FACING THE UNKNOWNS

WORKFORCE CHALLENGES NEEDED AI SKILLS & TALENTS

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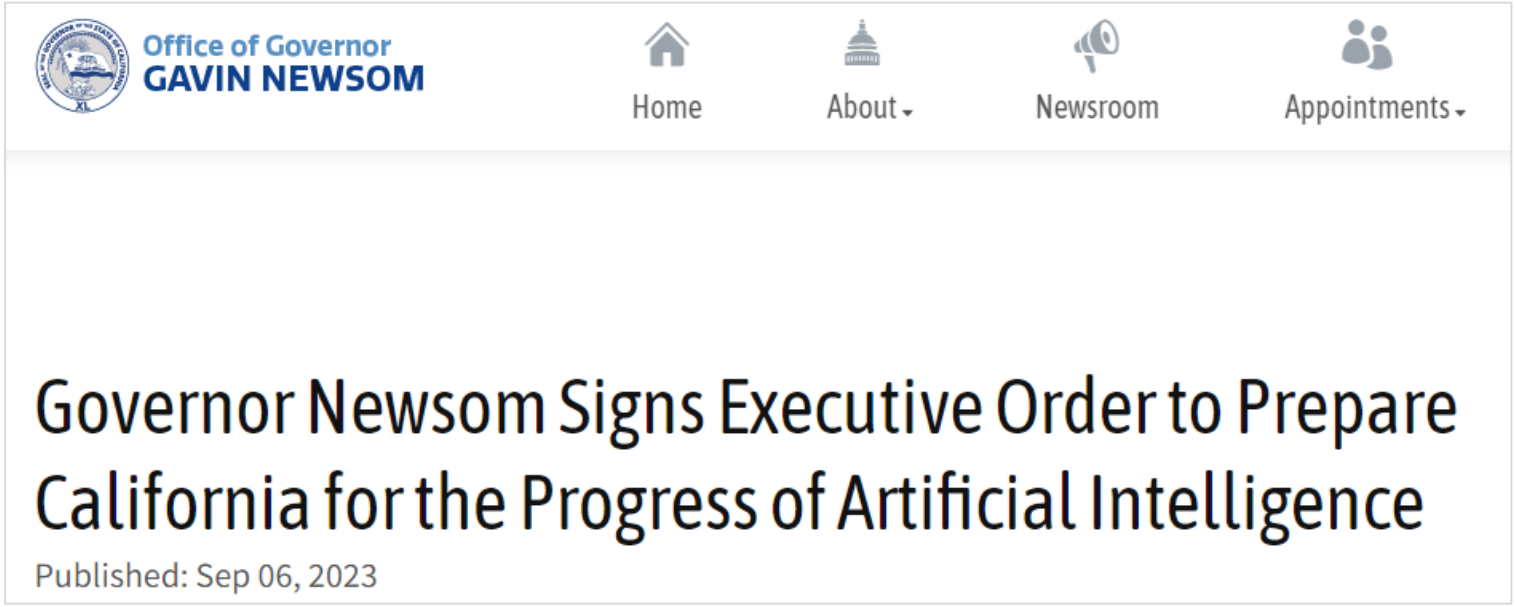
AGENDA

- Are you ready for it?
- AI Impact on the workforce
- The water industry challenges
- Barriers to adopting AI
- The need for an AI policy
- Addressing the educational gap

ARE YOU READY FOR IT?

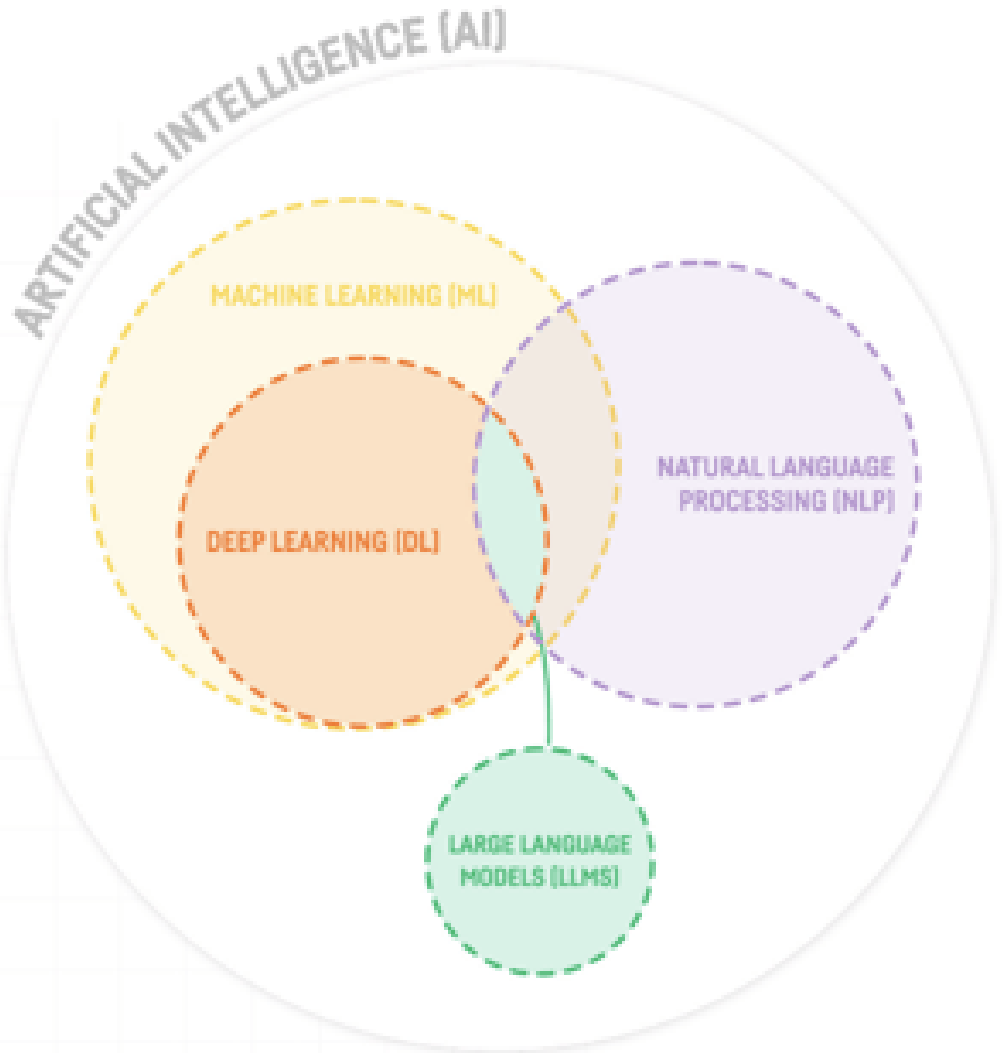
"We recognize both the potential benefits and risks these tools enable. We're neither frozen by the fears nor hypnotized by the upside." Governor Newsom



https://www.gov.ca.gov/2023/09/06/governor-newsom-signs-executive-order-to-prepare-california-for-the-progress-of-artificial-intelligence/

LET'S GET THE TERMINOLOGY RIGHT!

- Machine Learning (ML)
- Artificial Intelligence (AI)
- Large Language Models (LLMs)
- Collective Intelligence
- Digital Twins
- Digital Transformation
- Digital Capability



Leverage technology to do more with less

BUT LESS WHAT?

Report: AI Will Replace 2.4 Million US Jobs by 2030

Will AI Replace Workforce in the Water Industry?

- Automation is the biggest threat to white-collar workers
- Goldman Sachs estimates around 18% of (or 300 million) jobs globally could be affected by AI by 2030.
- However, AI is likely to reshape far more jobs that it replaces.

Generative AI (LLMs)

Data Analytics

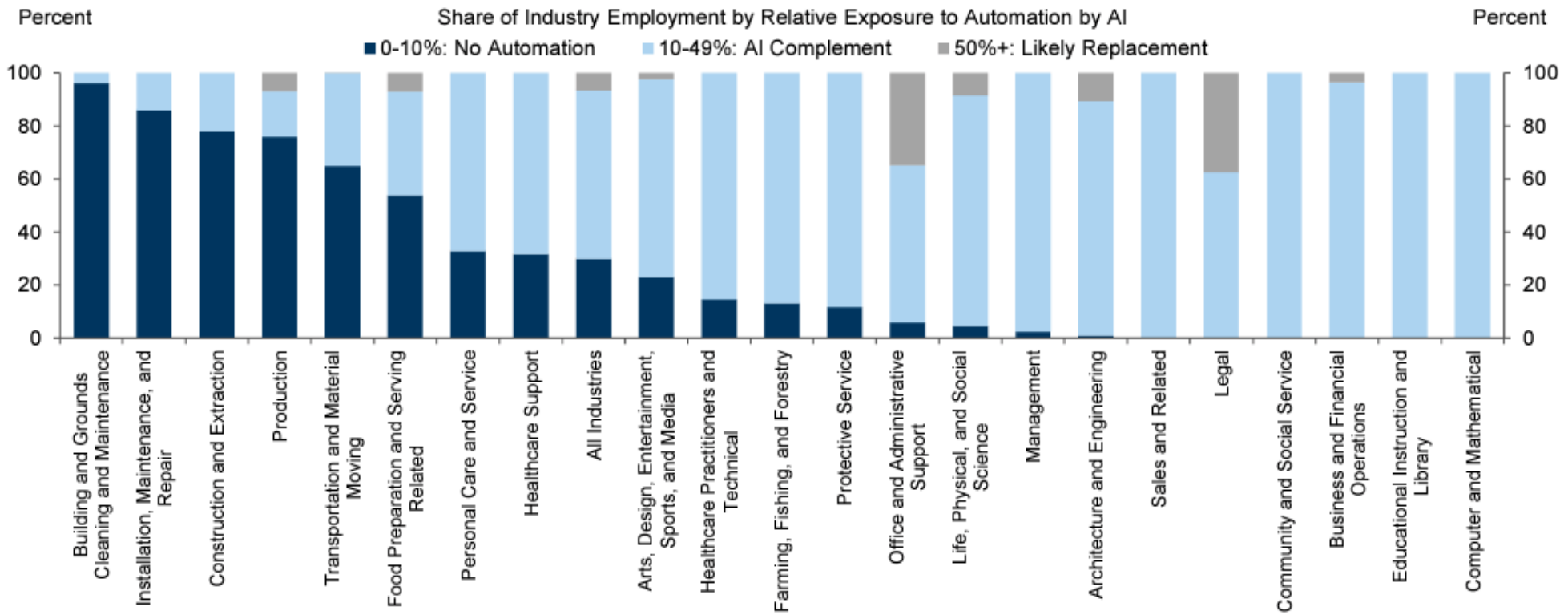
Automation

Business Intelligence

AI's IMPACT WILL NOT BE UNIFORM

- Highest risk: routine tasks - administrative (46%) and legal (44%)
- Lowest risk: physically-intensive professions - construction (6%) and maintenance (4%)

Exhibit 8: Replacement in Legal and Administrative Fields, Little Effect in Manual and Outdoor Jobs, and Productivity-Enhancement Everywhere Else



WHAT ARE THE MAIN WATER INDUSTRY CHALLENGES?

Figure 1

From your perspective, what are the most challenging issues facing the water, wastewater, and stormwater industry today?

Source: Black & Veatch

	Rank	
	2022	2012
Aging water and wastewater infrastructure	1st	1st
Hiring of qualified staff	2nd	—
Increasing/expanding regulation	3rd	5th
Aging workforce	4th	7th
Funding or availability of capital	5th	3rd
Justifying CIPs and/or rate requirements	6th	—
Managing capital costs	7th	2nd
Water conservation	8th	11th
System resilience	9th	—
Managing operational costs	10th	4th/7th*
Treatment technology	13th	6th
Information technology	14th	9th

— A dash indicates the answer wasn't included in 2012

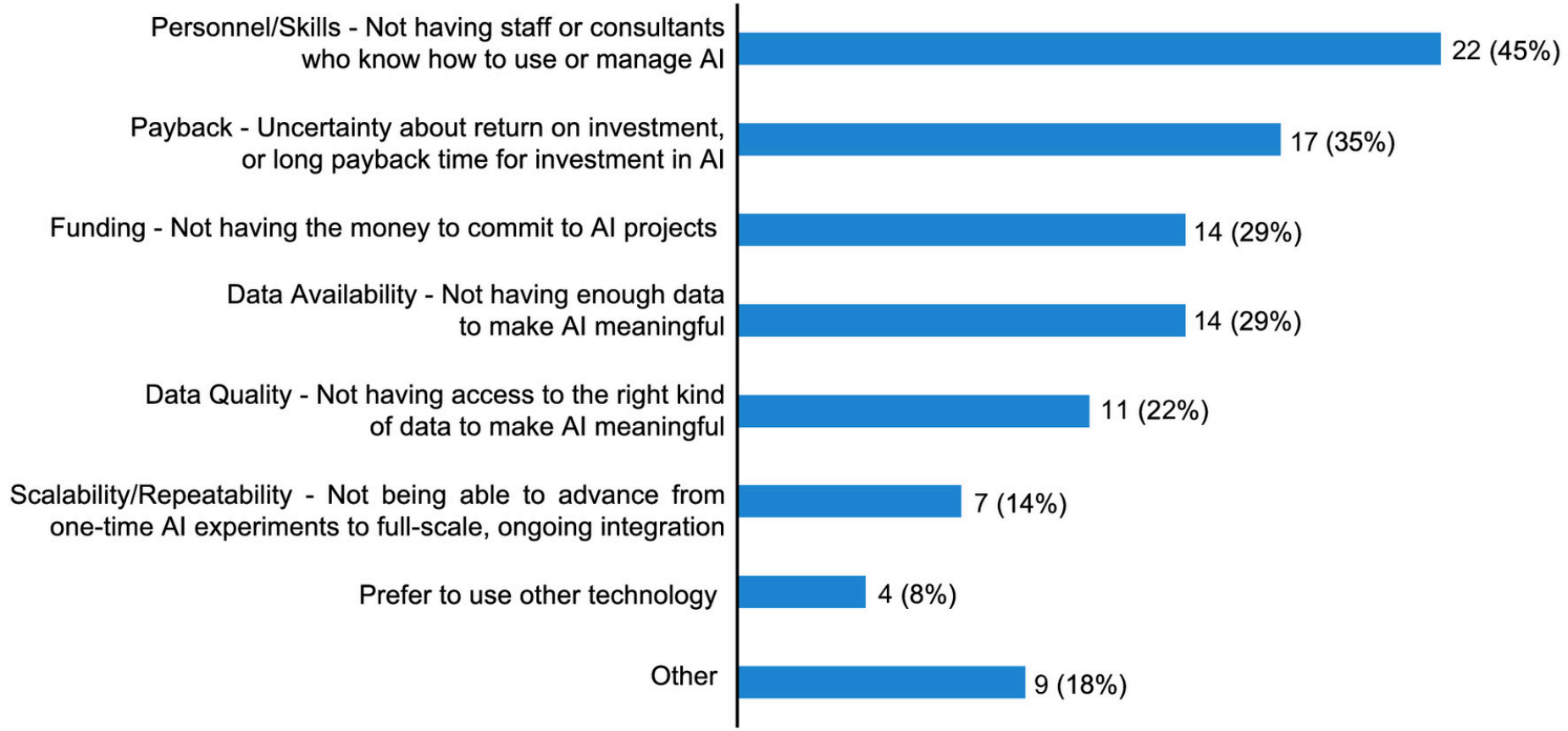
* Managing energy costs and Chemical cost asked in 2021

AGING WORKFORCE CHALLENGE

- Approximately one-third of U.S. drinking water and wastewater operators will be eligible for retirement by 2028 (Brookings Institution, 2021).
- Only 10% of the water sector's workforce in water occupation roles is aged 24 or younger (APWA 2020).
- More than half of all U.S. water and wastewater utilities have just one or two employees. 85% have three or fewer (APWA 2020).
- Workforce development is the top water concern for utilities in 2023 (AWWA CA-NV Section).
- Internal staff skill is the top challenge of utilities to improve their digital capabilities (Doge Data & Analytics, 2021).

BARRIERS TO ADOPTING AI

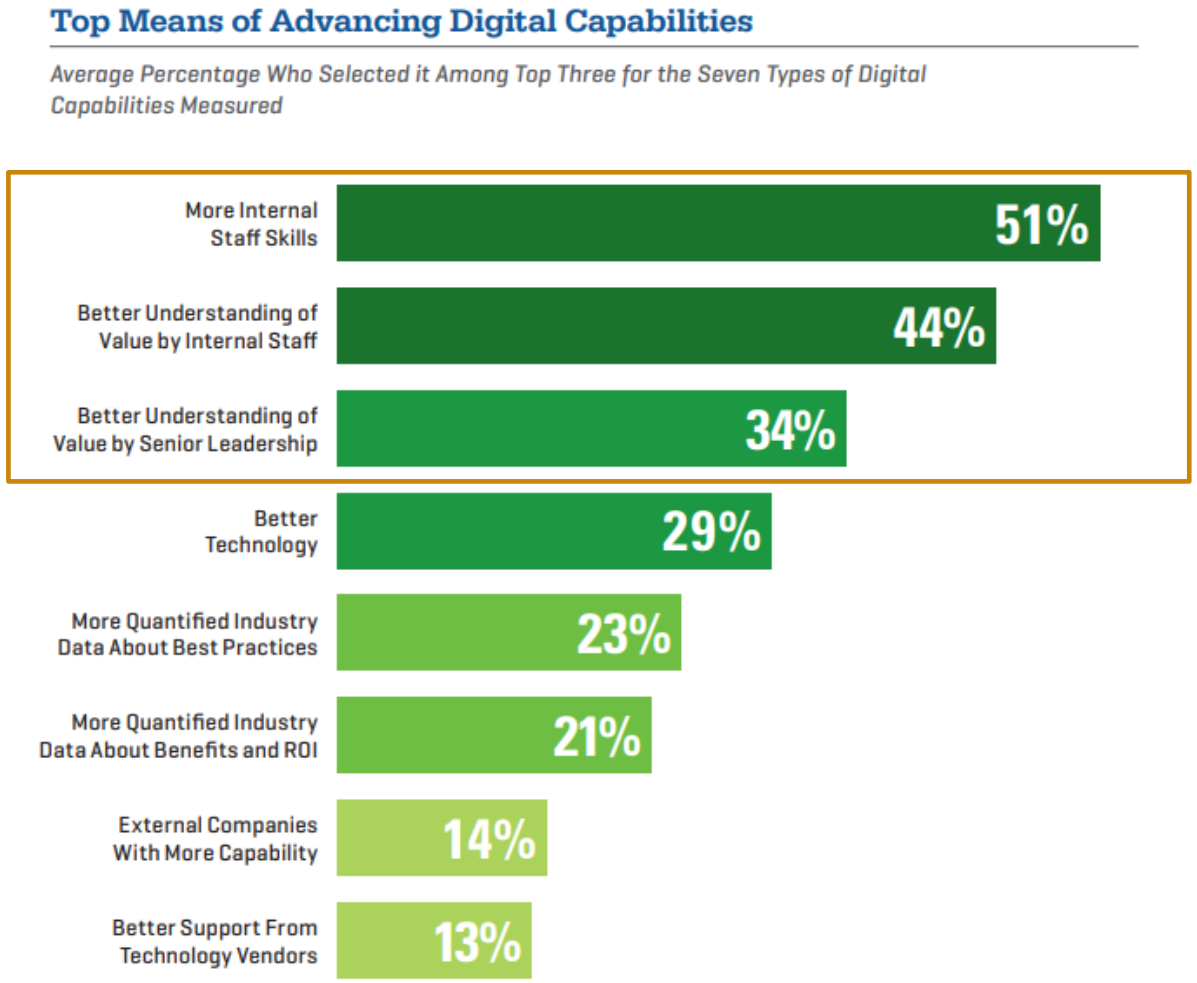
- The top barrier to adopting AI is having the right people/skills to use and manage this technology.



Source: https://ascelibrary.org/doi/10.1061/JWRMD5.WRENG-5870

HOW WILL UTILITIES DEVELOP DIGITAL CAPABILITIES?

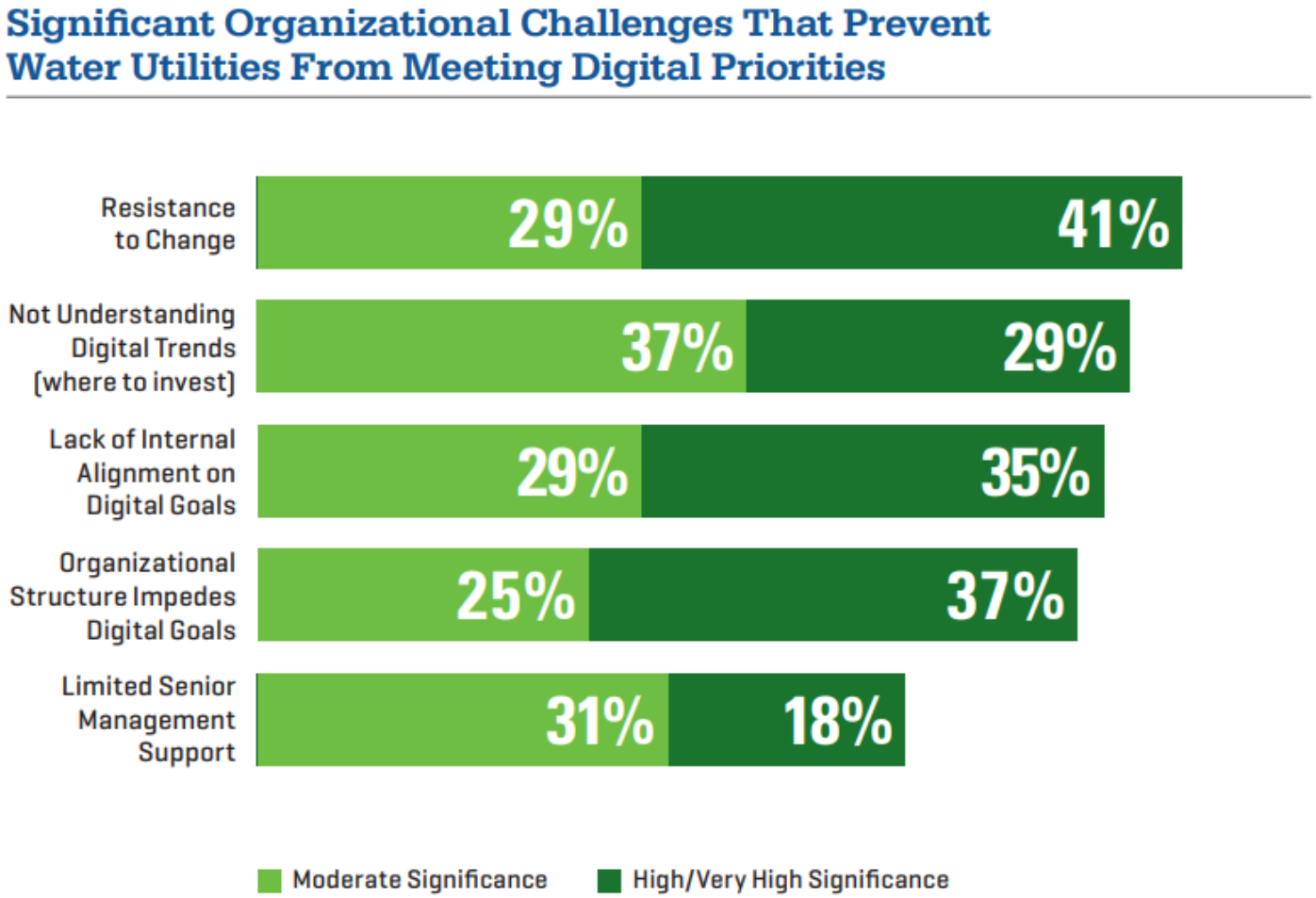
- Developing internal staff and leadership skills **exceeds** the need for better technology.
- The success of digital transformation is not a function of the technology, but rather of the **people** and the **value** to leverage the technology.



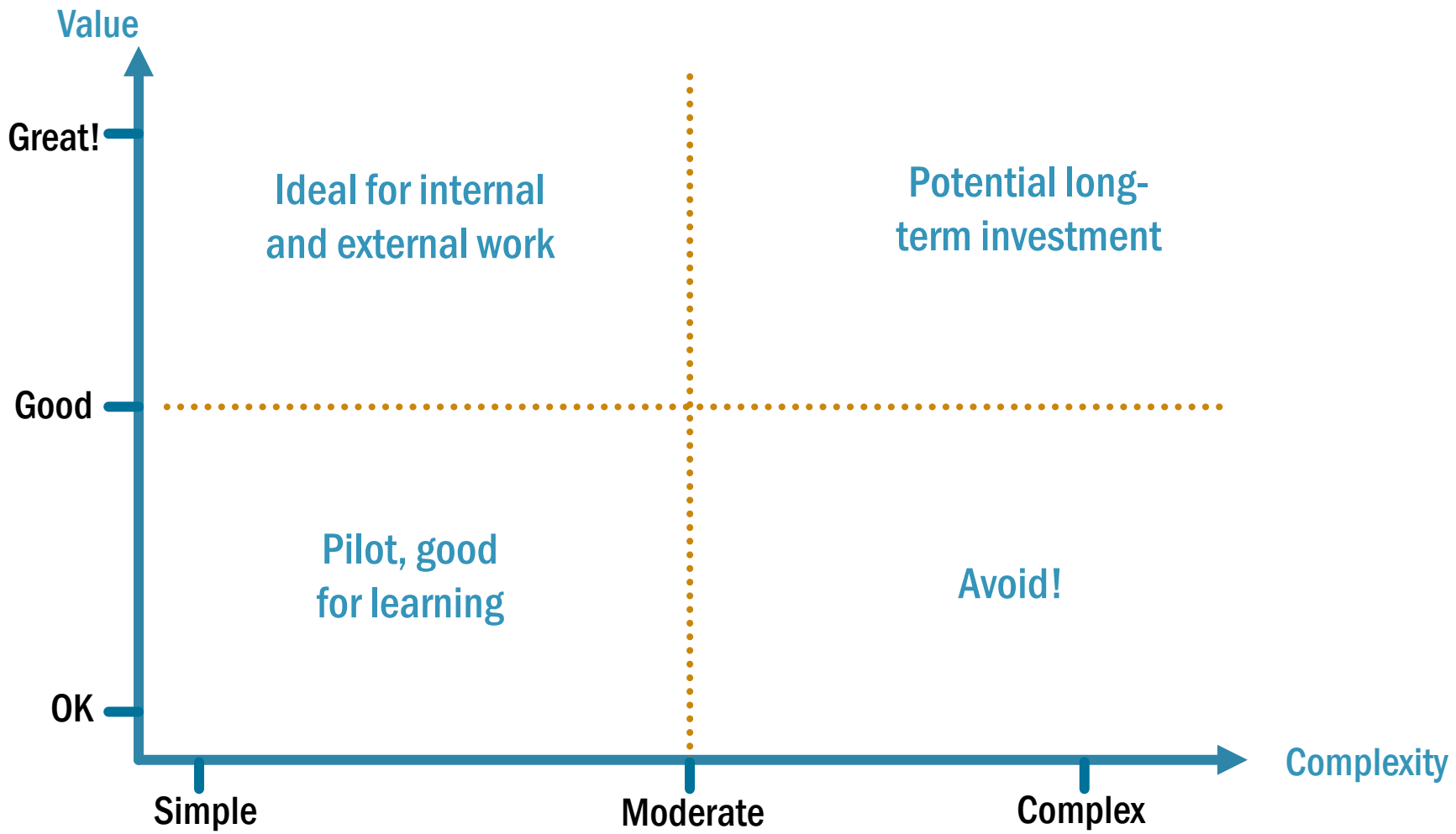
Source: https://www.construction.com/resource/digital-capabilities-of-us-water-utilities/

WORKFORCE HIRING/RETAINING CHALLENGES

- Resistance to change is the top challenge for existing workforce.
- Aligning organizational structure and internal goals with digital goals



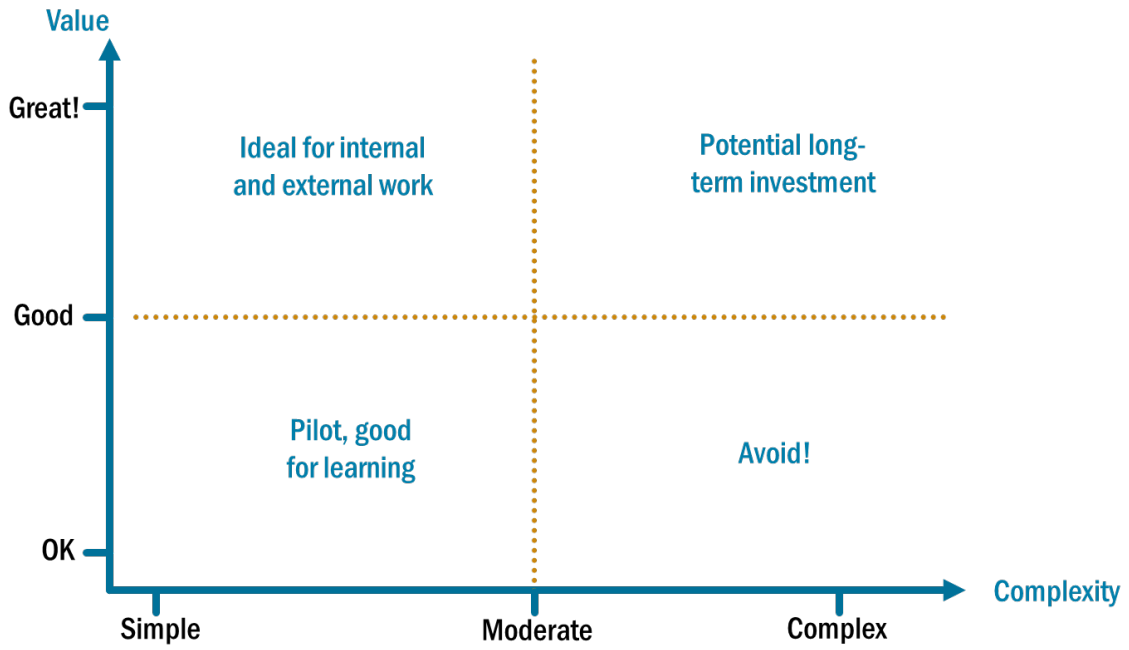
WHERE TO GET STARTED?



Adapted from source

EXAMPLES OF DIGITAL TRANSFORMATION

- Data collection/query
- Data transformation and loading
- Automate data analysis
- Create user interfaces
- Proofreading, improve writing
- Brainstorming ideas
- Generate text/photos
- Summarize text
- Generate dummy data for model



EKI'S APPROACH TO USING AI

- Accountability and Responsibility
- Human Oversight
- Ethical Integrity
- Data Security and Privacy
- Follow Best Practices

DRAFT: 26 September 2023

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Guidelines/Policy for Use of LLM Chatbots

This DRAFT guidelines/policy presents best practices for use of Large Language Models (LLMs) in the EKI workplace. As the Artificial Intelligence (AI) and LLM field is rapidly evolving, this guidance document will be updated in the future as needed.

1. Human Oversight for Content Generation

Users of LLM chatbots must understand that LLMs lack a true comprehension of technical context, business needs, and client preferences. In addition, factual information generated by LLM chatbots is not always reliable and may be subject to bias. As such, users must:

- Thoroughly review the accuracy and quality of all generated content.

AI POLICY NEEDS TO BE A LIVING DOCUMENT

- AI evolves quickly and we our policies need to be adaptable and flexible.
- Examples of recent advances in AI (last 2 months):

1. AI-Powered bots (e.g., meeting notes)
   - Already integrated into Teams and Microsoft
2. Custom GPTs (build and train a GPT on your own data).
   - Over 3 million GPTs created in 2 months.
   - OpenAI started the GPT store: marketplace for GPTs
   - Custom GPT are reviewed by both AI and humans for usage policy and guidelines
   - Ability to monetize from user engagement (Q1 2024)
   - Private GPTs securely published to enterprise website (Q3 2024)

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USEFUL CUSTOM GPTS

HydroGPT

By Aaron Nichols

HydroGPT is an expert in water resources engineering, specializing in hydrology, hydraulics, and drainage design. It provides detailed assistance in modeling concepts, methodologies, scopes of work, and drainage report writing, including aerial image analysis.

GIS Autonomous Assistant

By William Katzenmeyer

Helpful GIS Assistant using Code Interpreter

Borehole Analyst v2

By Deep Analytica SpA

Gridded Soil Data GIS Assistant

By William Katzenmeyer

Expert in USGS GSSURGO soil data, spatial analysis and mapping. This is a community-built assistant with access to publicly available documentation from the USGS GSSURGO website, and is not directly affiliated with USGS.

ChatFSM-1

By Ali Pourzangbar

Expert in analyzing and comparing flood susceptibility mapping methodologies in academic papers

HOW DO WE BRIDGE THE EDUCATIONAL GAP?

- There is a college skills mismatch between traditional engineering and advanced data analytics skills.
- Improper job requirements that fail to describe how digital skills will be applied to projects.
- Lack of accreditations (many self-taught talents) to prove skills and abilities.
- College research topics are often too niche for the market.

THE POSSIBILITIES

- Could we train a GPT to have the collective knowledge of water professionals across the industry to help provide industry-relevant answers to our most challenging questions?
- Could a GPT be trained by a seasoned professional engineer to help download their institutional knowledge into a system that can maintain their legacy?
- How about a GPT that facilitates collaborative problem solving among professionals from diverse disciplines?

TAKEAWAYS

- Will AI replace the water industry workforce?
- There is a growing need to establish collective intelligence, where water professionals leverage AI to improve resilience and affordability, automate tasks, and de-risk capital investments[1].
- Training (particularly on the job) and finding pilot projects are great ways to learn. Find ways to blend technical innovations with traditional engineering.
- Focus on return on investment and find ways to retain talents by investing internally in innovation and system improvements.
- Re-think job descriptions and compensation to attract talents.
- Create an AI use policy.
- Do not ignore or undervalue the human element of AI applications.

QUESTIONS

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