

Exponential Changes in the Labour Market/ Future Careers

Lawrence Park Collegiate Institute

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Workshop Description

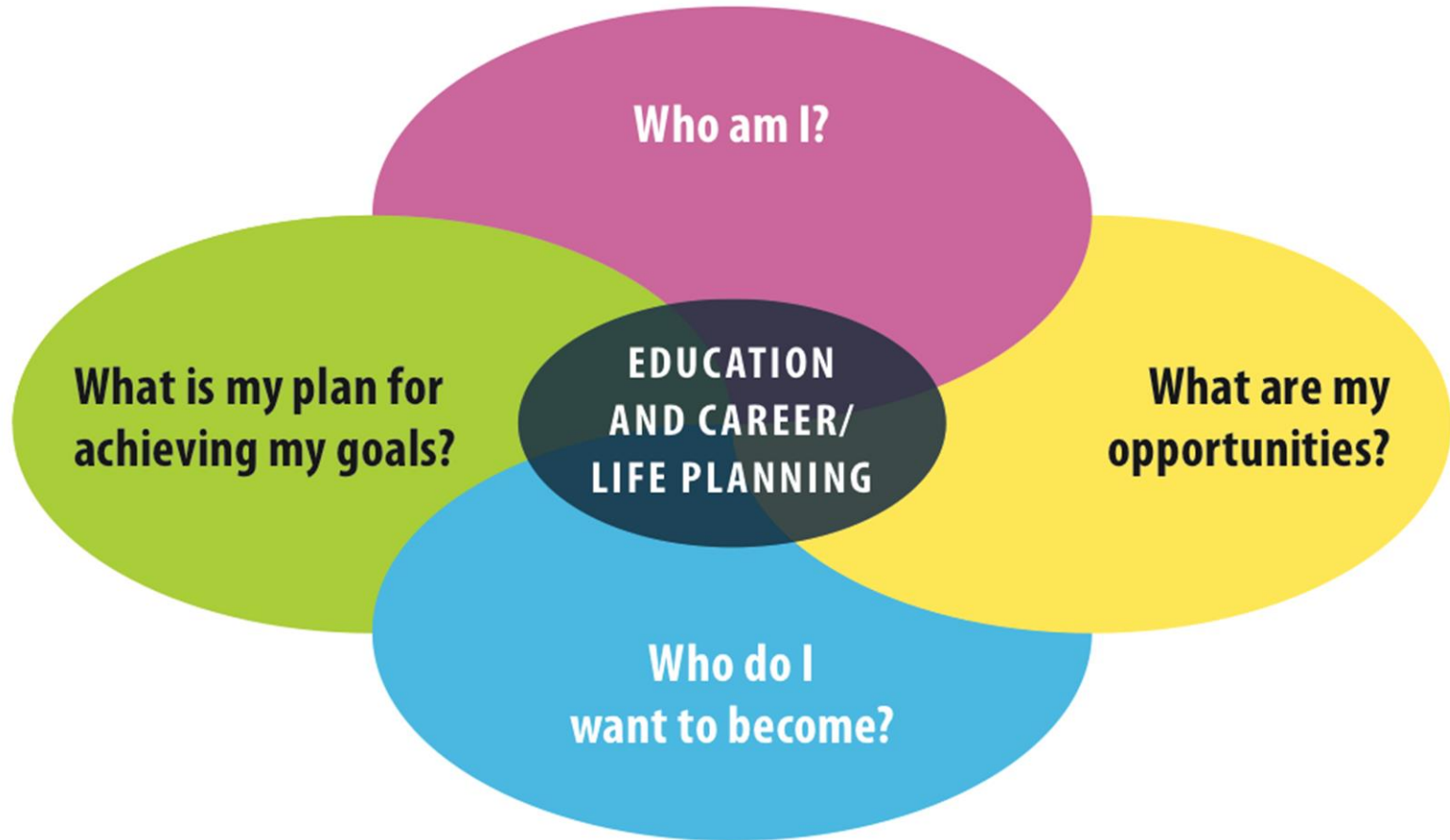
- ▣ **Exponential Changes:** What the futurists are predicting about emerging industries and the creation of billions of new jobs. How to be “future looking” and aligning education and career plans with what is coming in fields like nanotechnology, 3-D printing of everything from houses to human organs, genetics (for elimination of chronic diseases), green solutions for energy, and macrowikinomics.



Agenda

- ▣ Introduction – “Future Looking” at Opportunities
- ▣ Futurists’ outlooks
 - Thomas Frey
 - Jack Uldrich
 - Thomas Friedman
 - Don Tapscott
- ▣ Some views from World Economic Forum 2016
 - Fourth Industrial Revolution
- ▣ Resources for futuristic Education and Career/Life Planning
 - Career Moves
 - University of Waterloo Programs for High School Students
 - ▣ Quantum Cryptography, ...
 - CareerMash.ca
- ▣ Wrap-up, Q & A

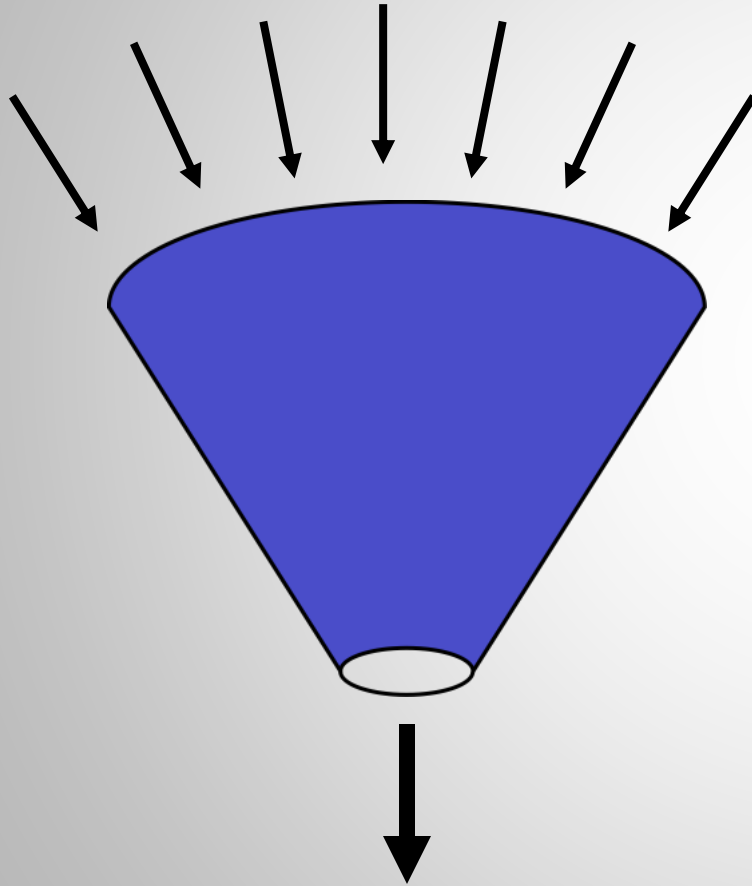
What are my Opportunities?



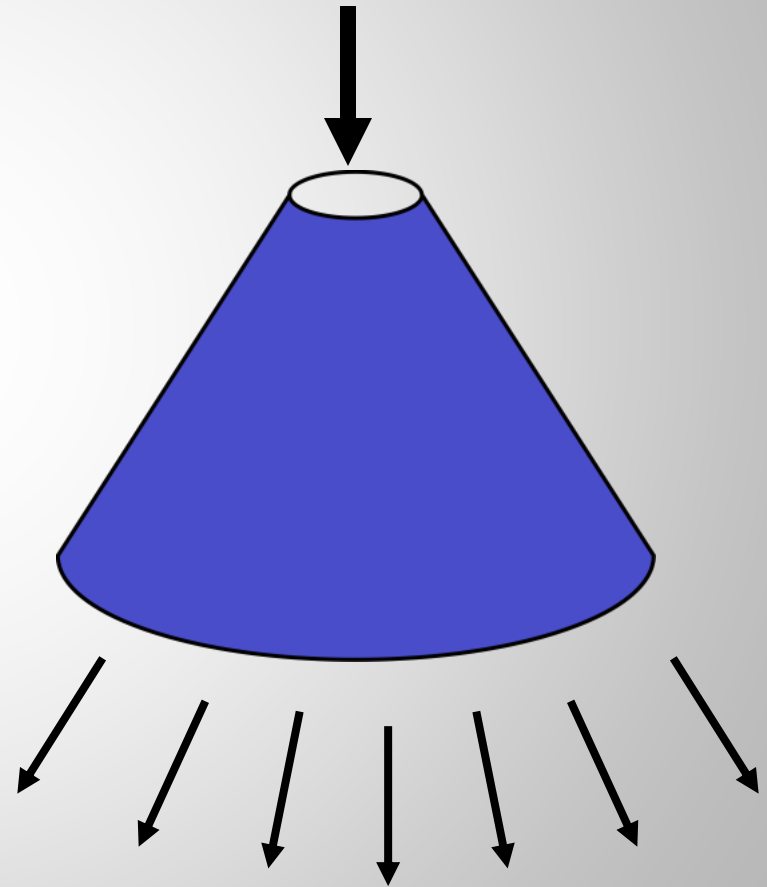
“Future Looking” in exploring opportunities

- ▣ Much of what students look at and have some knowledge and experience is based on what has been and is.
- ▣ Even future job prospects are largely based on seeing the occupations in their current form
- ▣ Being “future looking” is considering fields of work from a future perspective —
 - What might be in 5 - 10 - 20 years from now
 - Getting engaged in creating things and services that are new, different, innovative, a stretch of the imagination, ...

Generating career possibilities

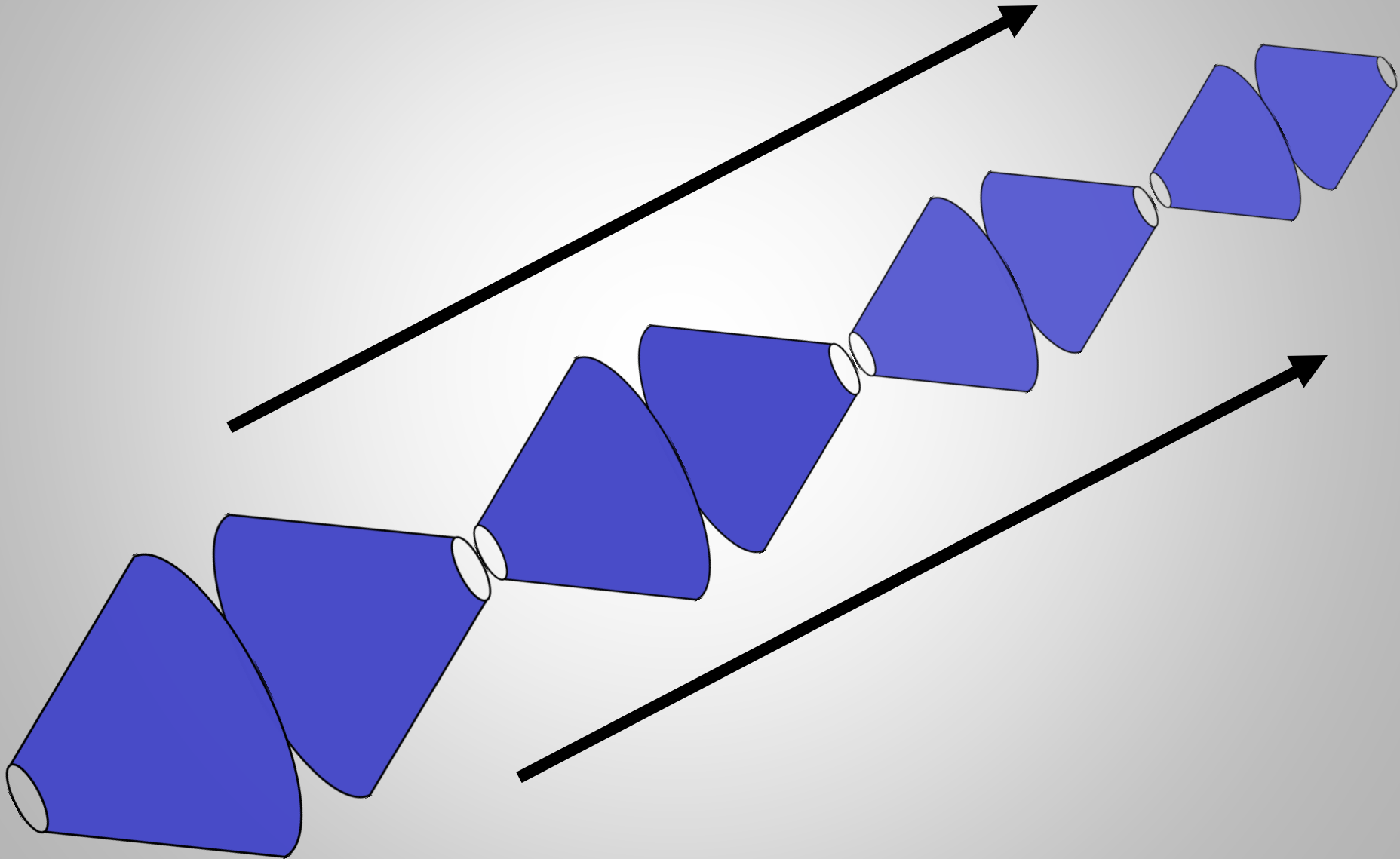


the "funnel"



the "lampshade"

Looking at POSSIBILITIES



21st Century Knowledge & Skills

- ▣ Creativity, Innovation and Entrepreneurship
- ▣ Critical Thinking
- ▣ Collaboration
- ▣ Communication
- ▣ Character
- ▣ Culture and Ethical Citizenship
- ▣ Computer and Digital Technologies
 - From *Shifting Minds: Canadians for 21st Century Learning & Innovation*

Futurists' Outlooks

Advice from Thomas Frey, Senior Futurist at the DaVinci Institute

“The greatest value in understanding the future comes from spotting the major cultural, demographic, societal, and economic shifts early and translating them into viable business strategies.”

Thomas Frey

- ▣ We tend to be “backward looking” because we usually refer back to our own past experiences
- ▣ Important to be “future looking” and aligning our plans with what is coming and taking control in creating that future
- ▣ New in the past 10 years – i-pod, i-pad, i-phone, GPS, e-commerce, changes in security measures, ...

Thomas Frey

Looking to the near-term future (10 years)

- ▣ Proliferation of mobile apps: 800,000+, soon more than books (3 million)
- ▣ Peripheral devices: use smart phone for blood pressure, heart rate, ultrasound, ...
- ▣ Internet of things (IoT): vehicles, appliances, buildings will communicate and run tasks on their own (e.g., car identifies available and cheapest parking)
- ▣ Fluid business model: employers hire fewest people for projects/short periods, e.g., like movie production – crew disbands when done
- ▣ People with expertise will form “business colonies” ready to fulfill projects (fewer “permanent” jobs)

24 Future Industries for Super Employment—Catalytic Innovation

- 1.) Atmospheric Water Harvesting
- 2.) Commercial Drone Industry
- 3.) Software Developers
- 4.) Mobile Apps
- 5.) Our Trillion-Sensor Future
- 6.) 3D Printing
- 7.) Cancer Immunotherapy
- 8.) LEDs
- 9.) Big Data
- 14.) Mass Energy Storage
- 15.) Micro Grid Conversion
- 16.) Hyperspeed Transportation Systems
- 18.) Driverless Everything

*By 2030 2 billions jobs with disappear; 2.6 new jobs created for each job lost

▣ <http://www.futuristspeaker.com/2013/11/>

World Future Society

www.wfs.org

FORECASTS ON 9 FIELDS

http://www.wfs.org/Forecasts_From_The_Futurist_Magazine

- ▣ Business & Economics
- ▣ Energy
- ▣ Environment & Resources
- ▣ Food & Agriculture
- ▣ Habitats
- ▣ Health & Medicine
- ▣ Information Society
- ▣ Science & Technology
- ▣ World Affairs

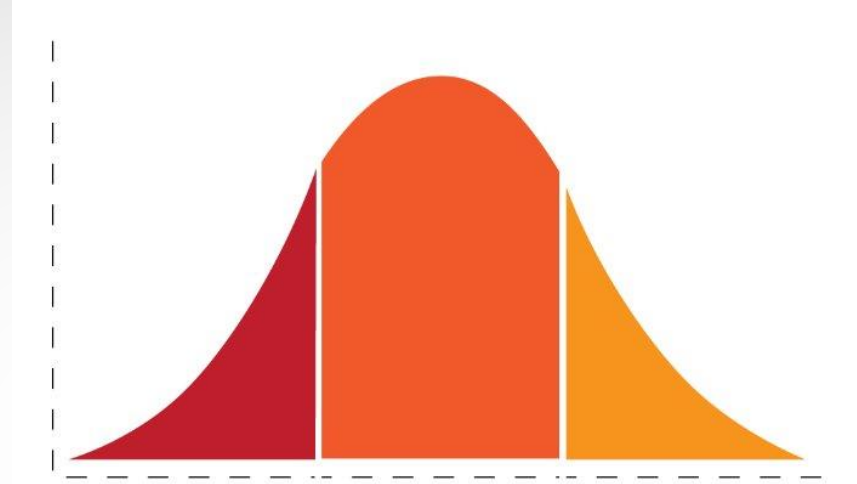
Futurist Jack Uldrich

www.jackuldrich.com

- ▣ Technology is growing exponentially and new technologies are replacing old technologies every day —
 - Land line, to mobile phone to smart phone, wrist phone...
 - Movie films, VHS, DVDs, NetFlix, ...
 - Encyclopaedias, Encarta, Wikipedia, ...
 - Mainframe computers, PCs, laptops, tablets, ...

Jack Uldrich

▣ Jump the Curve



▣ Education: Unlearn

- Unlearn the belief: Go to university, study anything, get a well-paying job. This was a safe bet before – not any more. Many people achieve great success going to college, apprenticeship/trades, workplace and entrepreneurship
- What's possible – what we don't know may be more important than what we know at this time;
- Imagination is more important than knowledge

Nanotechnology

- ▣ Nanotechnology deals with the very small--the art and science of manipulating and rearranging individual molecules to create useful materials, devices, and systems
- ▣ Within a decade, nanotechnology should account for 1 trillion worth of products in the United States alone.
- ▣ It will create anywhere from 800,000 to 2 million new jobs
- ▣ It will have huge effects on many industries, including manufacturing, health care, energy, agriculture, communications, transportation, and electronics
 - Jack Uldrich, 2012, *Investing In Nanotechnology: Think Small. Win Big*
 - Some of his other books: *Green Investing*, *Foresight 20/20*, *Jump the Curve*, ...

Nanotechnology

- ▣ Some current applications in development:
 - New material, graphene, speeds up recharging of electric car from 4 hrs to 30 sec
 - Nanosensors detect cancer cells
 - Nanocapsules are sent directly to cancer cells to kill them only
 - Nanoparticles used to administer gene therapy
 - Implanted medical devices detect, prevent and treat diseases
 - Nanowire-based solar cells double light absorption and double electrical output
 - New nanomaterials facilitate catalytic reaction between hydrogen and oxygen producing electricity used for cars, homes,

Thomas Friedman

- ▣ *The World Is Flat* (2005) addressed globalization and its effects on the economy and the opportunities for individual empowerment through digital media.
- ▣ Global competition affected most occupations except those that can't be off-shored, e.g., the trades and some personal services
 - Millions were lifted out of poverty but there have been environmental costs.

Thomas Friedman

- ▣ *Hot, Flat, and Crowded, Why we Need a Green Revolution and How it can Renew America (2008)*
- ▣ 5 Key problems:
 - Energy and natural resources supply & demand; petrodictatorship by energy producing countries; climate change; energy poverty (electrical blackouts); loss of biodiversity (deforestation, overfishing, pollution...)

Thomas Friedman

- ▣ Code Green solutions:
 - Design, build, use and export green technologies for producing clean electrons, clean water, clean air, and healthy and abundant food
 - Start of a new era: “Energy-Climate Era”
 - Opportunity for America to take a world leadership role – are we doing it?

Don Tapscott

dontapscott.com

- ▣ A leading influential thinker in the world (2015 Thinkers50 Awards)
- ▣ Global Solutions Award, for contributing most to the world's understanding of globalization and emerging markets.
- ▣ Some of his books:
 - *The Digital Economy* (1994) Anniversary Edition (2014)
 - *Macrowikinomics: New Solutions for a Connected Planet* (2010, rev. 2012)
 - *Grown Up Digital: How the Net Generation is Changing Your World* (2008)
 - *Wikinomics: How Mass Collaboration Changes Everything* (2006)

Don Tapscott

- ▣ 5 Principles of Wikinomics
 - Collaboration; openness; sharing; integrity and interdependence
- ▣ Applications
 - Financial services, innovation & wealth creation, reversing the tide of disruptive climate change, green energy, transportation, collaborative learning, science, health care, news media, music, TV & film, government, citizenship, global problem solving, justice & freedom, leadership

ZONE LEARNING

www.ryerson.ca/zonelearning/

- ▣ Ryerson University's Zone Learning Centre is a good example of students collaborating on innovative ideas
- ▣ The Centre has been expanding and includes
 - DMZ – Incubator for entrepreneurial leaders
 - Centre for Urban Energy
 - Fashion Zone
 - Design Fabrication Zone
 - Transmedia Zone
 - Social Ventures Zone
 - Launch Zone – Exploration of innovation and entrepreneurship
 - Legal Innovation Zone
 - Biomedical Zone
 - iBoost Zone – Helping technology entrepreneurs

Don Tapscott

- ▣ New book entitled *BLOCKCHAIN REVOLUTION: How the Technology Behind Bitcoin is Changing Money, Business, and the World* is co-authored by his son [Alex Tapscott](#).
- ▣ This will be the first book to explain why blockchain technology – a truly open, distributed, global platform – will fundamentally change what we can achieve online, how we do it, and who can participate.

Blockchain Technology

- ▣ In essence, the blockchain is a giant ledger that keeps track of who owns how much bitcoin.
- ▣ Owning bitcoin is merely having a claim on a piece of information sitting on the blockchain.
- ▣ The same could be said of how a bank keeps track of how much money is kept in each of its accounts. But there the similarities end.
- ▣ Unlike a bank's ledger, which is centralised and private, the blockchain is public and distributed widely. Anyone can download a copy of it. Identities are protected by clever cryptography; beyond that the system is entirely transparent.

A Net Generation and the Digital Economy

- ▣ Digital natives can lead the transition from the industrial age to the new civilization based on principles of collaboration, openness, sharing of intellectual property, interdependence and integrity.
- ▣ Through digital media they can engage in opportunities to transform science, health, education, energy, environment, business and finance.

World Economic Forum 2016

- ▣ The forum's 46th annual meeting at Davos, in the Swiss Alps, had at the heart of its agenda a theme entitled 'Mastering the Fourth Industrial Revolution' - as delegates discussed how best to respond to the rapid technological change that is disrupting most industries throughout the global economy

Fourth Industrial Revolution

INDUSTRIAL REVOLUTION TIMELINE

First

Water and steam power is used to create mechanical production facilities.



1800

1784: First mechanical loom

Second

Electricity lets us create a division of labor and mass production.



1900

1870: First assembly line

Third

IT systems automate production lines further.



2000

1969: First programmable logic controller

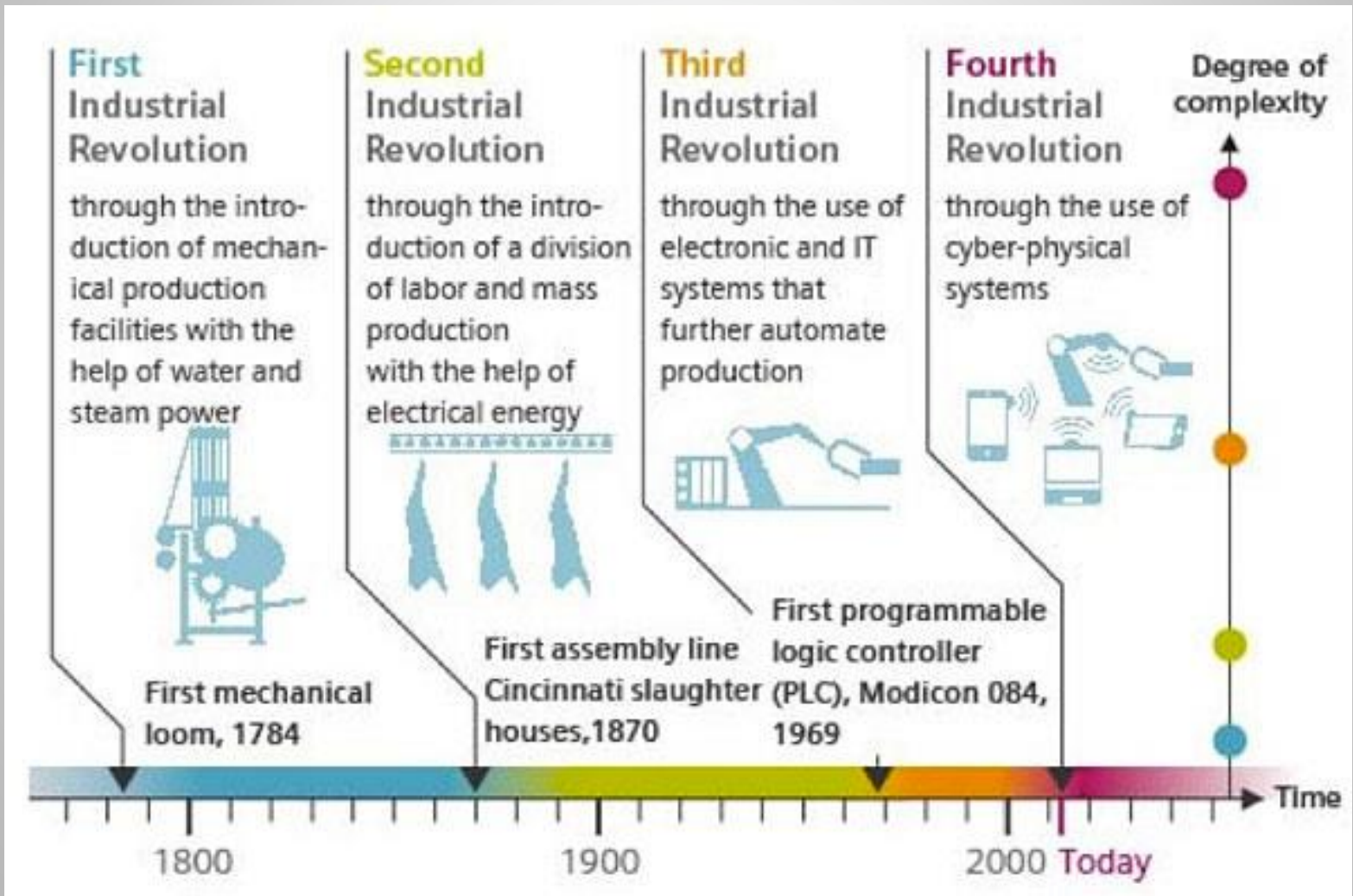
Fourth

IoT and cloud technology automate complex tasks.



Today

Fourth Industrial Revolution



Thinking Robots



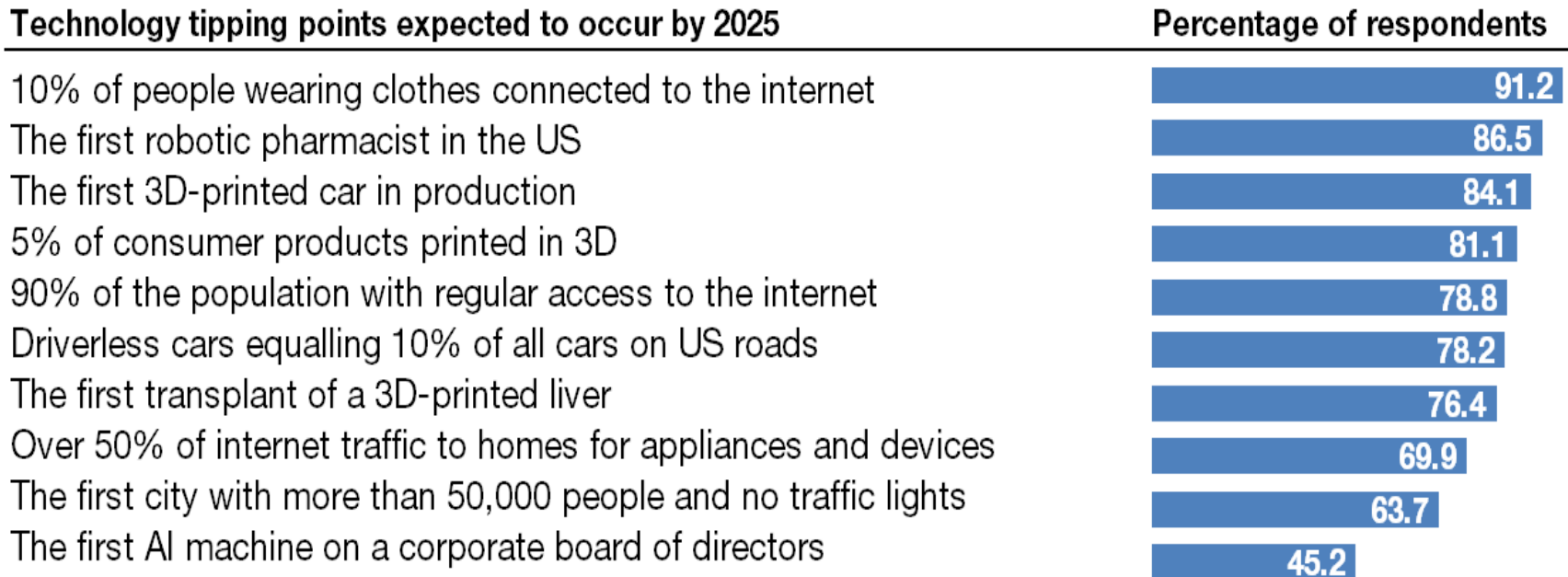
Expectations from Technology



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

When will the future arrive?

800 technology executives and experts from the information and communications technology sector were surveyed as part of our *Technology Tipping Points and Societal Impact* report



Some Student Resources for Futuristic Education and Career/Life Planning

Career Moves: Skills for the Journey

- ▣ Teacher's Kit produced by the Perimeter Institute for Theoretical Physics, Waterloo ON
- ▣ For Career Studies and Career Education
- ▣ Activity 6: Thinking Globally
 - 5 Areas of change and growing needs
 - Demographics
 - Globalization
 - Technology
 - Infrastructure
 - Environment
- ▣ Free kit available from www.perimeterinstitute.ca



THINKING GLOBALLY

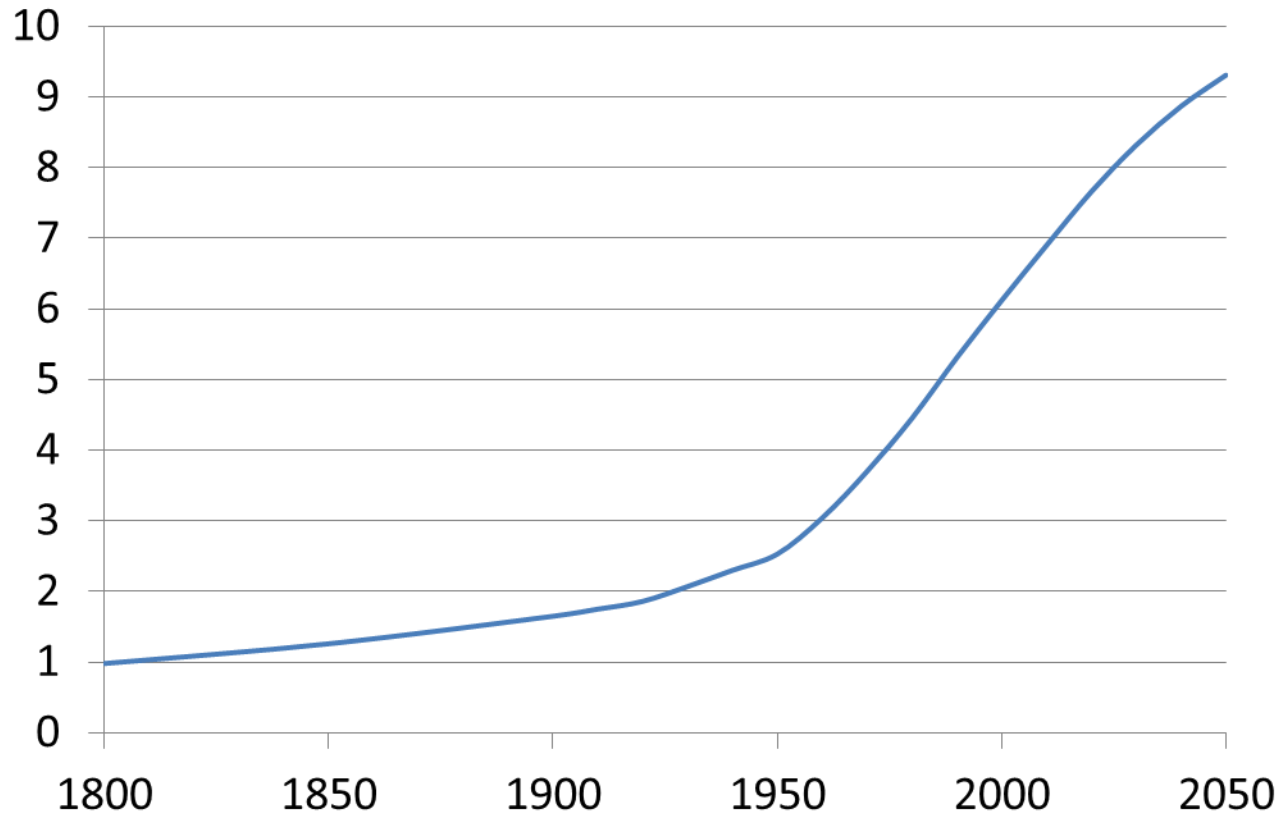
The world is changing...
are you preparing for it?

Trends to consider...

- **Demographics:**
How is the population changing?
- **Environment:**
How is the planet changing?
- **Globalization:**
How is the economy changing?
- **Technology:**
How is technology changing?
- **Infrastructure:**
How do we support a growing world?

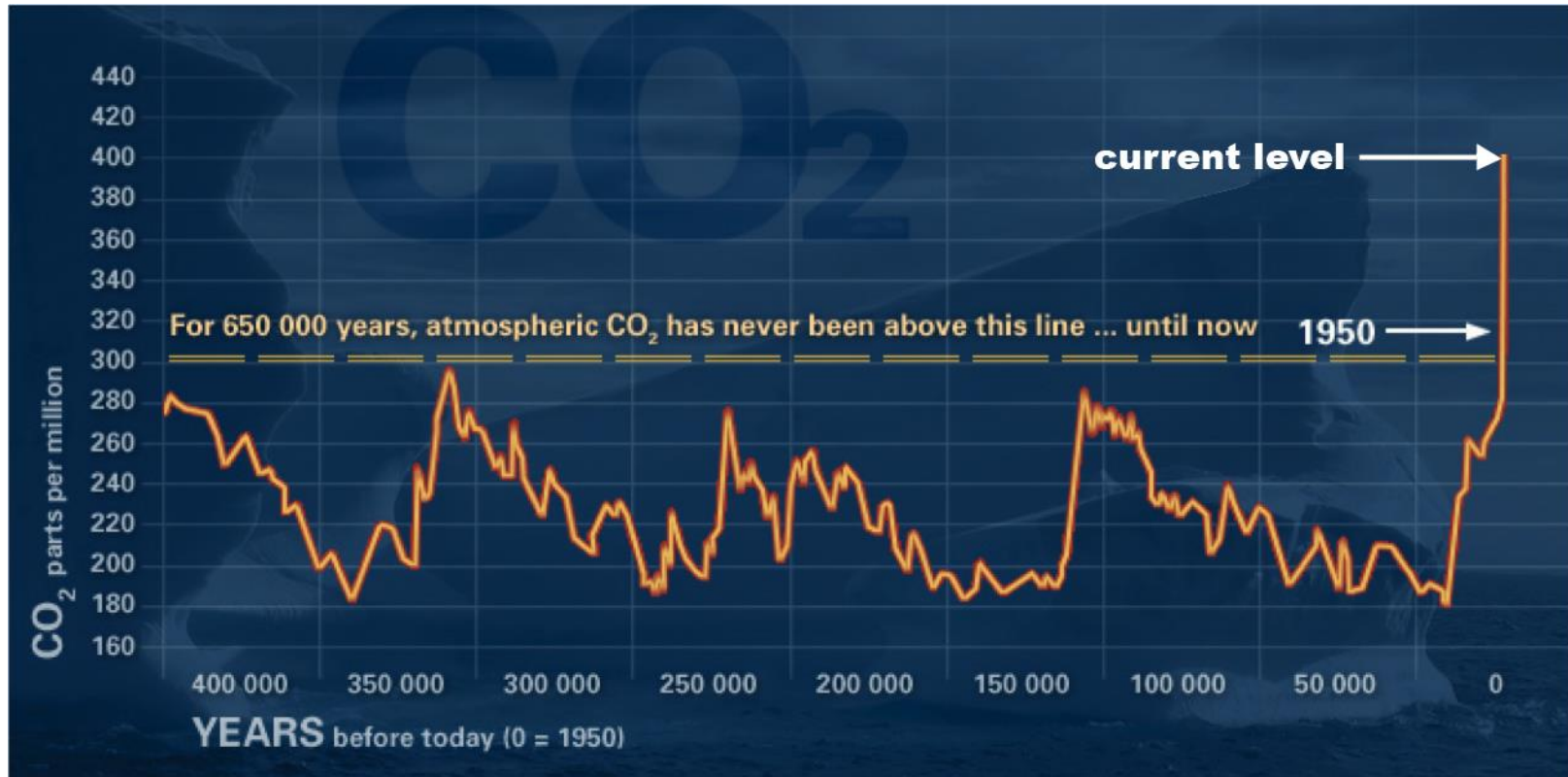
Demographics: World Population

(billions of people)



How does a growing population change your world?

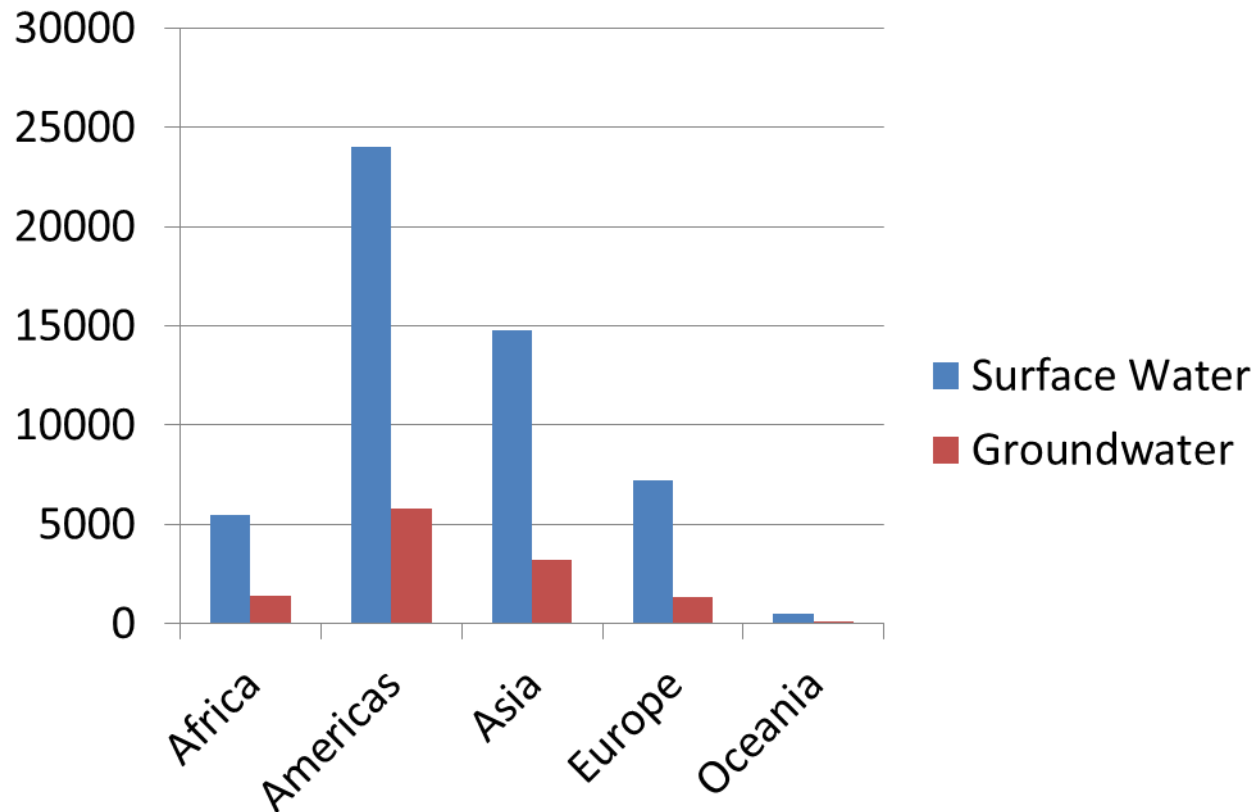
Environment: Climate Change



How is climate change impacting the economy?

Environment: Freshwater Supply, 2011

(x 10⁹ m³/yr)

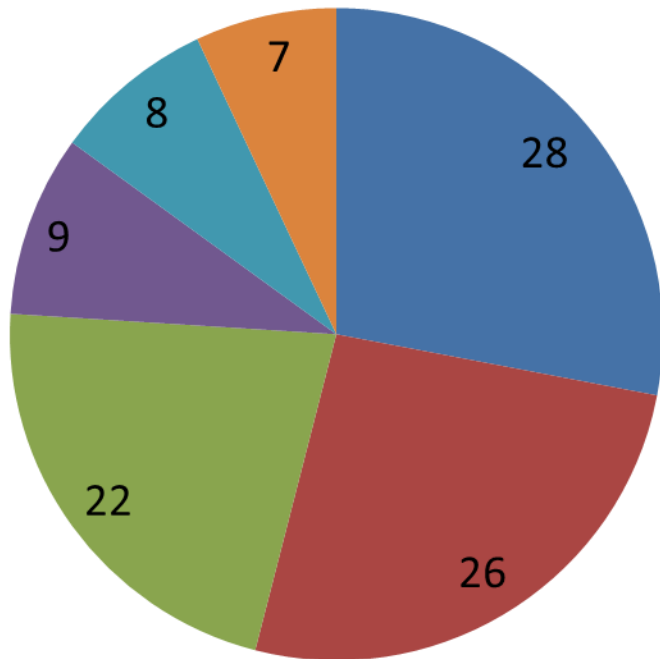


Who has access to the most freshwater?

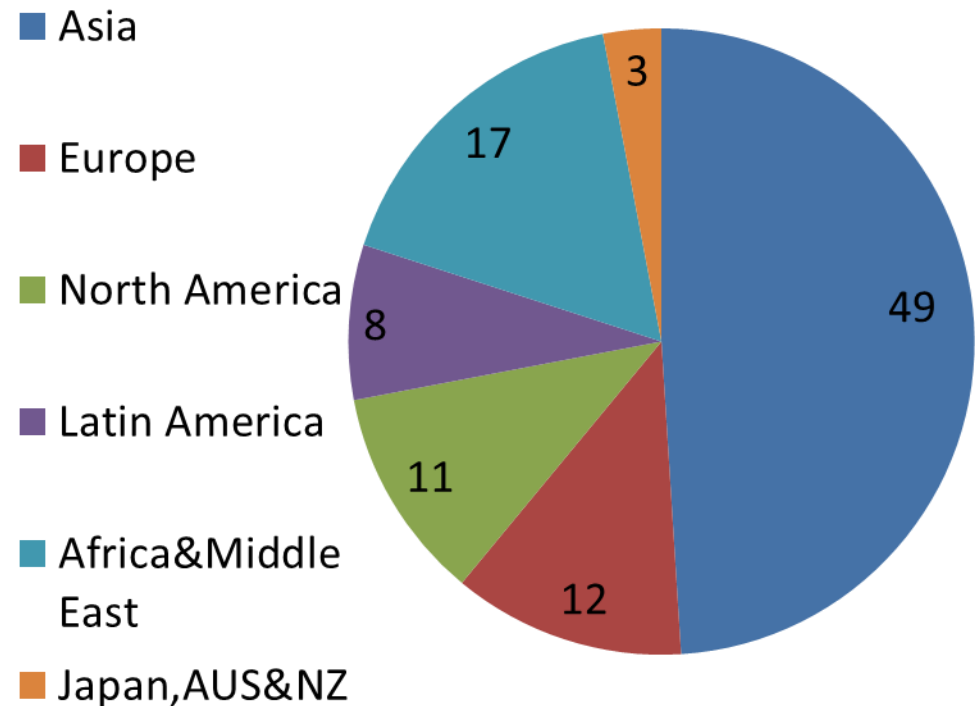
Globalization: Wealth Distribution

(Composition of World GDP)

2010

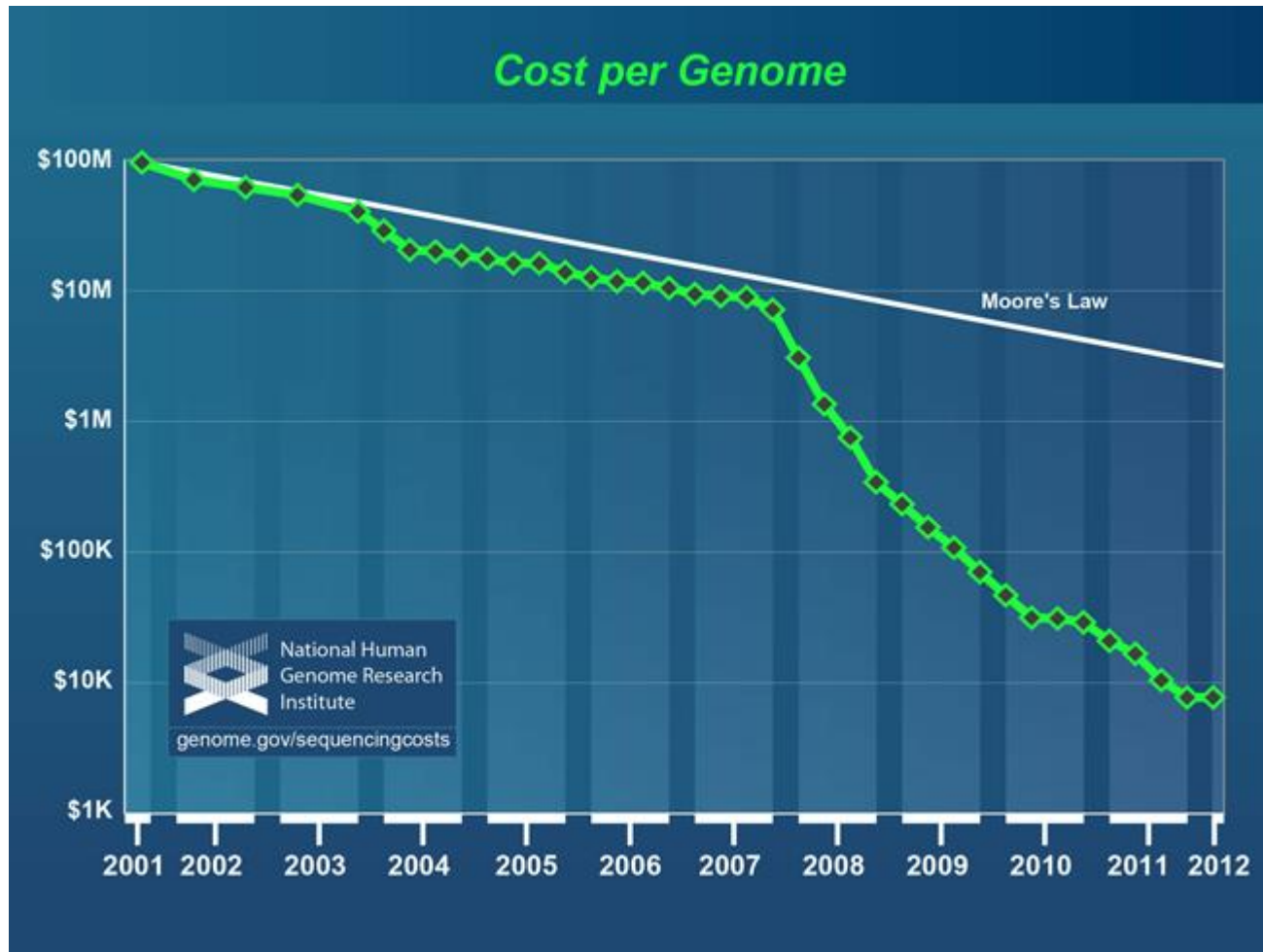


2050



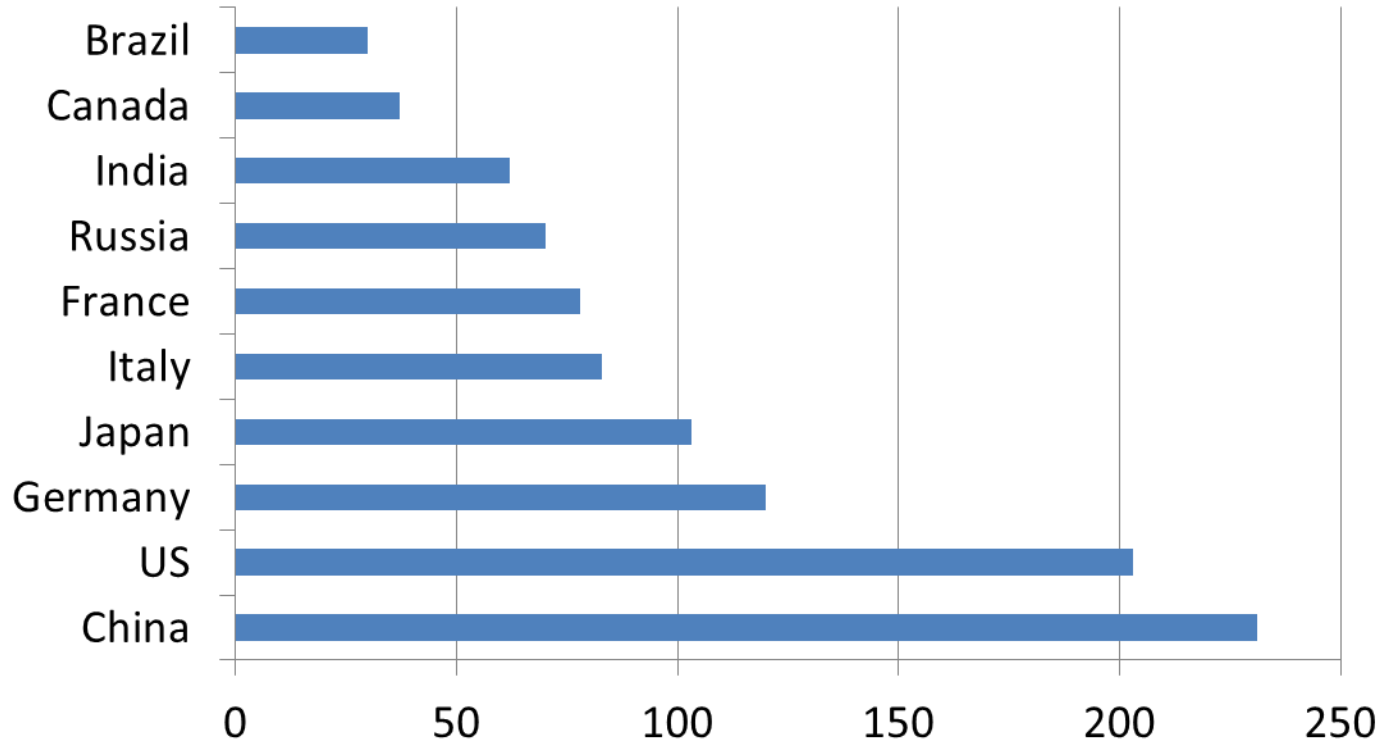
Who is going to be generating the wealth?

Technology: Genetic Testing



How will this change healthcare?

Infrastructure: Rail Construction 2000-2030 (USD billions)



Who will build these railways?

Question for the youth today...

How will **you** prepare for
this changing world?

Grade 10 Program Theme of “Change” University of Waterloo

- ▣ May 15 – 19, 2016 | 5- day program
- ▣ We live in the midst of change: technological change, social change, political change, environmental change. In modern times humankind has experienced an unprecedented rapidity of change. How do we adapt, or not adapt... and what are the consequences? Students will consider the perspectives of scientists, engineers, writers, and philosophers, as they examine the dynamics of “Change”.
- ▣ Program fee: \$500 (includes meals; includes HST
Supervised residence accommodation: \$160
- ▣ Application Deadline: March 9th, 2016

Other U of W Programs

- ▣ Grade 11 Program | Theme of “Design” |
March 14 - 18, 2016 | 5-day program
 - Application Deadline: December 16th, 2015

- ▣ Grade 12 Program | Road Map to Research |
Nov. 18 – 20, 2015 | 3-day program

U of Waterloo: IQC

New field – Quantum Physics

Application in Computing

The Quantum Cryptography School for Young Students (QCSYS) is an eight-day camp at the Institute for Quantum Computing (IQC) that gives 40 students in Grades 11 and 12 hands-on experience in the this cutting-edge field. This year QCSYS runs from August 5-12, 2016.

Quantum Cryptography

- ▣ Every time you perform an online transaction, such as a purchase or bank transfer, you entrust your personal data to a secure encryption system. Such encryption is based on mathematical problems too difficult for present-day computers to crack, which is why your information is relatively safe. But future computers – quantum computers in particular – will be able to decrypt many such coded messages. We need new cryptographic tools that are secure in a quantum world. Fortunately, the rules of quantum mechanics enable codes that cannot be broken with any amount of computing power.
- ▣ University of Waterloo, Institute for Quantum Computing

Bob, Alice and Eve

The Institute for Quantum Computing (IQC) is home to Alice, a photon receiver in a Quantum Key Distribution (QKD) system. Alice's counterpart, Bob, is housed in an office at Waterloo's Perimeter Institute for Theoretical Physics. Alice and Bob receive entangled (highly correlated) photons emitted from a crystal excited by a laser. By measuring the unique polarization of the photons, Alice and Bob receive random (but identical) "keys" which can be used to encode messages.

Eve?

Bob



www.CareerMash.ca



The CareerMash Tech Career Resource Kit for Guidance Counsellors and Teachers



www.CareerMash.ca

- ▣ Stories and opportunities of combining(mashing) ICT with most fields of work
 - i.e., Art Humanities Crime Solving Education Music Entrepreneurship Fashion Retail Sports Health
 - Taking on roles of Leader, Innovator, Builder, or Support Professional (or a combination)

- ▣ The Resource
 - Introduction to Tech Careers
 - Student Activities and Discussion Ideas using the CareerMash website
 - Using CareerMash for Experiential Learning
 - Mentoring Relationships through CareerMash

Wrap-Up

- ▣ Learning from the futurists stimulates creative and positive brainstorming on opportunities for youth – helps them get excited and energized in creating a better world – to have new dreams!
- ▣ Empowers youth to take control by being entrepreneurial in creating their own work and solutions for a better future
- ▣ Puts into operation the principles of Supply & Demand: Identifying needs and supplying the solutions creatively with innovation and entrepreneurship (Solve the “skills gap”)

Top Skills for the Future

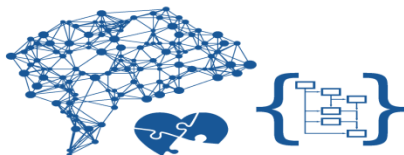
Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Youth “Future Looking” NOW

- ▣ See a need, issue or idea

- ▣ Seek a solution and take action
 - Craig Kielburger, 12 years old

- ▣ Opportunities:
 - get a job (traditional...in an innovative start up...growing field...)
 - create your own job and many more for others
 - create and innovate everywhere

Q & A

- ▣ My contact information
 - Emil.Boychuk@gmail.com
 - 416-476-8790

- ▣ Association of Career Educators
 - www.aceofontario.ca

ACE

- ▣ The Association of Career Educators (ACE) provide workshops for parents and students
- ▣ We provide personal education and career counselling
- ▣ Our Association is a forum for all interested in promoting, supporting and delivering career development programs and services especially for youth
- ▣ Please visit www.aceofontario.ca for more information