

# Accountability in the Fourth Industrial Revolution

Tina Kim, CPA, CFF, CITP, CGMA, CISA, CIA,  
CRMA, CGAP, CFE



New York State Comptroller  
**THOMAS P. DINAPOLI**

# Chat GPT

## World Changing?

### AI bot ChatGPT stuns academics with essay-writing skills and usability

Latest chatbot from Elon Musk-founded OpenAI can identify incorrect premises and refuse to answer inappropriate requests



The chatbot generated a response to an exam question that an academic said would have resulted in full marks if submitted by an undergraduate. Photograph: Jiraroj Praditcharoenkul/Alamy

Professors, programmers and journalists could all be out of a job in just a few years, after the latest chatbot from the Elon Musk-founded OpenAI foundation stunned onlookers with its writing ability, proficiency at complex tasks, and ease of use.

## Or Not So Much?



Arvind Narayanan  
@random\_walker

...

People are excited about using ChatGPT for learning. It's often very good. But the danger is that you can't tell when it's wrong unless you already know the answer. I tried some basic information security questions. In most cases the answers sounded plausible but were in fact BS.

AR Why are encryption algorithms kept secret?

Encryption algorithms are often kept secret to protect them from being compromised by attackers. If the details of an encryption algorithm were widely known, it would be easier for someone to find a way to break the encryption and gain access to the protected information. Keeping the details of an encryption algorithm secret makes it more difficult for attackers to break the encryption and access the protected information. It also allows the creators of the encryption algorithm to constantly update and improve the algorithm to make it more secure.

ALT

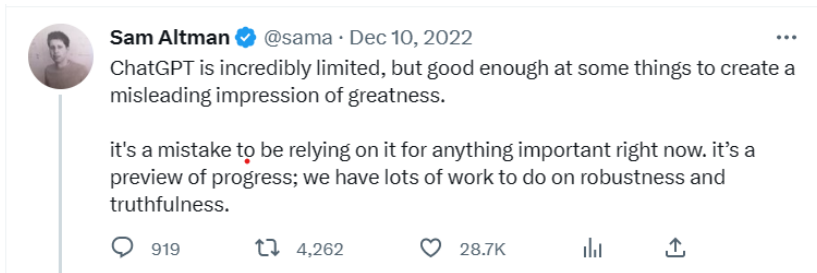
1:28 PM · Dec 1, 2022



New York State Comptroller  
THOMAS P. DiNAPOLI

# The Truth?

## A Preview of Progress



## Inaccurate and Untruthful

### 3. Why does the AI seem so real and lifelike?

- These models were trained on vast amounts of data from the internet written by humans, including conversations, so the responses it provides may sound human-like. It is important to keep in mind that this is a direct result of the system's design (i.e. maximizing the similarity between outputs and the dataset the models were trained on) and that such outputs may be inaccurate, untruthful, and otherwise misleading at times.

### 4. Can I trust that the AI is telling me the truth?

- ChatGPT is not connected to the internet, and it can occasionally produce incorrect answers. It has limited knowledge of world and events after 2021 and may also occasionally produce harmful instructions or biased content.

We'd recommend checking whether responses from the model are accurate or not. If you find an answer is incorrect, please provide that feedback by using the "Thumbs Down" button.

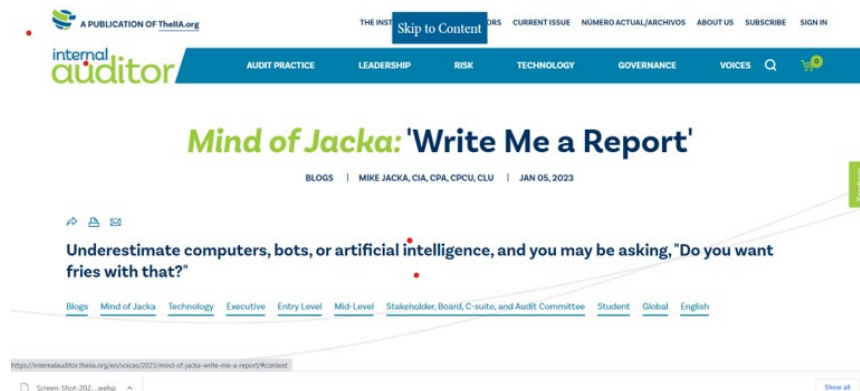


# Chat GPT

## Auditees

After [initially banning use](#) of the artificial intelligence-powered chatbot on school devices and Wi-Fi last month, education officials are reconsidering how to incorporate the technology in a way that enhances student learning while preventing cheating and plagiarism.

## Auditors



New York State Comptroller  
**THOMAS P. DiNAPOLI**



tell a funny joke about auditors



Here's a funny joke about auditors:

Why did the auditor cross the road?

To bore the people on the other side with stories of their recent audit findings!

## Chat GPT in Action



New York State Comptroller  
**THOMAS P. DiNAPOLI**

### Step 1

Collect demonstration data and train a supervised policy.

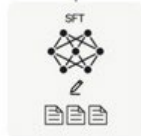
A prompt is sampled from our prompt dataset.



A labeler demonstrates the desired output behavior.



This data is used to fine-tune GPT-3.5 with supervised learning.



### Step 2

Collect comparison data and train a reward model.

A prompt and several model outputs are sampled.



A labeler ranks the outputs from best to worst.



This data is used to train our reward model.



### Step 3

Optimize a policy against the reward model using the PPO reinforcement learning algorithm.

A new prompt is sampled from the dataset.



The PPO model is initialized from the supervised policy.



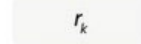
The policy generates an output.



The reward model calculates a reward for the output.



The reward is used to update the policy using PPO.



## Chat GPT

How Does It Work?



New York State Comptroller  
THOMAS P. DiNAPOLI

# Auditor Value?

- A deep knowledge of the organization, including its culture, key players, and competitive environment.
- **The courage to innovate in ways stakeholders don't expect and may not think they want.**
- A broad knowledge of those practices the profession, in general, considers value added.
- **The creativity to adapt innovations to the organization in ways that yield surprising results and exceed stakeholders' expectations.**

Source: James Roth



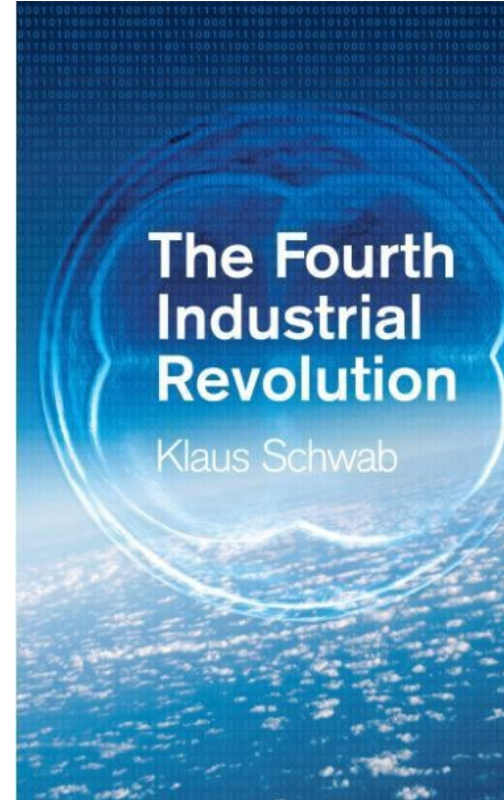
New York State Comptroller  
**THOMAS P. DiNAPOLI**



# Background

“The changes are so profound that, from the perspective of human history, there has never been a time of greater promise or potential peril.”

**Klaus Schwab, [The Fourth Industrial Revolution](#)**



New York State Comptroller  
**THOMAS P. DiNAPOLI**

“Consider the unlimited possibilities of having billions of people connected by mobile devices, giving rise to unprecedented processing power, storage capabilities and knowledge access. Or think about the staggering confluence of emerging technology breakthroughs, covering wide-ranging fields.... Many of these innovations are in their infancy, but they are already reaching an inflection point in their development as they build on and amplify each other in a fusion of technologies across the physical, digital and biological worlds.”

**Klaus Schwab, The Fourth Industrial Revolution, 2016**



New York State Comptroller  
**THOMAS P. DiNAPOLI**

## COVID-19 Has Accelerated the Adoption of Technology

“According to a new McKinsey Global Survey of executives:

- Companies have accelerated the digitization of their customer and supply-chain interactions and of their internal operations by three to four years.
- The share of digital or digitally enabled products in their portfolios has accelerated by a shocking seven years.”

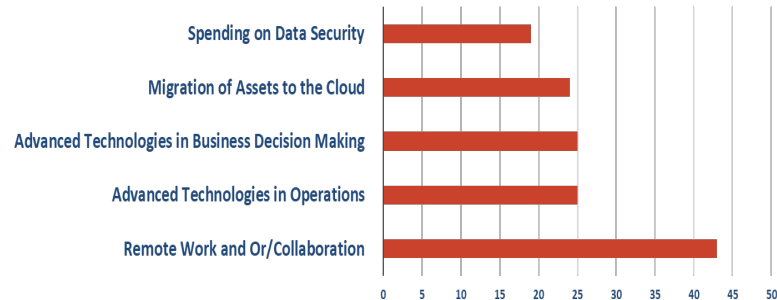
**McKinsey, October 5, 2020**



## Adoption and Development of Technology

- E-commerce sales in the US increased by 44% in 2020 compared to the previous year
- The number of daily Zoom meeting participants grew from 10 million in December 2019 to over 200 million in March 2020, according to Zoom.
- Telemedicine saw a 154% increase in visits during the last week of March 2020 compared to the same week in 2019
- The share of US consumers who have tried telehealth increased from 11% in 2019 to 46% in 2020.
- The global artificial intelligence (AI) market size is projected to grow from \$58.3 billion in 2021 to \$309.6 billion by 2026, at a compound annual growth rate (CAGR) of 39.7%

## Acceleration Factor, Multiple (McKinsey, 2020)

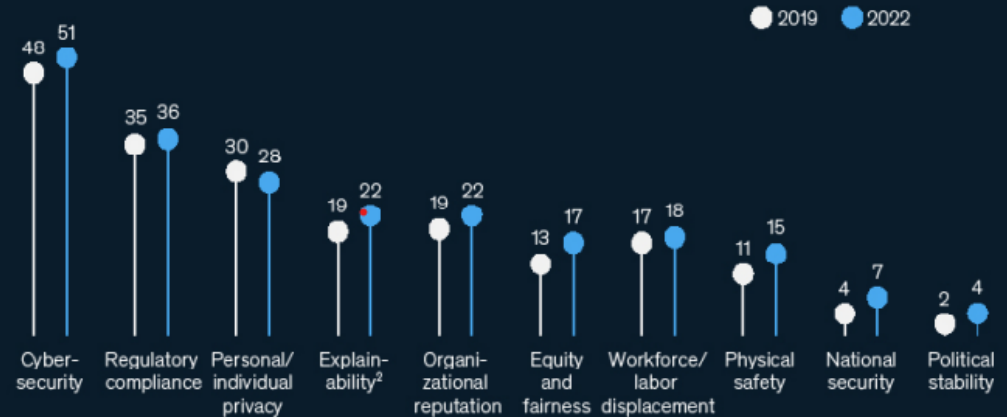


## McKinsey AI Annual Report, 2022

“Lastly, one thing that has remained concerningly consistent is the level of risk mitigation organizations engage in to bolster digital trust. While AI use has increased, there have been no substantial increases in reported mitigation of any AI-related risks from 2019—when we first began capturing this data—to now.”

There has been no substantial increase in organizations' reported mitigation of AI-related risks.

AI risks that organizations consider relevant and are working to mitigate, % of respondents<sup>1</sup>



<sup>1</sup>Question was asked only of respondents who said their organizations had adopted AI in at least one function; n = 1,151. Respondents who said "don't know/not applicable" are not shown.

<sup>2</sup>That is, the ability to explain how AI models come to their decisions.



New York State Comptroller  
THOMAS P. DiNAPOLI

## NYC AI Governance

“NYC does not have an effective AI governance framework. While agencies are required to report certain types of AI use on an annual basis, there are no rules or guidance on the actual use of AI. Consequently, City agencies developed their own, divergent approaches.”



# AI Governance: NYC DOE

## Then

“DOE and DOB officials stated that they did not have any AI systems or tools in development or in use so they do not need to have such policies and procedures, but would create AI policies and procedures if the need arises.”

“We identified three applications (Turnitin, TeachFX, and Teach to One 360) that have AI capabilities that were used by at least five DOE schools and two districts.”

## Now

“We are trying to figure it out, but as most emerging technologies we can sometimes get a little concerned. We’ve just got to figure out how to put the proper guardrails around that will allow for kids to get the most out of it without cheating.”

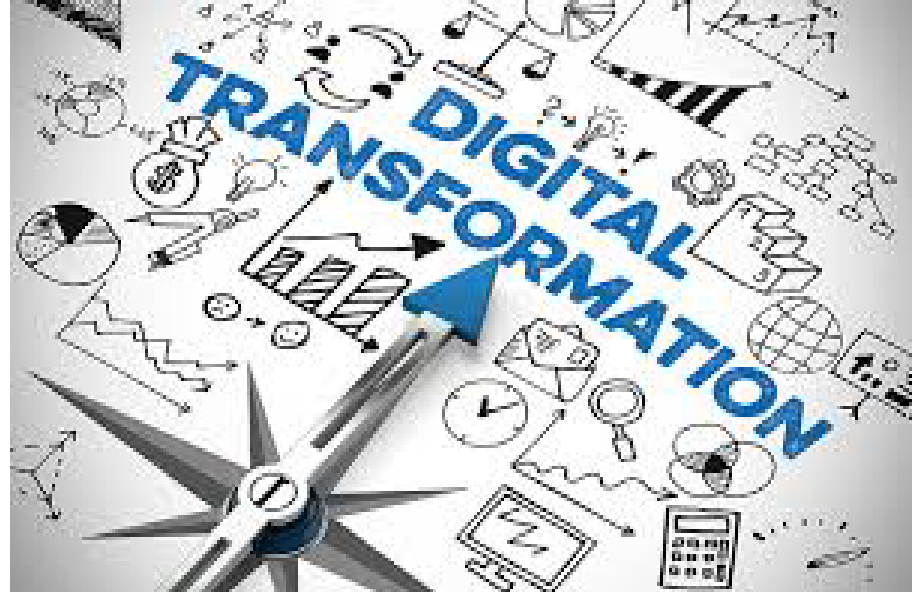




## What We Did

**70% of all such initiatives fail.** Of the \$1.3 trillion that was spent on DT in 2018, it was estimated that \$900 billion went to waste.

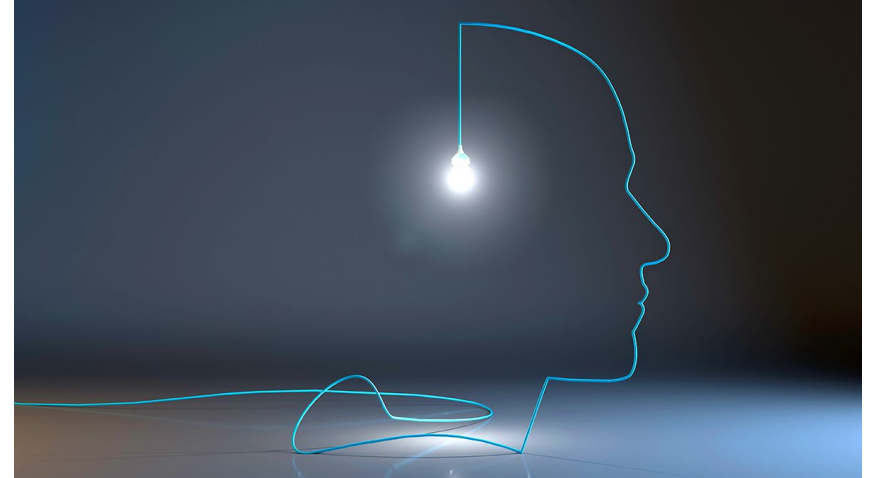
Tabrizi et al. Harvard Business Review, 2019



New York State Comptroller  
**THOMAS P. DiNAPOLI**

“Fundamentally ...if **people lack the right mindset to change and the current organizational practices are flawed**, DT will simply magnify those flaws.”

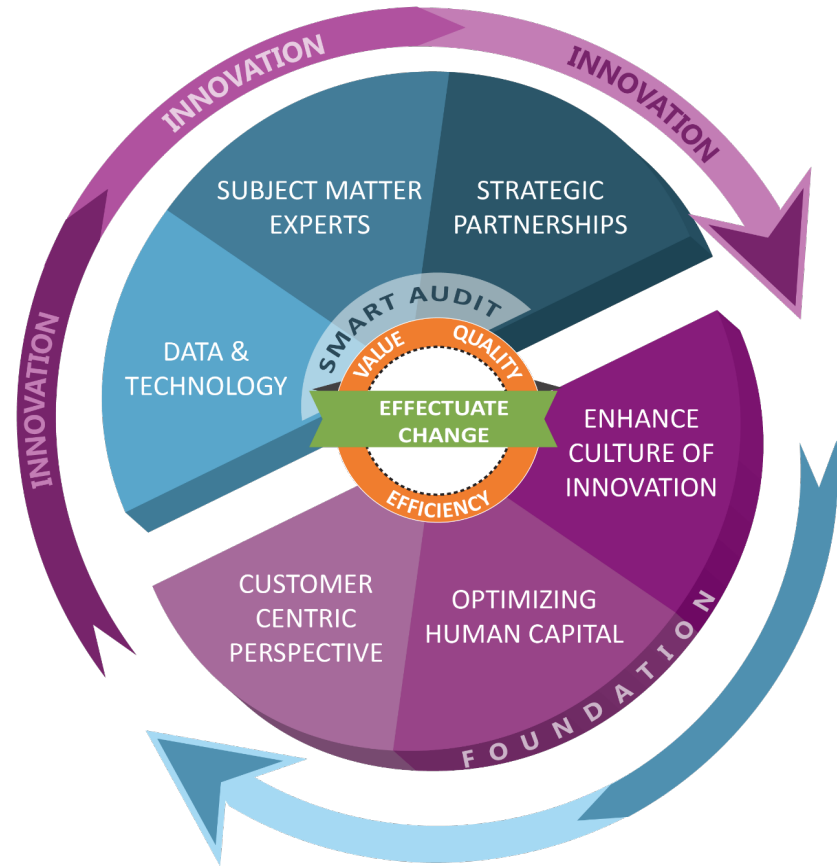
Tabrizi et al.  
Harvard Business Review, 3/13/19



# Smart Audit

Smart audit is an initiative that is based on the premises that by leveraging partnerships, data, and technology you can effectively produce high-impact, high-quality audits.

However, we recognized that in order to make this work you need a strong organizational foundation- a culture that supports innovation and collaboration and staff who feel empowered to pursue it.



# Performance

2014: Smart Audit Introduced

2015: **\$247 million**

2016: \$300 million

2017: \$785 million

2018: \$1.93 billion

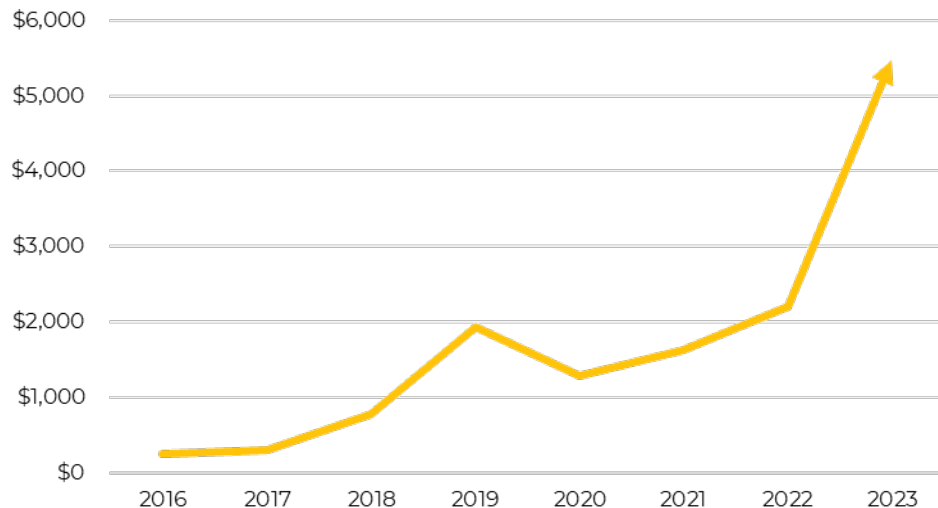
2019: \$1.29 billion

2020: \$1.62 billion

2021: \$2.20 billion

2022: **\$5.47 billion**

## Cost Savings



New York State Comptroller  
**THOMAS P. DiNAPOLI**

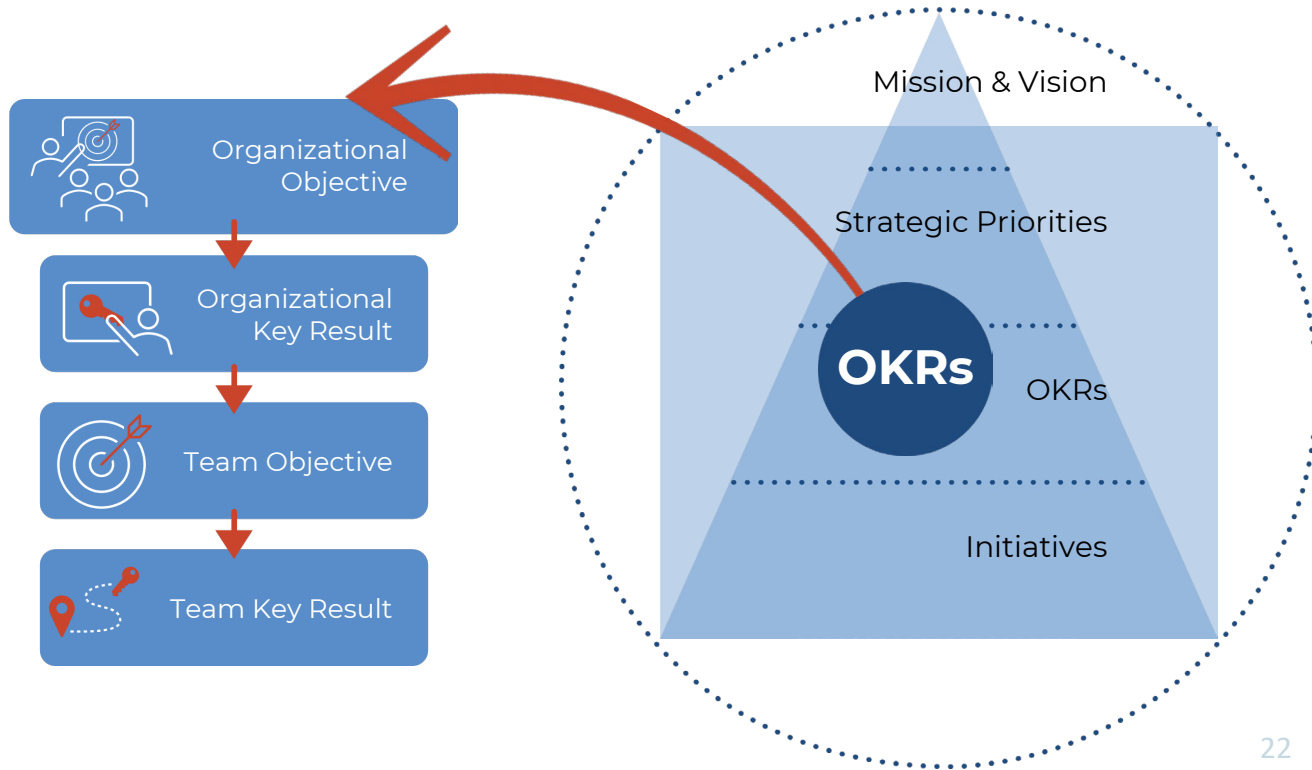


# What We Did

# What is an OKR Program?

The acronym OKR stands for **Objectives** and **Key Results**.

The OKR program is a popular goal setting and performance management strategy in which teams and individuals set challenging, ambitious goals to create alignment and engagement around measurable outcomes.



# OKR Components: Objectives and Key Results

## OBJECTIVES

**An Objective** is what you want to accomplish.

A good **Objective** is significant, concrete, action-oriented and inspirational. Can be set annually or over an even longer-term.





## KEY RESULTS

**Key Results** are how you will accomplish it.

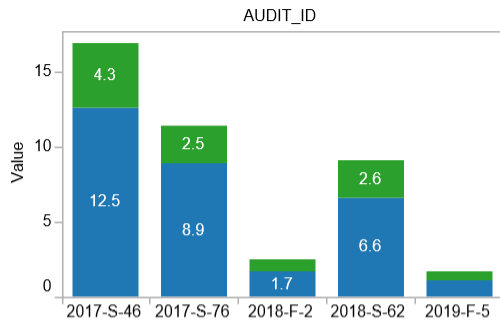
Good **Key Results** are specific, timebound, aggressive yet realistic, measurable and verifiable. Can be set quarterly and evolve as work progresses.



# OKR Mechanics: Performance Management

 <b>OKR Progress</b>	 <b>Confidence Levels</b>
What changed in the Key Results since the last check in?	With the information we have today, how confident is the team that we will reach each Key Result?
 <b>Obstacles</b>	 <b>Initiatives</b>
What obstacles or challenges is the team encountering?	What are we going to do to improve results?

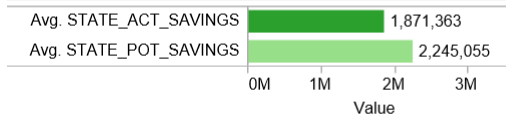
## Avg Total Months



### Measure Names

- Avg. Report Processing Months
- Avg. Fieldwork Months

## State Actual and Potential Savings



## Benchmarks

Audit ID	Survey Benchmark	QA P1 Benchmark	Closing Conference Ben...
2018-S-32	Below Benchmark	Below Benchmark	Above Benchmark
2019-S-16	Below Benchmark	Below Benchmark	NULL
2019-S-33	Below Benchmark	Below Benchmark	NULL
2019-S-39	Below Benchmark	Below Benchmark	NULL

# In Draft

1

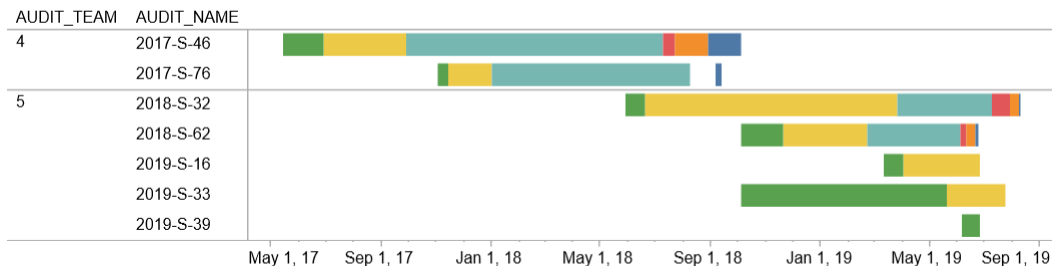
# In Field Work

3

### Agencies w/ Audits in Field Work

AGENCY	Number of Audits
DOCCS	1
OGS	1
State	1

## Project Gantt Charts



### PHASE

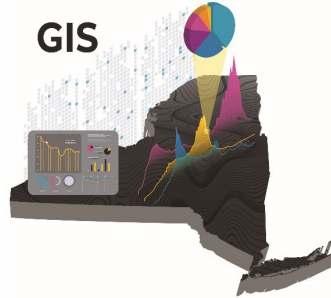
- DRAFT WITH DIRECTOR
- DRAFT WITH MANAGER
- DRAFT WITH SUPERVISOR
- FIELDWORK
- PLANNING MEMO
- SURVEY



## INFOGRAPHICS



## GIS



## TABLEAU

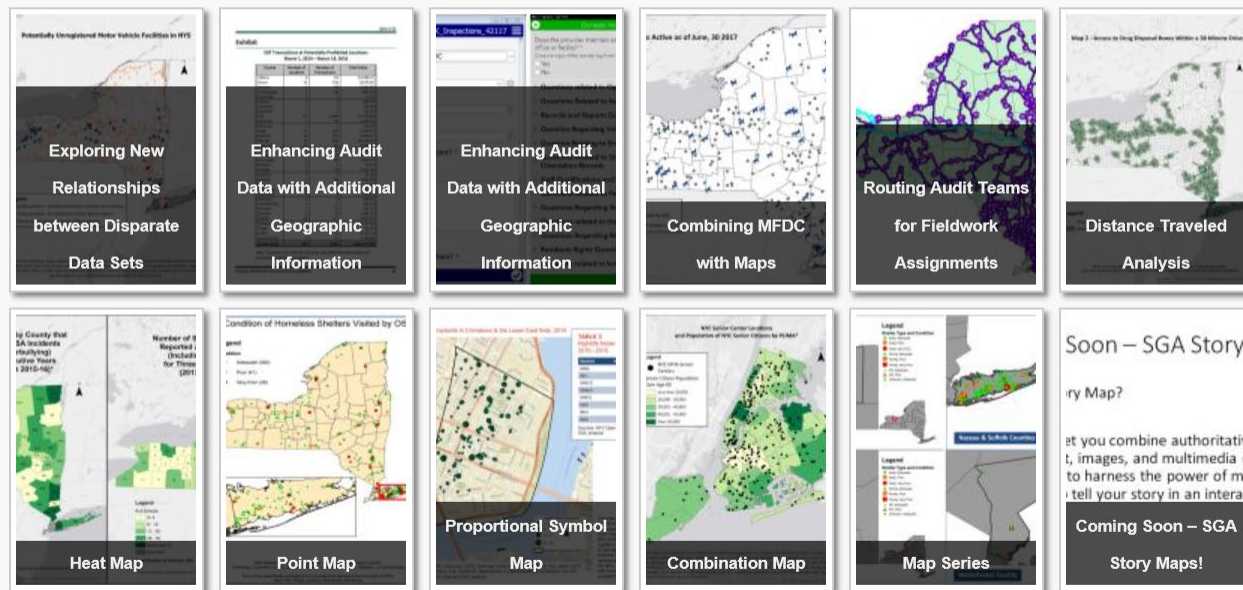


## REPORT EDITORS



New York State Comptroller  
**THOMAS P. DiNAPOLI**

## SGA GIS Gallery



Welcome to SGA's GIS Gallery!

## Accountability

- What's Happening in SGA
- About Us
- Vision, Mission, Values
- Division Overview
- Management
- Administrative and Audit Support Services
- Audit Resources
- Workplace Spirit
- SGA QA Corner
- Audit Innovation Unit
- Accountability Project
- SGA Employee Recognition

# Audit Innovation

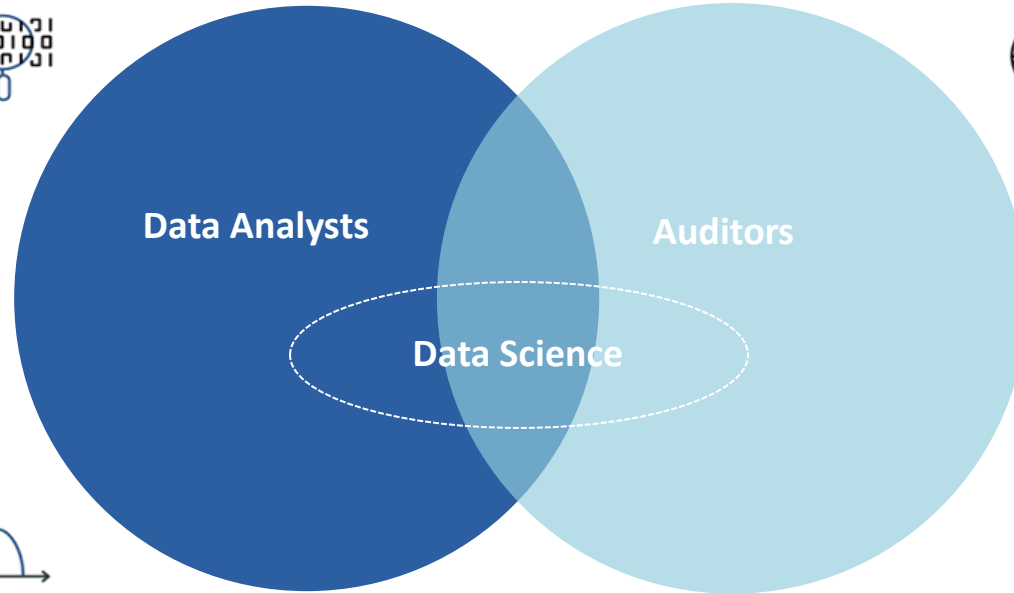
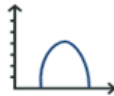
Data  
Exploration &  
Cleansing



Trend Analysis



Model  
Selection



Subject Matter



Open  
Data



Expertise



New York State Comptroller  
**THOMAS P. DiNAPOLI**

# Using Technology to Access Data: Non-Profit Risk Assessment

- Chapter 545 of the Laws of 2013 requires the State Comptroller to audit the expenses reported to SED by every program provider of special education services for preschool children with disabilities at least once by March 31, 2018, “subject to the funding made available by the Legislature for such purpose.”
- **Subject Matter Experts:** Partnership with Professors at SUNY Binghamton and Syracuse University who focus on Non-profit accounting.
- **Tools:** Modeler Premium (Text Mining), Python
- **Data:** Financial Statements, 990 Data, Internal Control Questionnaires, Certified Financial Reporting Data (All Revenue and Expenses by Category)



Our research identified 56 foundational skills that will help citizens thrive in the future of work.

56 DELTAS<sup>3</sup> across 13 skill groups and four categories

<b>Cognitive</b>		<b>Interpersonal</b>	
<b>Critical thinking</b> <ul style="list-style-type: none"> <li>● Structured problem solving</li> <li>● Logical reasoning</li> <li>● Understanding biases</li> <li>● Seeking relevant information</li> </ul>	<b>Planning and ways of working</b> <ul style="list-style-type: none"> <li>● Work-plan development</li> <li>● Time management and prioritization</li> <li>● Agile thinking</li> <li>● Ability to learn</li> </ul>	<b>Mobilizing systems</b> <ul style="list-style-type: none"> <li>● Role modeling</li> <li>● Win-win negotiations</li> <li>● Crafting an inspiring vision</li> <li>● Organizational awareness</li> </ul>	<b>Developing relationships</b> <ul style="list-style-type: none"> <li>● Empathy</li> <li>● Inspiring trust</li> <li>● Humility</li> <li>● Sociability</li> </ul>
<b>Communication</b> <ul style="list-style-type: none"> <li>● Storytelling and public speaking</li> <li>● Asking the right questions</li> <li>● Synthesizing messages</li> <li>● Active listening</li> </ul>	<b>Mental flexibility</b> <ul style="list-style-type: none"> <li>● Creativity and imagination</li> <li>● Translating knowledge to different contexts</li> <li>● Adopting a different perspective</li> <li>● Adaptability</li> </ul>	<b>Teamwork effectiveness</b> <ul style="list-style-type: none"> <li>● Fostering inclusiveness</li> <li>● Motivating different personalities</li> <li>● Resolving conflicts</li> <li>● Collaboration</li> <li>● Coaching</li> <li>● Empowering</li> </ul>	
<b>Self-leadership</b>		<b>Digital</b>	
<b>Self-awareness and self-management</b> <ul style="list-style-type: none"> <li>● Understanding own emotions and triggers</li> <li>● Self-control and regulation</li> <li>● Understanding own strengths</li> <li>● Integrity</li> <li>● Self-motivation and wellness</li> <li>● Self-confidence</li> </ul>		<b>Digital fluency and citizenship</b> <ul style="list-style-type: none"> <li>● Digital literacy</li> <li>● Digital learning</li> <li>● Digital collaboration</li> <li>● Digital ethics</li> </ul>	
<b>Entrepreneurship</b> <ul style="list-style-type: none"> <li>● Courage and risk-taking</li> <li>● Driving change and innovation</li> <li>● Energy, passion, and optimism</li> <li>● Breaking orthodoxies</li> </ul>		<b>Software use and development</b> <ul style="list-style-type: none"> <li>● Programming literacy</li> <li>● Data analysis and statistics</li> <li>● Computational and algorithmic thinking</li> </ul>	
<b>Goals achievement</b> <ul style="list-style-type: none"> <li>● Ownership and decisiveness</li> <li>● Achievement orientation</li> <li>● Grit and persistence</li> <li>● Coping with uncertainty</li> <li>● Self-development</li> </ul>		<b>Understanding digital systems</b> <ul style="list-style-type: none"> <li>● Data literacy</li> <li>● Smart systems</li> <li>● Cybersecurity literacy</li> <li>● Tech translation and enablement</li> </ul>	

<sup>3</sup>Distinct elements of talent.

McKinsey  
& Company

These are the recommended foundational skills for the future of work. Image: McKinsey & Company

# Skills

## Future of Work



New York State Comptroller  
THOMAS P. DiNAPOLI

## SGA's Learning & Development Program



Our robust **New Hire Training Program** starts the minute new staff come aboard.

①

### **New Hire Orientation**

8 administrative and job specific courses.

②

### **Core Curriculum**

8 comprehensive audit-related courses.

③

**Self Directed Assignments** reinforces learning and boosts practical knowledge.

Provides ongoing training that increases staffs' audit knowledge, skills, and capabilities, as well as increasing engagement, productivity, retention, and morale.

## ANCHORS AWEIGH



Comprehensive **audit-related training** enhances our auditors' technical knowledge throughout their careers.

- ✓ Performance Auditing
- ✓ Statistical Sampling
- ✓ Internal Controls
- ✓ Fraud Detection & Deterrence
- ✓ Government Auditing Standards
- ✓ Interviewing Skills
- ✓ Developing Audit Findings
- ✓ Data Reliability
- ✓ Audit Charter
- ✓ Risk Analysis
- ✓ NYS Budget Process
- ✓ Audit Charter

**We prepare our workforce for the future** by providing tailored training on strategic initiatives & emerging issues.



Artificial Intelligence



Data Visualization



Remote Supervision



Our **technical units** receive advanced sophisticated training unique to their specialty.



Audit supervisors and managers receive focused training to **build expertise in assigned audit areas**.



To keep our staff moving in the right direction...

We support **professional growth opportunities**.



SGA reimburses a portion of membership dues, study materials & exams fees.

1/3

of staff hold **professional certifications**

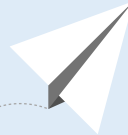
75

staff are members of a **professional organization**

We provide **NEXT LEVEL** Career Development



Supervisory Support



**New EIC Training** equips newly promoted EICs with **SGA tailored training**, tools and resources to successfully perform their new role.

12

**administrative, supervisory & audit related courses**

7 courses designed for **first-time supervisors**



focused on **leadership skills, conflict resolution, performance management and labor relations**.

# Python 70/20/10 Training





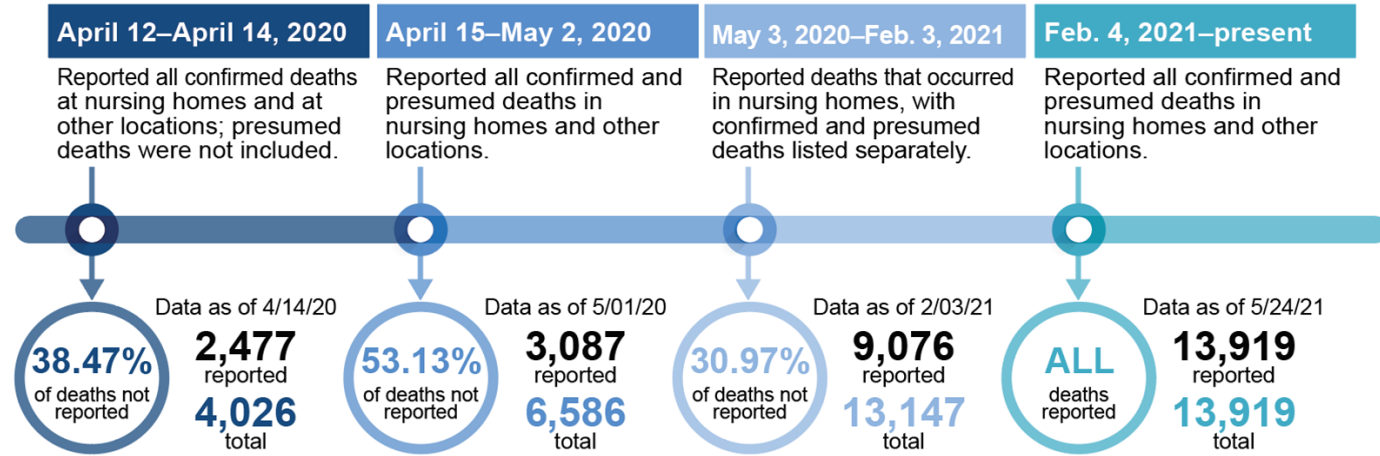
## Project Impacts

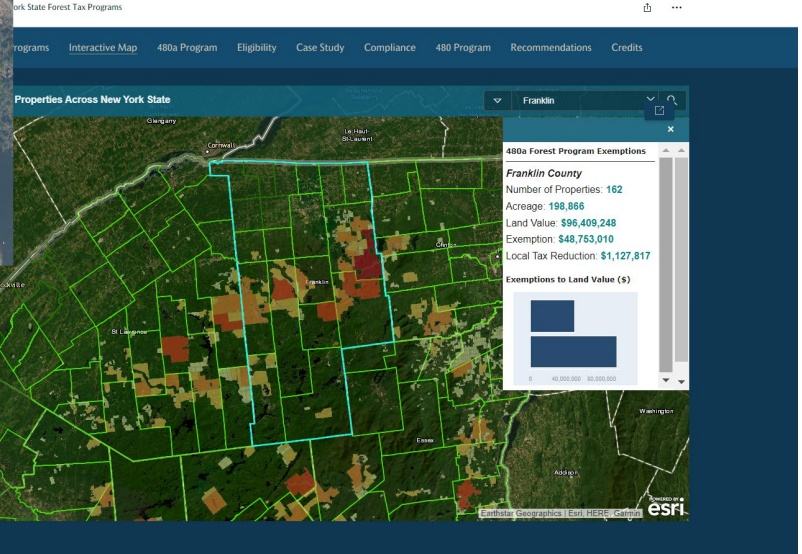
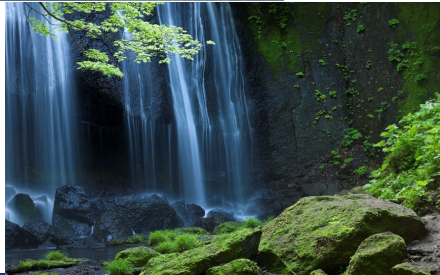
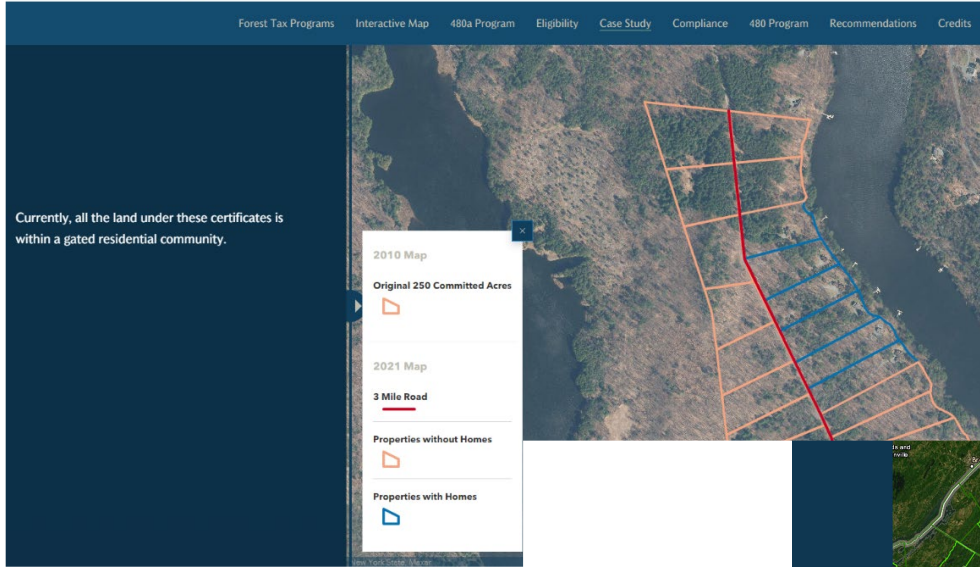


New York State Comptroller  
**THOMAS P. DiNAPOLI**

## Timeline of Changes to Reporting Methodology

The Department varied its method of publicly reporting COVID-19 deaths in nursing homes, as shown in the following timeline. (Note: The death counts were calculated using the date the deaths were reported to the Department, not the actual date of death.)





At least 68°F  
inside

Below  
55°F  
Outside



**DAY**  
6 AM - 10 PM



**NIGHT**  
10 PM - 6 AM



At least 62°F  
inside

No outside  
temperature  
required

## Using IoT: Heat and Hot Water Complaints



New York State Comptroller  
**THOMAS P. DiNAPOLI**

# Shakespeare Says It All



In audit's realm, technology's embrace,  
Through bytes and bits, doth errors chase.  
Yet with such progress, dangers dwell,  
A double-edged sword, truth to tell.

Cyber threats and breaches loom,  
In shadows dark, they weave and bloom.  
And data vast, like ocean's tide,  
May yet conceal what truths reside.

In balance find, our trust and fear,  
For digital age draws ever near.  
Auditors, hold fast thy quest,  
To search, reveal, and do thy best.



## Contact Information

---

➔ Tina Kim | [tkim@osc.ny.gov](mailto:tkim@osc.ny.gov)