To: PA Senate Communications and Technology Committee
DR. Tamás Terlaky, President Optamo LLC

Subject: Developing AI industry in PA

My name is Tamás Terlaky , Co-Founder and President Optamol LLC. Besides my role at Optamo, I am also the Alcoa Foundation Endowed Chair Professor at the Industrial and Systems Engineering Department of Lehigh University.

What is AI (Artificail Intelligence):
Let me start with an intuitive working definition

The safest working definition of Artificial Intelligence (AI) is the study and development of systems (integrated hardware and software) capable of <u>simulating human intelligence</u> and thought processes. AI systems come in many forms.

AI is close to 70 years old:

The Perceptron, a foundational concept in neural networks and artificial intelligence, pioneered by Frank Rosenblatt in the late 1950s. Rosenblatt's work, published in 1958, was inspired by the structure and function of the human brain. His "Mark I Perceptron" aimed to replicate aspects of neuronal processing. AI and machine learning has been born about 7 decades ago. …
The major break-through novelty of the past decade lies in our ability to train computers, deep neural networks, for numerous specific tasks, at scale, economically, at an accelerating pace.

Optamo was born out of a multi-year award-winning research collaboration between Lehigh University and the PA Department of Correction. Founded in 2018, Optamo is an operations research and analytics consulting firm based at the Ben Franklin TechVentures (BFTP) facility on Lehigh's campus. Specializing in the enhancement of business processes in correctional systems, Optamo remains the leading, still to date unique, company in developing software systems that optimize daily operations of correctional systems. Our solutions and services enable correctional systems to analyze, streamline and optimize their business operations.

Optamo's unique signature product is the **Inmate Assignment Decision Support System** (IADSS). IADSS is a revolutionary web-based decision support system which enables a correctional system to simultaneously and optimally assign inmates to correctional institutions and schedule their treatment programs while considering all business rules and policy regulations. The state-of-the-art advanced analytics behind IADSS enables a correctional agency to consider multitude of factors, in a typical state correctional system more than one hundred specific requirements, affecting the assignment of inmates and scheduling their treatment and rehabilitation programs. IADSS delivers optimized assignment and scheduling decisions in seconds, or minutes achieving level of performance far beyond the possibility of any individual or even team of human officers.

Optamo's solutions save human lives, and millions of dollars annually for correctional systems. System-wide optimization of the inmate assignment and optimized scheduling of their rehabilitation programs results in significant savings in at least 4 areas:
- Reduced imprisonment time;
- Reduced Staff resources;
- Reduced level of transportation;
- Reduced violence in Correctional Institutions.

Optamo's IADSS has been implemented at the PA Department of Corrections since 2016 and has also been implemented at the Georgia Department of Corrections since July 2021. Optamo's solution resulted in at least $3million savings annually at the PADOC, and the savings in Georgia DOC is much higher due to the complexity of the correctional system in Georgia.

Recognitions: The Optamo team was honored by House and Senate of the Commonwealth of Pennsylvania for their outstanding contributions to the State, as well as by numerous national awards, including:
- 2017 Daniel H. Wagner Prize by the Institute for Operations Research and the Management Sciences (INFORMS).
- 2019 Outstanding Innovation in Service Systems Engineering Prize, Institute of Industrial and Systems Engineers.

Optamo and AI:

Optamo is a unique start-up offering valuable unique products and services. Unlike many companies, Optamo serves a select group of clients, each benefiting from our highly sophisticated solutions. To date, no competing product has emerged, and all of our contracts have been awarded on a sole-source basis.

Optamo is a high-tech company, all of our full-time employees have college degrees, 40% holding masters degree, and another 40% holding doctoral degree. Our solutions are delivered through a "Software as a Service" (SaaS) model hosted on Amazon's government cloud service to meet stringent cybersecurity requirements.

Advanced Analytics, in particular mathematical optimization – commonly referred to as prescriptive analytics, serves as the core engine behind many AI applications, the same way as it

is the key technology behind Optamo's unique solutions. We utilize state-of-the-art advanced analytics, most dominantly prescriptive and predictive analytics.

IADSS enables correctional agencies to account for all critical factors, in a typical state correctional system more than one hundred specific requirements, that need to be observed when assigning inmates to correctional facilities and scheduling their treatment and rehabilitation programs. IADSS delivers optimized assignment and scheduling in seconds, or minutes —achieving a level of performance far beyond what is possible for any individual or team of officers within a reasonable timeframe.

Optamo provides mentorship, learning opportunity and hands-on experience to 2-4 students (mostly from Lehigh) each year. This is a mutually beneficial arrangements, frequently supported by partial Keystone Innovation Zone (KIZ) funding. This collaboration allows Optamo to access talented software development resources, while evaluating potential future hires, and it offers students invaluable real-world training at a high-tech start-up. Many of them end-up at highly compensated positions at major consulting and software development firms, such as Google, IBM, and PwC.

Optamo also co-sponsors Pennsylvania Infrastructure Technology Alliance (PITA) projects with the goal of developing innovative new products. Collaborative partners are Prof. Zuluaga from the Industrial and Systems Engineering Department of Lehigh, and the PA DoC. The aimed new products are the Detailed Scheduling of Treatment Programs for Inmates (completed), and the Cell-Bed Assignment Module (in it early phase now).

In summary: Optamo is a high-tech analytics company, utilizing unique combinations of descriptive, predictive, and prescriptive analytics, Optamo's services are offered as Software as a Service through cloud services, while fully complying with federal cyber security requirements.

I would also take this opportunity to acknowledge the vital role of BFTP incubator facility that still provides home for Optamo, the support of the BF staff, in particular Wayne Bartz the director at the time of Optamo's birth, and the ongoing opportunities provided by the KIZ and PITA programs has made a significant impact in developing Optamo to a broadly recognized high impact start-up company in the space of optimizing the operations of large correctional systems.

Finally, at the closing of this testimony I would like to call attention to the emerging, revolutionary technology of Quantum Computing (QC). QC is fundamentally different, novel computing paradigm, and the rapidly emerging fusion of AI and QC, as widely anticipated, may lead to unprecedented challenges and opportunities, also for Pennsylvania and its industrial ecosystem.