



TORONTO
16 - 19 Oct 2017



The impending technological revolution
in FinTech and artificial intelligence
– Are you ready?



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Our Mission

GRI is the premier risk management institute, that defines thought leadership in risk management for financial institutions globally. It brings together leaders from industry, academic and government to draw actionable insights on emerging risks globally.

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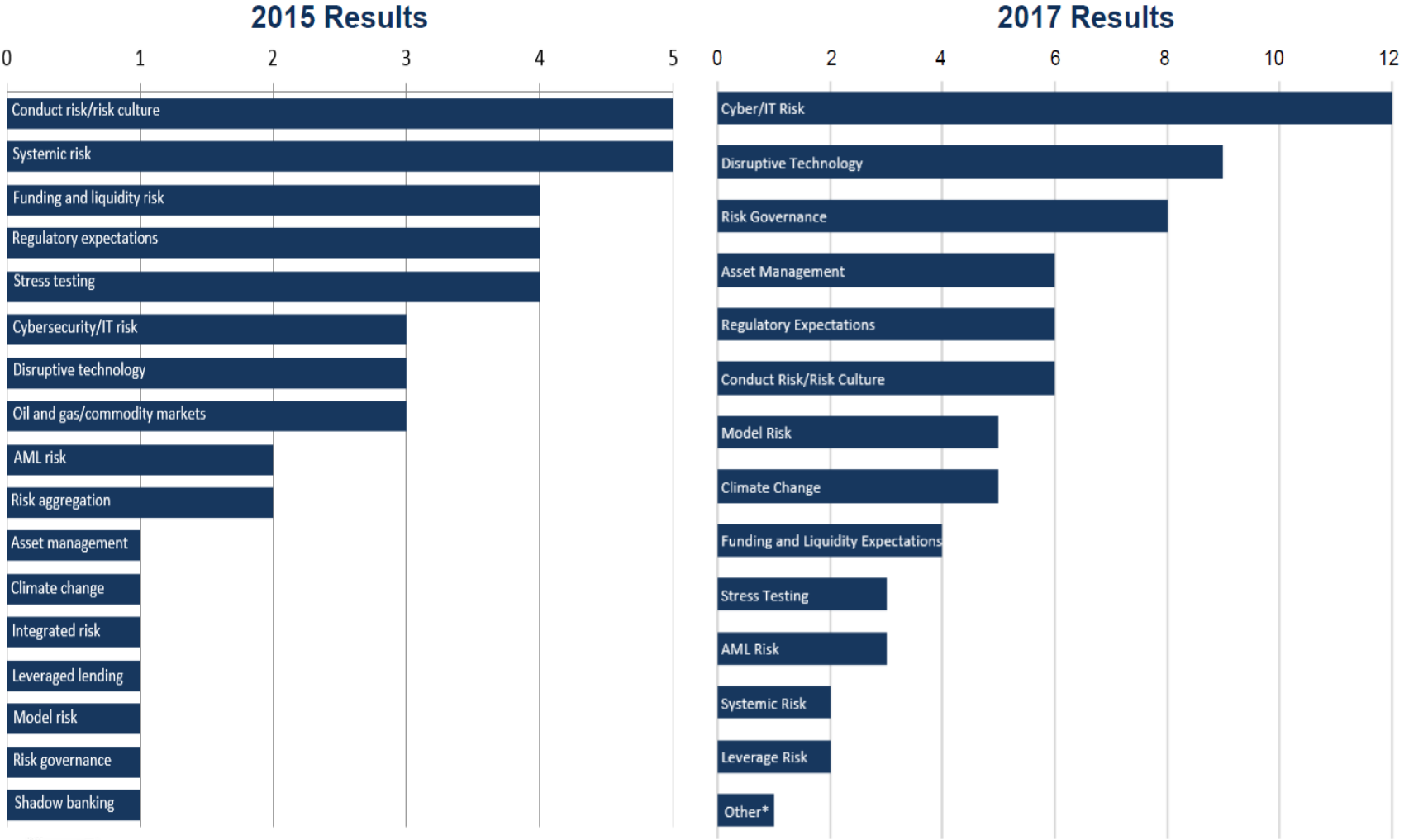
CPP
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PSP
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ONTARIO
TEACHERS'
PENSION PLAN

OPB
Your Pension. Our Promise.

Key Themes: 2015/2017 Comparison



*Negative Interest Rate

The Impending Technological Revolution in FinTech and Artificial Intelligence

Digital Disruption in Banking

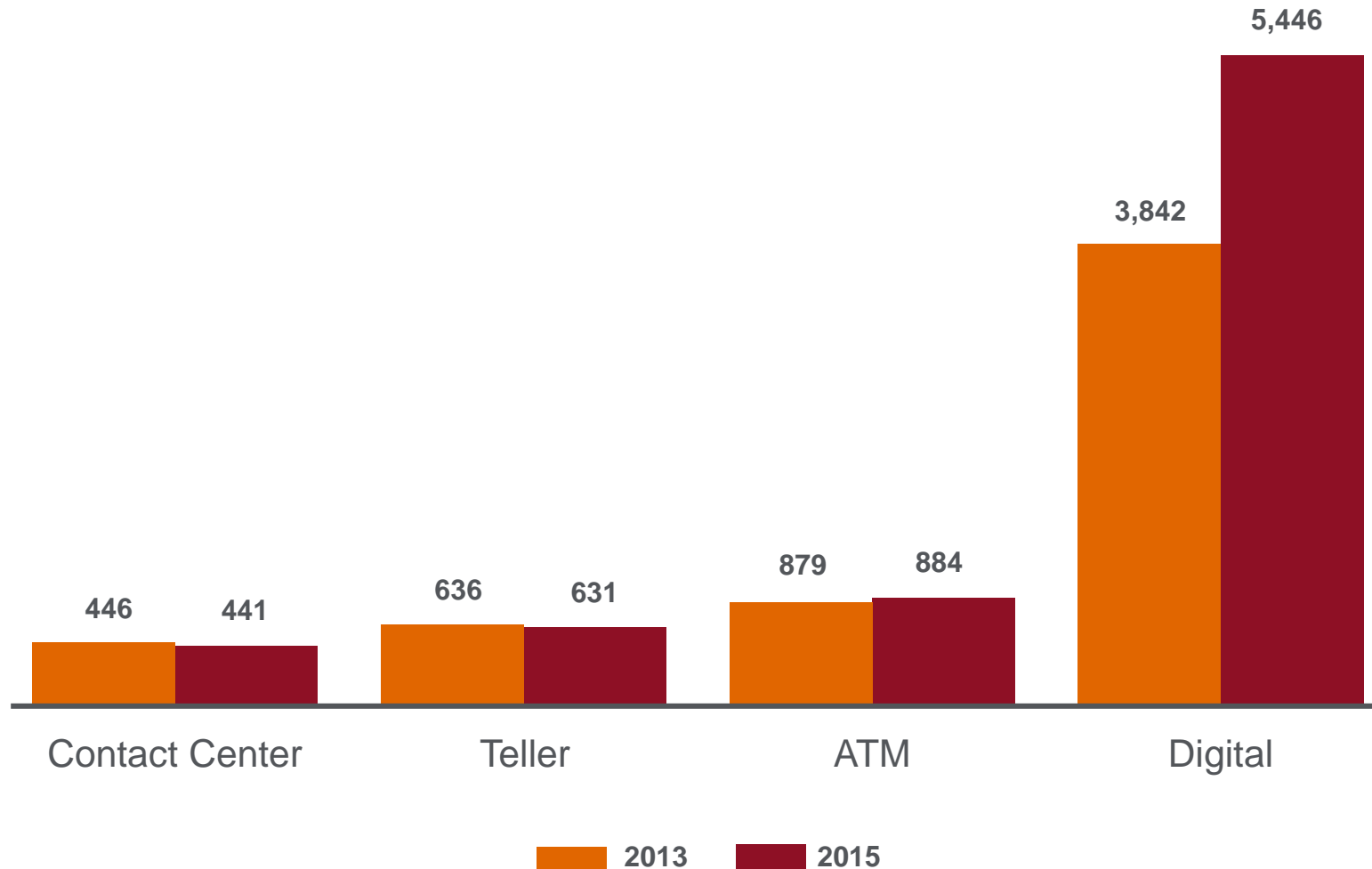


Digital Disruption in Banking

- The branch will become obsolete
- Banks that don't act fast are going to lose relationships with customers
- The ATM will go the way of the phone booth
- The smartphone will become the foundation banking channel

Digital Disruption in Banking

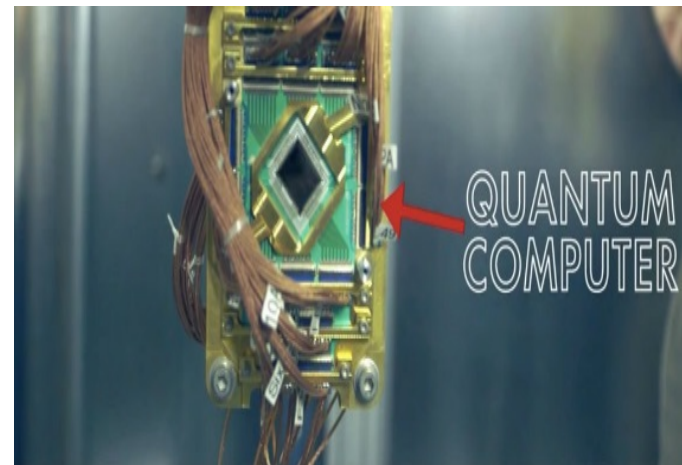
Wells Fargo deposit customer interactions (millions)



Source: Company filings



Technology Will Disrupt All Existing Relationships



AI has spurred narratives prophesizing the obsolescence of not only jobs, but also the human race in itself

“With artificial intelligence we are **summoning the demons**...If I had to guess at what our **biggest existential threat** is, it’s probably [artificial intelligence].”

– *Elon Musk*



“First, the machines will do a lot of jobs for us and not be super intelligent... A few decades after that, though, the intelligence is **strong enough to be a concern**.”

– *Bill Gates*

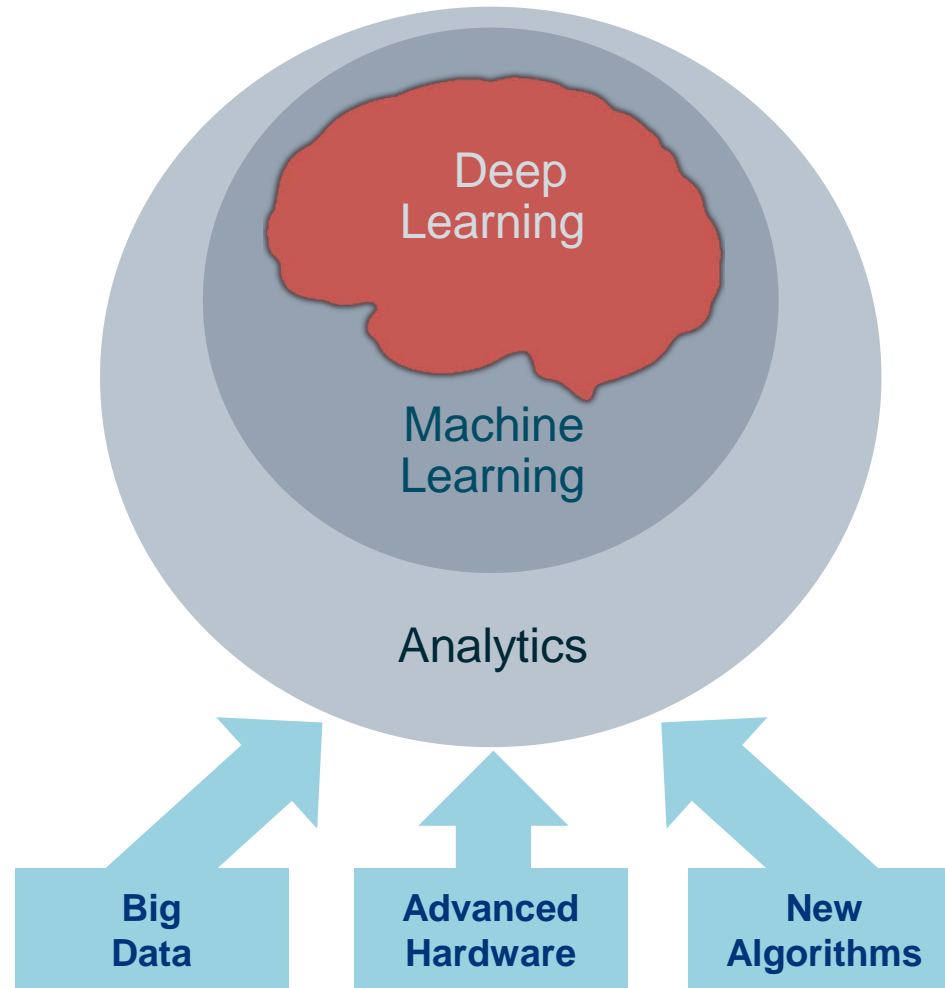


“The development of full **artificial intelligence could spell the end of the human race**.”

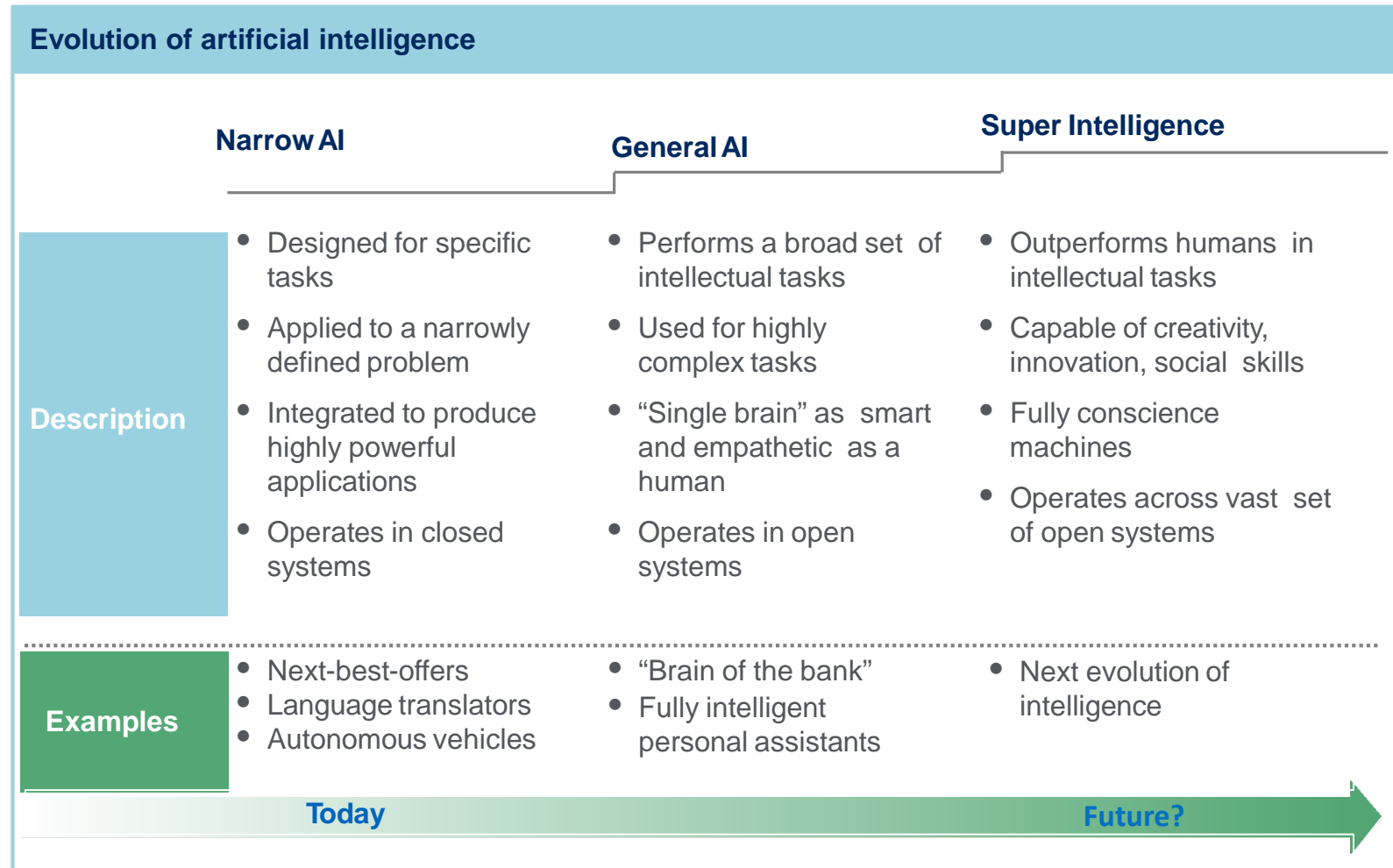
– *Stephen Hawking*







Three drivers have led to the rapid progression of AI



We are still in the early stages of AI development – all forms are instances of Narrow AI



Several key factors could constrain AI's advancement

Key factors that could constrain development of AI		Risk	Mitigation	<p>Preparing for the future of AI</p> <p>\$90B of growth in the global AI solutions market by 2020</p> <p>500,000 new data scientists will be needed by 2025</p> <p>40% of activities can be automated through AI</p> <p>+30% productivity increase by 2035</p>
<p>Finding suitable use-cases</p> 	<ul style="list-style-type: none"> Highly inflated expectations Imperfection of models 	<p><i>Honesty and awareness about what AI can and cannot do</i></p>		
<p>Access to big data</p> 	<ul style="list-style-type: none"> Exploitation of personal info Biased data Backlash 	<p><i>Building privacy and security into the design</i></p> <p><i>Shift of AI developer toward curation</i></p>		
<p>Scarcity of talent</p> 	<ul style="list-style-type: none"> Talent wars Technological unemployment 	<p><i>Grow technical, supportive and "business translator" talent</i></p> <p><i>Retraining of labour force</i></p>		
<p>Lack of platform tech.</p> 	<ul style="list-style-type: none"> Complex solutions for specific use-cases 	<p><i>Adopt, develop and train talent on platform technologies early</i></p>		

Source: New York Times; Accenture and Frontier Economics; MGI



Cyber Threats

- Cyber intrusions are a significant problem today
- Cyber crime will get worse over the next decade
- Potential for a dramatic impact on the world's appetite for e-commerce
- Many organizations are not fully prepared today - both for preventing the cyber event or for the aftermath of an intrusion such as a denial of service

YAHOO![®]



- Late 2014 – A “state-sponsored” hacker breaks through Yahoo’s network security and steals data belonging to at least 500 million accounts
- Technology publication Vice Motherboard tells Yahoo a hacker known as Peace had contacted it about a cache of 200m Yahoo credentials he was selling on the dark web. The site reports that Yahoo was already aware of the claim and was investigating the allegations
- An exhaustive audit of Yahoo’s security networks takes place. Finds no evidence of the allegation from Peace being true
- 2016 - In a preliminary filing to the SEC relating to the Verizon sale, Yahoo says it has no knowledge of “any incidents” of “security breaches, unauthorised access or unauthorised use” of its IT systems
- 2016 – Yahoo officially admits for the first time that it might consider selling its core internet business amid pressure from investors
- Yahoo publicly discloses the hack, saying it could affect at least 500m user accounts; these include accounts on Yahoo and photo-sharing service Flickr

EQUIFAX



- Equifax reports that it discovered data breach on July 29 2017
- Subsequently found breaches had been occurring May 13 to July 30
- Hackers will able to access 143 million customer files
- A cybersecurity arm of the U.S. Department of Homeland Security, US-CERT, "identified and disclosed" the Apache Struts flaw in March, Equifax said in a statement.
- And the company's security department "was aware of this vulnerability at that time, and took efforts to identify and to patch any vulnerable systems."
- Chief Information Officer and Chief Security Officer retire
- CEO resigns





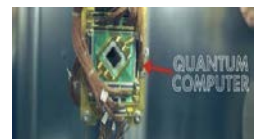
- 2016 hackers raid SEC's Edgar system used to file public company disclosure information
- SEC does not disclose the attack at the time it happened
- Sherrod Brown, the top Democrat on the Senate Banking committee
- “How are Main Street investors expected to have confidence that the SEC can hold big companies accountable when the SEC is not forthcoming?”
- Mike Crapo, the Republican chair of the committee
- “I was disturbed to learn that the SEC suffered a cyber breach of its Edgar system in 2016, but did not notify the public, or even all of its commissioners, until it was discovered during your recent review.”

Quantum Computing

“If Quantum encryption is not 1 millimetre ahead of Quantum computing, it could mean the end of electronic products and services.
Back to buggy whip banking.”



Quantum Computing



Quantum Computing

Mosca:

“20 qubits in 20 years”[NIST April 2015, ISACA September 2015]:

“1/7 chance of breaking RSA-2048 by 2026, 1/2 chance by 2031.”

Microsoft Research:

Recent improvements in control of quantum systems make it seem feasible to finally build a quantum computer within a decade. Use of a quantum computer enables much larger and more accurate simulations than with any known classical algorithm, and will allow many open questions in quantum materials to be resolved once a small quantum computer with around one hundred logical qubits becomes available. [October 2015]



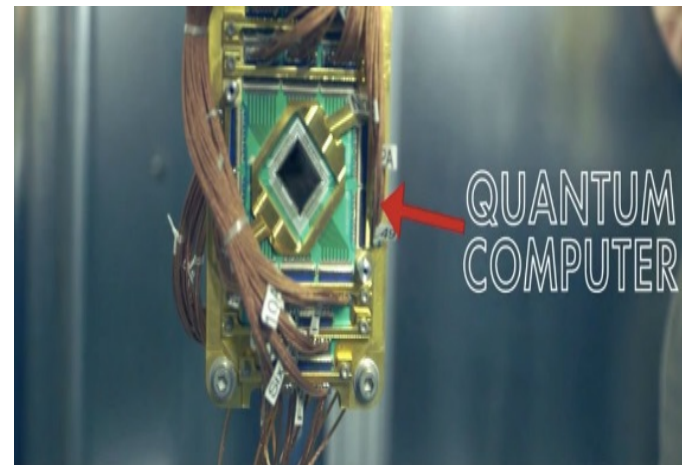
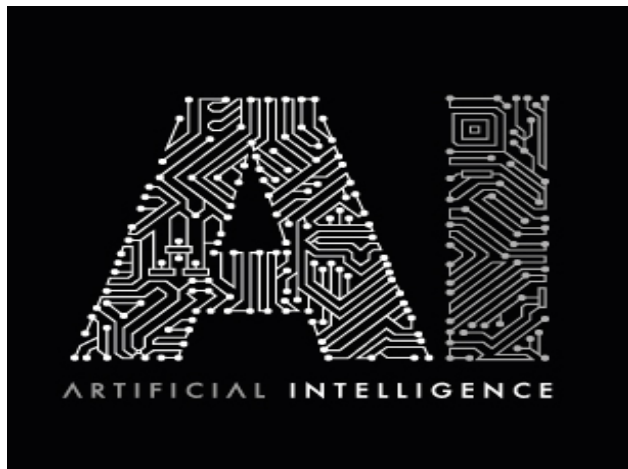
Quantum Computing – Benefits

- Safer airplanes
- Discover distant planets
- Win elections
- Boost GDP
- Detect cancer earlier
- Help automobiles drive themselves
- Reduce weather-related deaths
- Cut back on travel time
- Develop more effective drugs

Quantum Computing – Risks

- Quantum computers may be able to break every cryptographic key currently used to protect e-commerce
- There may be insufficient lead time to both develop and to implement new quantum ready cryptographic keys before quantum computing is a reality
- Weak links in supplier chains and clients may exist post quantum even if your e-commerce applications are protected

Technology Will Disrupt All Existing Relationships



GRI Website – www.globalriskinstitute.org

Publications Library

TITLE	AUTHOR	THEMES	
A Comparison of Survey and Incentivized-Based Risk Attitude Elicitation	Jim Engle-Warnick, Diego Pulido, & Marine de Montaignac	Risk Management Best Practice	
Cyber Risk & Security	Josh Yavor & Brian O'Donnell	Cyber security and Fraud	
CAT Bond – Premium Spreads	Mary Hardy and Fan Yang	Climate Change and Environmental Risks	
Breaking Bad Data & Solving for AML	Abhishek Mehta & Eliud Polanco	Technology Innovations	
Climate Change and Long-Run Discount Rates: Evidence from Real Estate	Stefano Giglio, Matteo Maggiori, Johannes Stroebel, and Andreas Weber	Climate Change and Environmental Risks	May 23, 2017
A Resource Estimation Framework for Quantum Attacks Against Cryptographic Functions	Michele Mosca	Cyber security and Fraud	May 11, 2017
Incentives Behind Clearinghouse Default Waterfalls	Agostino Capponi	Systemic Risk	May 11, 2017
Managing Carbon Risk: A Look at Environmentally Conscious Indices	Alex LaPlante, Charlotte Watson	Climate Change and Environmental Risks	May 5, 2017

The screenshot shows the GRI website homepage. At the top, there is a navigation menu with links for ABOUT, IDEAS, EVENTS, EDUCATION, and RESEARCH. The main content area features a large banner for a research report titled "A Comparison of Survey and Incentivized-Based Risk Attitude Elicitation" dated 10 JULY 2017. Below the banner, there is a "Welcome" section with "OUR MISSION" and "NEWS" sub-sections. On the right side, there is a vertical list of featured articles, including "A Comparison of Survey and Incentivized-Based" (10 JULY 2017), "Cyber Risk & Security" (4 JULY 2017), "CAT Bond – Premium Spreads" (19 JUNE 2017), and "Breaking Bad Data & Solving for AML" (6 JUNE 2017).



Questions