PwC response to NIST RFI:
Developing a Federal AI Standards Engagement Plan

Introduction

PwC appreciates the opportunity to respond to the National Institute of Standards and Technology's (NIST) Request for Information on Artificial Intelligence standards. The creation of reliable, robust, and trustworthy AI systems is the need of the hour, and the creation of AI technical standards will go a long way in ensuring this.

What is AI?

AI covers a wide range of capabilities that spans the foundational, cognitive, system, and sensory layers. PwC defines AI as the theory and development of systems that can continuously sense its environment, think, make decisions, and take actions that influence the environment to achieve its goals.
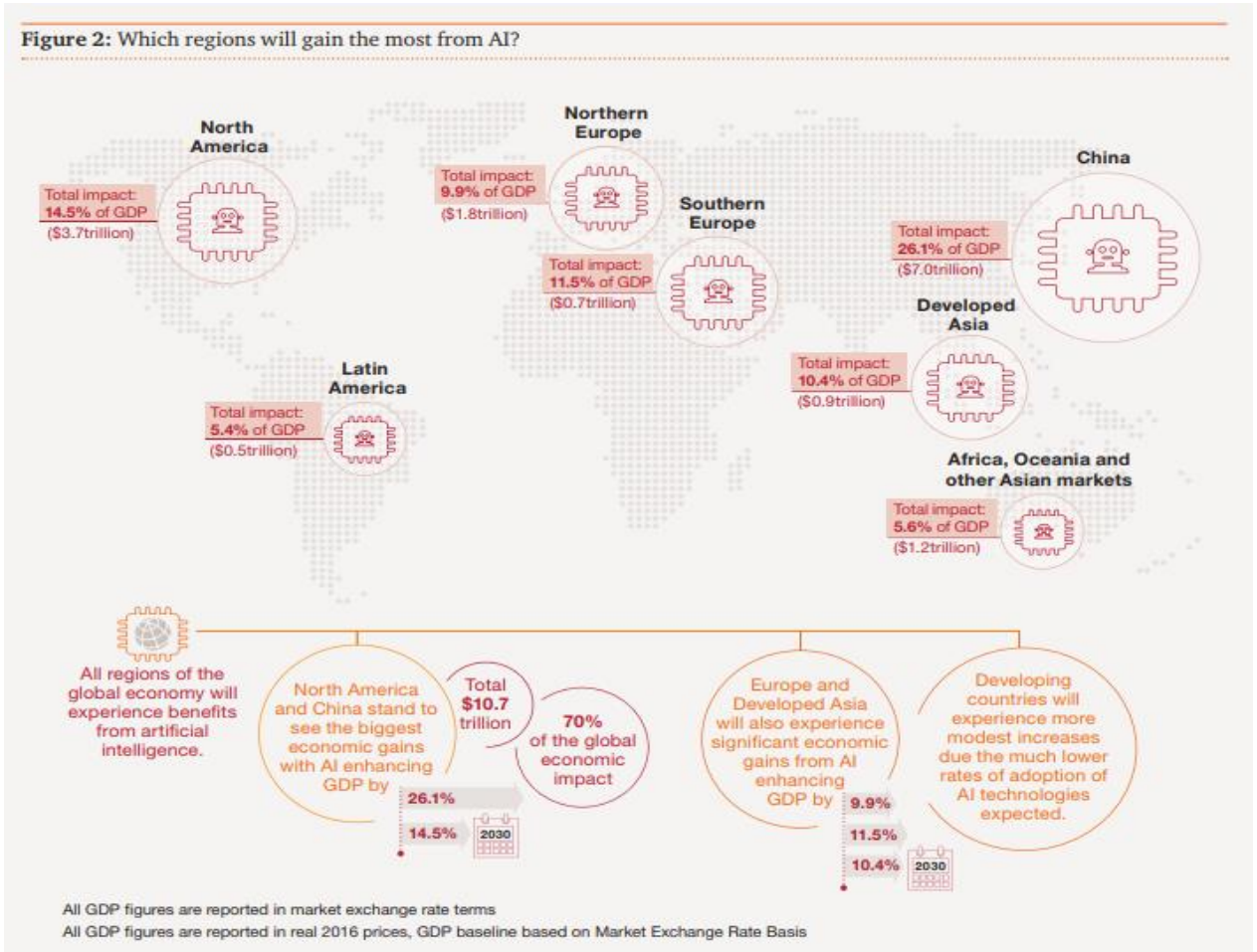

Source: PwC Analysis

Growth of AI

The growing sophistication of AI and machine learning technologies are transforming our lives – both as a consumer and as an enterprise. PwC predicts that global GDP will be up to 14% higher in 2030 as a result of the accelerating development and take-up of AI – the equivalent of an additional $15.7 trillion. Of this, $6.6 trillion is likely to come from increased productivity and $9.1 trillion is likely to come from consumption side effects. AI is emerging as the defining technology of our age, with many industries already utilizing AI in some form.

Figure 2: Which regions will gain the most from AI?

North America
Total impact:
14.5% of GDP
($3.7trillion)

Northern Europe
Total impact:
9.9% of GDP
($1.8trillion)

Southern Europe
Total impact:
11.5% of GDP
($0.7trillion)

China
Total impact:
26.1% of GDP
($7.0trillion)

Developed Asia
Total impact:
10.4% of GDP
($0.9trillion)

Latin America
Total impact:
5.4% of GDP
($0.5trillion)

Africa, Oceania and other Asian markets
Total impact:
5.6% of GDP
($1.2trillion)

All regions of the global economy will experience benefits from artificial intelligence.

North America and China stand to see the biggest economic gains with AI enhancing GDP by
26.1%
14.5% | 2030

Total **$10.7** trillion

70% of the global economic impact

Europe and Developed Asia will also experience significant economic gains from AI enhancing GDP by
9.9%
11.5%
10.4% | 2030

Developing countries will experience more modest increases due the much lower rates of adoption of AI technologies expected.

All GDP figures are reported in market exchange rate terms
All GDP figures are reported in real 2016 prices, GDP baseline based on Market Exchange Rate Basis
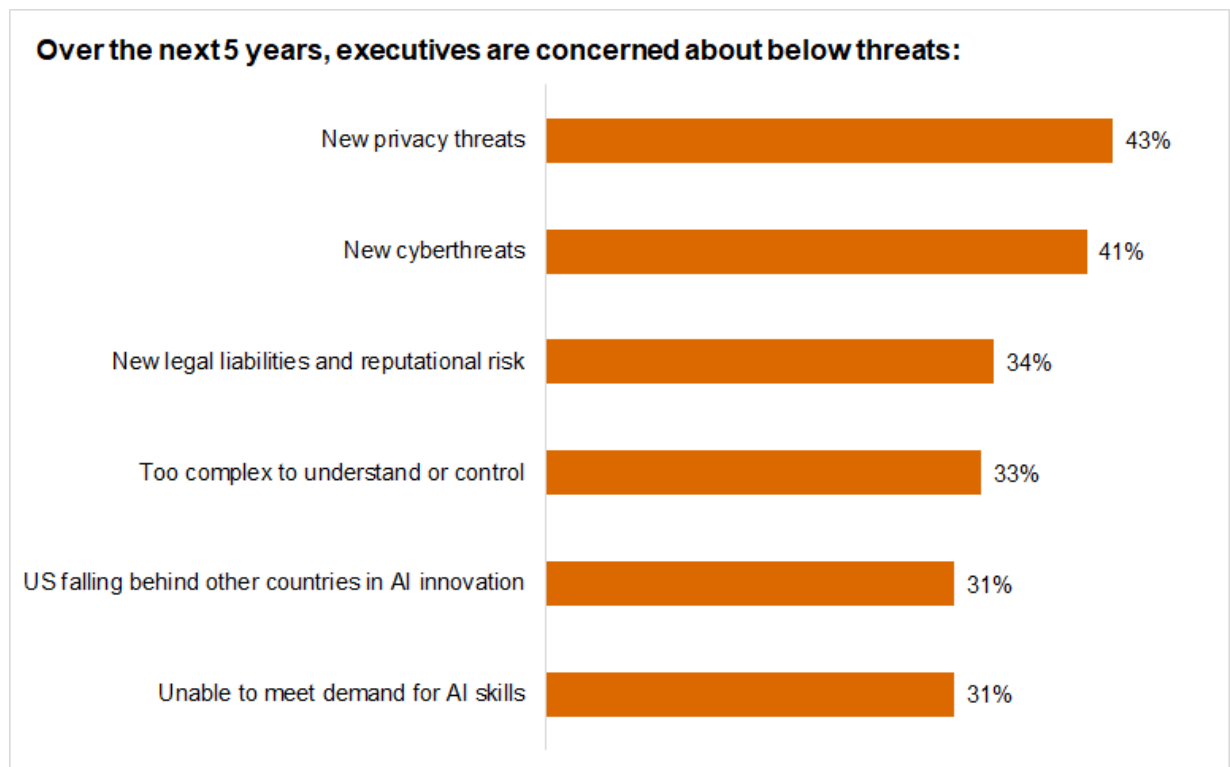
Source: PwC Analysis

Emergent challenges

The growth of AI is not without risks and challenges. In a PwC survey of over 1,000 executives, over 37% of executives surveyed agreed that "ensuring that AI systems are trustworthy" was a key challenge of working with AI, while 33% fear AI is too complex to understand or control.

Over the next 5 years, executives are concerned about below threats:

Threat	Percentage
New privacy threats	43%
New cyberthreats	41%
New legal liabilities and reputational risk	34%
Too complex to understand or control	33%
US falling behind other countries in AI innovation	31%
Unable to meet demand for AI skills	31%

Source: PwC 2019 AI Predictions

The risks associated with artificial intelligence can be classified into 6 broad categories:

- **Performance risks:** Performance risks include risks of errors, bias, opaqueness or black box risks, explainability, stability of performance, etc.
- **Security risks:** AI algorithms are prone to adversarial attacks that undermine the security of safety-critical systems.
- **Control risks:** Increasingly complex and dynamic systems make it difficult to predict emergent behavior and control it when something goes wrong.
- **Ethical risks:** AI algorithms that ingest data on human actions and preferences as input are prone to also learn our innate biases and prejudices, and our own system of values.
- **Economic risks:** Estimates from PwC's studies put the short-term impact of AI at less than 3% of the jobs lost by 2020, but as high as 30% by the mid-2030s.
- **Societal risks:** The widespread adoption of complex and autonomous systems could result in 'eco-chambers' and further accelerate the 'intelligence divide'.

PwC Responsible AI Framework

Artificial Intelligence needs both more robust governance and a new operating model to realize its full potential. To build trust in AI, PwC has developed the Responsible AI framework that addresses these five dimensions. The questions in each of the below facets will help regulators, executives, developers and users determine the trustworthiness of our AI solutions

- **Bias & Fairness:** Are you minimizing bias in your data and AI models? Are you addressing bias when you use AI?
- **Interpretability & Explainability:** Can you explain how an AI model makes decisions? Can you ensure those decisions are accurate?
- **Robustness & Security:** Can you rely on an AI system's performance? Are your AI systems vulnerable to attack?
- **Governance:** Who is accountable for AI systems? Do you have the proper controls in place?
- **System Ethics & Regulation:** Do your AI systems comply with regulations? How will they impact your employees and customers?

AI assessment tools

PwC is developing an extensive Responsible AI toolkit to assist developers and users to ensure that their AI solutions are trustworthy. PwC's Responsible AI toolkit is empowering organizations to build trust and confidence in their AI applications. The Responsible AI (RAI) Toolkit is a flexible and scalable suite of frameworks, process, tools and services to enable assessment and development of AI across an organization.

One component of the PwC toolkit focuses on detecting bias in the outcome of applied algorithms, advising clients on remediation plans, and monitoring fairness throughout updates.

Conclusion

Establishment of unambiguous AI standards that apply to all AI solutions will help provide a common framework to evaluate AI systems and certify them as "trustworthy". The NIST's efforts in establishing such technical standards is laudable and PwC appreciates the opportunity to contribute to this effort. We thank the NIST for taking into consideration our perspectives in the field of AI.

Contact

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