Social Change:
Globalization, Digitization, and Climate Change

Presented by Dr. David Gould

Purpose

To review …..

Social change from a globalization, digitization, and climate change perspective

And

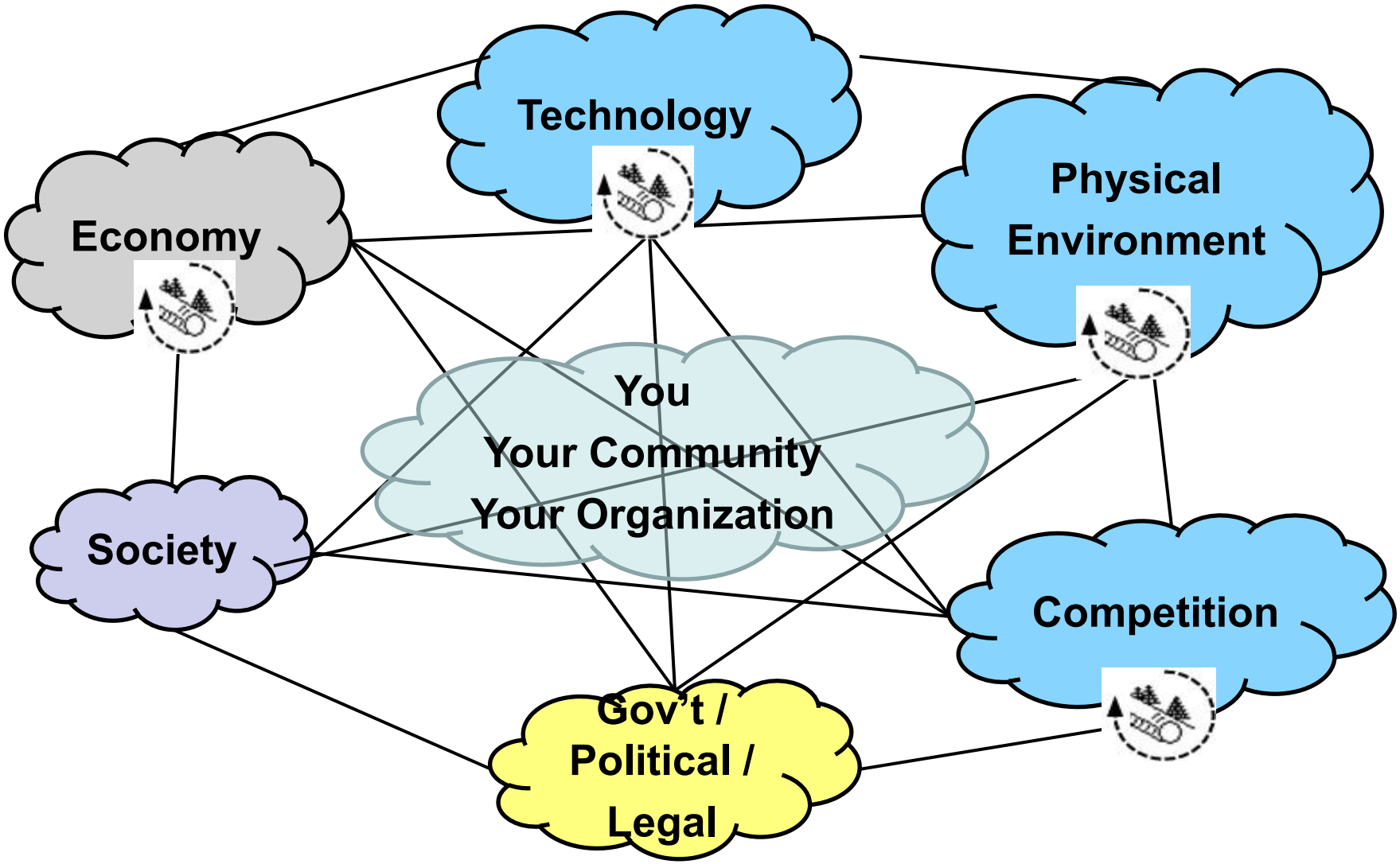
To think about implications for leadership and possible research ideas

Contents

- Environmental Context
- Our Biggest Challenge
- Globalization
- Digitization
- Climate Change
- Wrap up

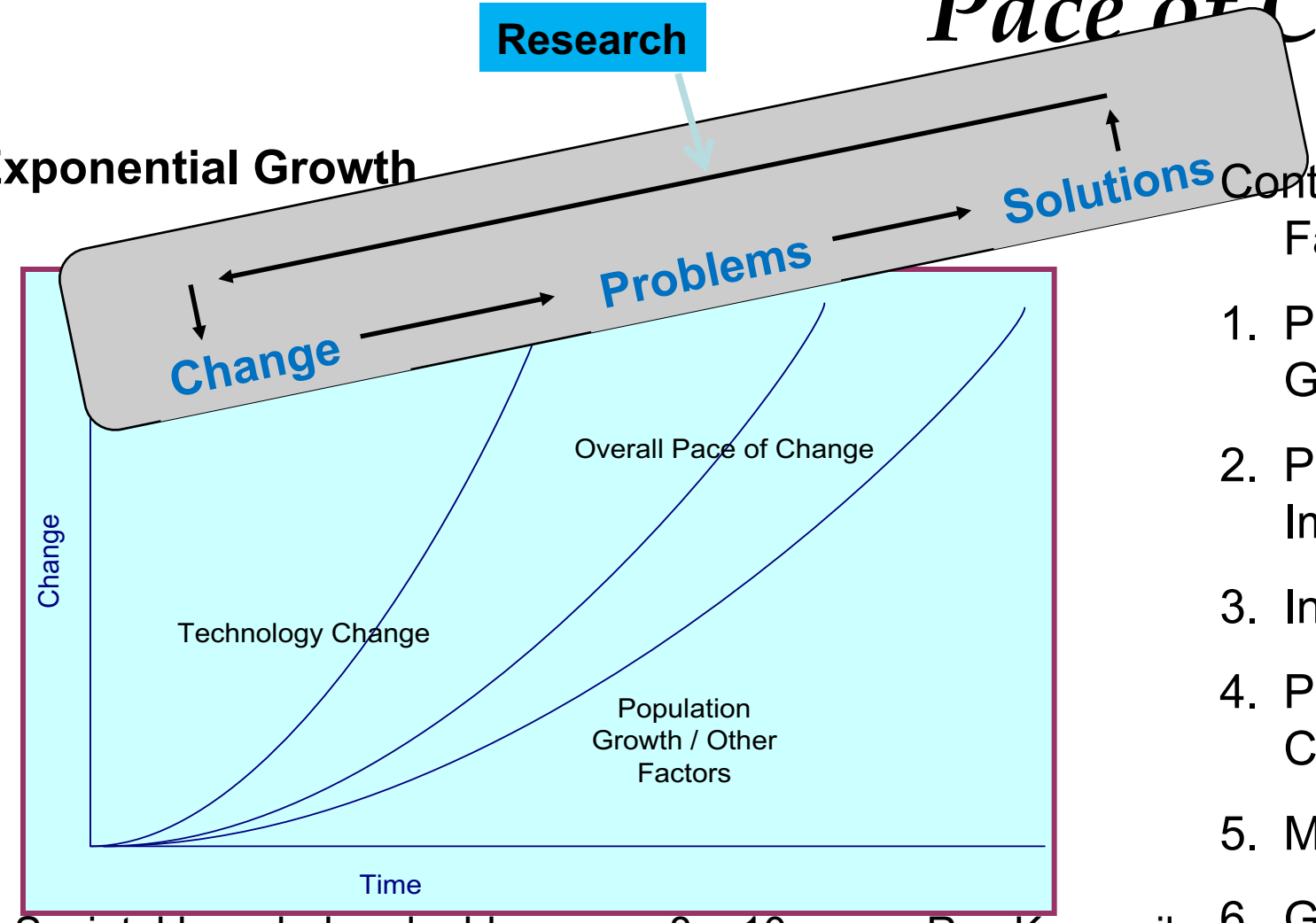
The Environment

A network of complex systems



Pace of Change

Exponential Growth



Societal knowledge doubles every 8 – 10 years: Ray Kurzweil

Processing speed doubles every 12 – 18 months: Moore's Law

Contributing Factors

1. Population Growth
2. Process Improvement
3. Innovation
4. Product Combinatorics
5. Market Demand
6. Globalization
7. Cost Reductions

Our Biggest Challenge?

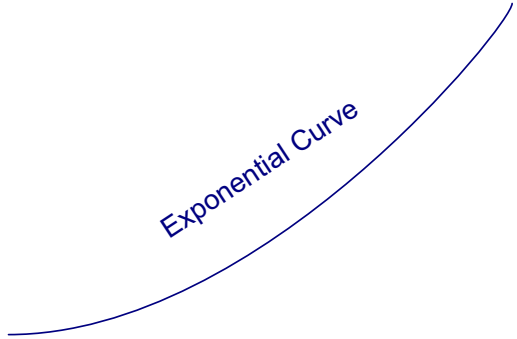
- The biggest forces on the planet—the market, Mother Nature, and Moore's Law—are all surging, really fast, at the same time.
  - The Market (globalization)
  - Moore's Law (digitization)
  - Mother Nature (climate change)

Globalization

- World economies integrating faster and more tightly together than ever before.
  - Implications: Stakeholders (customers, investors, managers, and workers) more interdependent yet exposed to world wide trends, risks, threats, and opportunities.

Implications, research ideas, social changes?

Digitization



- Moore's Law: computing capacity doubles every 24 months
  - Along with anything else information based, such as communication links, storage, knowledge, and organizations. Actual time may vary, but the pace is exponential

Implications, research ideas, social changes?

Climate Change

"The rapid growth of carbon in our atmosphere and environmental degradation and deforestation because of population growth on earth."

Implications, research ideas, social changes?

“The only fix involves big, hard things that can only be built together over time: resilient infrastructure, affordable heath care, more start-ups, and lifelong learning opportunities for new jobs, immigration policies that attract talent, sustainable environments, manageable debt, and governing institutions adapted to the new speed.”

Implications, research ideas, social changes?

"Global challenges facing humanity are transnational in nature and transinstitutional in solution."

Source: The Millennium Project

Implications, research ideas, social changes?

Globalization

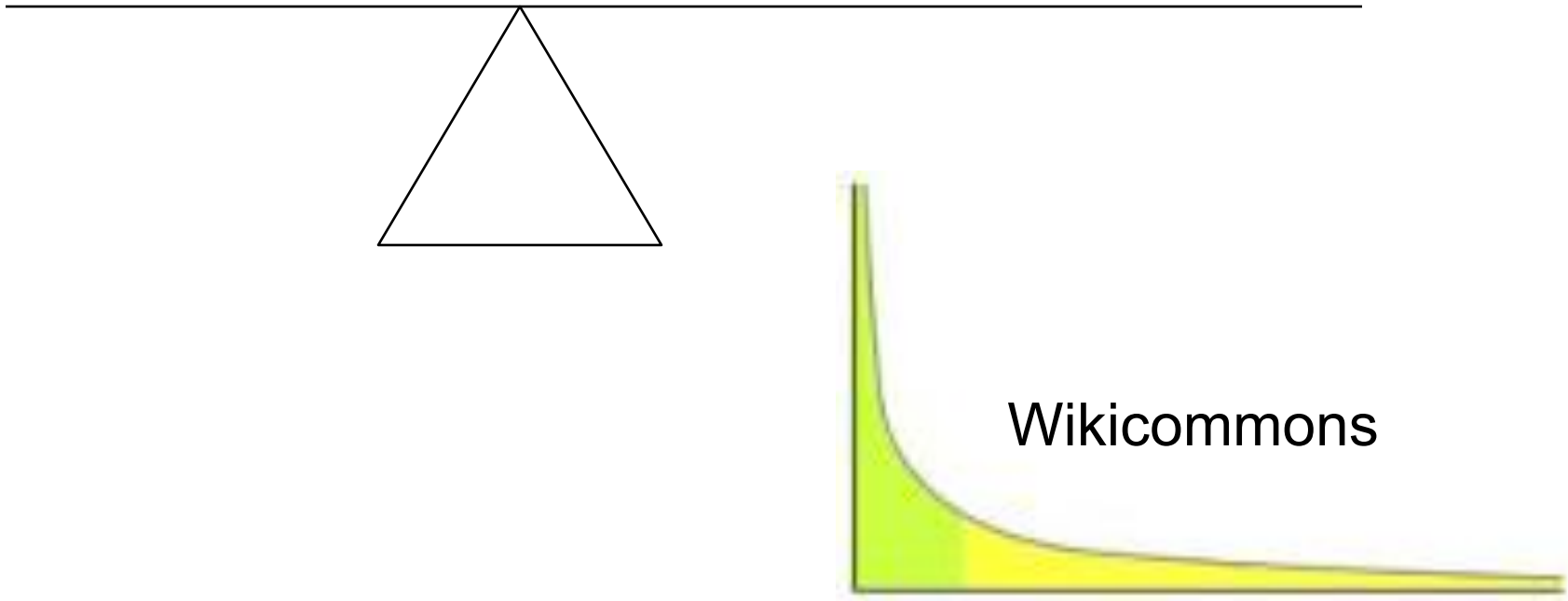
Globalization

- Top Global Risks (in terms of likelihood)
  - Severe income disparity
  - Chronic fiscal imbalances
  - Rising greenhouse gas emissions
  - Water supply crises
  - Mismanagement of population aging

Implications, research ideas, social changes?

Top 85

Bottom 3,500,000,000



Economy—World Economies

- 2010
  1. US
  2. China
  3. Japan
  4. India
  5. Germany
  6. Russia
  7. Brazil
  8. UK
  9. France
  10. Italy

- 2050
  1. India
  2. China
  3. US
  4. Indonesia
  5. Brazil
  6. Nigeria
  7. Russia
  8. Mexico
  9. Japan
  10. Egypt

Globalization: The iEconomy

The economic growth of nations is linked to one factor: adoption of information and communication technology

The more advanced the country, the greater the impact of digitization, which establishes a virtuous cycle: A country reinforces and accelerates its own progress as it moves along the line

Might this be true for cities, communities, families, individuals?

Digitization

Technology

The processing speed of a computer doubles every 12 to 18 months. Along with this comes disk storage and bandwidth.

Continued miniaturization of electronic components

Speech, touch, gesture, motion, and thought… interfaces

A 2020+ laptop will exceed the processing speed of the human brain

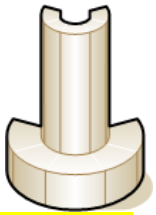
Note: disk storage will be replaced with solid state over the next few years.

Technology—Processing Speeds

Exponential Curve

- iPad 2
  - 170 megaflops (10^6)
- Cat Brain
  - 61 Million megaflops (10^12)

- Human Brain
  - 2.2 Billion megaflops / petaflops (10^15)
- Super Computer
  - 34 Billion megaflops / petaflops (10^15)
    - One megaflop = one million floating point operations per second



On the horizon, superfast computers with processing speeds measured in exaflops (10^18), and some day in yottaflops (10^24) 2030E ☺

Technology—Transformational Technologies

1. Mobile internet
2. Automation of knowledge work (AI)
3. The Internet of things (IoT)
4. Cloud technology
5. Advanced robotics
6. Autonomous and near-autonomous vehicles
7. Next-generation genomics
8. Energy storage
9. 3D printing
10. Advanced materials
11. Renewable energy
12. Advanced oil and gas exploration and recovery

And of course many more interesting technologies. Implications for managers?

Will leaders need to be more “tech savvy?”

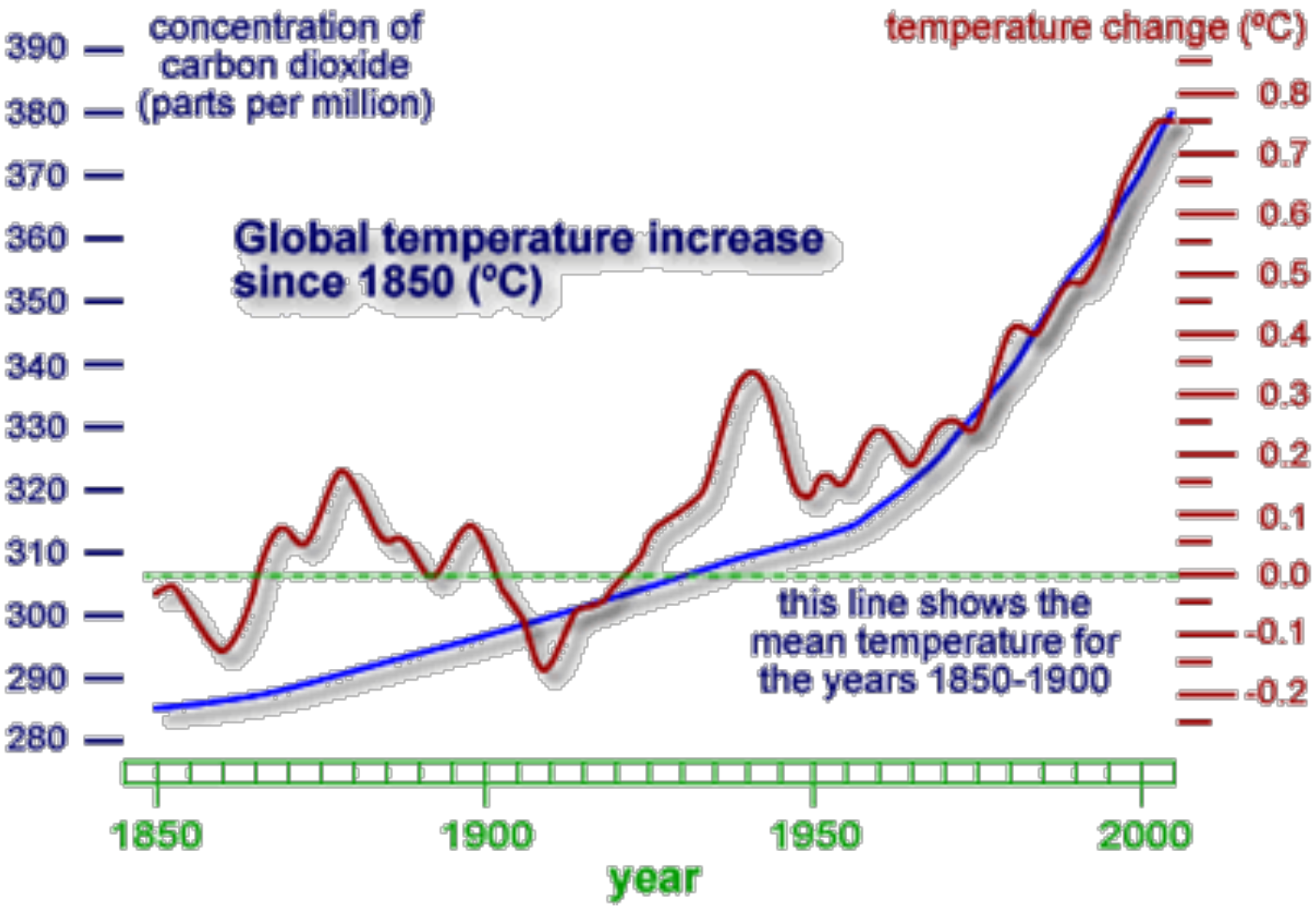
Climate Change

Physical Environment – Climate Change

- Rising sea levels.
  - 1-2 meters forecast over next 50 + years
- Declining numbers of species.
- Loss of fresh water and agricultural lands.
- Loss of coastal cities
- Migrations of people.
- Increase in tropical disease
- Factors (Insolation, Albedo, GHG)
- Volcanoes emit between 130 and 380 million tons of CO2 per year, while humans emit about 30 billion tons of CO2 each year--100-300 times more than volcanoes--by burning fossil fuels--NASA

Implications?

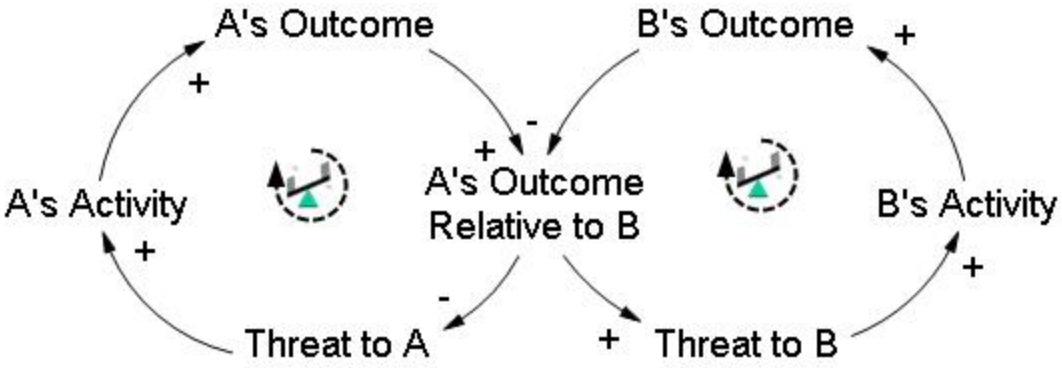
Climate Change

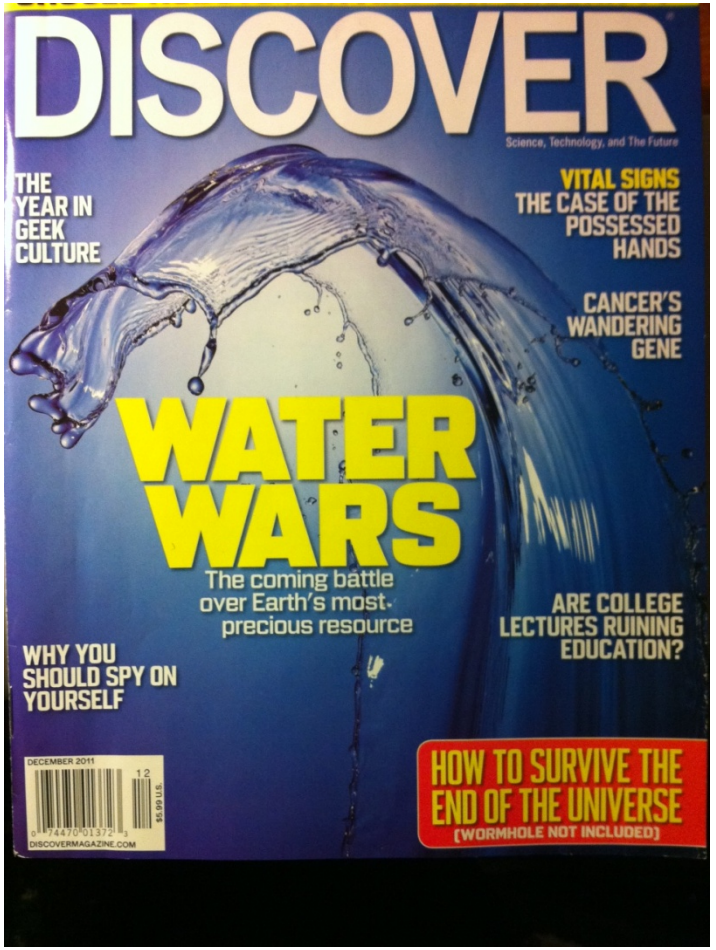


Physical Environment—Resource Wars

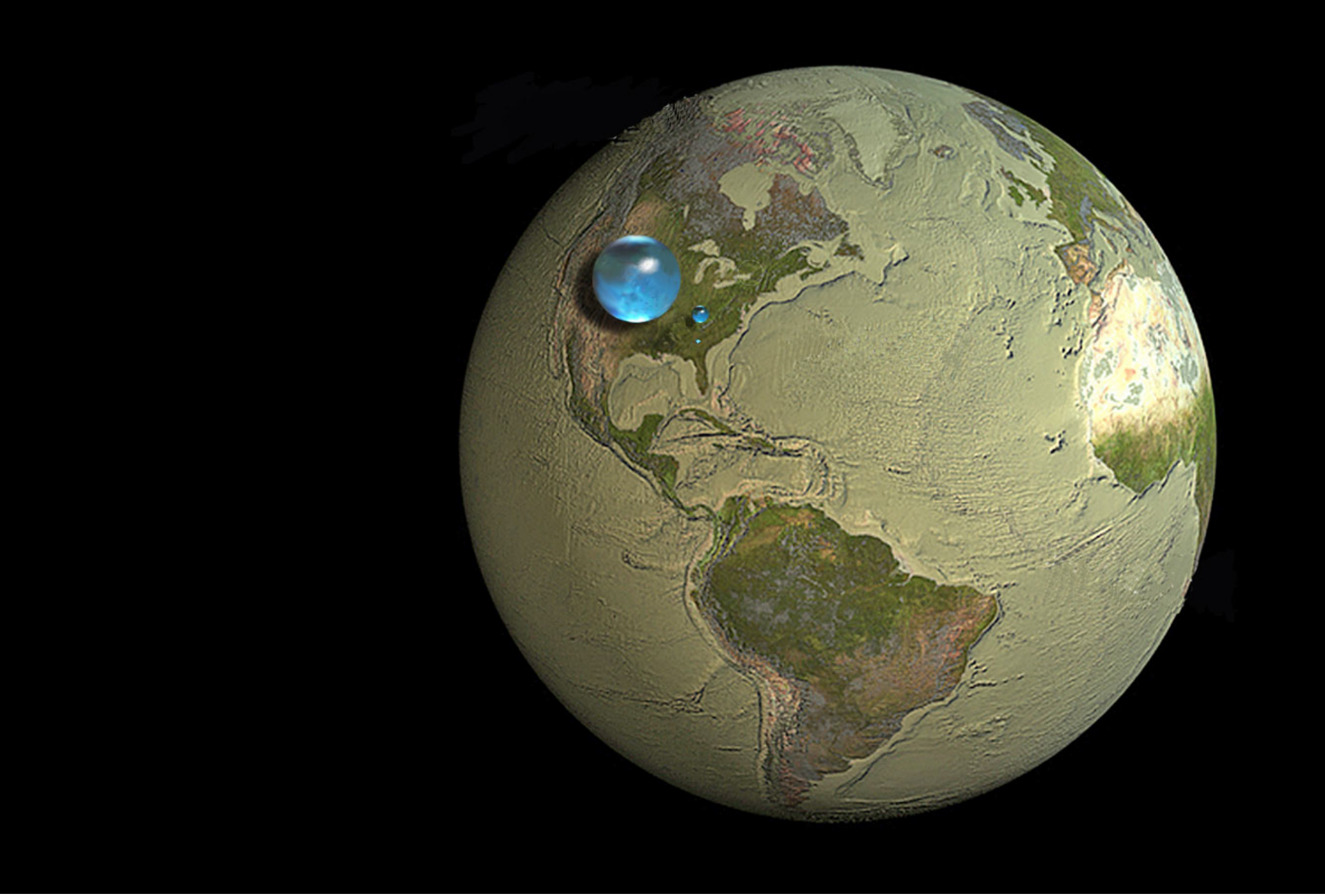
Climate / resource wars in our future?

Escalation Archetype





Implications for leadership, ideas for research?



Physical Environment—Planetary Boundaries

1. **Climate change**
2. **Nitrogen / phosphorous cycle**
3. **Ocean acidification**
4. Ozone depletion
5. Freshwater use
6. Land use
7. Biodiversity
8. Chemical pollution
9. Atmospheric aerosols

Threshold passed

Implications, research ideas?

Wrapup

Education in its truest sense is not about “a saleable skill set.”

It’s about freedom from inherited prejudice and argument by authority.

How are we going to feed, shelter, transport, and educate another 2,000,000,000 people?

Implications for leadership, ideas for research?

Leadership is about making things happen and getting things done.

- Peter Scholtes

If there were one thing you could do to improve the world, what would it be?

Thank you!

- Globalization is “the extension, acceleration, and intensification of consequential worldwide interconnections.”
  - R&D
  - Product Development
  - Supply Chain
  - Consumption
  - …….

psdgraphics.com

Sparke, M. (2013). *Introducing globalization: Ties, tensions, and uneven integration*. Oxford, UK: Wiley-Blackwell.

Globalization

According to Credit Suisse (2014), the top 10% of the worlds population own 86% of the wealth while the top 1% own about 50% of the wealth.

***The percentages increase each year*.**

Implications, research ideas, social changes?

Globalization: Global Flows

- $26 T goods, services, $$$ in 2012; expected $85 T by 2025
- 18 X increase in cross-border internet traffic between 2005 and 2012
- 500% increase in international Skype call minutes since 2008
- Growth in knowledge-intensive goods trade 1.3 X as fast as labor-intensive goods

United States—Inequality

- Increasing inequality (rich-poor) gap in U.S.
  - Charitable Giving
  - Civic Engagement
  - Education
  - Family Structure
  - Health / Lifespan
  - Income / Wealth
  - Opportunity

- U.S. Top 1% 25 years ago
  - 12% of income, 33% of wealth
- U.S. Top 1% today
  - 25% of income, 40% of wealth

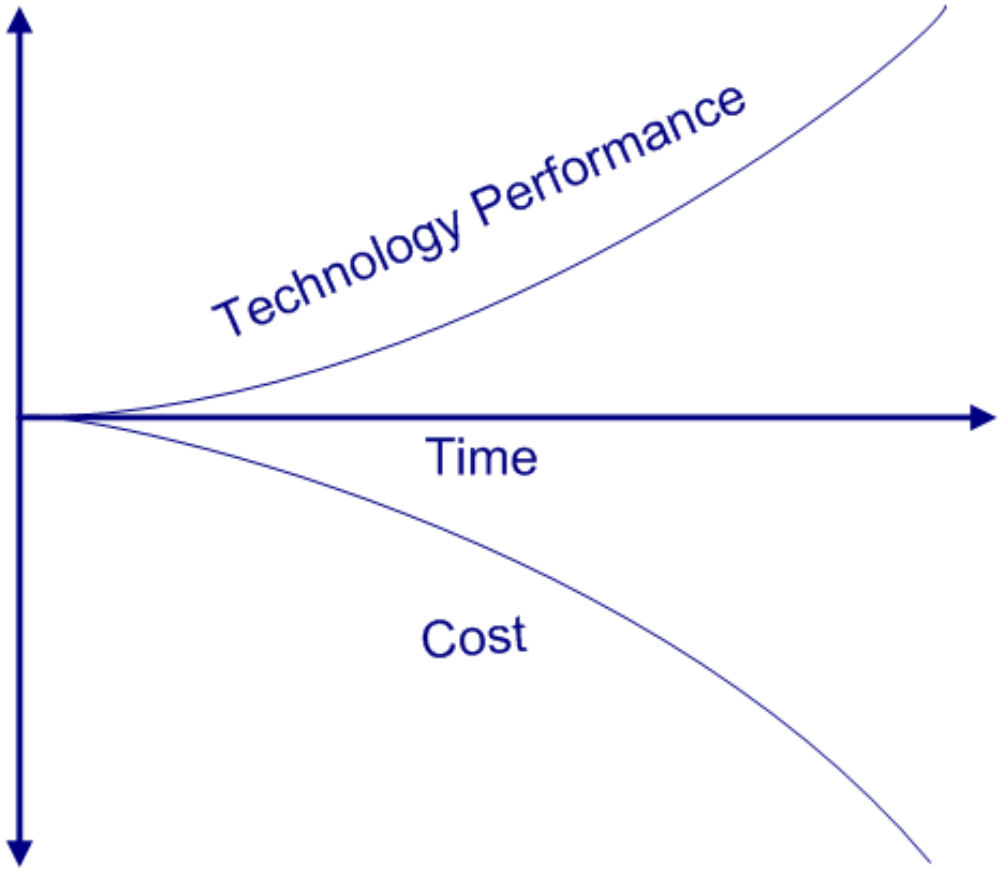
Implications for leadership, ideas for research, social changes?

Economy--Cities

- In 2010,
  - Large U.S. cities generated ~85% of the nation's GDP
- By 2025,
  - the largest 259 U.S. cities are projected to generate > 10% of global GDP growth
  - City 600 GDP will increase over $30 T or ~ 65% of global growth
  - Over $10 T in additional **annual** investments will be needed in cities worldwide

Implications for leadership, ideas for research, social changes?

Technology: Wright's Law



A generalized Moore's Law. The performance of a technology increases while the cost decreases.

Think aerospace, biotechnology, energy, information technology, medical technology, …

Technology

Business processes will be transformed by increasing levels of:

- Efficiency
- Self-service
- Automation / mechanization
- Outsourcing / off shoring
  - Note 1: Once a process / job can be scripted, it can easily become self-service, automated, outsourced, offshored or some combination of the above. That is, the job may well disappear
  - Note 2: The next source of low cost labor will be **robotics**
  - Note 3: The next source of low cost talent will be **software**

Technology--Healthcare

- Digital Biology
- mHealth Monitoring
  - Sensors and other device add-on's and software apps for Smartphones and other mobile products
  - Apple Nano and iPhone, and other devices, can do all or some of the following: monitor distance walked, run or bicycled; compute number of calories burned; elevation gained / lost; and heart rate.
  - New devices will monitor sleep, blood pressure, EKG …
- Robotic Assisted Surgeries
- Telemedicine
- Tissue Engineering

What if we could create a call center for healthcare?

Technology

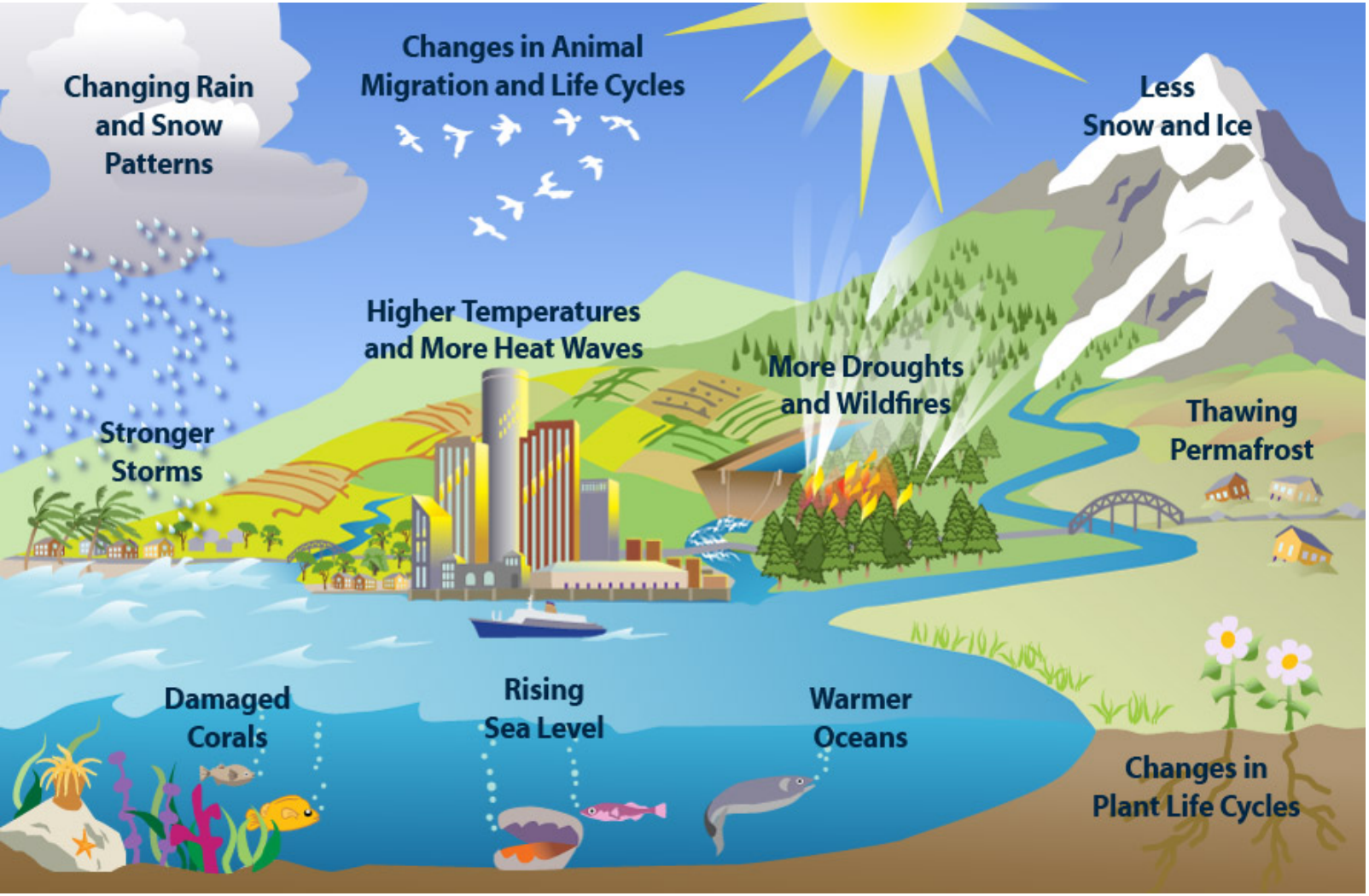
- 10-20 years ago
  - Camera
  - CD Player
  - Cell Phone
  - Calculator
  - Clock Radio
  - Encyclopedia
  - Flashlight
  - Newspaper
  - Notepad
  - Photo Album
  - Radio
  - Stereo
  - Watch
- Today
  - Smartphone

- Tomorrow?
  - ✓ Education Manager
  - ✓ Entertainment Manager
  - ✓ Health/wellness Manager
  - ✓ Home Manager
  - ✓ Wallet
  - ✓ ….

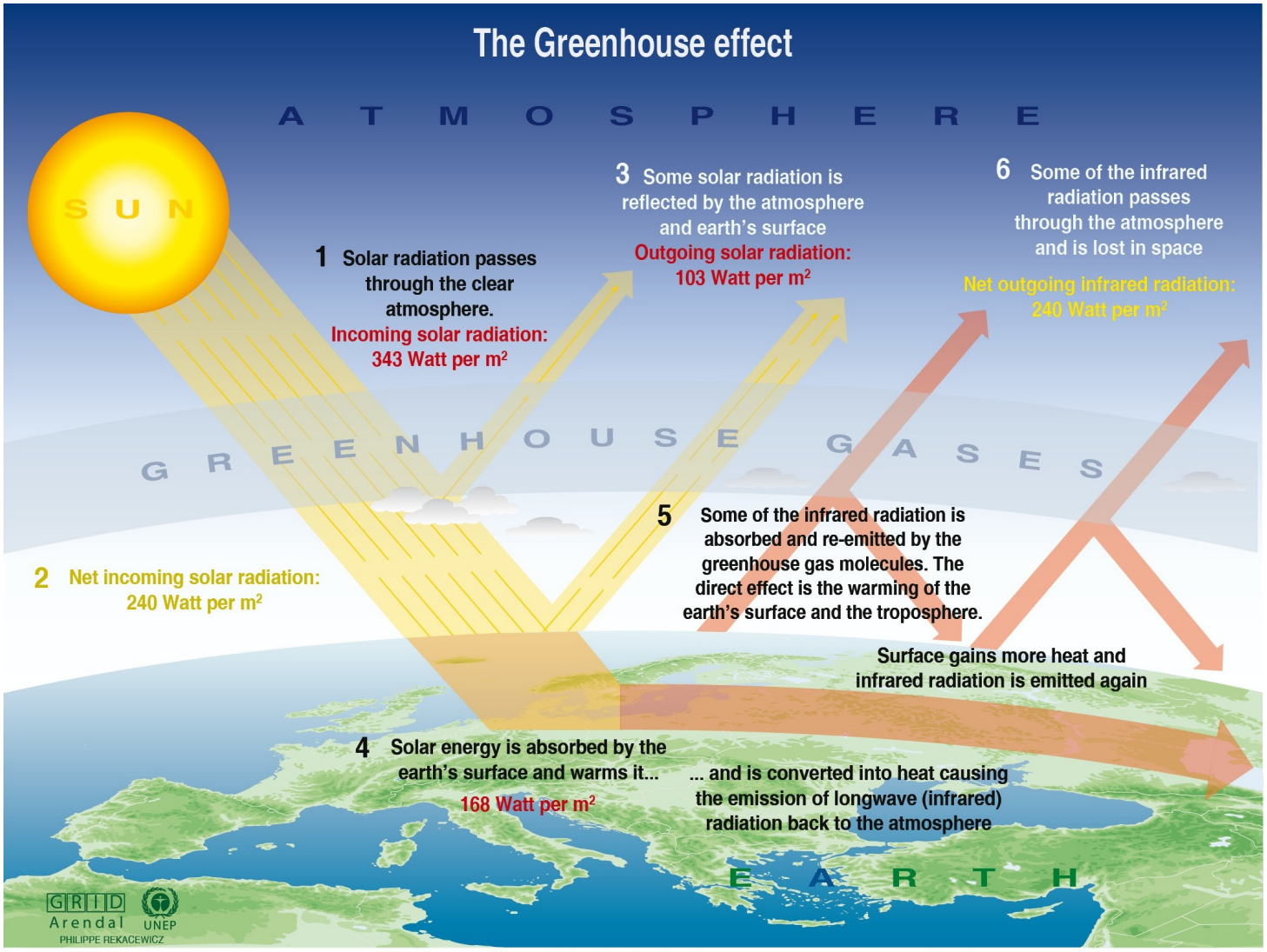
A few thousand dollars to a few hundred plus a few dollars monthly and it fits into a pocket

Supply chain issues, job loss, … or ??

Climate Change



Climate Change



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

THE BOTTOM LINE

- Societies everywhere are going to continue to be influenced and changed as
  - Globalization is not going away
  - Technology is not going to slow down
  - Climate change is here to stay
- And there are three other factors not touched on in this conversation.
  - Government, Legal, and Military
  - Society
  - Economic booms and busts
- These are wicked problems and we need more research, conversation, ideas, education, and so on to find ways to mitigate what we can and to adapt to what we can't

Implications for leadership, ideas for research, social changes?

It must be considered that there is nothing more difficult to carry out nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.

Niccolo Machiavelli (1469-1519)

Serious Change is Coming

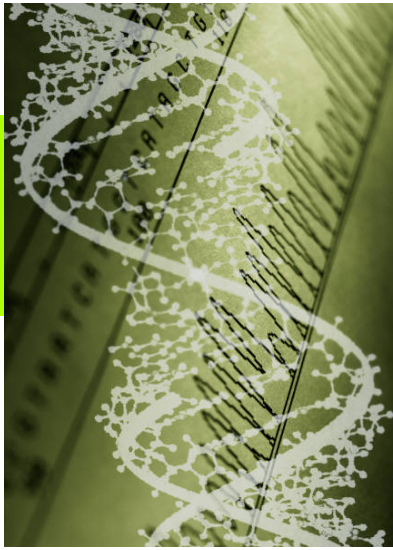
Exponential Curve

Technology to clone ourselves

Rewrite genetic codes to create thousands of new life forms

Reverse engineering of the human brain

Genetically change ourselves and future generations into one or more new species



And things are just warming up….

Implications, research ideas?

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