

# Tech After Growth

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# Collaborators

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  - Jay Chen
  - Birgit Penzenstadler
  - Many others
- 
- Builds on “**Computing Within Limits**”, Communications of the ACM, October 2018

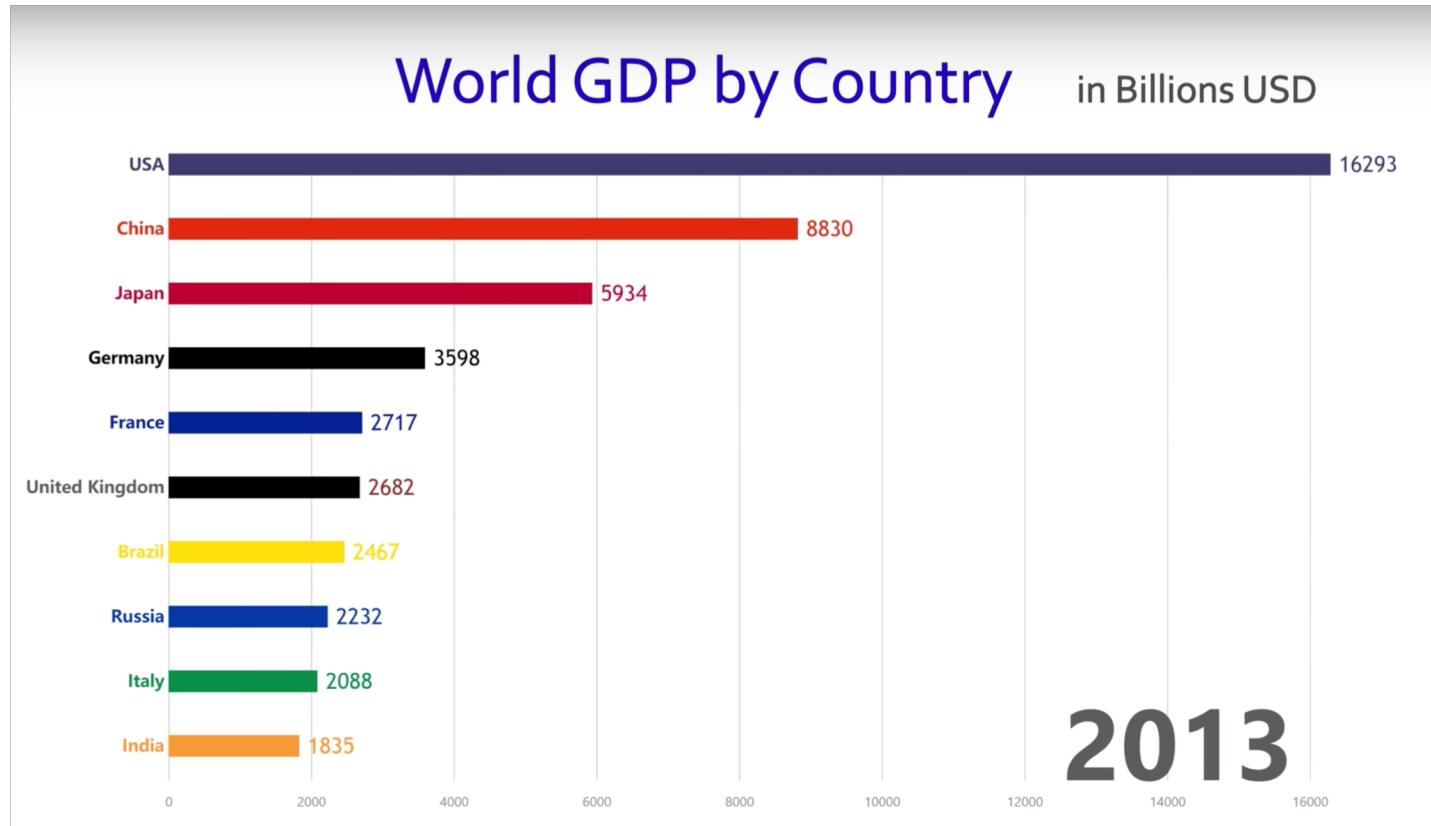
# My Background

- Undergraduate in Biology
- PhD in Media Arts & Sciences – AI and graphics
- Professor at UCI since 2003
- Research mostly in HCI



# The world economy has been growing for many decades

- <https://www.youtube.com/watch?v=wykaDgXoajc>



# Economic growth comes from increased production of goods and services



# Most governments have growth as an explicit policy goal

The screenshot shows the official website of the White House under President Barack Obama. The top navigation bar includes links for the Briefing Room, Issues, The Administration, and 1600 Penn. Below the navigation is a breadcrumb trail: HOME · BRIEFING ROOM · PRESIDENTIAL ACTIONS · PRESIDENTIAL MEMORANDA. On the left, a sidebar lists various news categories. The main content area displays a presidential memorandum from September 19, 2011, titled "Presidential Memorandum--President's Plan for Economic Growth and Deficit Reduction". The document is attributed to The White House, Office of the Press Secretary, and is marked as For Immediate Release.

**the WHITE HOUSE**  
PRESIDENT BARACK OBAMA

BRIEFING ROOM | ISSUES | THE ADMINISTRATION | 1600 PENN

HOME · BRIEFING ROOM · PRESIDENTIAL ACTIONS · PRESIDENTIAL MEMORANDA

Briefing Room  
Your Weekly Address  
Speeches & Remarks  
Press Briefings  
Statements & Releases  
White House Schedule  
**Presidential Actions**  
Executive Orders

**The White House**  
Office of the Press Secretary

For Immediate Release

September 19, 2011

**Presidential Memorandum--  
President's Plan for Economic  
Growth and Deficit Reduction**

The screenshot shows a news clipping from a website. It features a thumbnail of the White House, a search icon, and a "NEWS CLIPS" section header. The main headline is "The Trump Economy Smashes Expectations", dated November 2, 2018, under the "ECONOMY & JOBS" category. The clipping includes a star rating and a link to "ALL NEWS". The text of the clipping discusses strong job creation, rising wages, and soaring confidence due to President Trump's pro-growth agenda.

NEWS CLIPS

**The Trump Economy Smashes Expectations**

ECONOMY & JOBS | Issued on: November 2, 2018

★★★

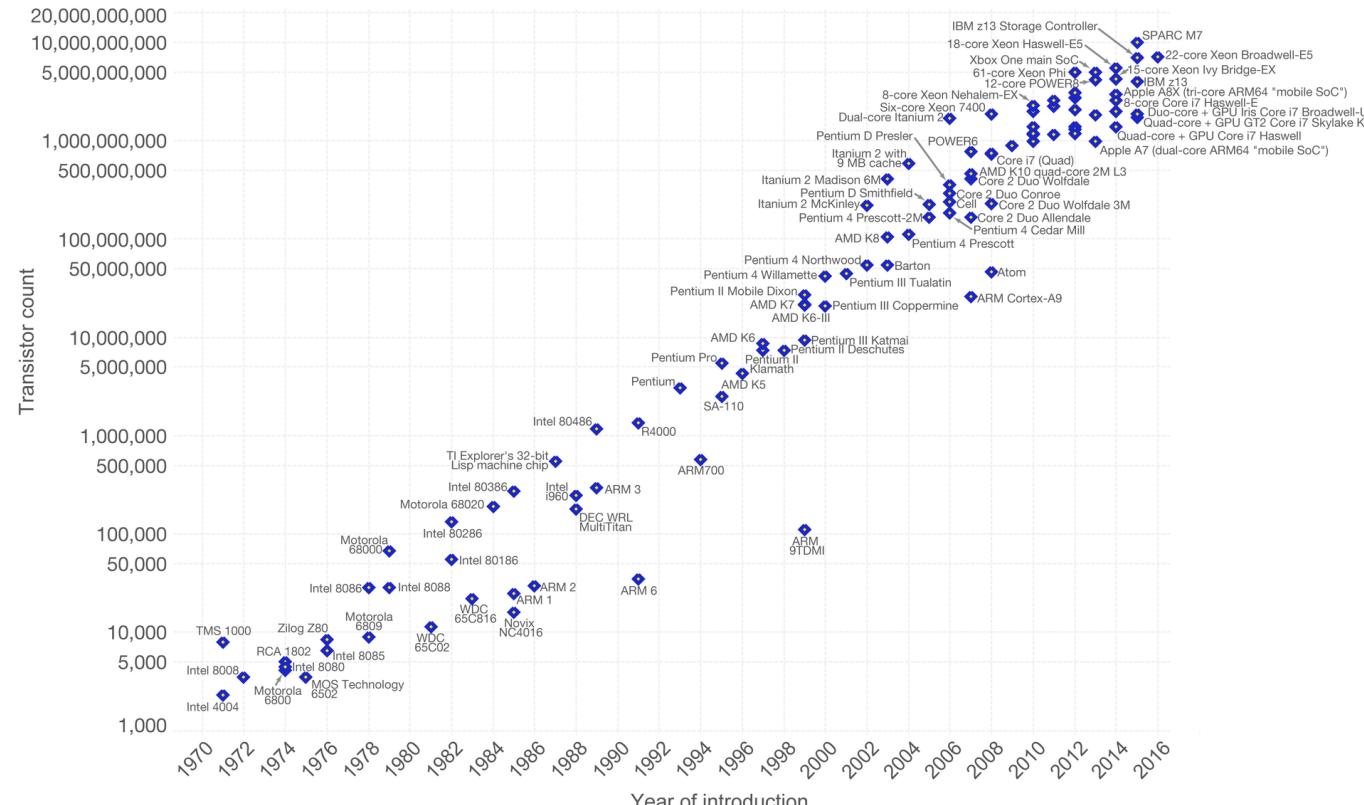
ALL NEWS

*The economy continues to smash expectations with strong job creation, rising wages, and soaring confidence thanks to President Trump's pro-growth agenda.*

# Most computing embedded in world view in which growth is desirable and achievable.

Moore's Law – The number of transistors on integrated circuit chips (1971-2016) OurWorld in Data

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are strongly linked to Moore's law.



Data source: Wikipedia ([https://en.wikipedia.org/wiki/Transistor\\_count](https://en.wikipedia.org/wiki/Transistor_count))

The data visualization is available at [OurWorldinData.org](http://OurWorldinData.org). There you find more visualizations and research on this topic.

Licensed under CC-BY-SA by the author Max Roser.

# Different from most computing talks

- Growth-based world view is at odds with many other scientific disciplines, in which growth is problematic.

Increased production of goods and services  
has dramatic environmental implications



# What's the problem?

- Climate change (IPCC)
- Species extinction
- Human suffering
- >140 million people displaced by 2050 (World Bank)

# How is IT implicated?

- General purpose technology/force multiplier.
- Underlies most major activities in industrial civilization.
- Helps humanity do what we do, but faster and more of it.
- Carbon footprint on par with the airline industry, and growing faster.
- Potentially equivalent to half of all transportation by 2040.

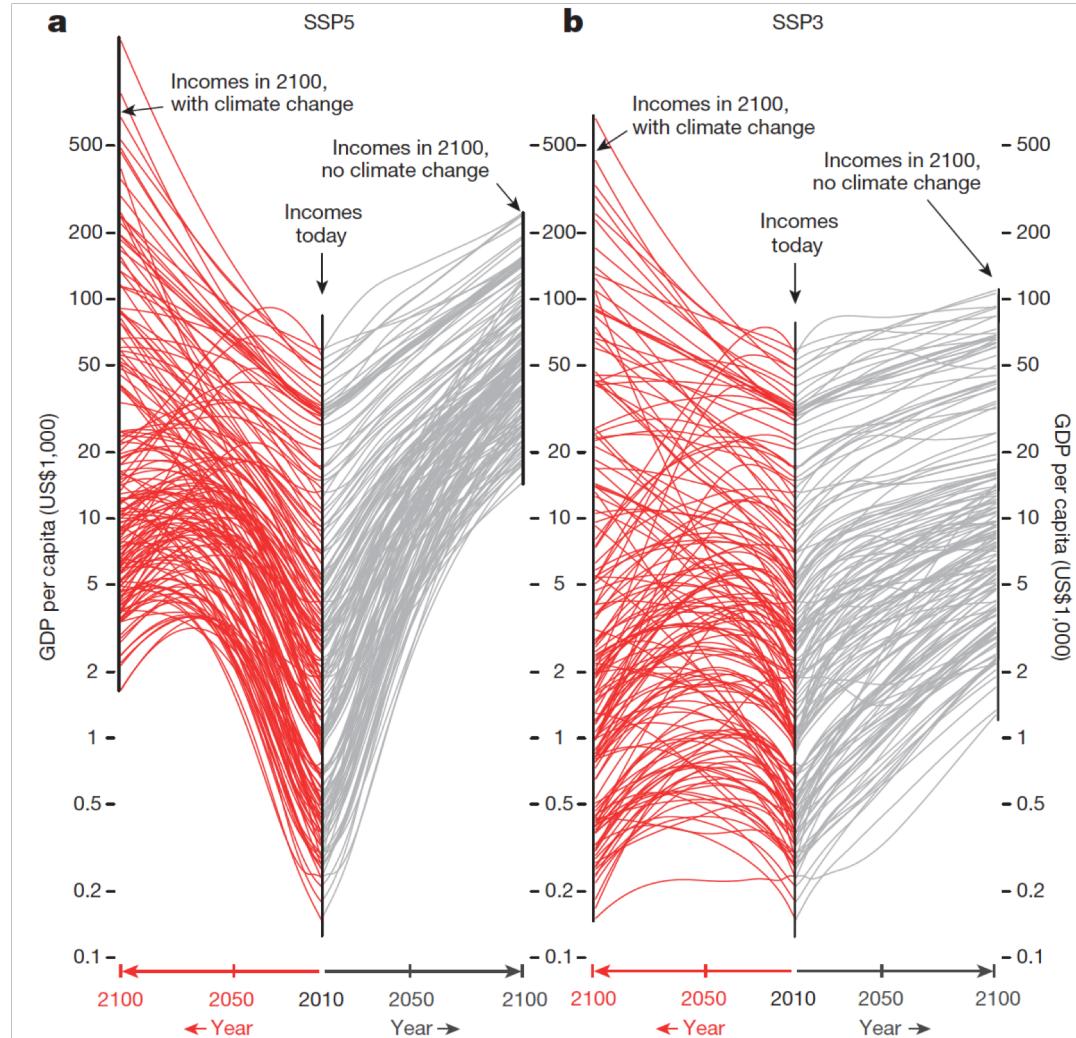
# Some thoughts that IT can help...

- National Academies: “Despite the profound technical challenges involved, sustainability is not, at its root, a technical problem, nor will merely technical solutions be sufficient. Instead, deep economic, political, and cultural adjustments will ultimately be required, along with a major, long-term commitment in each sphere to deploy the requisite technical solutions at scale. Nevertheless, technological advances and enablers have a clear role in supporting such change...”
- Smart 2020 report: “the ICT industry is a key player in creating a low carbon society”

# It's complicated

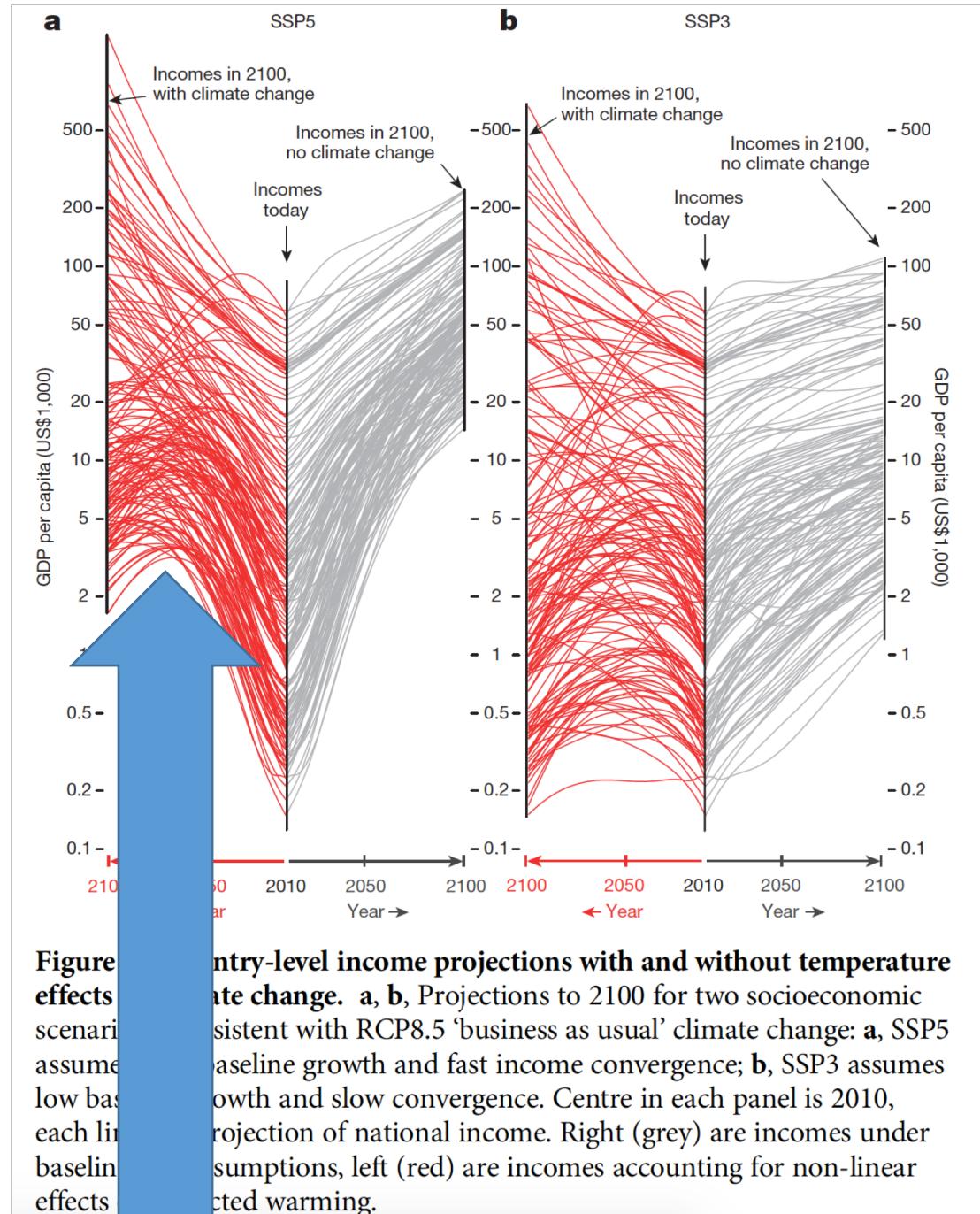
- Rebound effect/Jevons paradox
- For every way a general purpose technology enables sustainability, it enables business as usual even more (unless culture shifts significantly).

# Burke, Hsiang, and Miguel. 2015. Global non-linear effect of temperature on economic production. *Nature*.



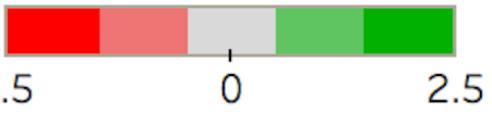
**Figure 3 | Country-level income projections with and without temperature effects of climate change.** **a, b,** Projections to 2100 for two socioeconomic scenarios<sup>22</sup> consistent with RCP8.5 ‘business as usual’ climate change: **a**, SSP5 assumes high baseline growth and fast income convergence; **b**, SSP3 assumes low baseline growth and slow convergence. Centre in each panel is 2010, each line is a projection of national income. Right (grey) are incomes under baseline SSP assumptions, left (red) are incomes accounting for non-linear effects of projected warming.

# Burke, Hsiang, and Miguel. 2015. Global non-linear effect of temperature on economic production. *Nature*.



2020

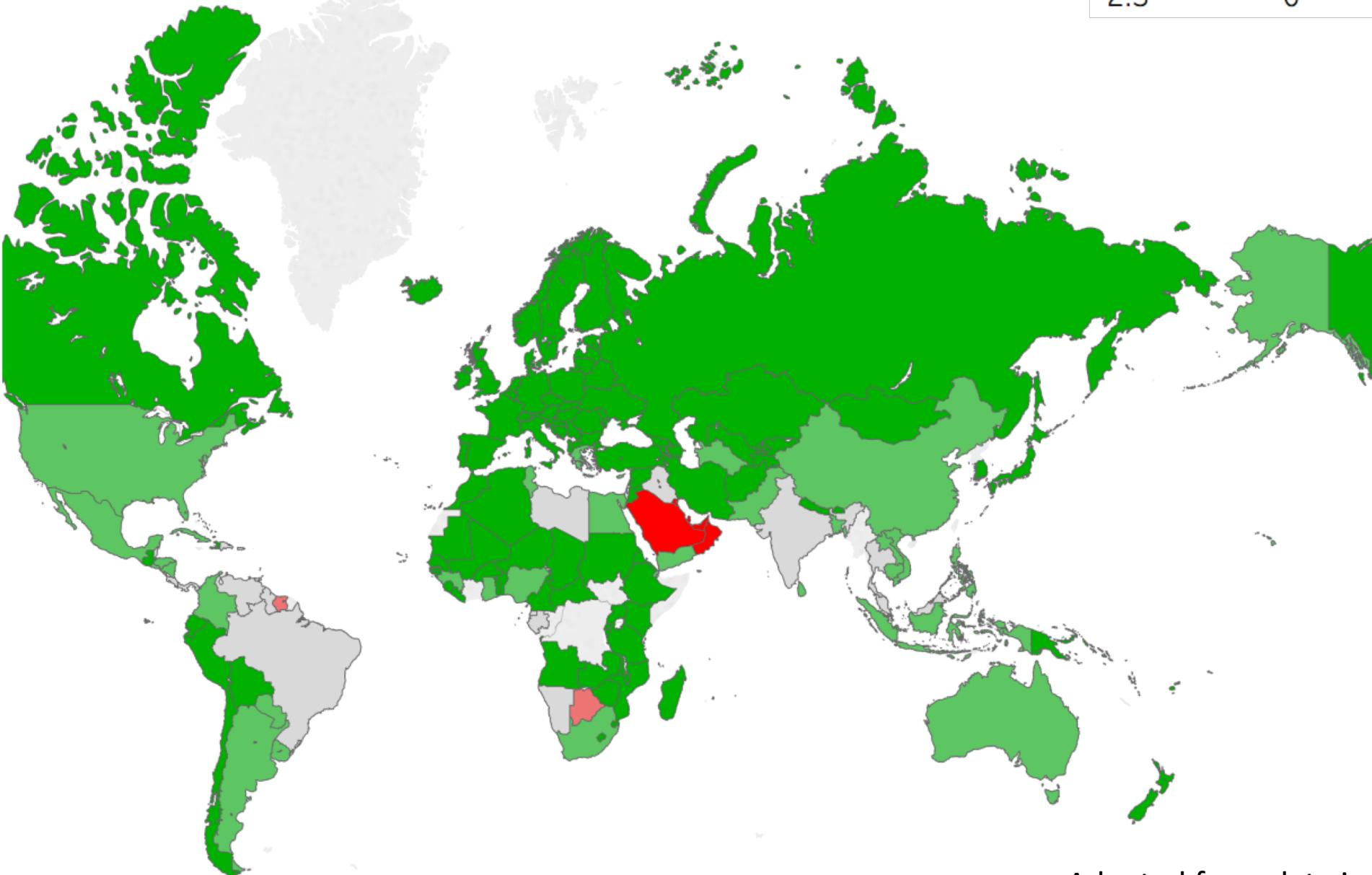
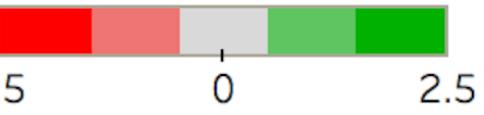
GDP Growth (annual %)



Adapted from data in Burke et al. 2015

2060

GDP Growth (annual %)



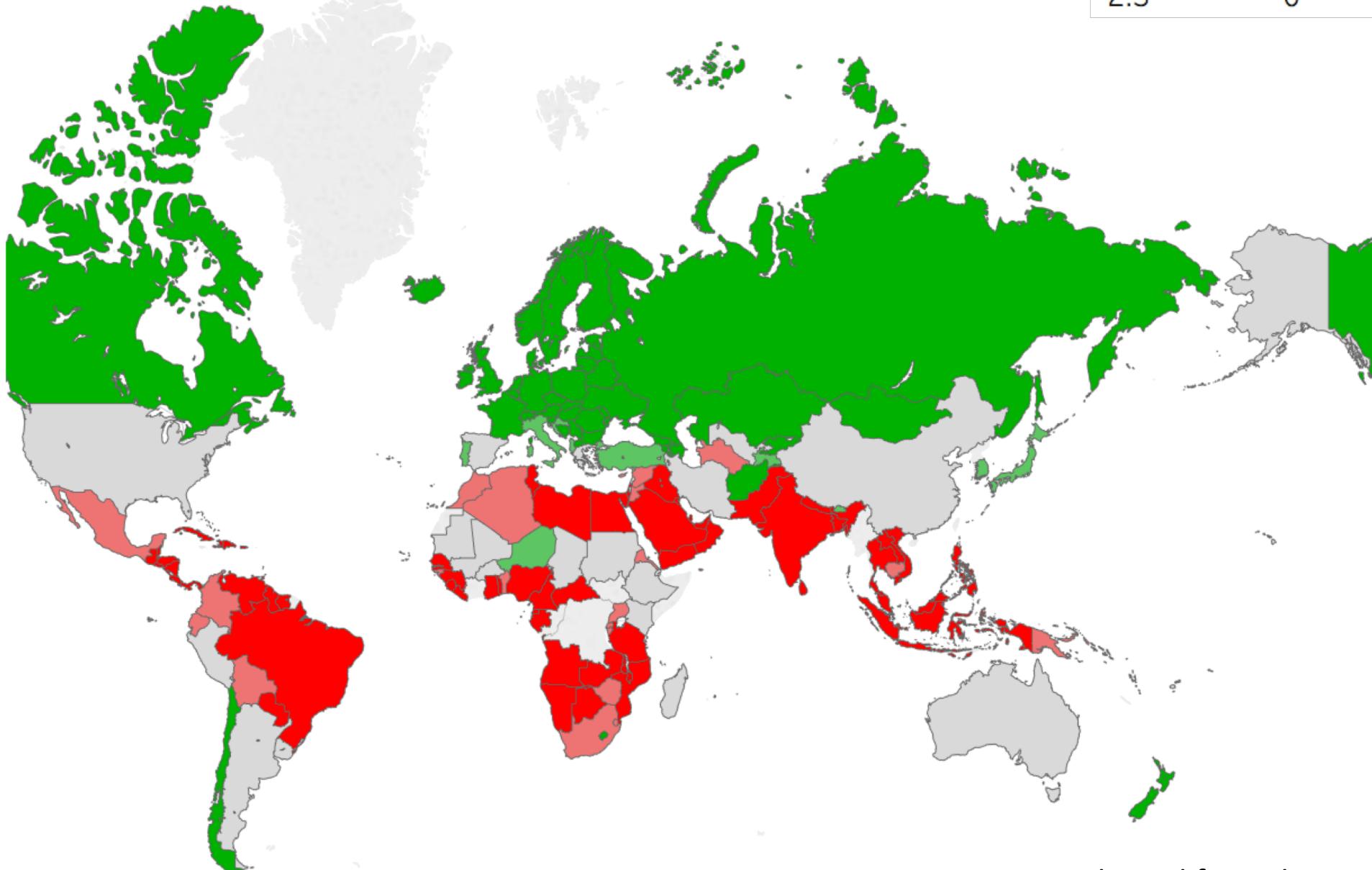
Adapted from data in Burke et al. 2015

2099

GDP Growth (annual %)



-2.5 0 2.5



Adapted from data in Burke et al. 2015

# What's coming next

- Massive social transformation



# Involuntary contraction

- Collapse – “rapid simplification, the loss of an established level of social, political, or economic complexity” (Tainter 2006)

# Voluntary contraction

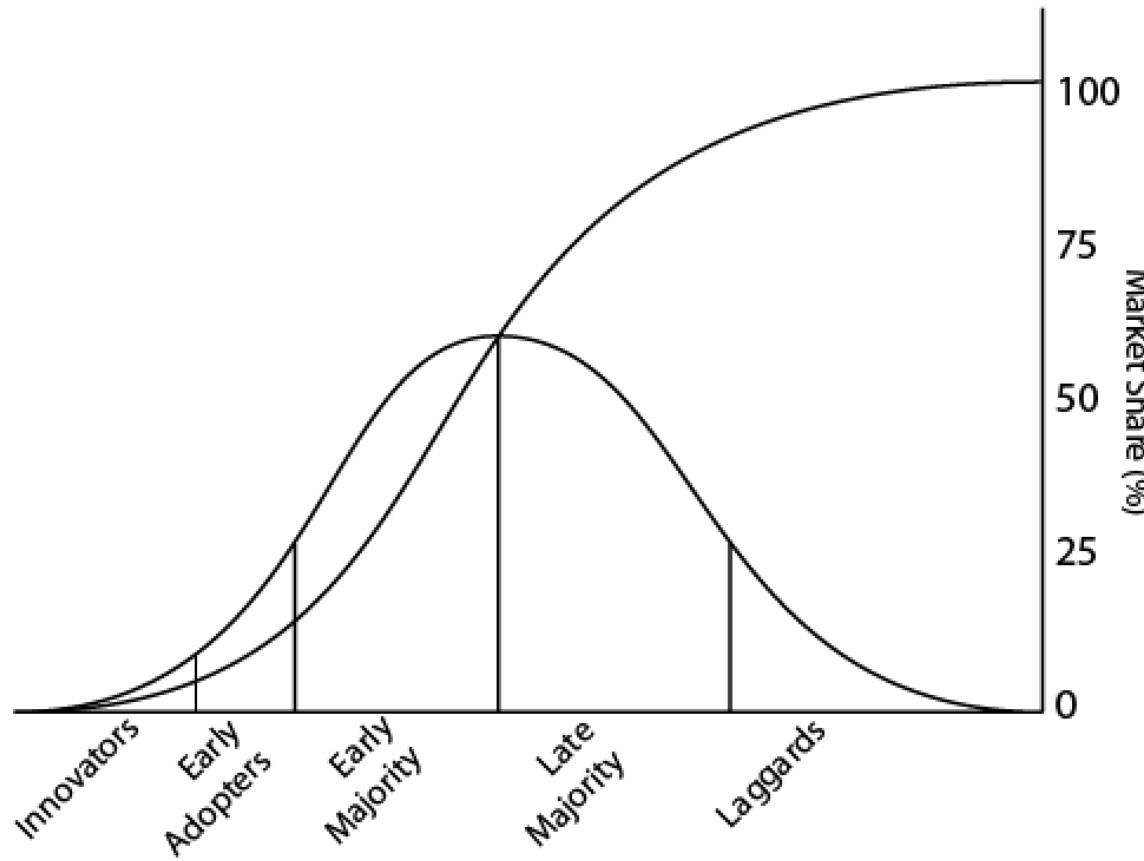
- Degrowth – “downscaling of production and consumption that increases human well-being and enhances ecological conditions and equity on the planet” (<https://degrowth.org/definition-2/>)

How can computing support wellbeing while enabling humanity to live within ecological and material limits?

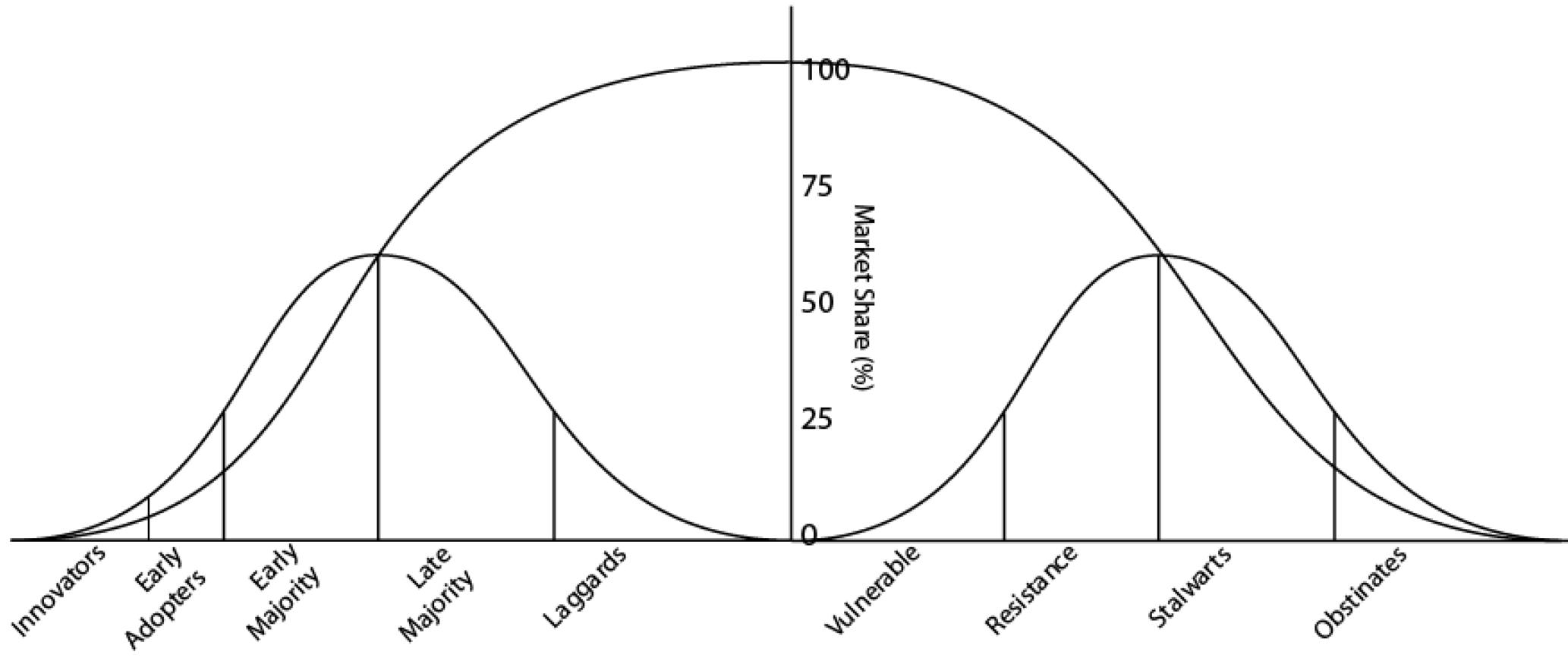
# IT through collapse

- Frugal innovation
- Shifts in global distribution of ICT goods and services
- Reverse diffusion of innovation

# Diffusion of Innovations (Rogers, 1962)



# Retreat of Innovations



# IT for Degrowth

- Maintainable
- Local
- Care-based

# What should we be doing now?

- Self-obviating systems
- Undesign
- Implication not to design
- Appropriate technologies

# What should we not be doing?

- Contributing to the weaponizing of ICT.
- “There’s a thousand people on the other side of the screen whose job is to break down whatever responsibility I can maintain.” (Harris, 2016)

# Good UX is like efficiency.

- Its broad societal benefit depends on what you're enabling.

# Implications for User Interaction Software?

- You're learning how to make awesome user interactions.

What will those awesome interactions be used for?

Thank you.