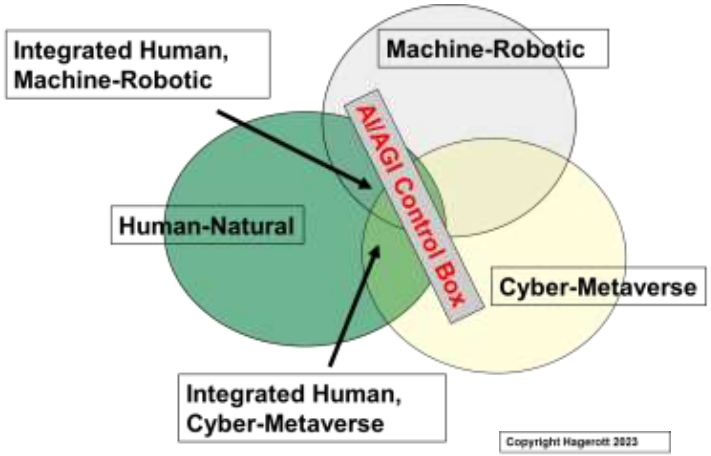
# The Emergence of Generative AI, Intelligent Machines and the Metaverse:

## Framing the Challenge to University Systems and Suggesting a Three-Level Strategy of Resilience




FRAMEWORK

Strategy of Resilience built on pillars of

1. Daily Reliability…

2.Adaptability…

3.Transformability…

28 Jan 2025

Mark Hagerott, PhD

❑Note: The views and opinions of authors expressed herein do not necessarily state of North Dakota, the NDUS, or the U.S Navy.


WASHINGTON D.C.
KOMO NEWS 4
TRUMP ANNOUNCES $500 BILLION FOR AI


Trump Ends AI Regulations, Launches "AI Stargate"

# Structure of Brief

- Brief history of AI and Digitization of Society/Economy
  - Offer a Framework based Historical experience of last Tech Revolutions (the next General Purpose Technology)
- Implications of AI in higher education (opportunities, risks)
- Landscape of AI in higher education (who is doing what)
- Roles of a governing board in AI and digitization
  - For uncertain Future, offer a Strategy of Resilience, Personally and Organizationally
  - You are on the right track to think as a ‘System of State Campuses” approach

THE PEOPLE ALIVE AT THIS TIME, ARE THE MOST IMPORTANT IN HISTORY… you are THE human leaders as machine intelligence is emerging…

# *1. Some History: Humans Anticipated the "Artificial Machine" long ago…for a century or more…theories in flux*

- Luddite Rebellion against mill machines 1811
- Shelly 1818 (Frankenstein); Butler 1871(EreWhon)
- Turing 1936/1950 (universal machine;Turing Test)
- Asimov 1939 ('I Robot'… see last pages of book)
- Digital Computer 1945
- Term "AI" first used 1954
- Kubrick 1968 (AI villain in 'Space Odyssey 2001)
- Internet created1969… but few leaders noticed.
- AI/ASI Wins Jeopardy 2011 ( "Go" follows with GPT)
- CHAT GPT goes Public Nov 2022
- Actors/Writers/UAW Strikes in part over AI 2023

# *What is AI, ASI/ANI, AGI….?*

- Artificial Intelligence is the Capacity for a Machine to take actions to achieve its objectives. (paraphrased from Stuart Russell, Director of Center for Human Compatibility, Univ of California, Berkeley)

- Types of AI:ASI/ANI, AGI
  - Artificial Specialized or Artificial Narrow Intelligence (ASI/ANI)
  - Artificial General Intelligence (AGI)

## *AI Research Evolves to a Breakthru*

- GOFAI: long time the approach were Boolean Logic and Baysian networks etc.
- Recently, the convergence of COMPUTE, DATA, SOFTWARE, allowed a new approach.
- Machine Learning is using an approach called “Deep Learning” or “Neural Network”
- With creation of internet, came enough data to create “Large Language Models.”
- The result: Generative Pretrained Transformer (GPT), as a CHAT application. (a form of ASI)

## *Current Situation: CHAT GPT rapidly evolves*

- "CHAT GPT3 (generative pretrained transformer) got close to meeting human capabilities…. i.e., passing the "Turing Test".

- CHAT GPT4 may be showing signs of AGI (ref: Microsoft Research Center paper, 17 May 2023)

- Massive redirection of COMPUTE, DATA, SOFTWARE, TALENT, ORGANIZATION, $$, to accelerate AI to AGI…. Unprecedented shift.

# CHAT GPT part of emerging historic events 2021-2022…




**…..how to frame these events?**

# *What are your theories or framework of Emerging Technology?*

**Theories of Politics**

**Theories of Religion**

**Theories of Economics**

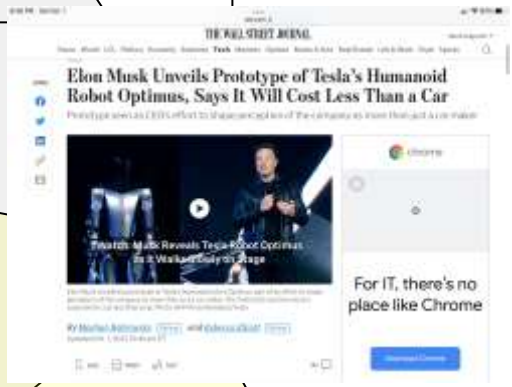
**Theories of Technology?**

Challenge: Those alive now are OBLIGATED to create and control emerging technology… but you must care for the human…so let's think about this together…

# *Visual Framework of Digitizing World … and How to Situate AI/AGI and Realms for Human Adaptation…*

**Integrated Human, Machine-Robotic**

**Machine-Robotic**




**AI/AGI Control Box**

**Human-Natural**


**Cyber-Metaverse**

**Integrated Human, Cyber-Metaverse**

# 2. Implications of AI in higher education

# 2. Implications of AI in higher education (opportunities, risks) Building on Historical Precedent…

***a.*** ***Historical Evidence for the Magnitude of your Challenge***

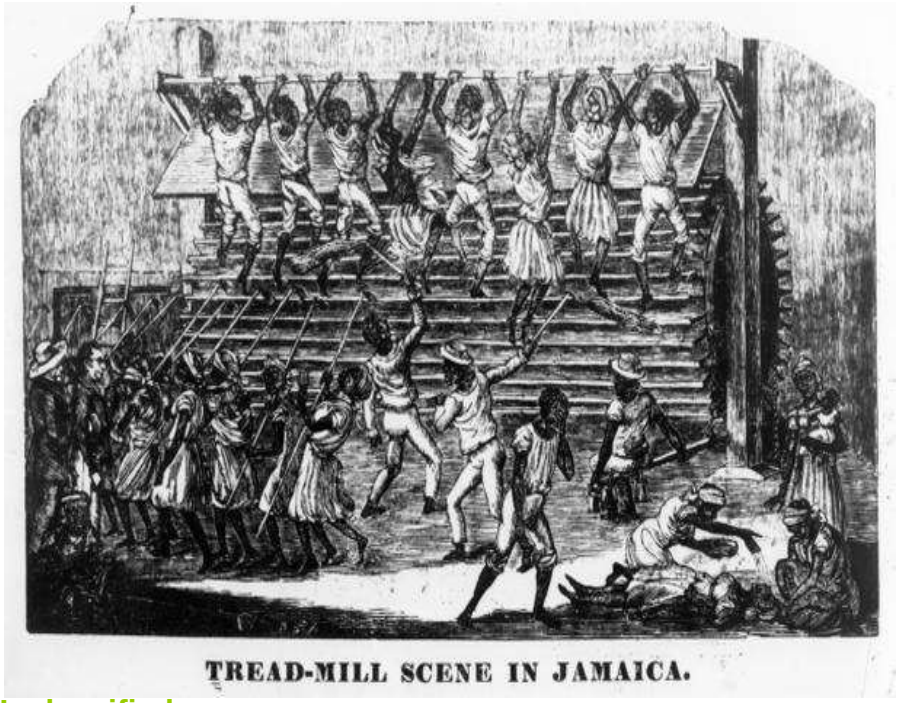
***b. Insight from past Paradigm Shifts created effects that were truly UNIMAGINABLE for people at the time.***

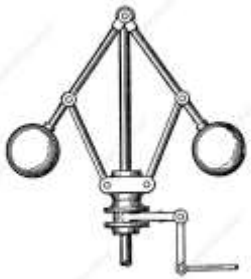
***c. AI/AGI will cause similar level disruption… much of our world won't be recognizable in a generation.***

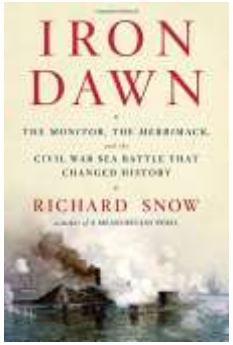
***d. History provides CONCRETE examples of what happens when new Realms begin to emerge… global level disruption across society, economy, education.***

# *Industrial and Military Machines help liberate millions enslaved … Emancipation and Civil War*

- In pursuit of Sense-Think-Acting advantage and efficiency…
  - 1st: Human-Natural Realm
    - (apprx10,000 BC… farming, rise of cities, **human slavery era**))
  - 2nd: Integrated Human-Machine Realms (the Industrial Revolution)
    - 1776 Watt steam engine & by1865 machine power helps to end slavery by overwhelming the Confederacy with mass production.





# *When Humans and Animals reigned: agricultural-industrial communities…displace aboriginal communities …*

- For most of history….humans did most of the “Sensing-Thinking” but were aided by animals and basic machines to “ACT” (ie., muscle power and leverage)
  - 1st: Human-Natural Realm
    - (apprx10,000 BC… rise of farming)

# *Humans Create more Complex machines…huge implications for rural and animal economy*

- Second Realm emerges as machines do more heavy lifting…
  - 1st: Human-Natural Realm
    - (apprx10,000 BC… rise of farming)
  - 2nd: Integrating Human & Machine Realm transforms agriculture…. moving from animal to machine power

… and life and work was never the same… first for the horses!... Where are they?

# *Industrial Revolution of Agriculture… on the face, positive labor saving and productivity enhancements… but…*

- Second Realm matures as machines replace people…
  - 1st: Human-Natural Realm
    - (apprx10,000 BC… rise of farming)
  - 2nd: Integrated Human-Machine Realm
    - Industrial Revolution on the farm continues.….the “Combine”

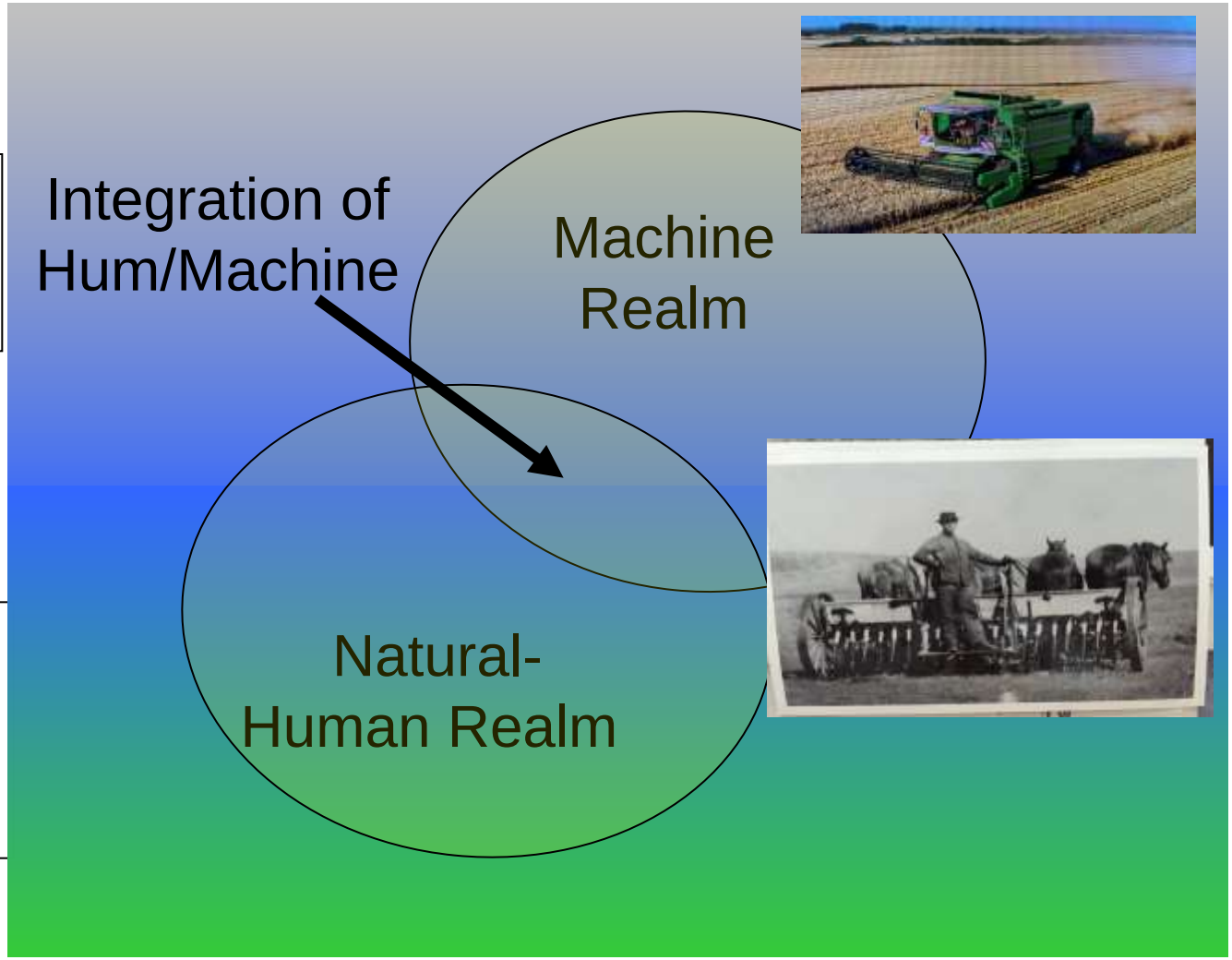
**…life and work was never the same… where are the people…my grandfather adapted and kept his job…**

# *Industrialization of Agriculture…reliance shifts to machines decimates horse population…evolving to GPS guided, robot combines.*

***Machine Factors More Decisive***

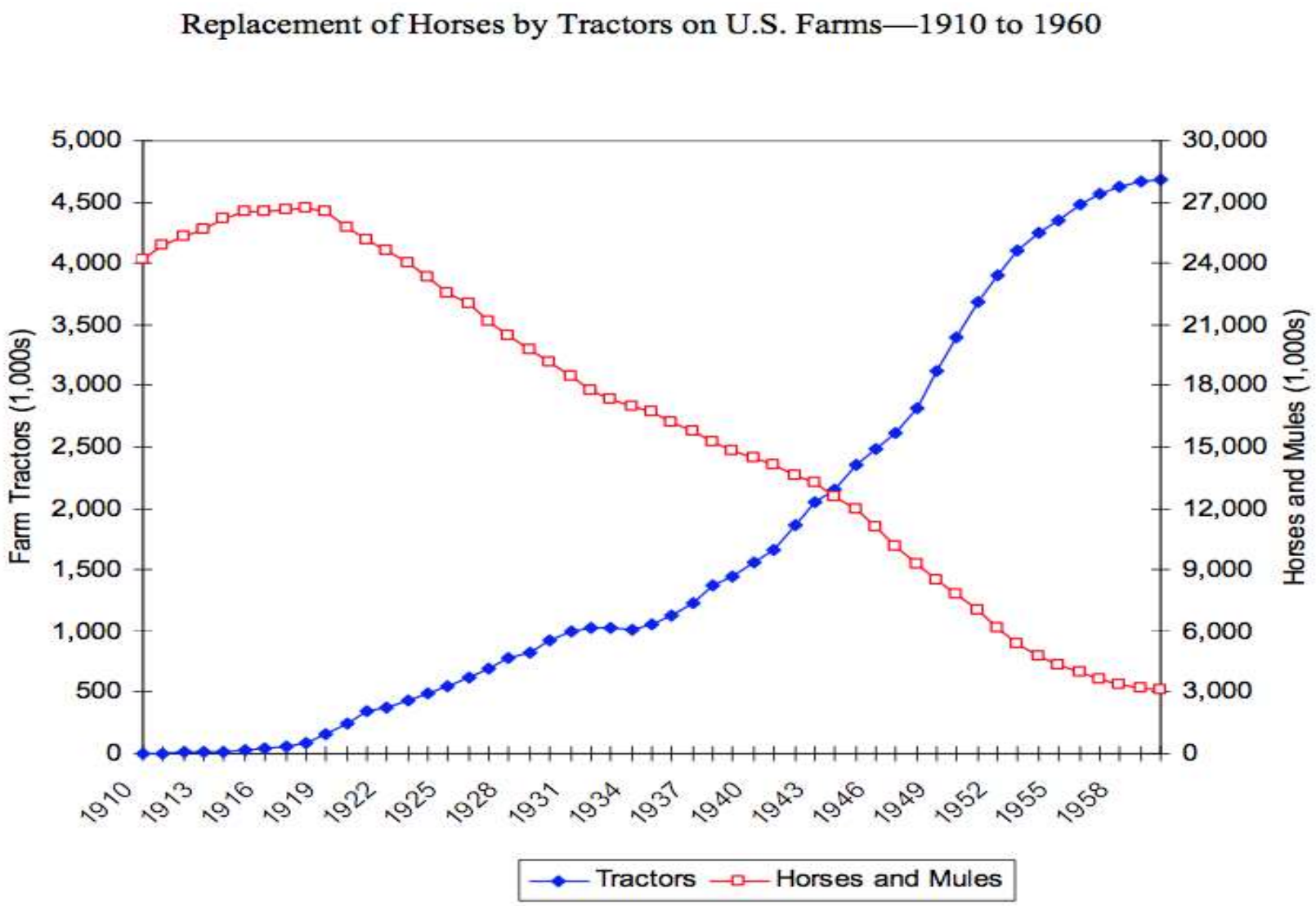
Role of Machine Factors in S-T-A Functions

***Hum/Natural Factors more decisive***

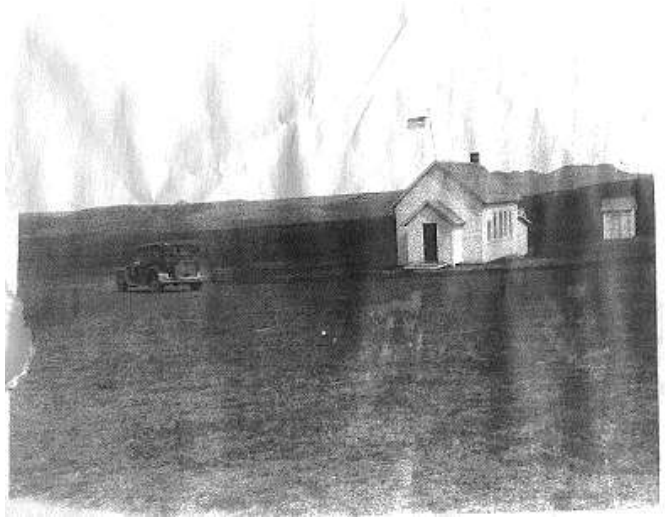



***…fewer horses… what could be the downside?***

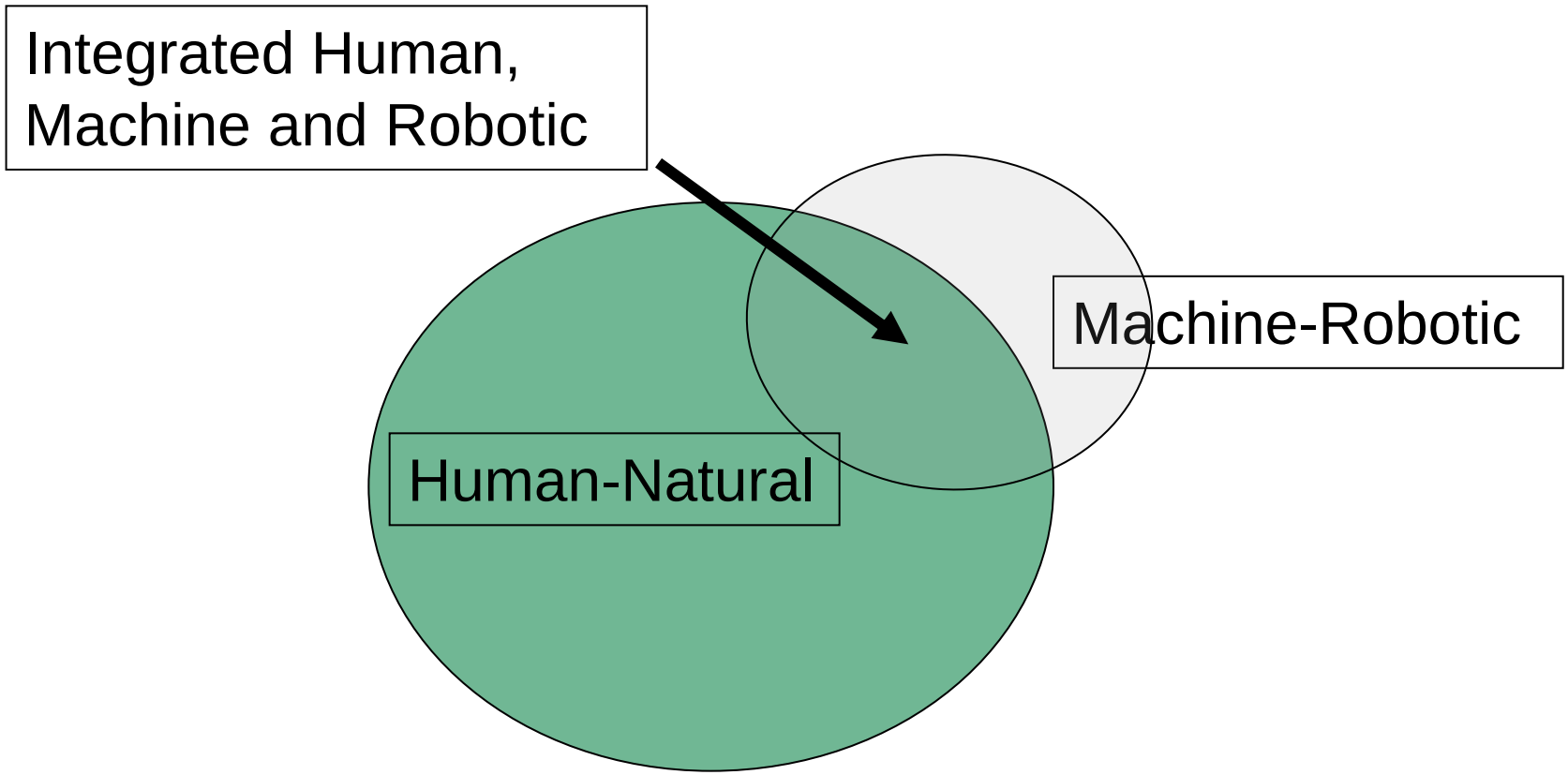
# Machines Replace Horses, hay land moves to cash crop, prices collapse, Banks fail...Crash of '29(Brad Smith MSFT)



# *Rural America…. what WASN'T expected? Human-machine integration devastated small institutions*



# *The Human-Natural, Machine-Robotic Framework…*

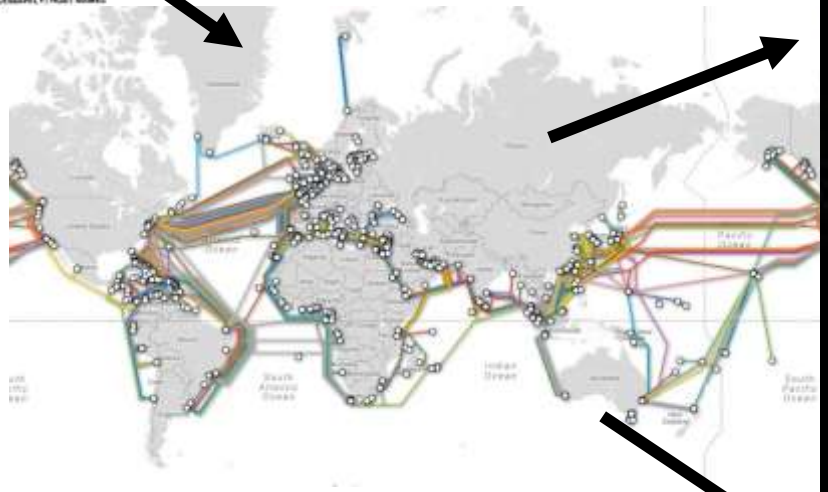


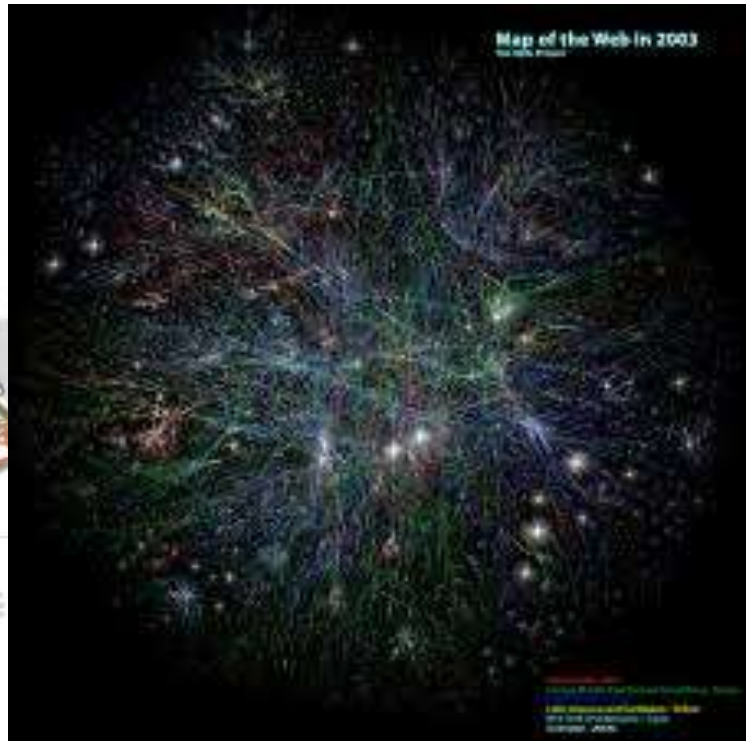

***… and then came October 1969***

# *At a small collection of university computers… the Internet comes alive…*

… the emergence of the weirdest surprise…. not fully anticipated until Gibson, and his sci-fi novel, *Neuromancer*… the place we call CYBERSPACE…or METAVERSE… or the place of DIGITAL TWINNING.

# 3rd Realm: Cyber Space, Massive Shock. note: robots predicted ~200BC, Cyber space not predicted until 1984…



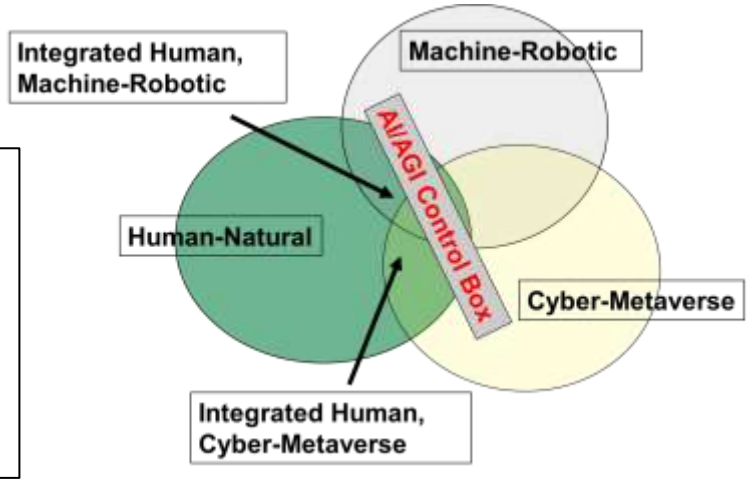

**Rapid A.I. advance with access to massive internet/IoT data...**

# Using the Framework to Think about Reliability, Adaptability, Transformability

Resilience by Realms and Intersections between Realms:

-the Human/Natural Realm where Humanity resides

-Integrated (intersections) of Human, Data, and machines




Main Objective: that Humanity Flourishes, our Students are Prepared for these new Worlds… morally, mentally, physically….

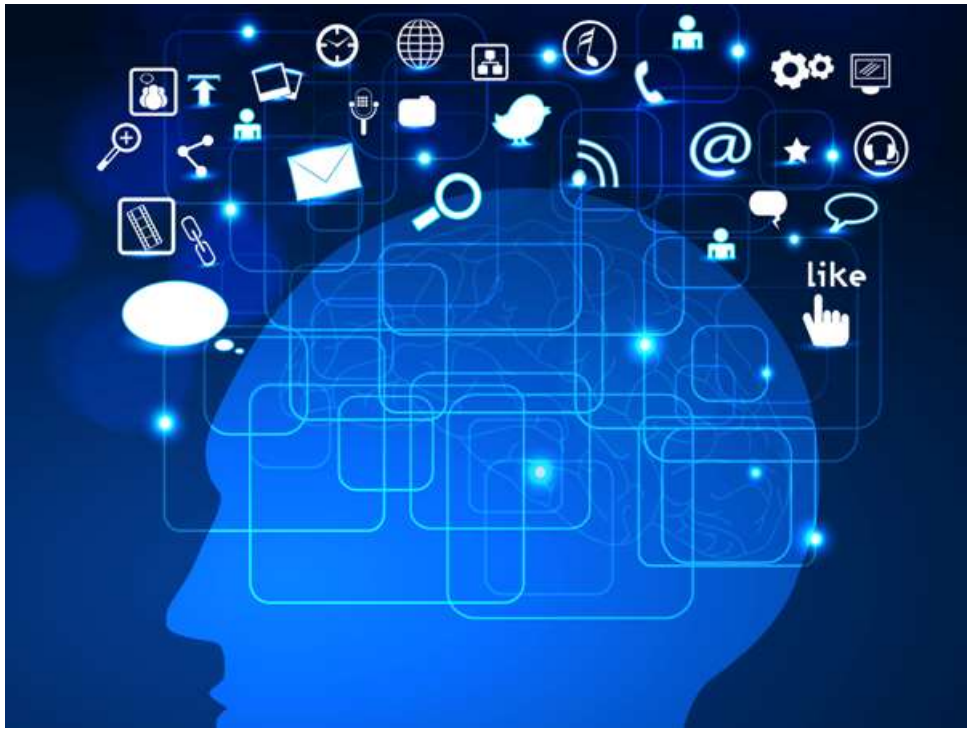
## *Momentum Theory of Technology… also known as Technological "Lock In" or "Path Dependence"*

- **Early Stages of Technology Innovation**: leaders and society exerts most influence. Redirecting technological change is relatively easy.
- **Middle Stage**: momentum accumulates around the invention (e.g., capital, labor, political)… redirecting change is harder but doable at moderate cost.
- **Late Stage**: technology is "Locked In" or beyond social redirection short of crisis. (e.g., QWERTY keyboard; Mnpls 1958 versus Silicon Valley 2019; Nuclear Arms Race 1949 & Cuban Missile Crisis 1962; Nuclear power design 1955 flaws & 2011 Fukushima Crisis); Human-walkable city challenge of today due to auto-centric values 1940s-60s, contributes to Obesity Crisis 2024).

The decisions made (or not made) by people in this room will 'lock in' the future our great grandchildren will inherit…

# Brain Systems Potentially Affected by our Hi-Tech World

- Pleasure System
- Tranquility System
- Memory System
- Learning System




State of Virginia, Home to AMZN HQ2, Protects the Human…North Dakota has new legislation to make K12 classrooms OFF-LIMITS to Phones.

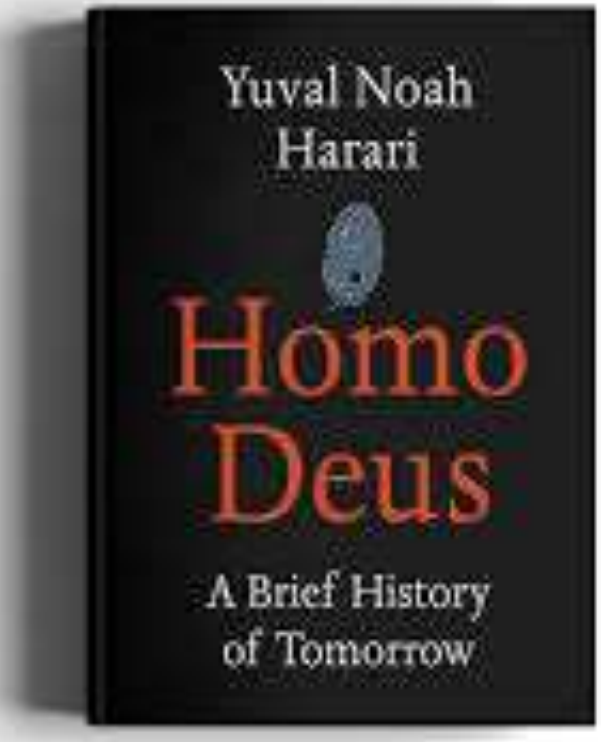
## *Student and Employee Security, Health, Work Ethic in the face of online bullying, AI influencers, Fake News….*

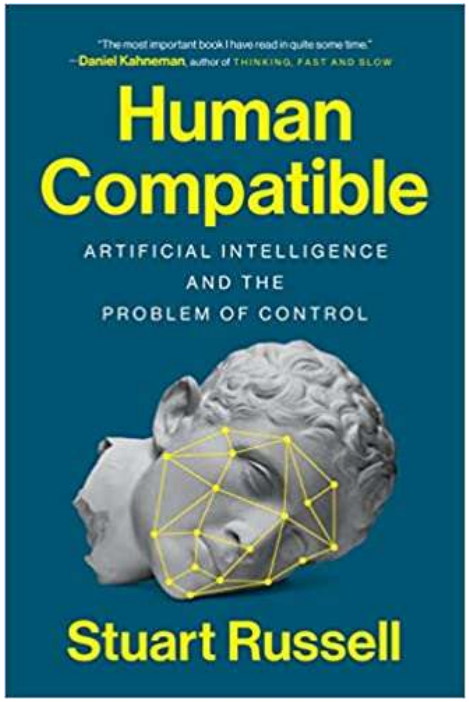
**Industrial Age affliction: ANOMIE, Loneliness…1890, Hans Thoma**

**Miquela… millions of followers… what are her work ethic values?**

Our people need help to develop healthy “Online” and “AI” habits… place limits…preserve REAL human community…know that you are valued BEYOND your online profile

# Human Policies will be key: an Interdisciplinary approach to adapting to AI




**Leading AI Scientist: Stuart Russell believes cultural-social-political reformers will be the key to adapting to AI… Yuval Harari call to action for scholars… a response to "Dataism"**

# *States must embrace AI… some early data points…*

- 75% of campus work force are using AI… 78% bring their own AI tools…
- 79% of biz leaders believe AI is imperative to stay competitive… but only 40% believe their organization has a plan and vision to implement.
- 82% of leaders say their employees will need AI skills
- 53% of educator skills need a human performer, but 45% could be augmented by AI
- Positive return on investment for organizations: for every $1 invested in AI, early returns averaging $3.42

- Ref: Work Trend Index and Future of Work report, by MSFT/LinkedIn, 2023

# 3. Landscape of Higher Education and Generative AI: Who is doing What?

## *Most Common Uses of AI in Higher Education (survey by Educause Magazine, 1/16/25)*

- Personalized Learning
- Virtual Assistant/Chat Bots
- Learning Analytics
- Language Translation
- Content/Syllabus Creation
- Research
- Admissions Processes

# Global Ranking from AI Magazine

- https://aimagazine.com/top10/top-10-ai-schools
- 10. National University of Singapore
- 9. University of Southern California
- 8. The Chinese University of Hong Kong
- 7. Tsinghua University
- 6. Harvard University
- 5. Oxford University
- 4. Carnegie Mellon University
- 3. University of California - Berkeley
- 2. Stanford University
- 1. Massachusetts Institute of Technology (MIT)

***Challenge: The Opportunities of the Generative AI, Intelligent Machines, and Metaverse Twinning are Decoupling from smaller States, rural areas, and struggling Socio-Economic Groups***

# *Other AI efforts of interest…a sampling…*

- New Jersey state-wide effort (exact implications for universities/colleges still in flux)
- University of Florida: embraced AI strategy in 2020
- University of Michigan, AI roll-out August ‘23
- Arizona State University: partner with OPEN AI
- Federal AI Initiative: NSF AI Centers; POTUS Executive Order (thin on Higher ED);
- Congress: in draft, the problematic “CREATE AI Act”… who will determine ‘merit’? Analogy to Library of Congress with a Gate Keeper!
- European Union “AI Act” (stops human impersonation)

# AI at University of Florida/State System

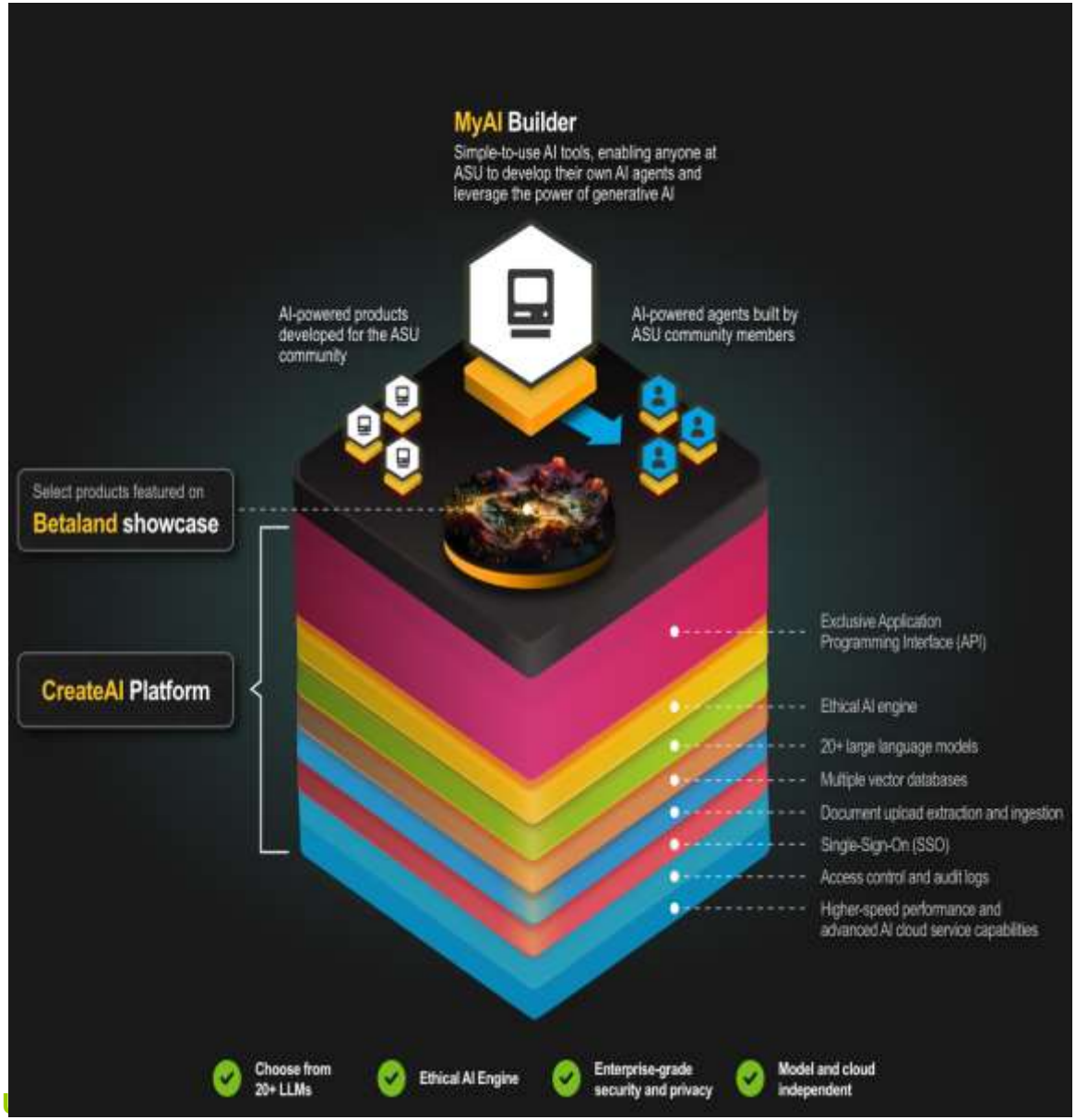
- University of Florida/State System efforts
  - 100 professors hired in past couple years
  - $24 million purchase in late 2024 of newer-generation NVIDIA machines “on premise” (https://news.ufl.edu/2024/12/hipergator-upgrade/ )
  - University of Florida commits to help the “state system”…. But information is limited… how?
- Florida-Caribbean “CHIPS” AI HUB: $275 million initiative for chip manufacturing, led by UF
  - https://ai.ufl.edu/
  - https://news.ufl.edu/2024/11/chips-funding/

# *New York's & Suny "Empire AI" Compute (On Premise, within the Boundaries of NY State... near Niagara Falls power)*

"Access to the computing resources that power ***AI systems is prohibitively expensive and difficult to obtain. These resources are increasingly concentrated in the hands of large technology companies, who maintain outsized control of the AI development ecosystem. As a result, researchers, public interest organizations, and small companies are being left behind,*** which has enormous implications for AI safety and society at large. Empire AI will bridge this gap and accelerate the development of AI centered in public interest for New York State. Enabling this pioneering AI research and development will also help educational institutions incubate the AI-focused technology startups of the future, driving job growth."

- 
- full article here: https://www.suny.edu/suny-news/press-releases/5-24/5-9-24-ai/ai.html

# Arizona State "My AI Builder" for Learning & Research…and "Dream Scape Learn" INC.




# 4. Role of a State Governing Board

# 4. Role of a State Governing Board: State Wide System Efforts?…. MN could be leader in the Mid West?

**STRATEGY**

Strategy of Resilience for an unknown future:

1.Maintain Daily Reliability… day to day, every day

2.Biased for Adaptability… on demand

3.Build capacity and culture for Transformability…

What to do?...

Reduce barriers to innovation; build interdisciplinary teams state-wide; achieve AI scale & security thru 'system of state campuses'

Means? Money for Compute, Talent, and Data…

# Some Advantages of "Cloud-Based" or "On Premise" Generative AI Compute?

- **CLOUD BASED AI COMPUTE: Improved data management**: AI can help streamline the process of collecting, modifying, and organizing data.
- **Better analytics**: AI helps businesses analyze large data sets to create useful information.
- **Increased productivity**: AI can automate repetitive tasks, freeing up employees to do more complex work.
- **Better decision-making**: AI can help businesses make decisions by analyzing data and imitating human thought processes.
- **Cost savings**: Cloud computing can help businesses reduce data storage costs.
- **Faster innovation**: AI can help businesses innovate more quickly by providing rapid insights.
- **Personalized user experience**: AI can help businesses personalize the user experience.
- **Improved collaboration**: AI can help businesses collaborate more effectively.

- **ON-Premise AI Compute: Data Security:** By keeping data within the organization's own physical infrastructure, on-premise AI offers tighter control over sensitive information, minimizing the risk of data breaches compared to cloud-based solutions.
- **Compliance:** Organizations in highly regulated sectors can implement stricter security protocols on their own servers to meet compliance requirements more easily.
- **Customization:** On-premise setups allow for greater flexibility to tailor AI models and infrastructure to specific business needs.
- **Performance:** For applications requiring low latency and high computational power, processing data locally on dedicated hardware can provide superior performance.
- **Control over Hardware:** Complete control over the hardware environment enables optimization for specific AI workloads.
- **No Vendor Lock-in:** Unlike cloud-based AI services, on-premise deployments provide freedom from dependence on a single vendor.

# Some Drawbacks of "Cloud-Based" or "On-Premise" Generative AI Compute

- **Cloud-Based AI systems Potential Drawbacks:**
  - **Data security and privacy**: Sensitive data is stored off-site, vulnerable to data breaches.
  - **Internet dependency**: Service disruptions can occur if the internet connection is lost.
  - **Cost**: Ongoing subscription fees may rise.
  - **Third-party dependency**: Reliance on a third-party provider can limit customization and control.
  - **Regulatory compliance**: Legal issues may arise, especially if data crosses international borders.
  - **Bias in AI algorithms**: AI systems can be biased and unfair if the designers do not provide representative data.
  - **Potential vendor lock-in**: Users may become locked into a particular provider.
- Other disadvantages: Data loss or theft, Account or service hijacking, Insecure interfaces and APIs, Denial of service attacks.

- **On-Premise Compute Potential Drawbacks:**
- **Higher Initial Costs:**
- Setting up and maintaining an on-premise AI infrastructure can require significant upfront investment in hardware and expertise.
- **Scalability Challenges:**
- Scaling an on-premise AI system to meet rapidly growing data needs can be more complex compared to cloud solutions.
- **Maintenance Overhead:**
- Managing and updating hardware and software on-premise can be time-consuming and resource-intensive
- Other disadvantages: Data loss or theft, Account or service hijacking, APIs.

# Wrap Up Summary of Brief

- Brief history of AI and Digitization of Society/Economy
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- Implications of AI in higher education (opportunities, risks)
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  - For uncertain Future, offer a Strategy of Resilience, Personally and Organizationally
  - You are on the right track to think as a ‘System of State Campuses” approach

THE PEOPLE ALIVE AT THIS TIME, ARE THE MOST IMPORTANT IN HISTORY… you are THE human leaders as machine intelligence is emerging…


WASHINGTON D.C.
KOMO NEWS 4
TRUMP ANNOUNCES $500 BILLION FOR AI


Trump Ends AI Regulations, Launches "AI Stargate"

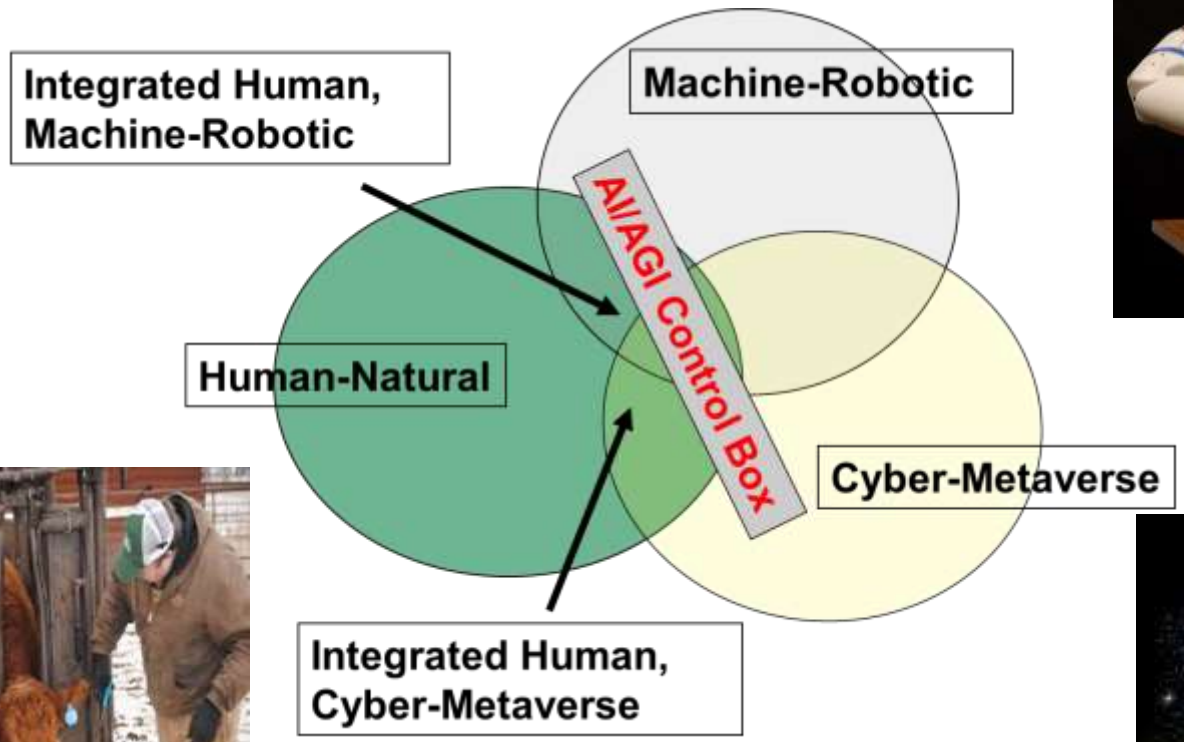
# STARGATE AI Announced 1/21/25: $500Billion (excerpts from Forbes article 1//22/25)

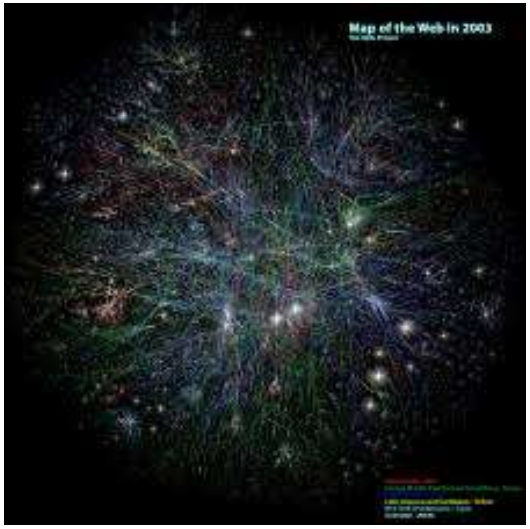
- "To meet this challenge, Stargate must:
- Partner with Universities and Trade Schools: Collaborate with academic institutions to create targeted training programs for future employees.
- Upskill and Retrain Workers: Transition workers from other industries into tech roles with accelerated training programs.
- Tap New Markets: Build data centers in regions with untapped talent pools while addressing infrastructure needs in those areas.
- This isn't just about jobs—***it's about a cultural shift***. Stargate's roles will demand hands-on teamwork, rapid execution, and a mission-first mindset, leaving little room for a lackadaisical "work from home" approach. For Stargate to succeed, it's essential to retool the workforce, emphasize skills that align with on-site collaboration, and cultivate a culture of dedication and purpose. ***Now is the time to lean in and embrace the challenge***."
- https://www.forbes.com/sites/emilsayegh/2025/01/22/stargate-ai-project-the-500-billion-gamble-to-dominate-the-future/

# Questions/Discussion

# Back up slides if needed

# The Framework to Orient Action and Planning: World splitting into Three Realms with AI at the center…



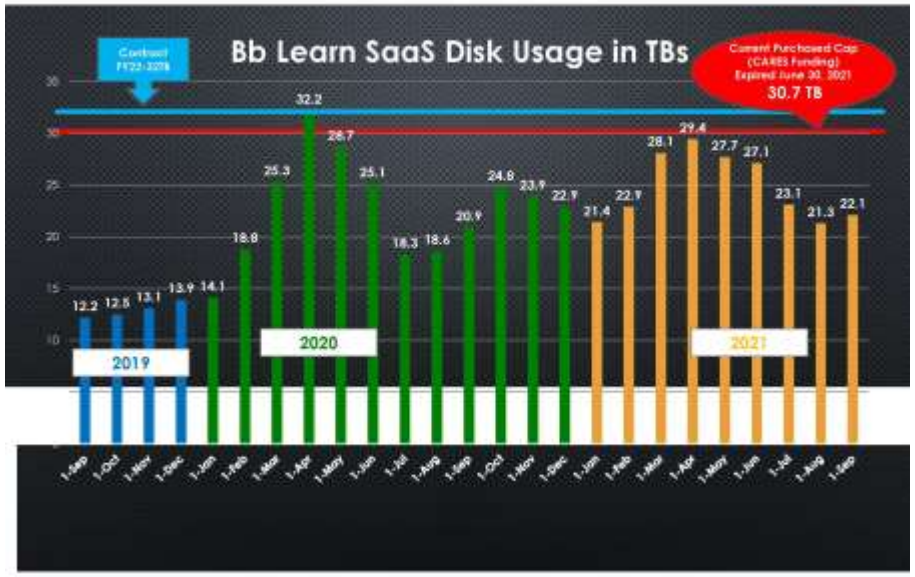

**FRAMEWORK**

# Level 1: Reliability in Day-to-Day Operation…

- Level One: Faculty and Staff **Reliably** care for student health; preserve knowledge (Data) in machine systems against the effects of cyber attack and against thermodynamic and community from social entropy (disorder). Reliably pass knowledge to, and teach the next generation how to learn **(the students)…**

# Level 2: Adaptability

- Level Two: Faculty and Staff **Adapt** existing data/knowledge sets, organizations, processes, and systems etc., to changes in the external environment.



# Level 3: Transformability

- Level Three: **Transformability** is the ability to create new processes, organization type, new fields of knowledge, scale-up to something new
- Transformations in the past included horse to car; aviation; computers; Ivy league colleges to Land Grant Act…
- **How will AI require Businesses, Employees, Students, Faculty, Staff, Administration to TRANSFORM?**

*Continuous Improvement* of the Candle did not evolve into the Electric Lightbulb….rather, unimaginable TRANSFORMATION was required such as invention of electrical generators, power lines, and carbon filament in glass enclosures….

# *Challenges facing Smaller States and /or Rural Serving Systems…*

- Fewer experts in Robotics, Cyberspace, AI
- Fewer K12 Teachers and College Professors “in region” to re-generate new knowledge… and new teachers
  - The Problem of attracting/retaining specialized faculty
- Cultural-Human Connections are fewer between Silicon Valley/High Tech regions and the neglected regions, thus blocking inflows of knowledge and culture
- Financial Resources in shorter supply in rural areas.
- But… Power supplies and Energy for Generative AI is an advantage of more Rural Areas…. A possible incentive to partner with urban areas and large universities and business?

# WORKING PAPERS: DIGITIZATION: UNIFY, INTEGRATE TO GET TO SCALE


**INTEGRATED, CONSOLIDATED DATA SYSTEMS**

- **COMPUTE:** Artificial intelligence computers and software; funding for software
- **STORAGE:** Increasing demands for data & file retention

**DIGITAL INFRASTRUCTURE**

- **DATACENTER:** Physical infrastructure to support future needs
- **SECURITY:** Protection of data in motion and at rest

**CYBER LIABILITY**

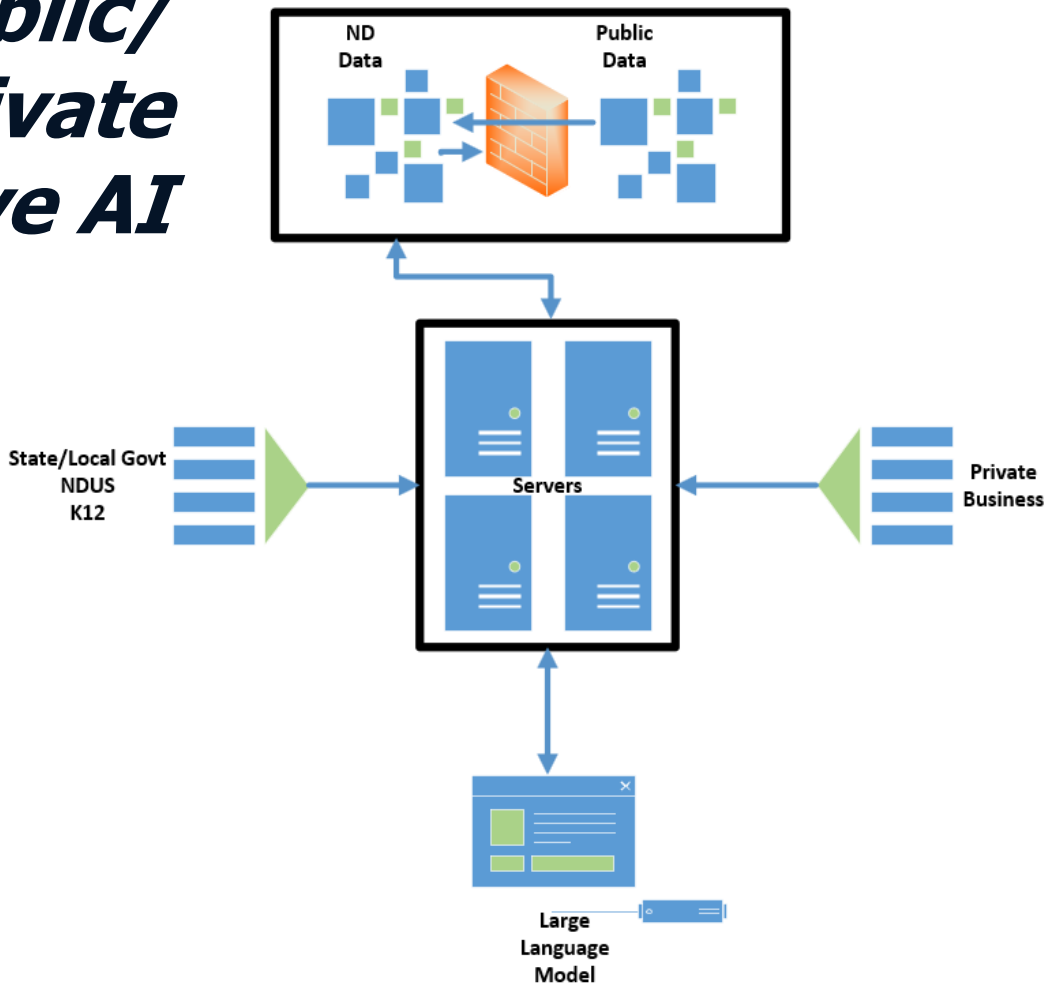
- **INSURANCE:** Robust, comprehensive liability insurance for the digital age

**SUPPORT AND STAFFING**

- **TALENT:** Recruit, train, and retain top digital science experts
- **ORGANIZATION:** Roles and relationships of NDUS, CTS, and campuses
- **COLLABORATION:** Leverage and extend existing talent (Dakota Digital Academy)

WORKING PAPERS: North Dakota… an All of State, K12, University System, Gov't… businesses access COMPUTE, TALENT, and DATA

# *ND Public/ private Generative AI*

# *My Decade+ Effort to Create a Framework/Theory of AI-Robotics-Digitization…and How to help the next Generation?*