



Addressing the Impacts of the Shrinking Geoprofessional Workforce with Automation and Artificial Intelligence



TIER 1 PARTNERS



TIER 2 PARTNERS

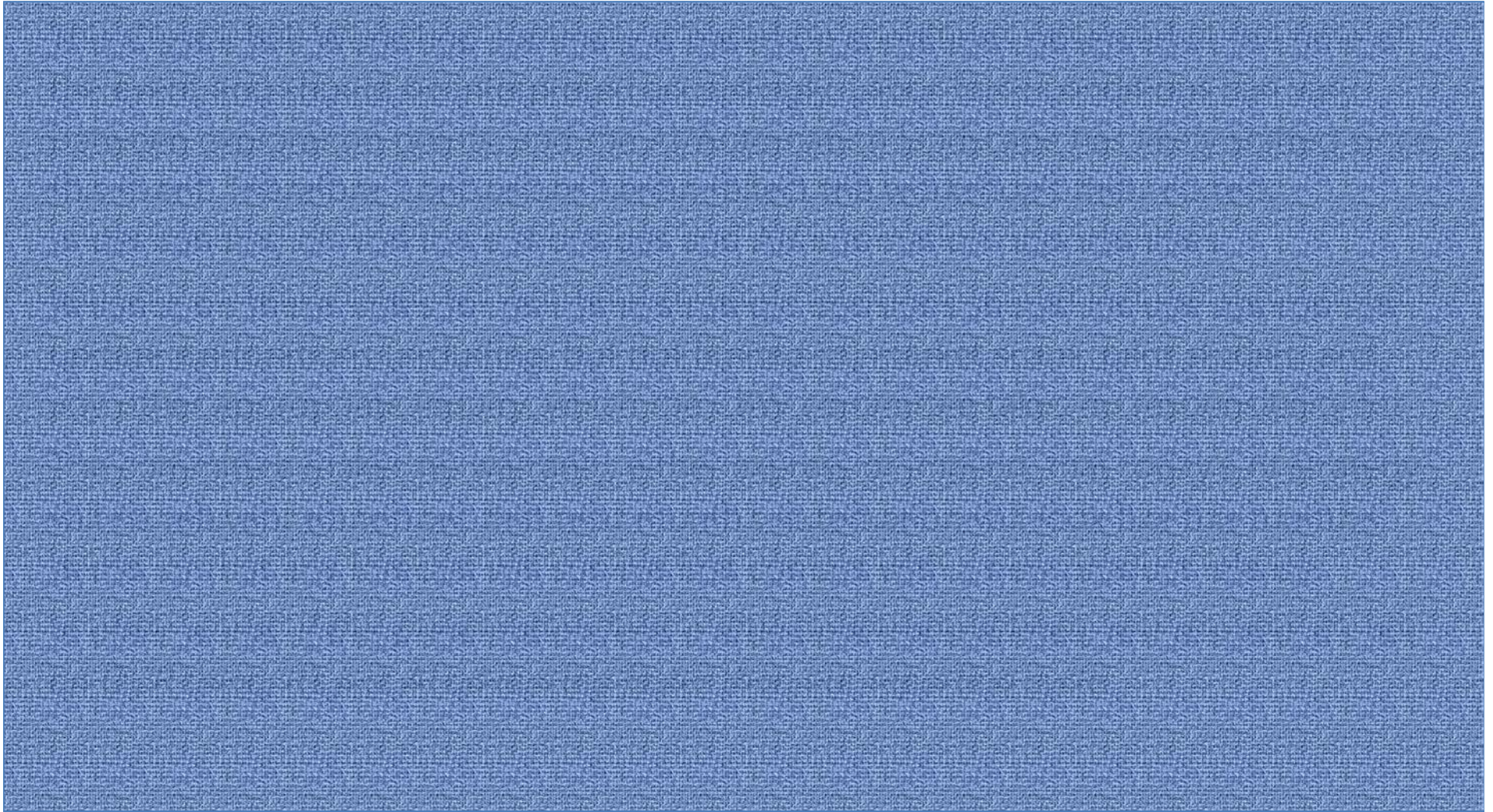


TIER 3 PARTNERS



CBW is a collaboration of geoprofessional associations and serves as a catalyst for understanding, leadership, and action—equipping geoprofessionals to responsibly embrace the future of the profession, and to excel in that future

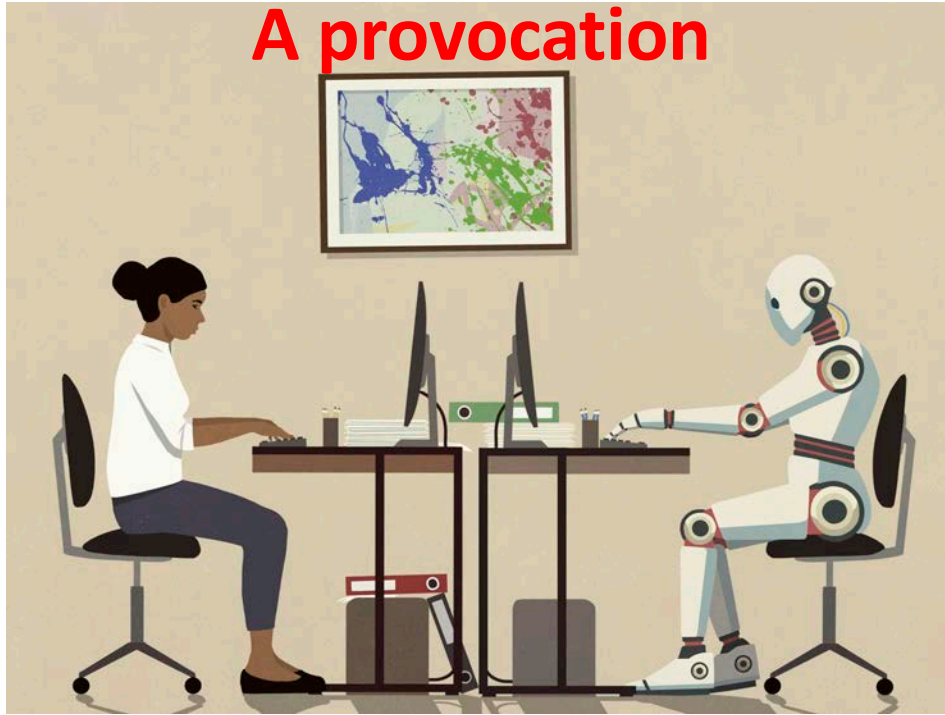
Important Limitations About Your Crystal Ball Workshop Summary







A provocation



AI isn't arriving slowly—and our workforce shortage is making sure of that.

The work is growing, the work force isn't,

... and that forces a decision:

We let AI supplement our professional judgment, or

We accept that capacity, quality, and relevance will erode.



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June 24-25, 2025 Olathe, Kansas

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Two Forces. One Inflection Point.

A shrinking workforce and accelerating AI are redefining the geoprofession.



Shrinking
Workforce



Automation &
Artificial Intelligence



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Framing Statement

The geoprofessions are at a pivotal moment, shaped by two converging forces:

1. a shrinking workforce and
2. the rapid advancement of automation and artificial intelligence.

Together, these forces raise a fundamental question—not just *who* will do the work, but *how* the work will be done.

The Crystal Ball Workshop explored how AI and automation can

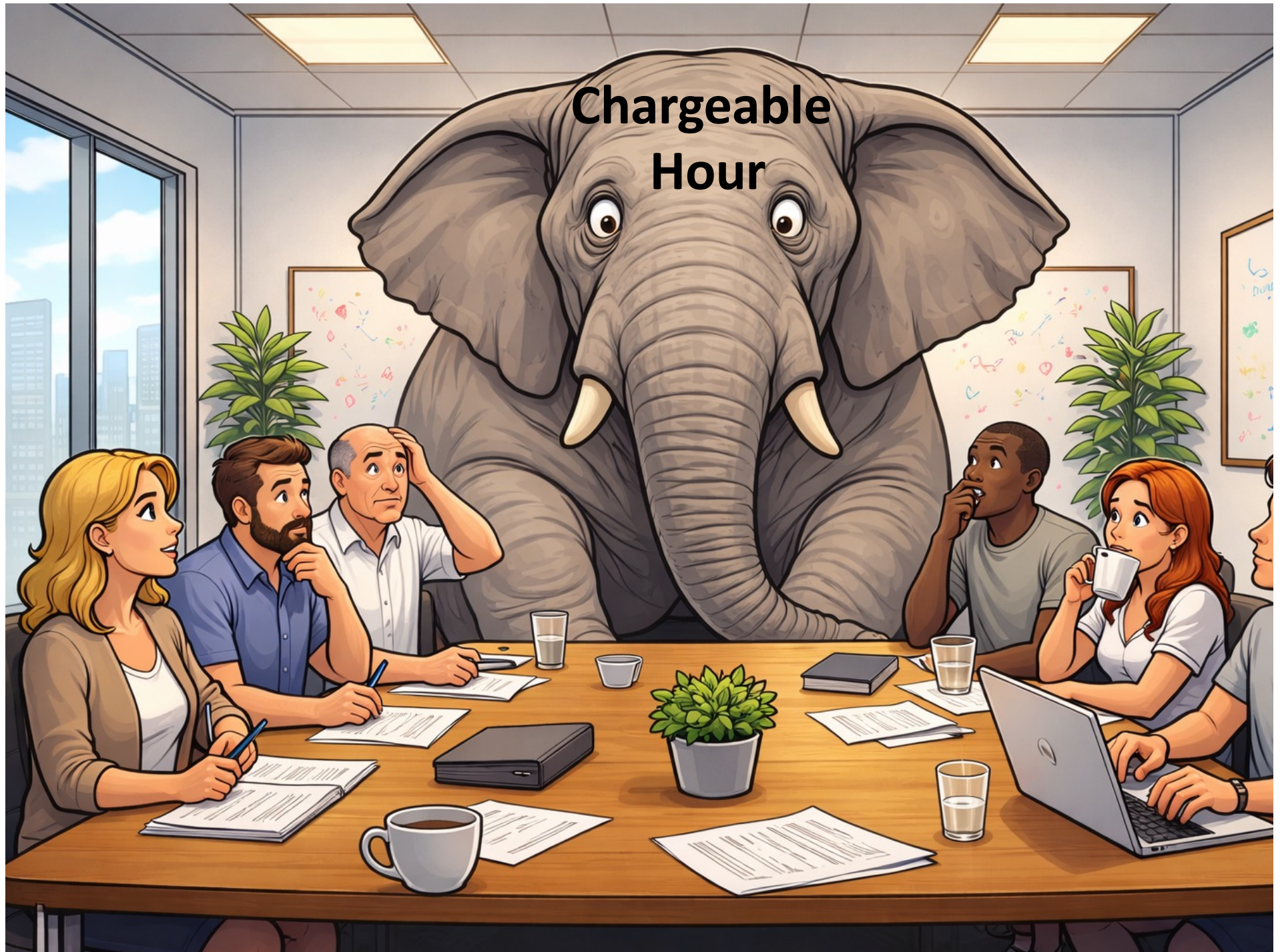
- expand capacity,
 - enhance quality, and
 - reduce risk
- NOT how it can eliminate our jobs,
or make us more unhappy!**

Bridging the gap between workforce constraints and growing demand for our services.

Adoption of digital tools and transforming legacy business models presents a generational opportunity for firms willing to adapt.

Not to mention that more perplexing topic ...

Chargeable Hour





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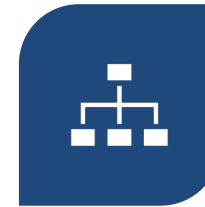
Summary



FOCUS: ADDRESSING
WORKFORCE
SHRINKAGE WITH AI
AND AUTOMATION
DO THIS TOGETHER



66 PARTICIPANTS, 6
SME PRESENTATIONS,
PANEL DISCUSSION, 3
WORKGROUP
SESSIONS



THEMES: STRATEGY, DATA
STANDARDIZATION,
INNOVATION CULTURE,
WORKFORCE DEVELOPMENT



EMPHASIS ON
COLLABORATION,
REGULATION, &
ACADEMIC
ENGAGEMENT



AI SEEN AS ESSENTIAL
TO MEET DEMAND
AND REMAIN
COMPETITIVE

Not just an event ...



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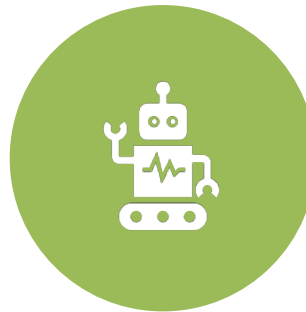
Kevin Benedict – Keynote

Big Picture: Workforce Dynamics/Automation/AI & the Convergence of World Changing Trends



EXPLORED AI'S
TRANSFORMATIVE
POTENTIAL ACROSS SECTORS

AI is world-changing
Comparable to electricity
and the printing press



FRAMED AI AS A GENERAL-
PURPOSE TECHNOLOGY

AI can
amplify insight and error
be used for good or for evil



EXPONENTIAL CHANGE
REQUIRES CONTINUOUS
LEARNING, UNLEARNING,
AND RELEARNING TO
REMAIN COMPETITIVE

Leadership must guide
thoughtful adoption



CRYSTAL
WORKS

June 24-25, 2025

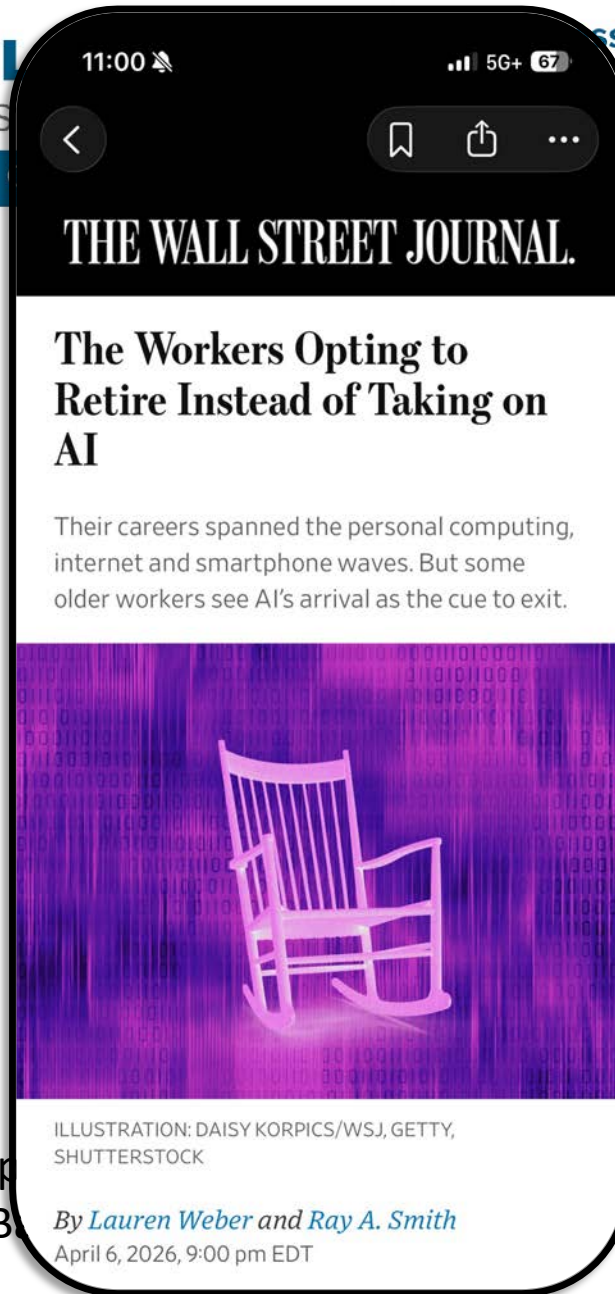
Assessing the Impacts of the Shrinking
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and Artificial Intelligence

David Harwood, Terracon



ANALYZED WORKFORCE
SHRINKAGE AND DEMAND
TRENDS

The population of Gen Alpha
of the population of the Baby



CALLED FOR MODERN
COMPETENCIES IN
ENGINEERING EDUCATION

Gen X, and almost HALF



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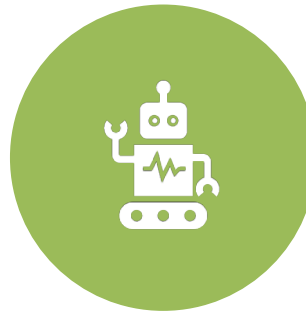
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Dr. Soga & Dr. Zekkos, UC Berkeley



SHOWCASED AUTOMATION IN
GEOTECHNICAL ENGINEERING



DISCUSSED DIGITAL TWINS,
ROBOTICS, AND FIBER OPTIC
SENSORS AUTOMATED
CONSTRUCTION
TECHNOLOGIES



ADVOCATED FOR AI
INTEGRATION IN EDUCATION
AND PRACTICE

The rise of the Geotechnical Data Analyst
and
The need for integration of AI/automation
into engineering education

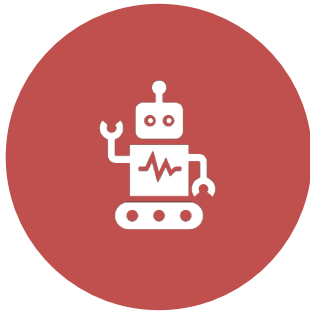


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Mark McKelvey, Creative Planning



PRESENTED REAL-WORLD
AI APPLICATIONS IN
OPERATIONS



HIGHLIGHTED DATA
EXTRACTION, CHATBOTS,
AND PREDICTIVE MODELS



EMPHASIZED
THOUGHTFUL
INTEGRATION AND ROI

Multiplying Capacity with AI
Mining decades of reports with LLMs
Reducing review and QA/QC time
Shifting staff to higher-value work
Improving ROI through intelligent automation



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Brian Monahan, Dreamspace AI Solutions

Aligned AI with
leadership and
organizational change

Introduced IQ, EQ, AQ
framework

Promoted
incremental adoption
and AI-augmented
leadership

Doing More with Less: Leading the AI Shift in the Geoprofessional Industry

“Allow people to work at their highest degree or level of experience.”

Build innovation networks to allow top down and bottom up strategies.

Understand the “last mile” problem... Strategic human intervention



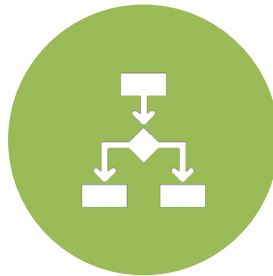
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Dr. Enrique Farfan, HDR

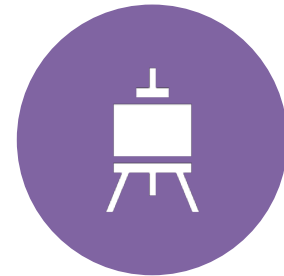
AI and the Geoprofessional Practice: Overcoming Barriers and Unlocking Potential



EXPLORED PHILOSOPHICAL
AND PRACTICAL AI
INTEGRATION



ADDRESSED BARRIERS: LACK OF
UNDERSTANDING, DATA PRIVACY,
ETHICS, RESISTANCE TO ADOPTION



SHOWCASED REAL-WORLD
TOOLS AND MODELING
APPLICATIONS

AI Implementation is not an option.

Call to embracing AI strategically and urgently, encouraging GBA members to
foster literacy, collaboration, and innovation to remain competitive and
relevant in a rapidly evolving digital landscape.



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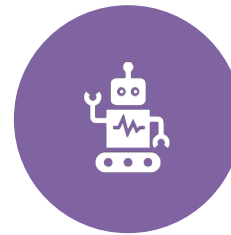
Work Group Findings



AI CAN AUTOMATE
REPETITIVE TASKS AND
ENHANCE CAPACITY



OPPORTUNITIES IN DATA
MINING, SMART FIELD
TECH, AND TRAINING



AI CAN ADVANCE FIELD
PRACTICES TO REDUCE
MANUAL LABOR AND
IMPROVE SAFETY AND
TURNAROUND TIMES



STRATEGIC, ETHICAL,
AND INCLUSIVE
ADOPTION IS KEY



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Key Takeaways

Automate repetitive tasks (data entry, reporting, QA/QC, invoicing). Humans create value.

Use AI to mine historical data for insights, predictive modeling, and client-facing tools.

Adopt new business models like subscription-based services (SaaS/DaaS) & value-based pricing.

Deploy smart field technologies (robots, drones, sensors) to modernize data collection, reduce field trips/time and improve safety.

Improve training/onboarding with AR/VR simulations and AI-powered mentorship bots.

Standardize and centralize data to enable interoperability, reduce redundancy, and support automation.

Enhance project management with AI-assisted scheduling, staffing optimization.

Preserve institutional knowledge and track employee KPIs with AI-powered systems.

Experiment safely in “sandbox” environments to build trust and refine implementation strategies.

Reframe AI as augmentation, not replacement, improving human productivity & satisfaction.

Diversify employees to include liberal arts students, educators as well as data scientists.



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Overcoming Barriers

Reframe AI as augmentative: AI "exoskeleton" enhances, not replaces, human expertise.

Combat cultural resistance: Use transparent communication, reverse mentoring, and positive analogies (e.g., CAD) to ease fears.

Engage regulators proactively: Work with licensing boards to evolve standards of care and define liability frameworks.

Establish safe experimentation zones: Create secure environments with clear governance for trying out AI tools.

Bridge workforce skill gaps: Invest in intergenerational training, role-specific onboarding, and modernized engineering curricula.

Address data integrity and interoperability: Standardize taxonomies, centralize data systems, and improve cybersecurity.

Modernize business models: Pilot value-based pricing, subscriptions, and monetized data products to align incentives with efficiency.



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Overcoming Barriers Continued ...

Empower internal champions: Identify and support early adopters to lead change and demonstrate success.

Define clear AI roles and workflows: Avoid confusion by assigning responsibilities and integrating AI into formal business processes.

Invest in the development of AI solutions within your firm. Line-item plans for AI development are necessary. The do-nothing alternative will be disastrous.



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Karl Von Terzaghi, The “Father of Soil Mechanics” would encourage us:



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Now What ??

“The greatest danger in times of turbulence is not the turbulence—it is to act with yesterday’s logic.”

Peter Drucker

“In times of rapid change, run toward the uncertainty—investigate it rigorously, interpret it wisely, and design with disciplined confidence.”

A Seasoned Geoprofessional

“Coming together is a beginning. Staying together is progress. Working together is success.”

Henry Ford



Geoprofessional Career Ascent Program (GCAP)

Sustain; Level 4 Senior Leadership

Summit; Level 3 Leadership

Ascend; Level - 2 Management Intro

Embark; Early Professional Class





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Lagniappe ...

Official Notice ...

This brings us to the end of the CBW summary

Vic's Ancient Geoprofessional Survival Guide





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Ancient Engineer Survival Guide

Ancient Geoprofessional Survival Guide

1. Data Lake
2. Data Mesh
3. Serverless
4. Digital Twin
5. Blockchain
6. Low-Code / No-Code





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Ancient Engineer Survival Guide

1. Data Lake
2. Data Mesh
3. Serverless
4. Digital Twin
5. Blockchain
6. Low-Code / No-Code

If someone says, “We’ll just put it in the data lake,”

Translation: *We have no idea what to do with it yet,
but storage is cheap.*



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Data Mesh

If they say, "We're moving to a data mesh,"
Translation: *We gave up trying to centralize anything.*



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1. Data Lake
2. Data Mesh
3. **Serverless**
4. Digital Twin
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Serverless

There are still servers. You just don't control them.
It's like hiring a subcontractor and not being allowed
to visit the job site.



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Digital Twin

A virtual model of a real asset.

Translation for you:

It's a live, continuously updated as-built model.

Caution! Don't say ...

"So we're making a fake version of the project now?"

"If we design it right the first time, we shouldn't need that."

"Why do we need a twin? We already built the real one."



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1. Data Lake
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5. **Blockchain**
6. Low-Code / No-Code

Blockchain

A decentralized ledger.

Often proposed for things that worked perfectly well without it.



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1. Data Lake
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6. Low-Code / No-Code

Low-Code / No-Code

Software development for people who don't want to code.

Sometimes brilliant.

Sometimes a compliance nightmare waiting to happen.



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Ancient Engineer Survival Guide

Core Rule

When in doubt:

1. Data Lake
2. Data Mesh
3. Serverless
4. Digital Twin
5. Blockchain
6. Low-Code / No-Code

What problem does it solve?

How does it scale?

How is risk managed?

Who is accountable?

Final Reminder

Terminology changes.

Engineering judgment does not.

Final Encouragement

Do not fear AI.

Slide rules did not eliminate engineers.

Finite element modeling did not eliminate engineers.

CAD did not eliminate engineers.

But each new tool initially created fear.