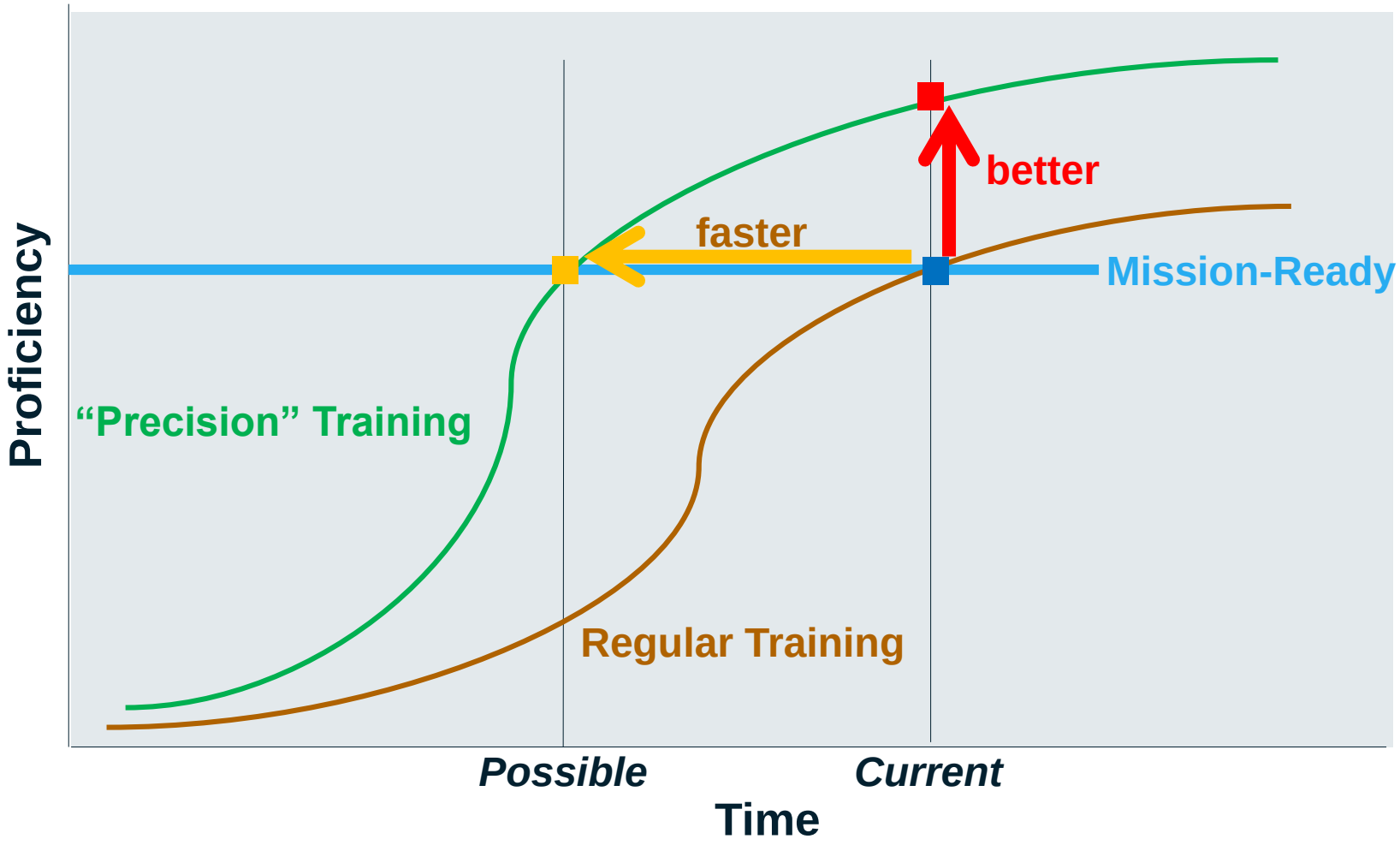
Precision Learning Analytics: Adaptive Learning Management, Big Data Analytics, and AI



** Intelligent mathematical modeling approach POMDP (Partially Observable Markov Decision Process)*

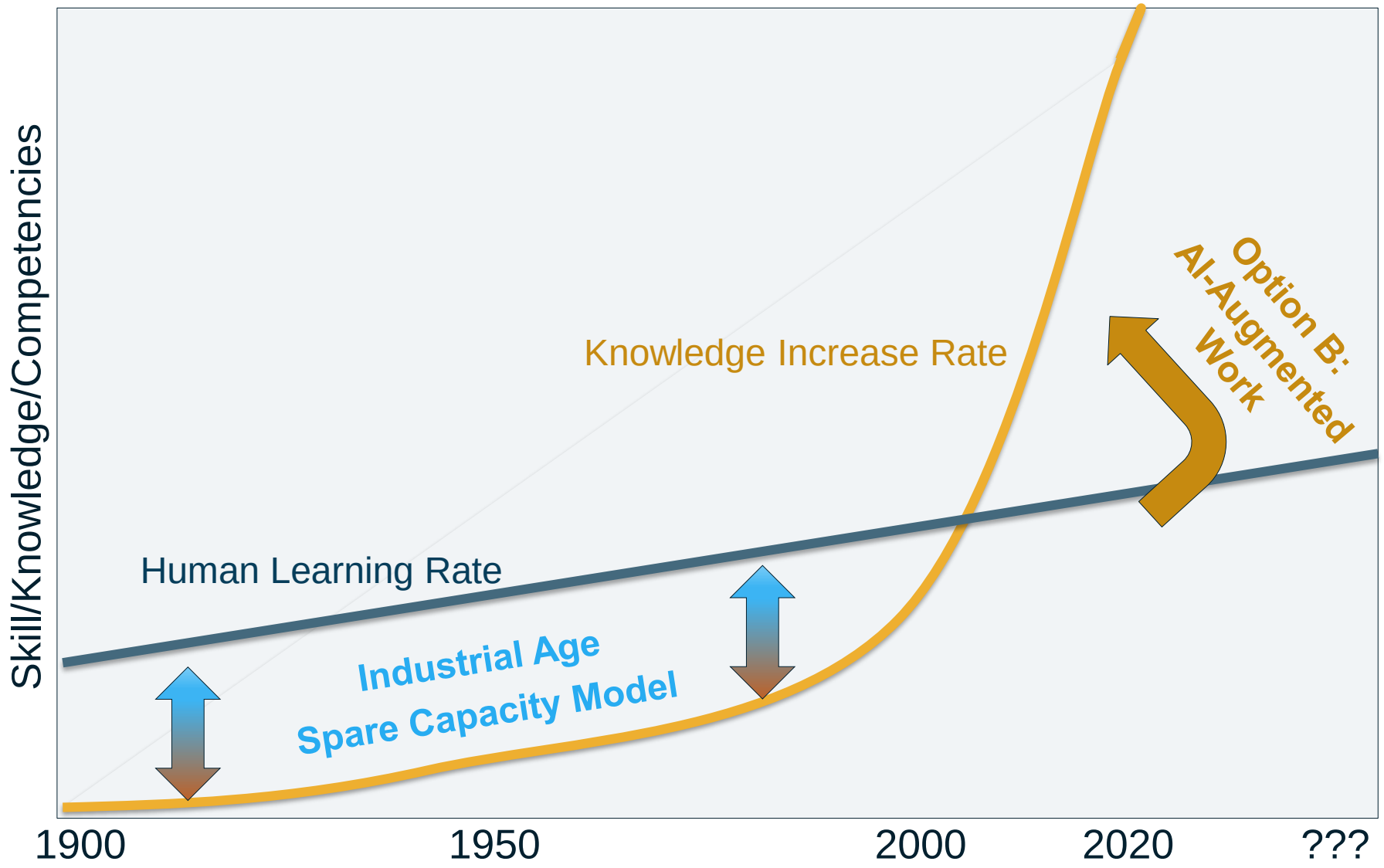
*** In M&S, the Scenario is the Curriculum*

“Precision” Learning Payoff: Efficiency and/or Effectiveness



- Target only skill/knowledge needing improvement
- Learner-worker’s engagement & motivation

Strategy B: AI-Augmented Work

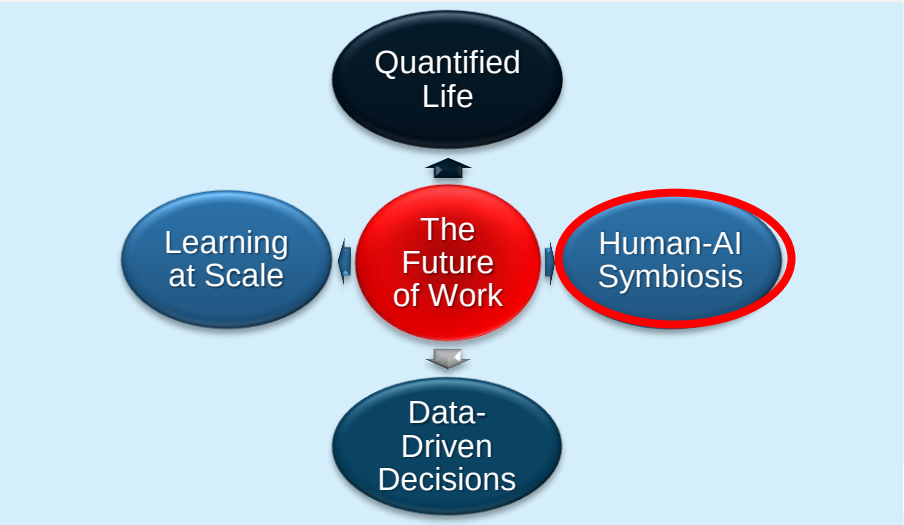


Human-Machine Teaming

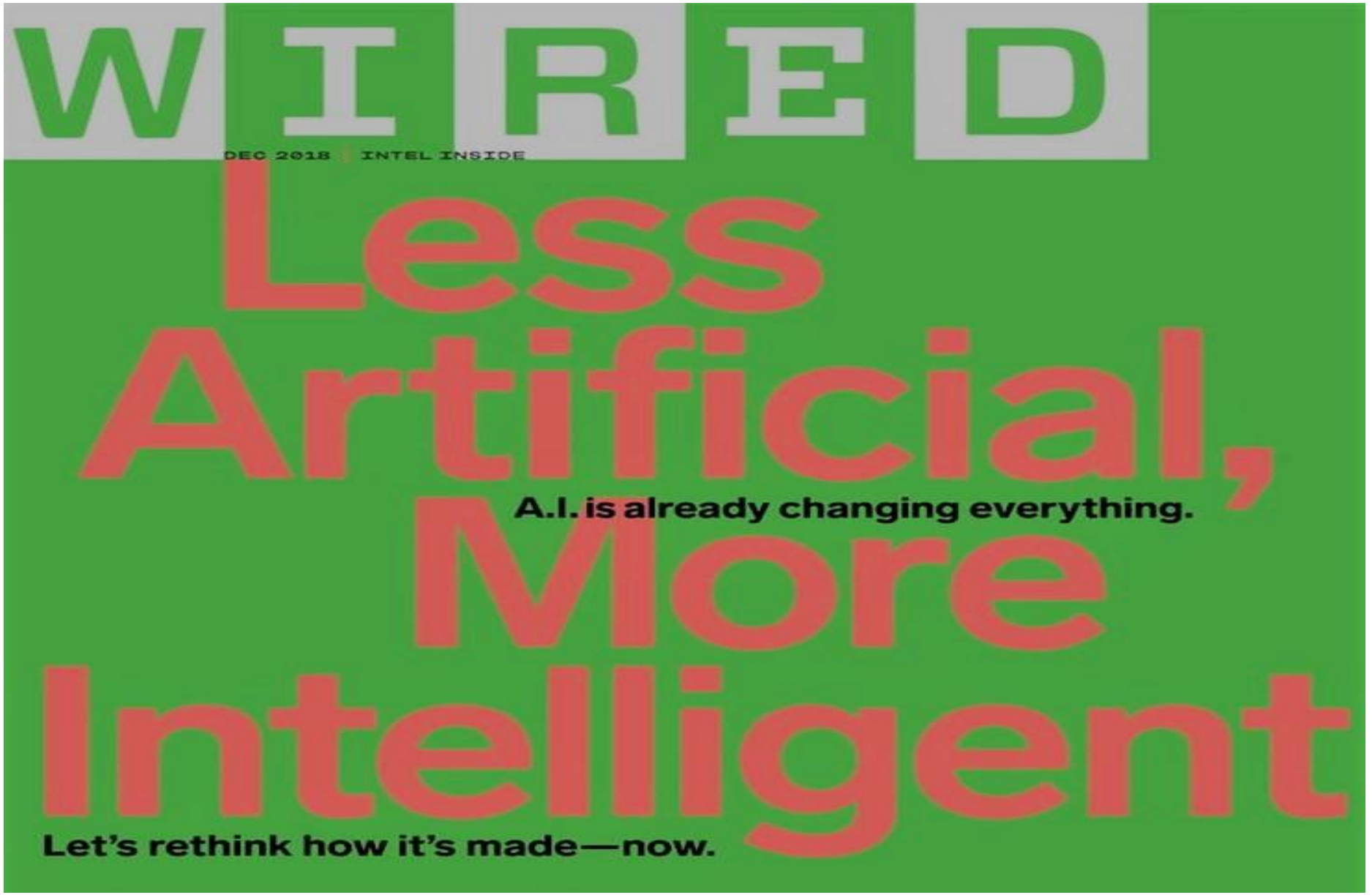
"..estimated that it would be 1980 before developments in artificial intelligence make it possible for machines alone to do much thinking or problem solving of significance.

That would leave, say, 5 years to develop man-computer symbiosis and 15 years to use it. The 15 may be 10 or 500, but those years should be intellectually the most creative and exciting in the history of mankind"

J.C.R. Licklider (1915-1990) in 1958…



Third Wave A.I.: “Let’s rethink how it’s made – Now.”



Kasparov's Inequality & The Expertise Shift

Superior Human
+
AI Machine
+
Average H-M Team "Design"

<

Average Human
+
AI Machine
+
Superior H-M Team "Design"

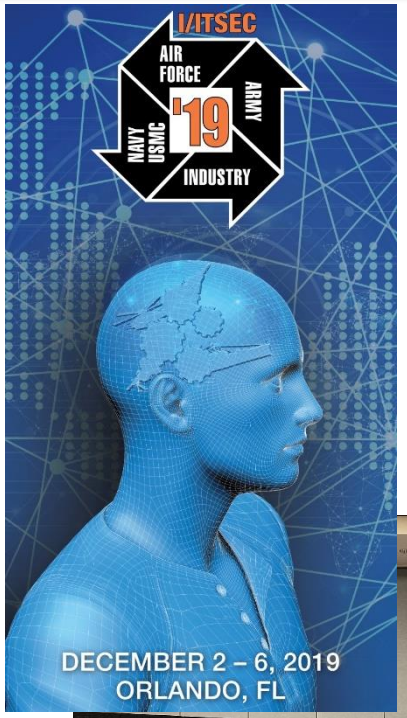
Cautionary Questions About AI

- Should we design AI to our (human) image?
- Does AI need human data to learn better?

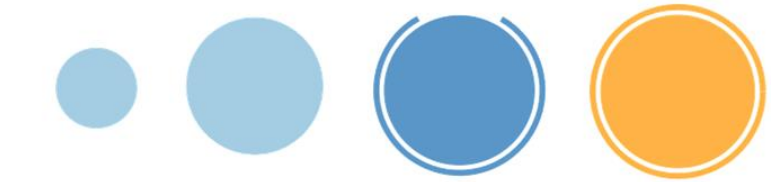
The Lonely Tale of AlphaGo Zero

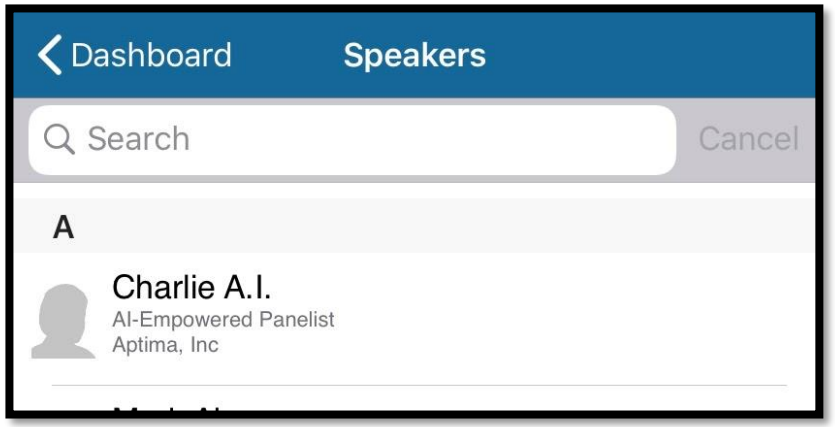
- Deep Learning: What does AI learn exactly?

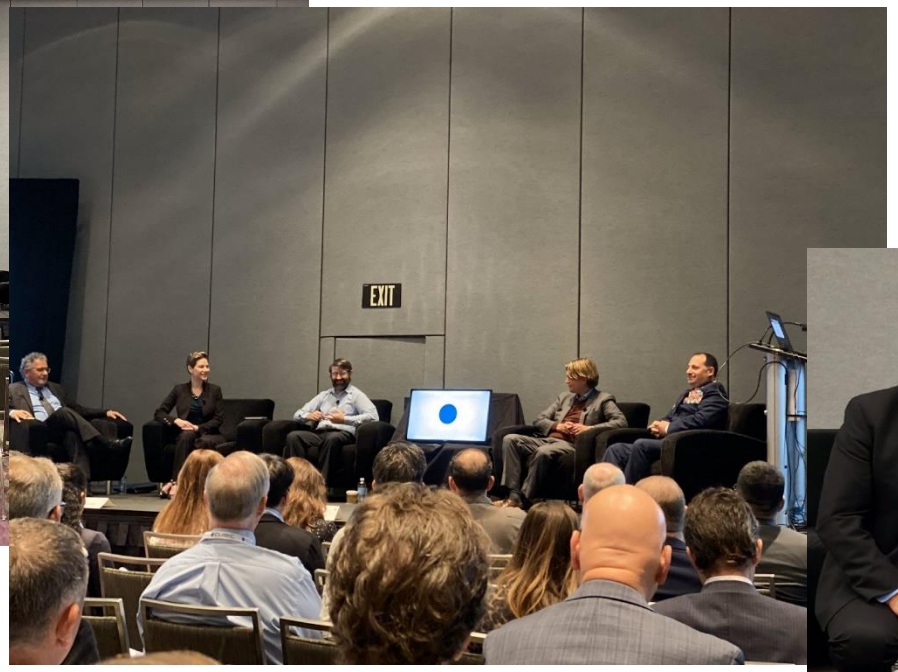
A Personal Story: Adapting to an AI Teammate -- Charlie



IMAGiNE 2030
AI-Empowered Learning

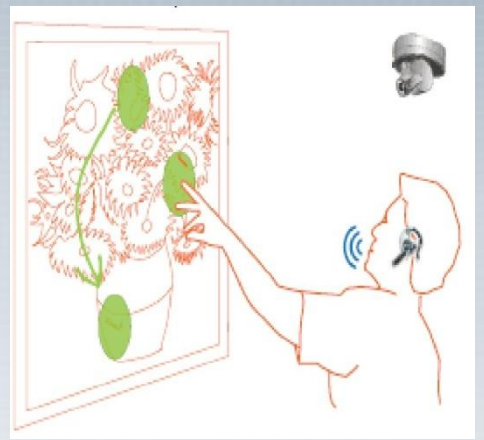


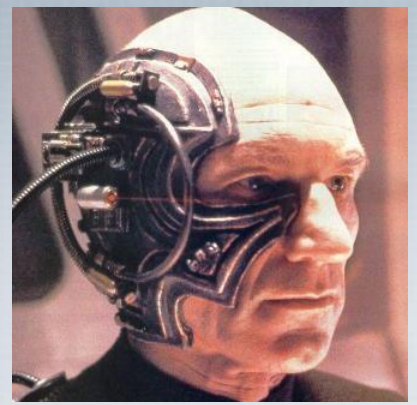


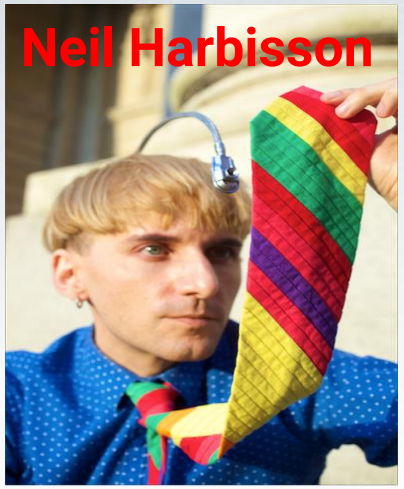


Increased Intimacy of Human-Technology Teaming

Interaction → Integration → Augmentation → Fusion



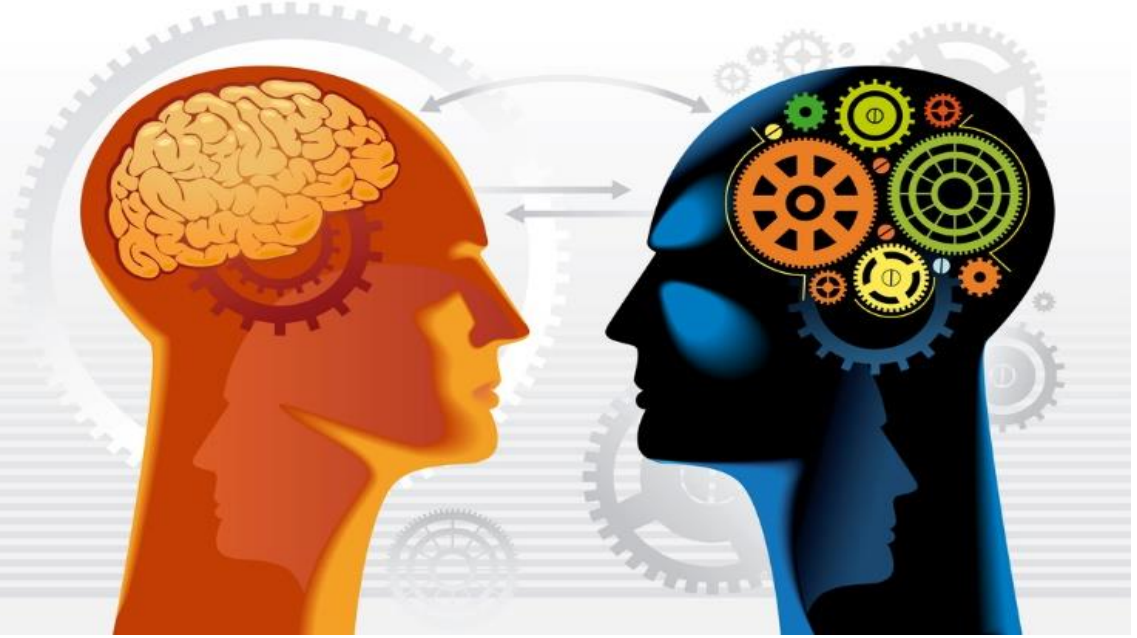




Human Working/Learning in the Age of AI

From Socio-Technical Organizations to…

Multi-Species Systems



"We are probably one of the last generations of Homo sapiens"

Y. N. Harari

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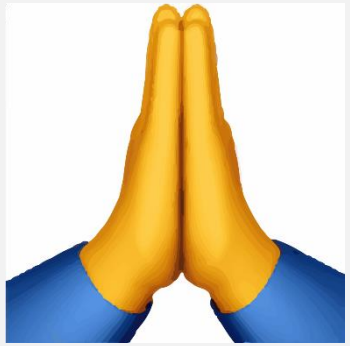

Thank You!

Contact Info:

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