Future of the Midwest

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THE FUTURE OF URBAN LIVING
Foresight Research paper produced from a Think-Tank consultation held at
St George's House, Windsor Castle in December 2018.
18 March 2019


CITIES OF THE FUTURE
ANTICIPATING TRENDS AND POSSIBILITIES


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THE FUTURE OF MANUFACTURING
BUILDING THE FUTURE THROUGH AGILITY AND INNOVATION


AG INSTITUTE
FUTURE OF AGRICULTURE IN WESTERN AUSTRALIA
THINK-TANK WORKSHOP REPORT
20 and 21 August, 2019


FUTURE OF TOURISM - THE MAINE
PART 1: EMERGING TRENDS


THE FUTURE OF FOOD
FEEDING THE WORLD – THE COMING FOOD REVOLUTION


FUTURE OF MIDWEST AGRICULTURE
Scenarios of the Future
June 15-16, 2017


THE NEXT INDUSTRIAL REVOLUTION
A NEW ERA – ROBOTICS, AUTOMATION AND LIFE SCIENCES
Prepared by Future IQ


GLOBAL FOOD INDUSTRY
SCENARIOS OF THE FUTURE
SCENARIO PLANNING REPORT
February 24-25, 2016

Macro Trends and Forces of Change Related to . . .

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- Demographics, population and mass urbanization
- Energy, food, water & climate change
- Technology driving change
- Societal change

Demographics, population and mass urbanization

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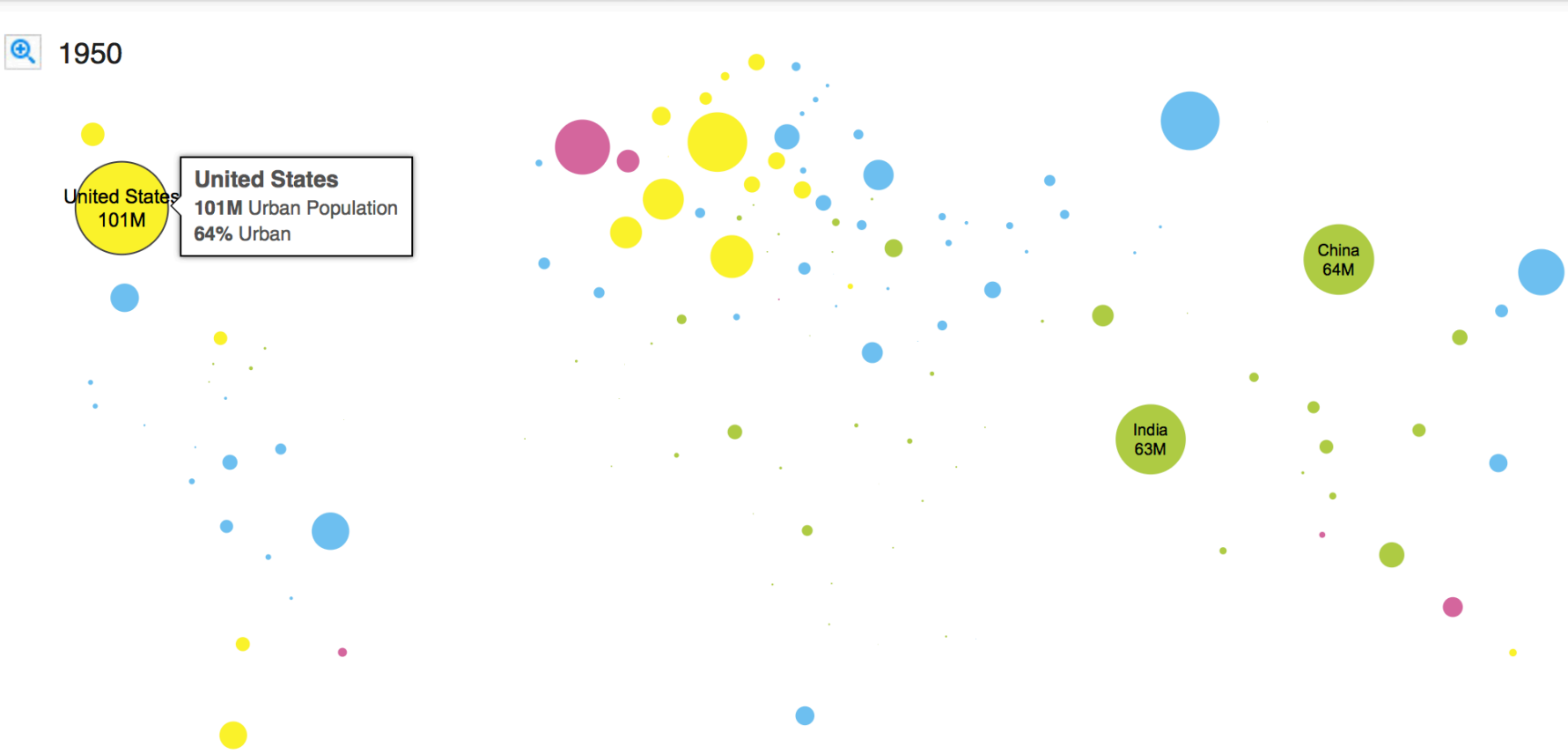
unicef

AN URBAN WORLD

This graphic depicts countries and territories with 2050 urban populations exceeding 100,000. Circles are scaled in proportion to urban population size. Hover over a country to see how urban it is (percentage of people living in cities and towns) and the size of its urban population (in millions).

Urban Population
- Greater than 75%
- 50% - 75%
- 25% - 50%
- Less than 25%



unicef

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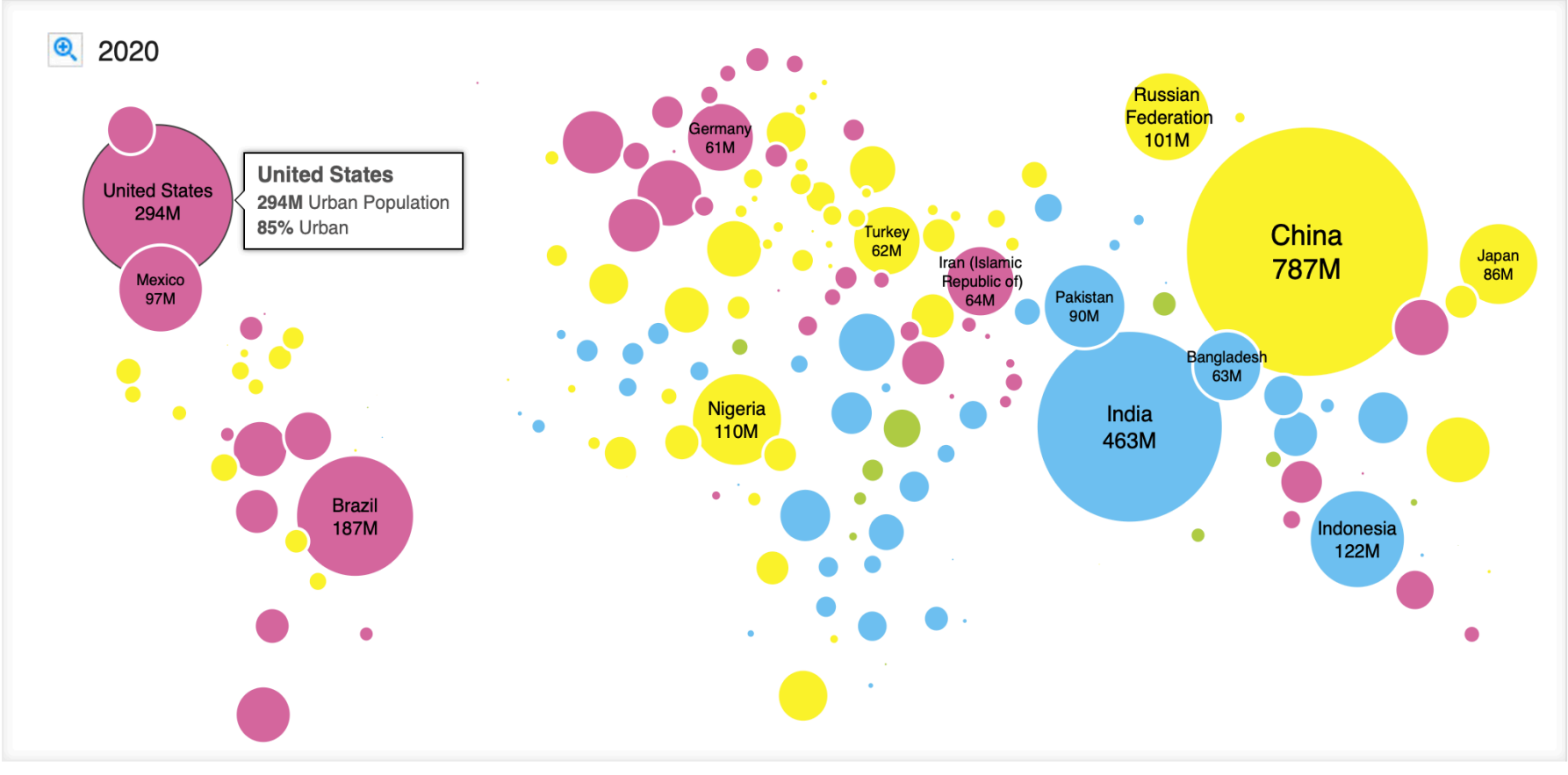

unicef

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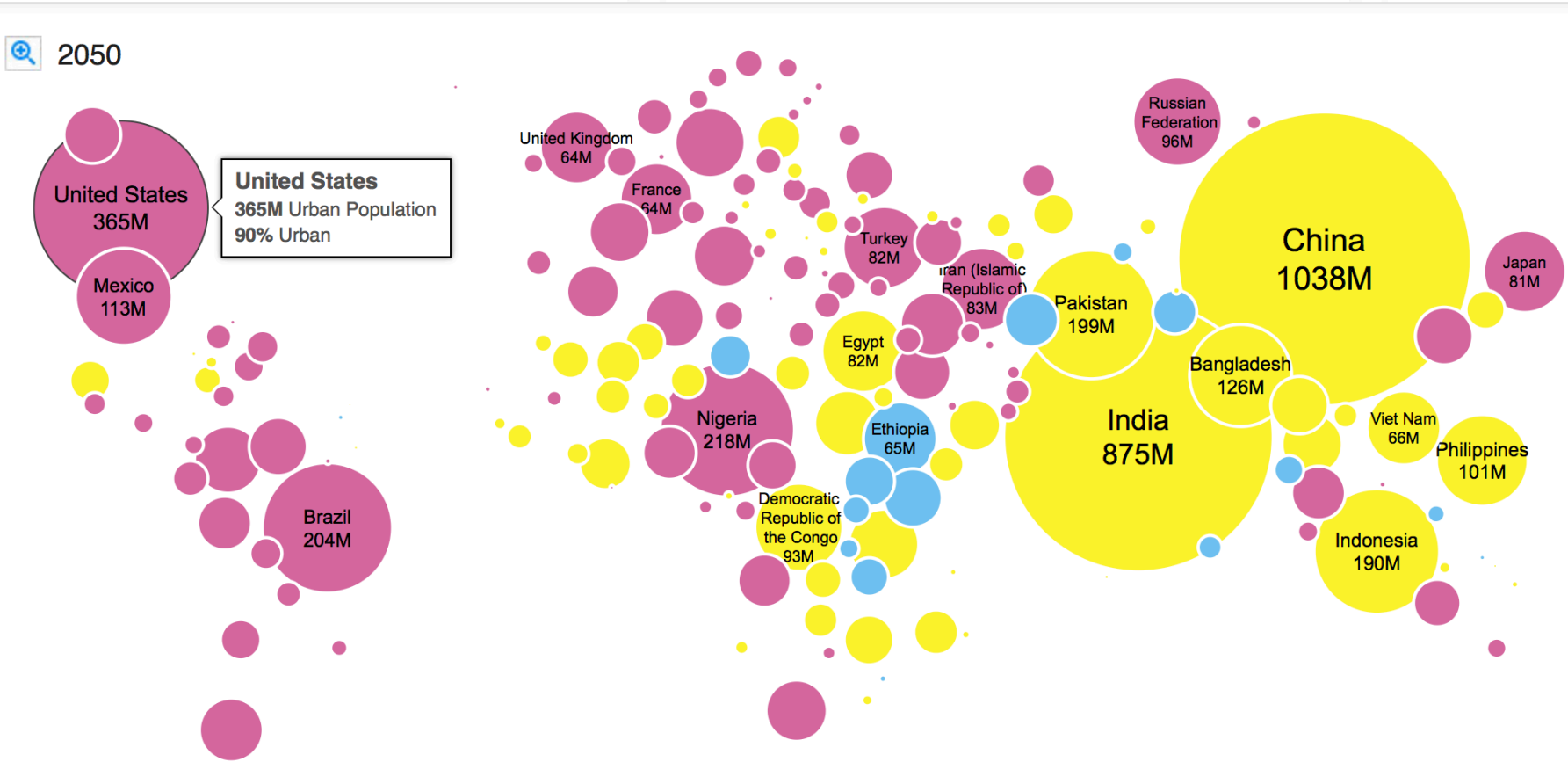
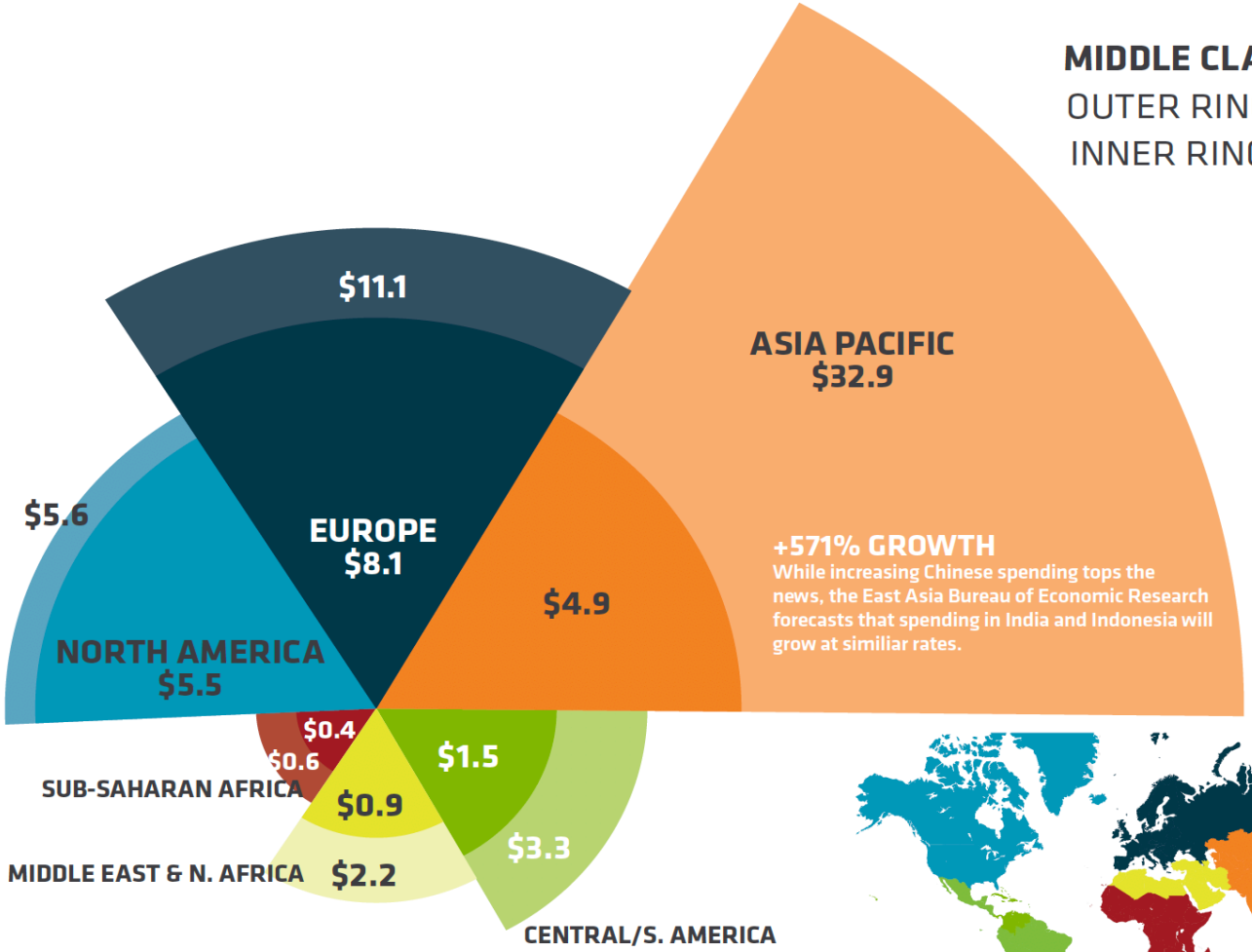


MIDDLE CLASS CONSUMER SPENDING

OUTER RING: 2030 IN TRILLIONS, USD

INNER RING: 2009 IN TRILLIONS, USD



+571% GROWTH

While increasing Chinese spending tops the news, the East Asia Bureau of Economic Research forecasts that spending in India and Indonesia will grow at similiar rates.

Source: Kou, L. 2013. The world's middle class will number 5 billion by 2030. Quartz.
Figures based on OECD, 2012. An emerging middle class.

Built Environment is a Direct Reflection of the Underlying Economy

Urban Land Institute Minnesota

Agriculture Economy

- 1st version of the American Dream
- "40 Acres and a Mule"

Industrial Economy

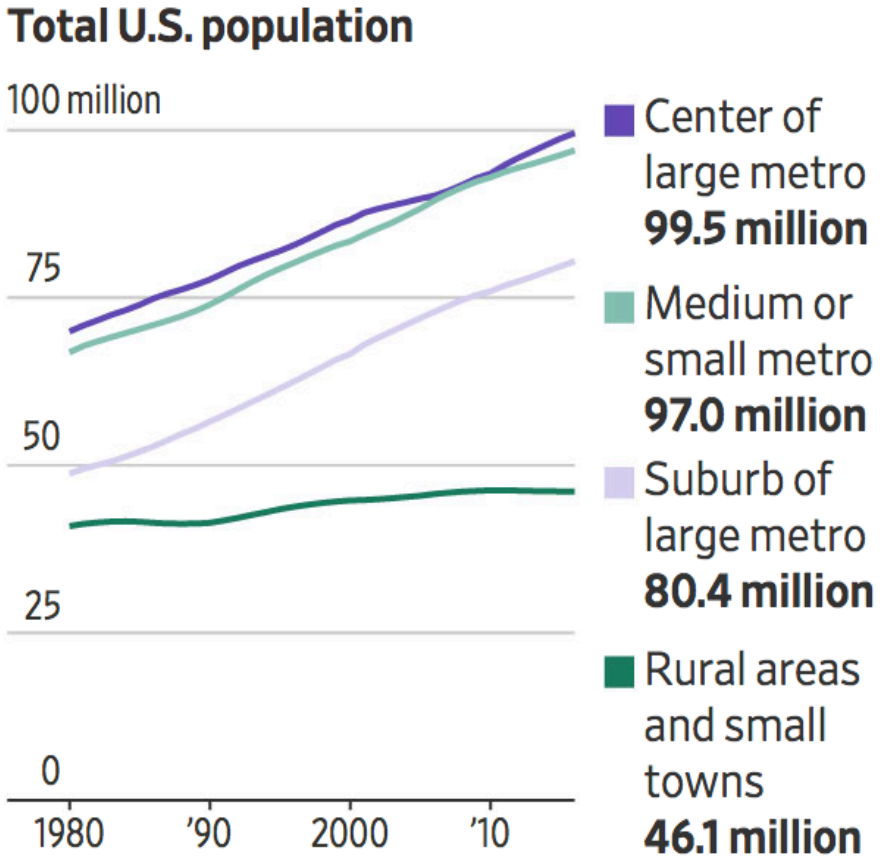
- 2nd version of the American Dream
- Drivable Sub-urban…"See the USA in Your Chevrolet"

Knowledge/Experience Economy

- Current/Future version of the American Dream
- ***Option*** of Walkable Urban and Drivable Sub-urban

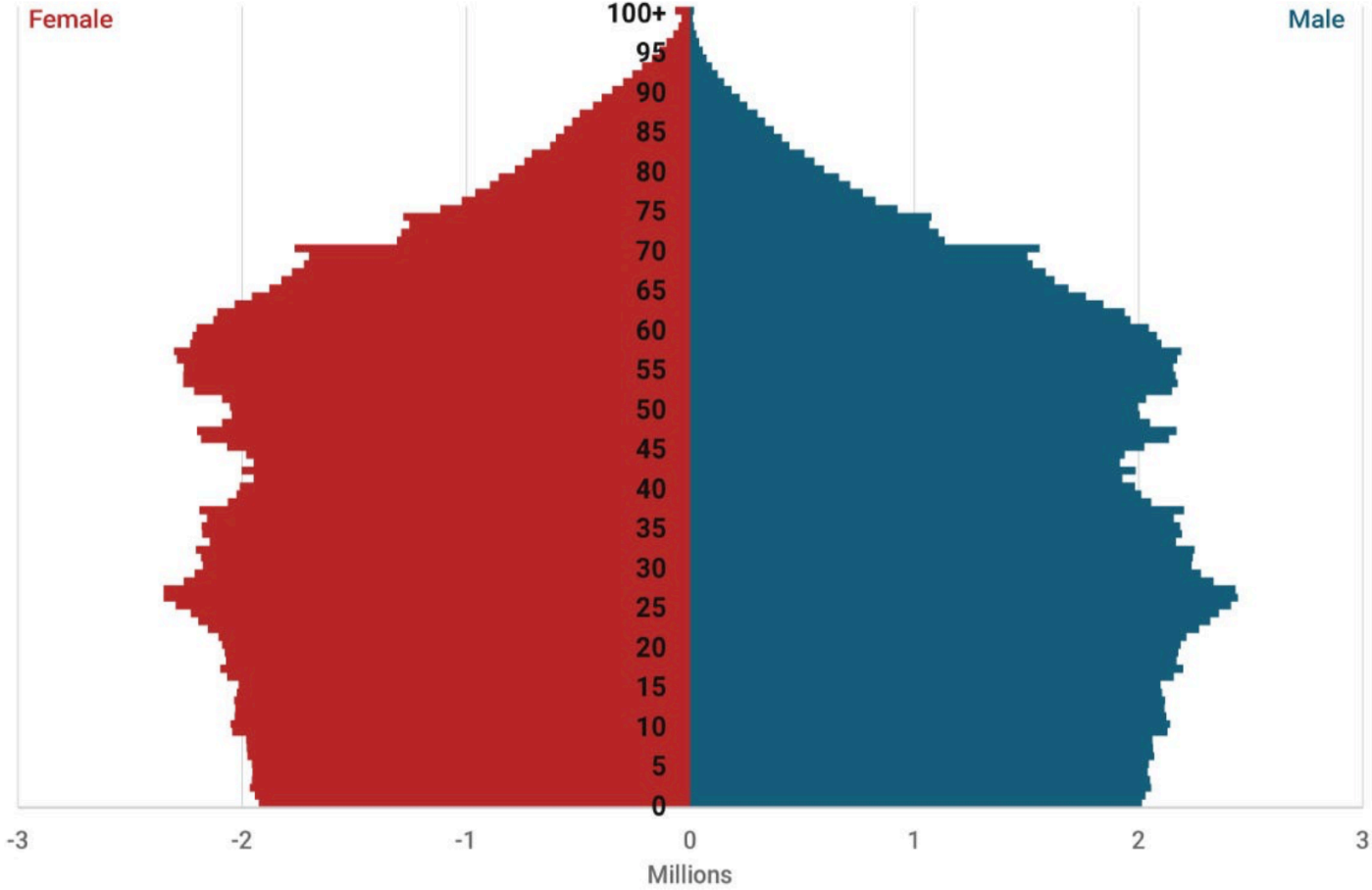
Built Environment reflects underlying economy

Changing geographic distribution of American society



Source: Census Bureau

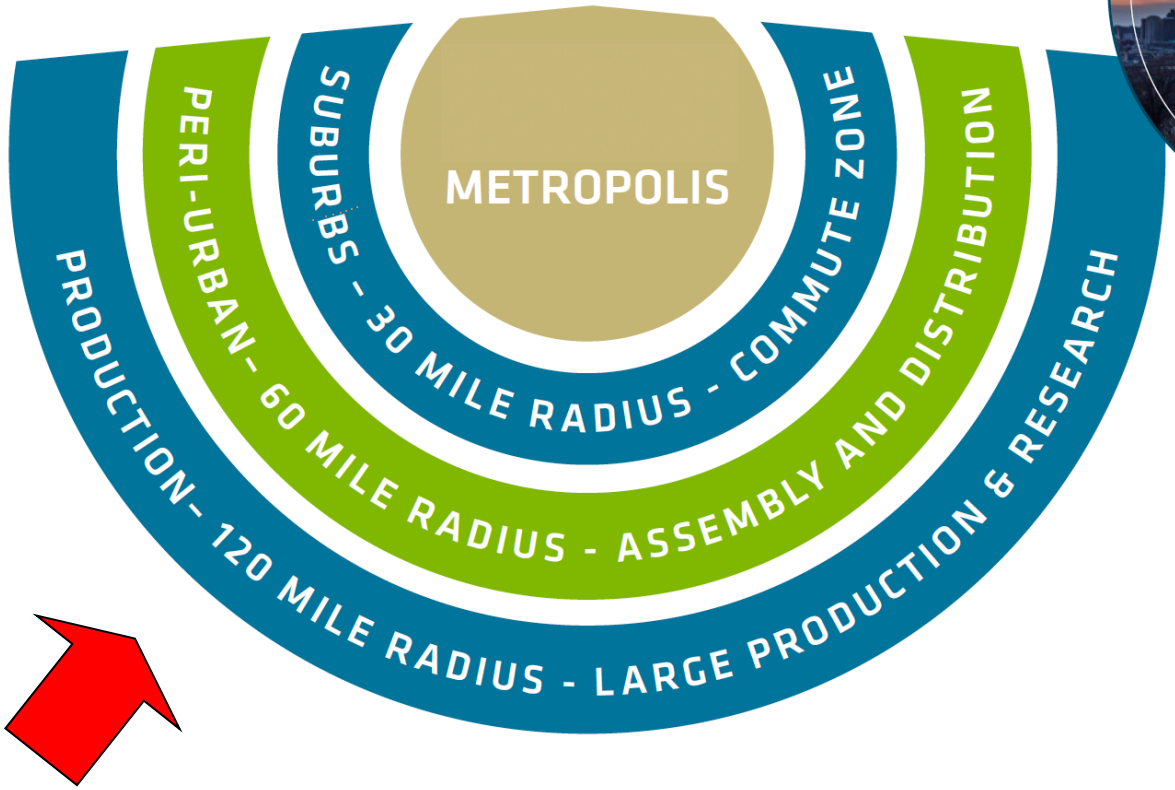
US population by age and sex, 2017



Source: US Census Bureau. Population estimates are for July 1, 2017.

BUSINESS INSIDER

Arc of Innovation



Future-Splitting Questions™

What does this mean for industries and clusters around Twin Cities?

Demographics, population and mass urbanization

Future-Splitting
Questions™

What does mass urbanization mean for the future social and economic fabric of the Mid-West and Minnesota?

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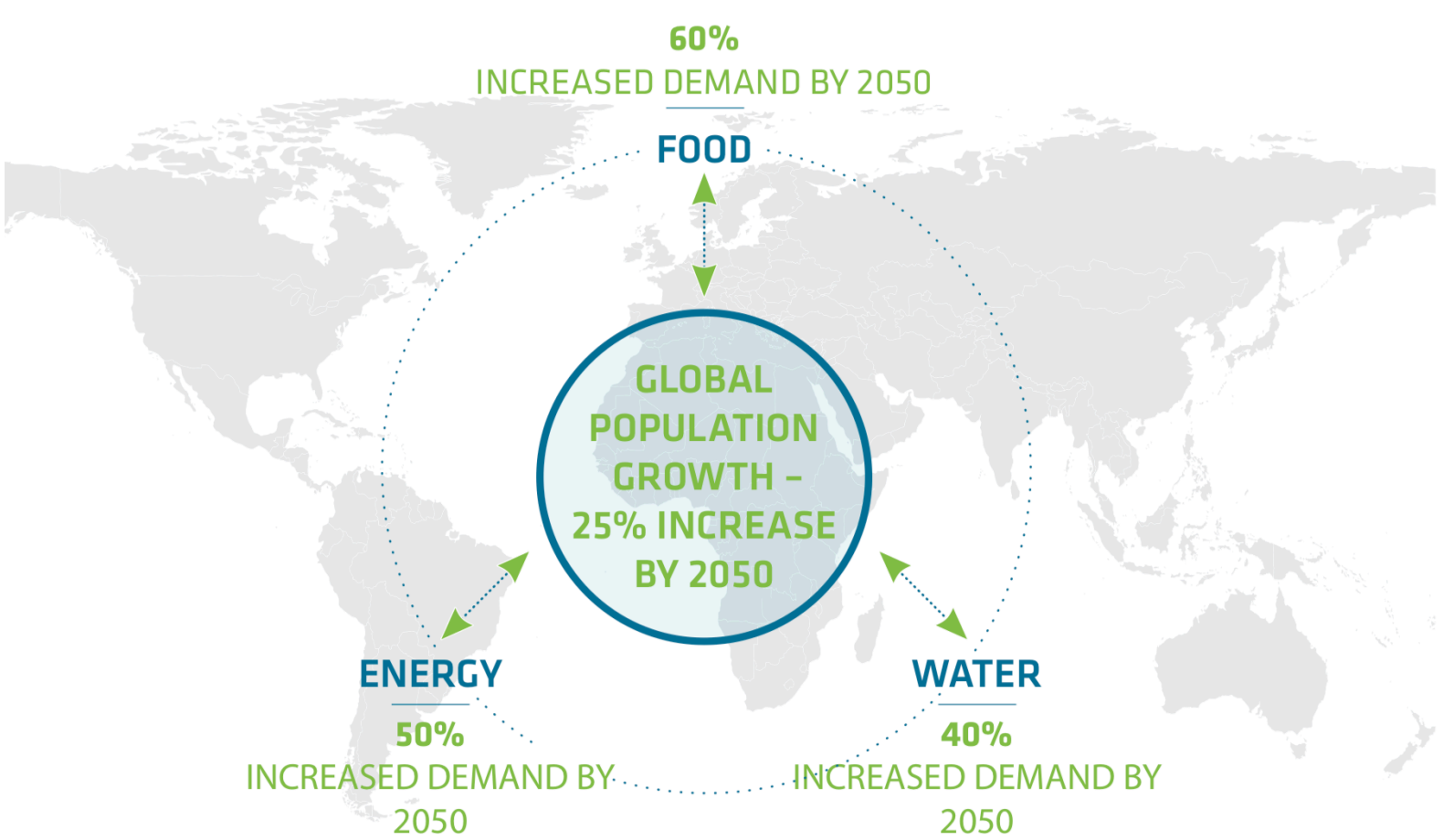
Energy + Water + Food + Climate Change



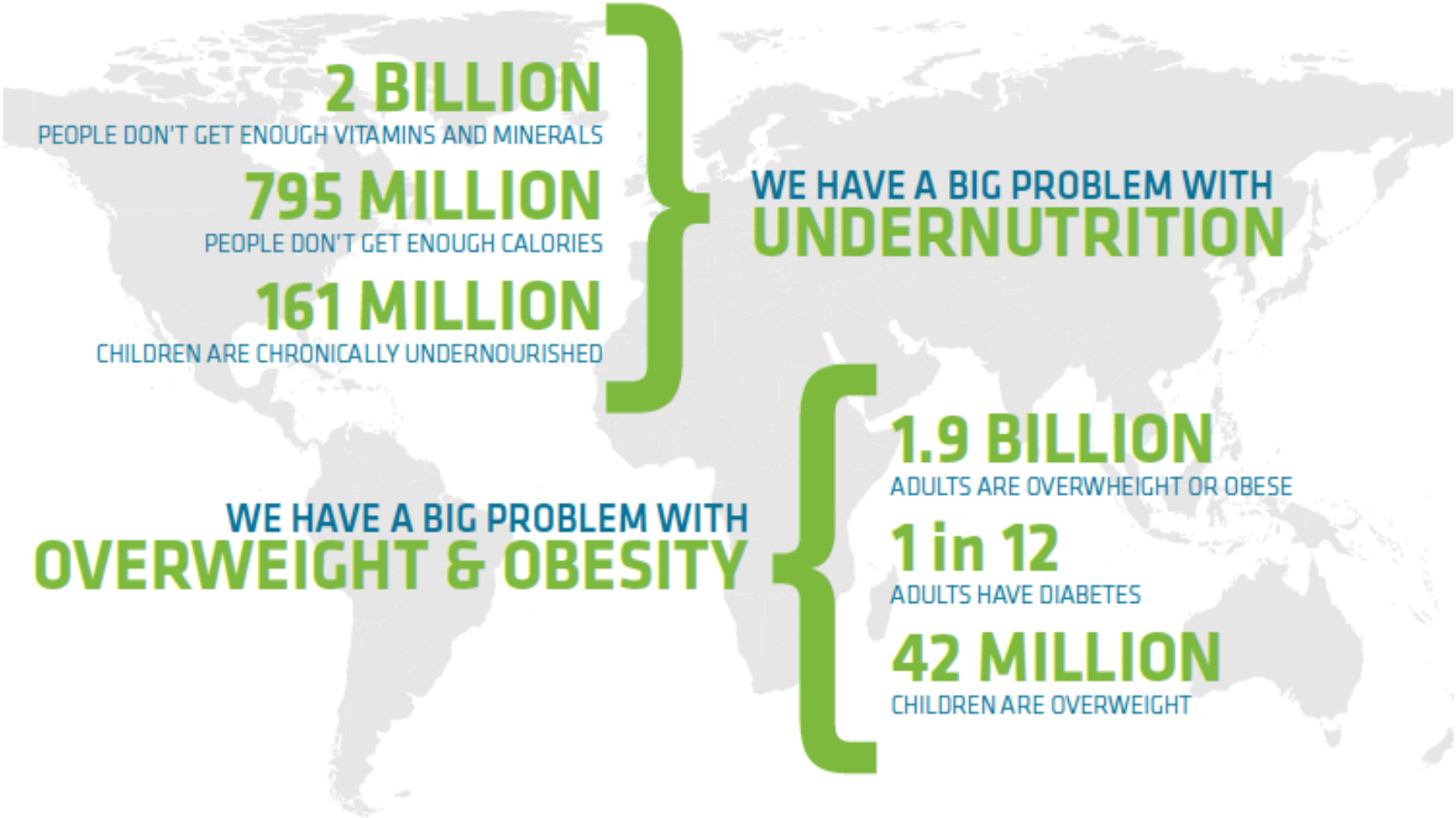
Adapted from work by Prof. Nicholas Jordan, University of Minnesota (2015)

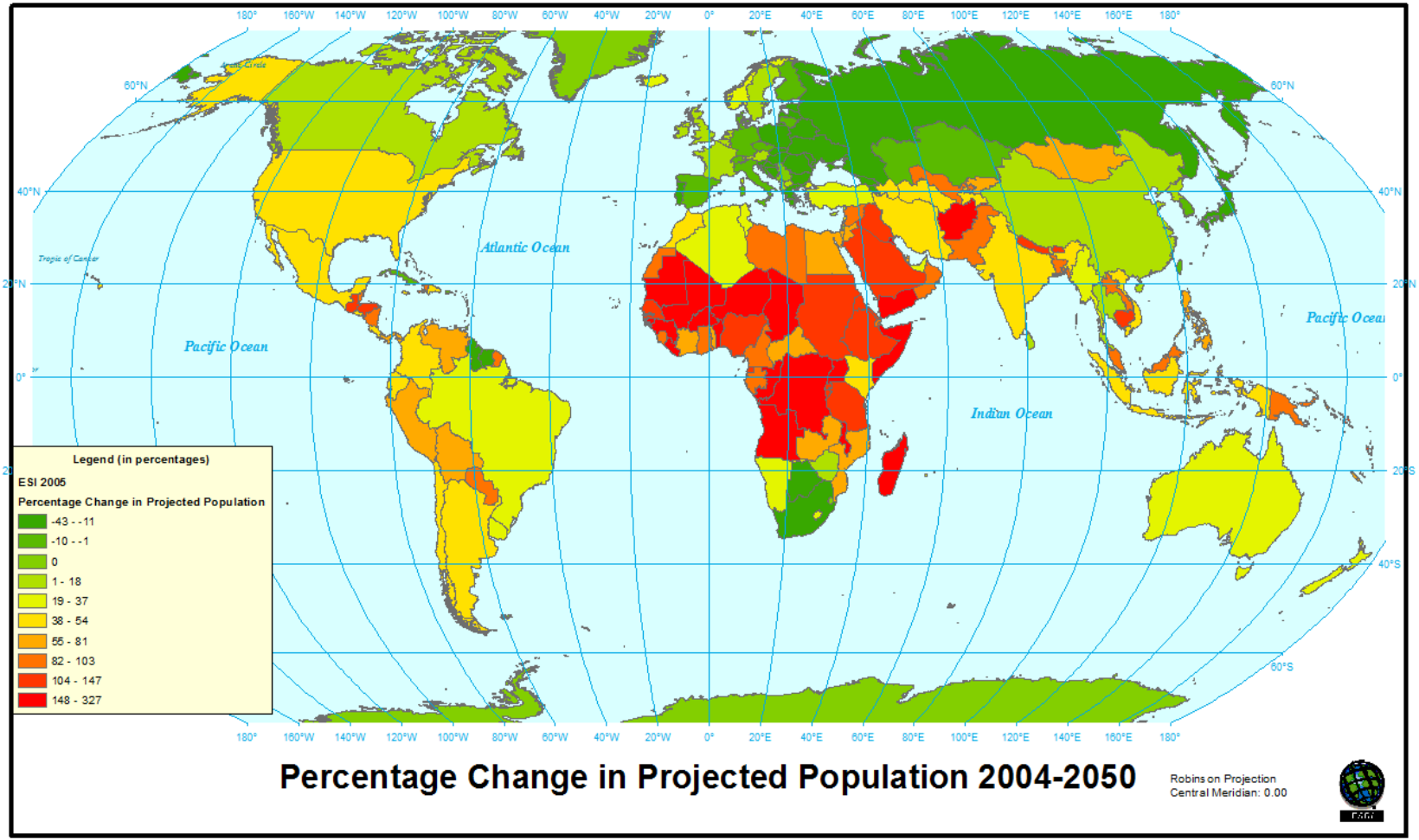
FRESH WATER

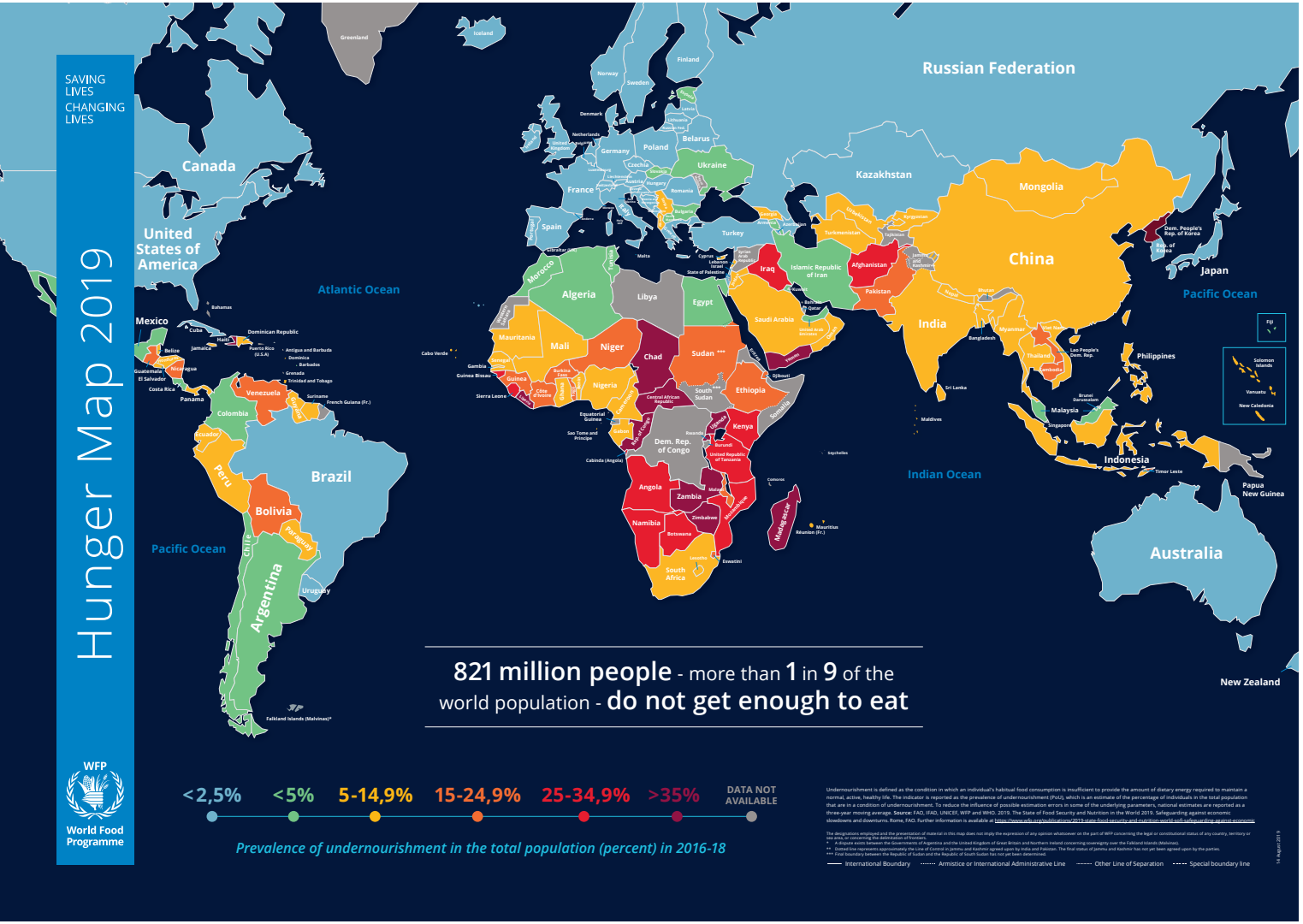
- Nearly 450 million people in 29 countries now face severe water shortages
- As much as 2/3 of the world population could be water-stressed by 2025
- Half the world's rivers and lakes are seriously polluted

- Irrigation uses 70% of the world's fresh water
- Water scarcity will be the chief constraint to increased food production
- The threat to water resources stands as one of the major crises facing the planet

Midwest USA has 20% of global freshwater resources

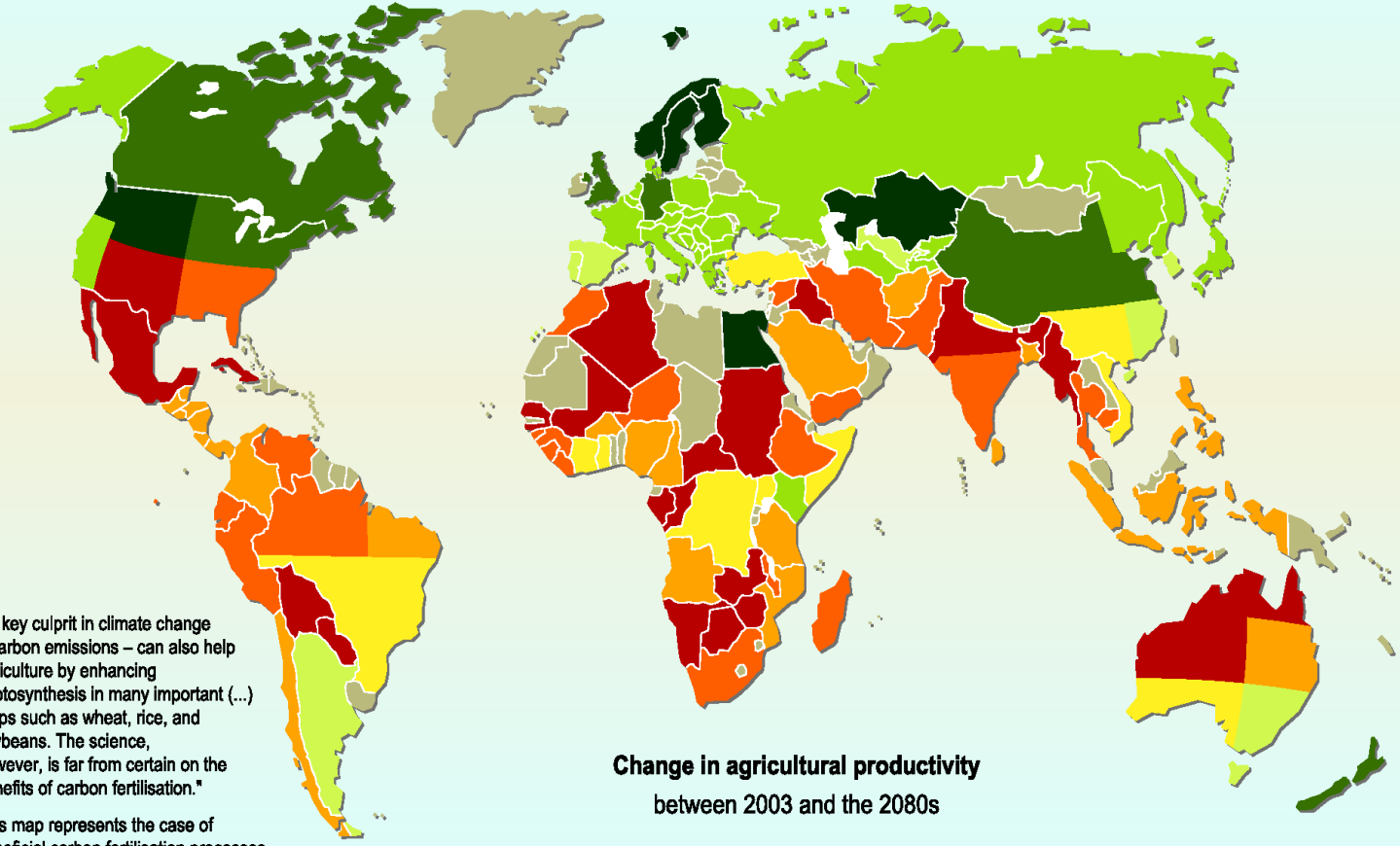

2 BILLION
PEOPLE DON'T GET ENOUGH VITAMINS AND MINERALS
795 MILLION
PEOPLE DON'T GET ENOUGH CALORIES
161 MILLION
CHILDREN ARE CHRONICALLY UNDERNOURISHED
WE HAVE A BIG PROBLEM WITH
UNDERNUTRITION
WE HAVE A BIG PROBLEM WITH
OVERWEIGHT & OBESITY
1.9 BILLION
ADULTS ARE OVERWHEIGHT OR OBESE
1 in 12
ADULTS HAVE DIABETES
42 MILLION
CHILDREN ARE OVERWEIGHT


Legend (in percentages)
ESI 2005
Percentage Change in Projected Population
-43 - -11
-10 - -1
0
1 - 18
19 - 37
38 - 54
55 - 81
82 - 103
104 - 147
148 - 327
Atlantic Ocean
Pacific Ocean
Pacific Ocean
Indian Ocean
Tropic of Cancer
Arctic Circle
180° 160°W 140°W 120°W 100°W 80°W 60°W 40°W 20°W 0° 20°E 40°E 60°E 80°E 100°E 120°E 140°E 160°E 180°
60°N
40°N
20°N
0°
20°S
40°S
60°S
Percentage Change in Projected Population 2004-2050
Robinson Projection
Central Meridian: 0.00



Global hunger is emerging critical issue

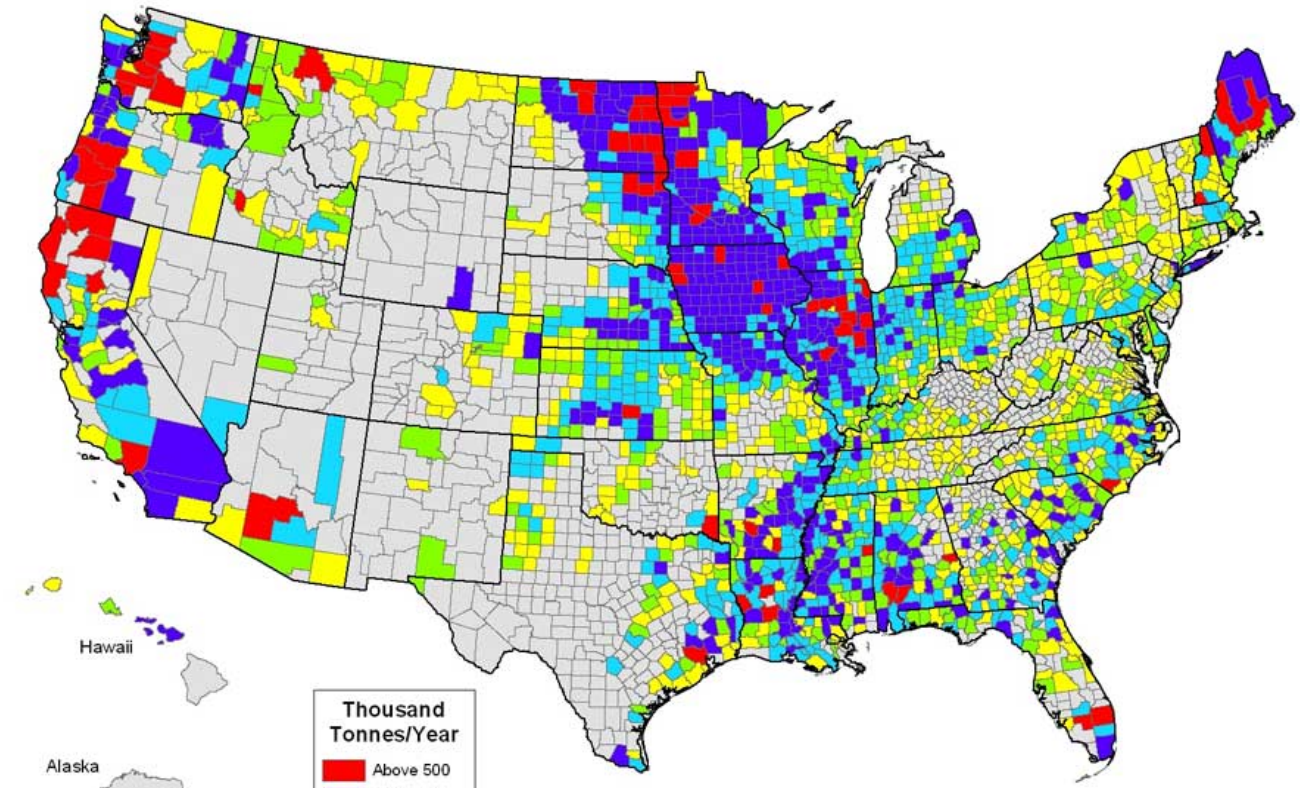
Projected impact of climate change on agricultural yields



Source: Cline W., 2007, *Global Warming and Agriculture.*

‘Winners and losers’

Biomass Resources Available in the United States



This study estimates the technical biomass resources currently available in the United States by county. It includes the following feedstock categories:
- Agricultural residues (crops and animal manure);
- Wood residues (forest, primary mill, secondary mill, and urban wood);
- Municipal discards (methane emissions from landfills and domestic wastewater treatment);
- Dedicated energy crops (on Conservation Reserve Program and Abandoned Mine Lands).

NREL

September 2005

Energy + Food + Water + Climate Change

Future-Splitting Questions™

Are we reaching an ecological and societal tipping point? - and what radical disruption, or accelerated change will this bring to global food systems?

Technology and the speed of change

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What makes this industrial revolution different?

- Machine learning / Artificial Intelligence
- Converging technologies
- Exponential impacts

1.0 — **1780 – Mechanisation**
Industrial production based on machines powered by water and steam

2.0 — **1870 – Electrification**
Mass-production using assembly lines

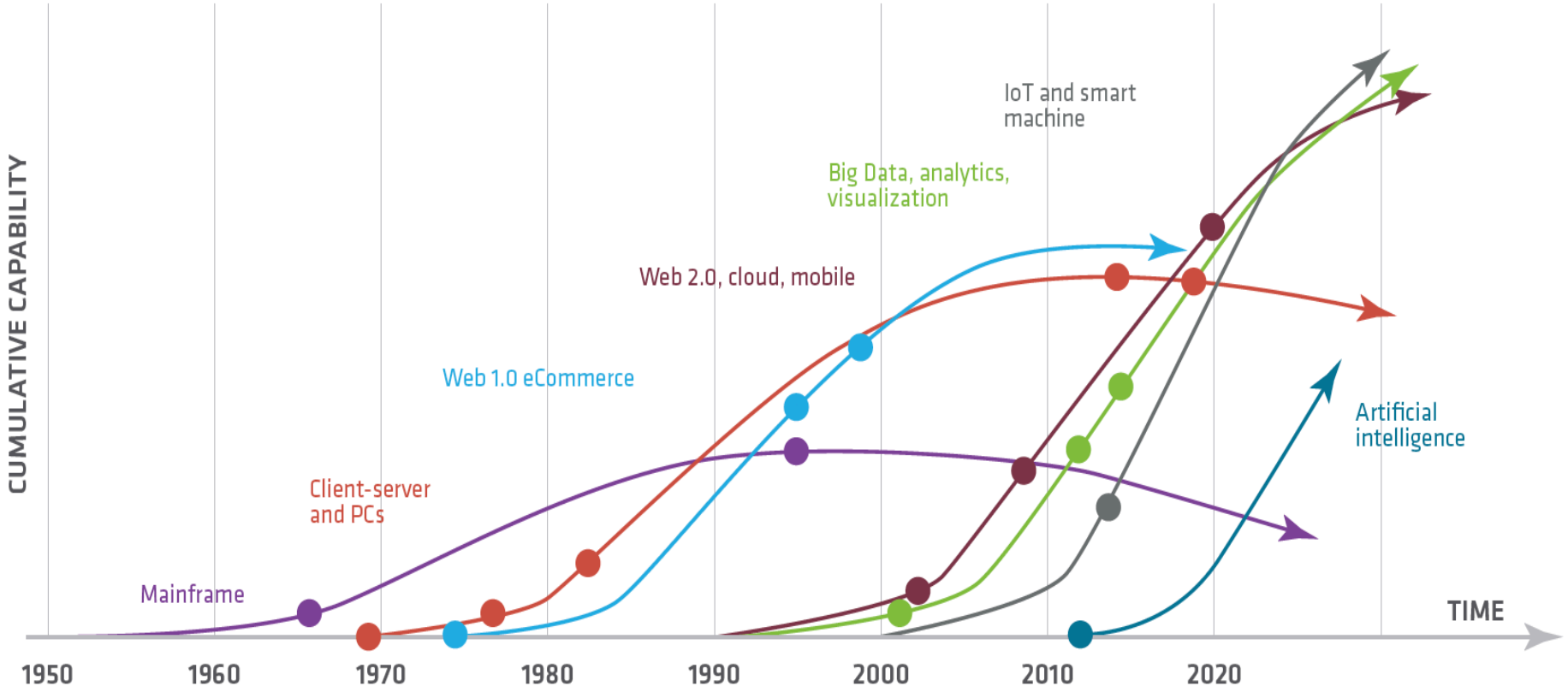
3.0 — **1970 – Automation**
Automation using electronics and computers

3.5 — **1980 – Globalisation**
Offshoring of production to low-cost economies

4.0 — **Today – Digitalisation**
Introduction of connected devices, data analytics and artificial intelligence technologies to automate processes further

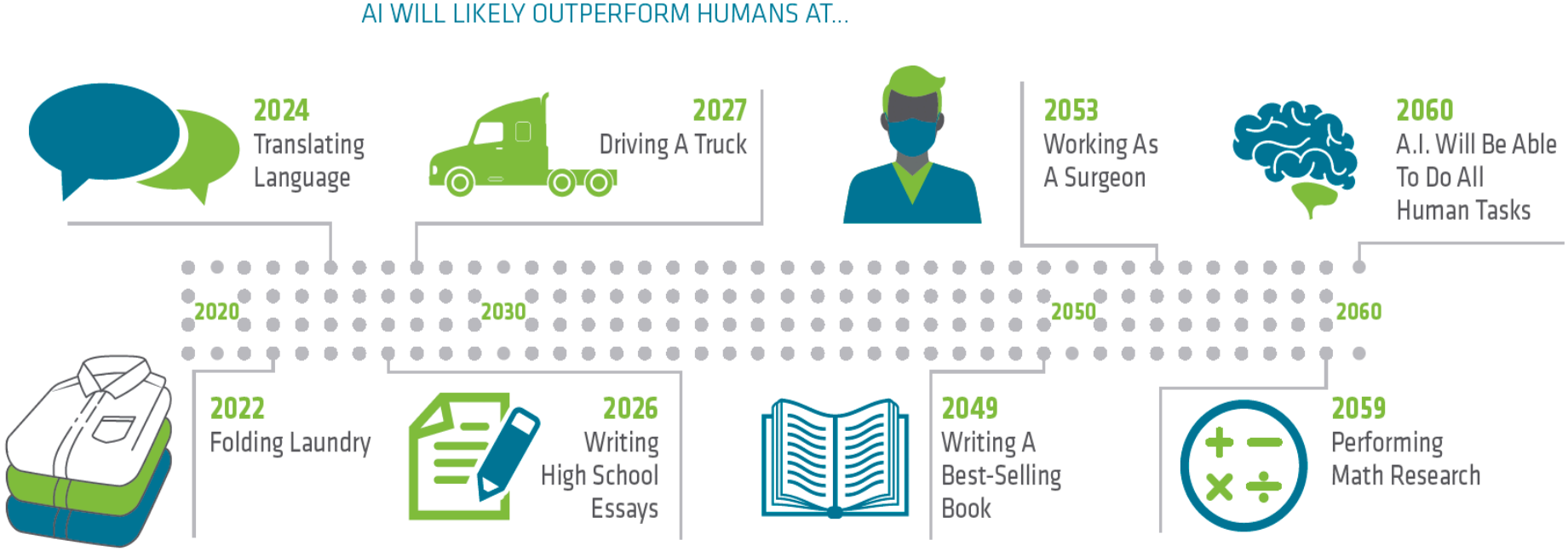
BY BEN ROSSI – MARCH 7, 2018

THE INCREASING CAPABILITY OF DIGITAL TECHNOLOGIES



Digital Transformation Initiative Mining and Metals Industry, White Paper, World Economic Forum / Accenture analysis, January 2017

When will AI outperform people?

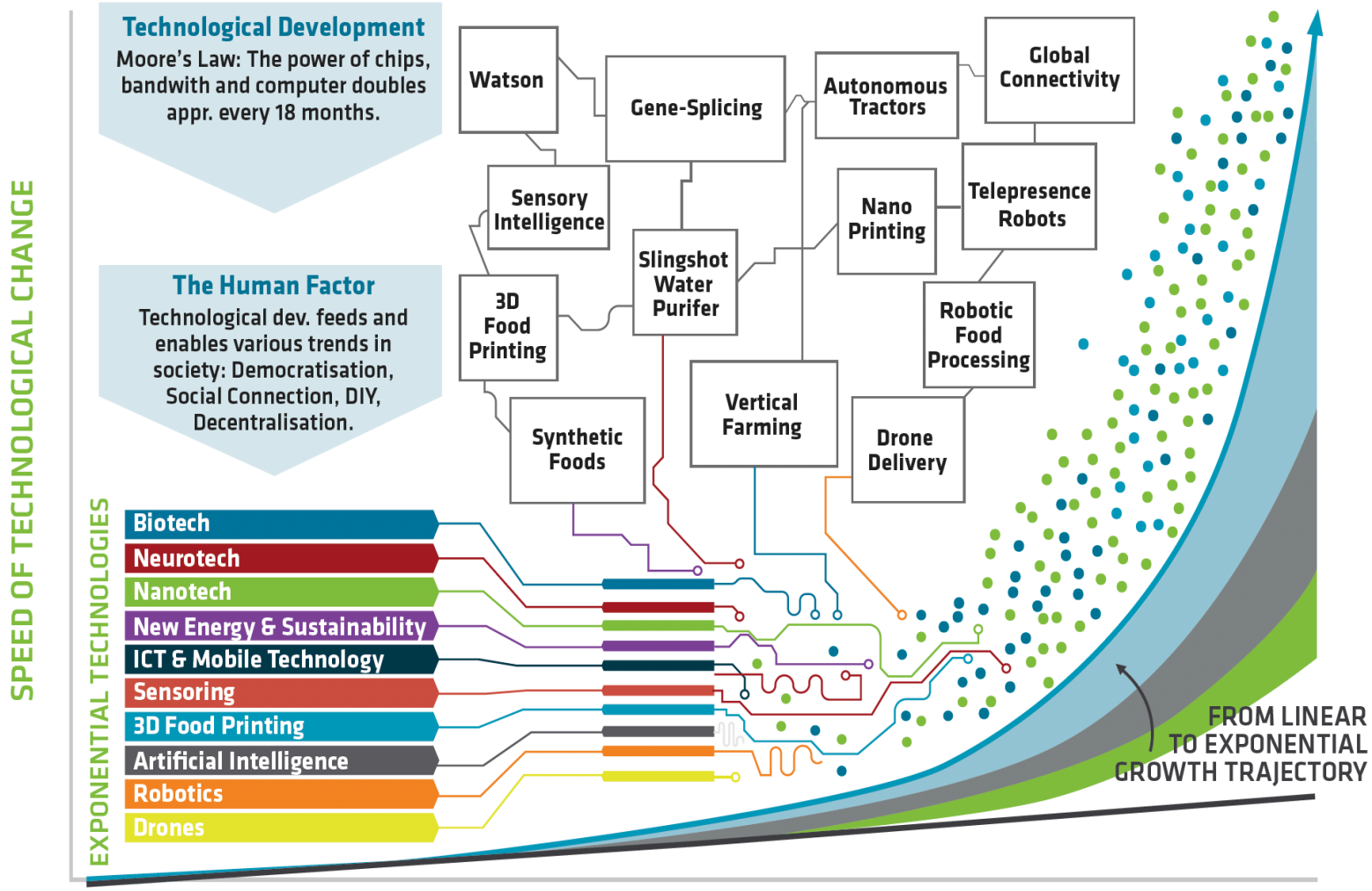


Source: 'You Will Lose Your Job to a Robot–and Sooner Than You Think'. Kevin Drum, Mother Jones, November / December Issue, 2017. (adapted from 'When will AI exceed human performance? Evidence from AI Experts', Oxford and Yale University 2017) [12]

Reproduced from Next Industrial Revolution, Future iQ, 2018

Source: New Yorker Oct 23, 2017, and Max Planck Research 2009

Rapid systemic change and technology integration



Adapted from: Source: Deloitte. 2014. Industry 4.0 Challenges and solutions for the digital transformation and use of exponential technologies

Future-Splitting Questions™

How do we invest enough (*and fast enough*) in the right priorities, to stay competitive in an exponential world?

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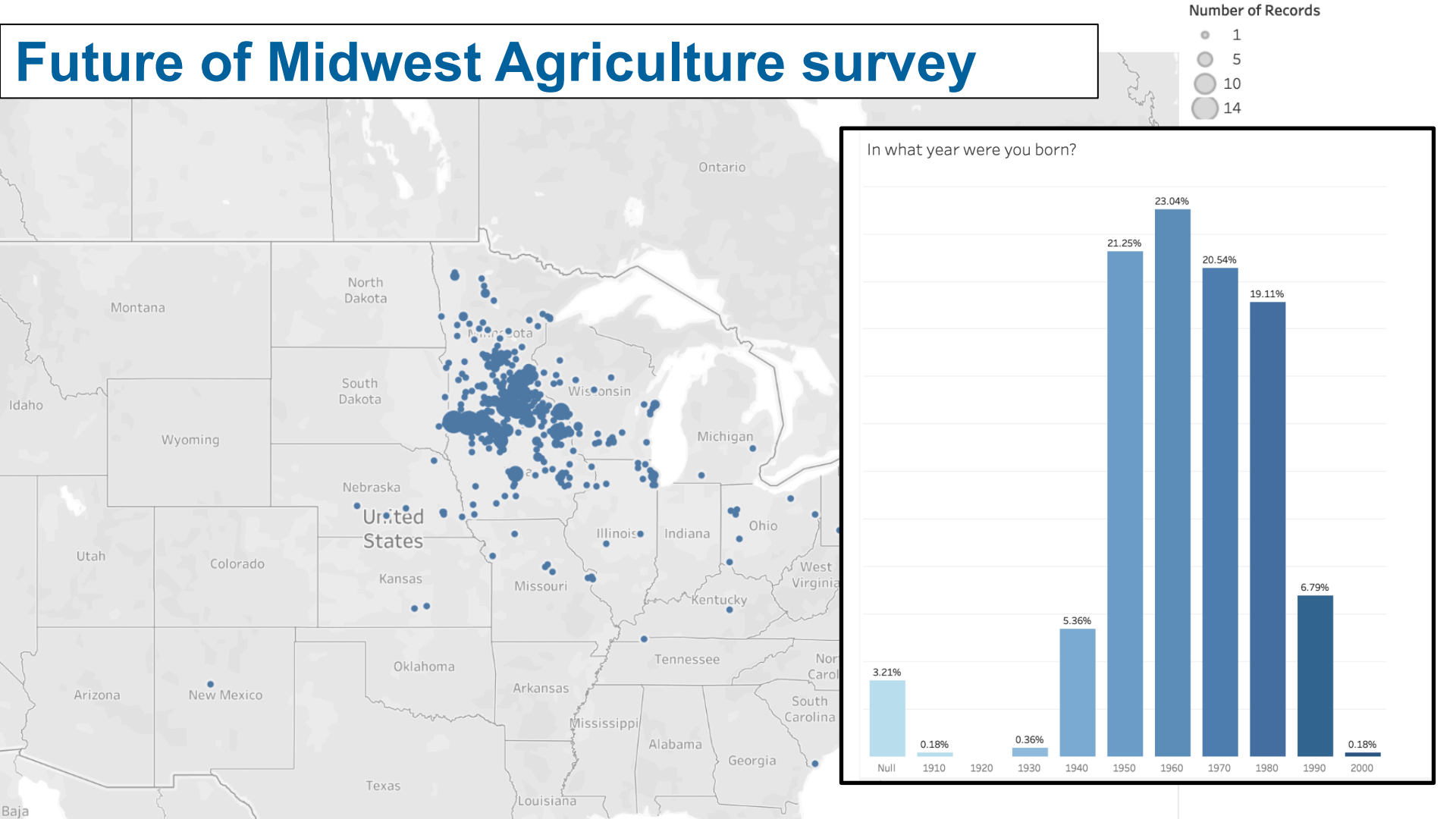
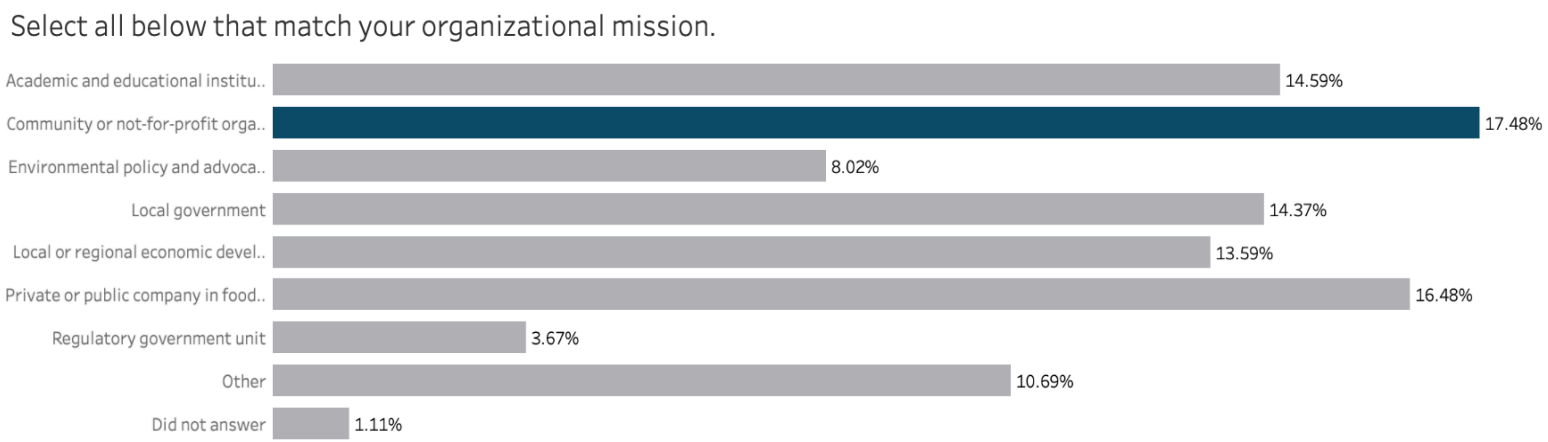
Future of Midwest Survey

Future of Midwest Agriculture survey



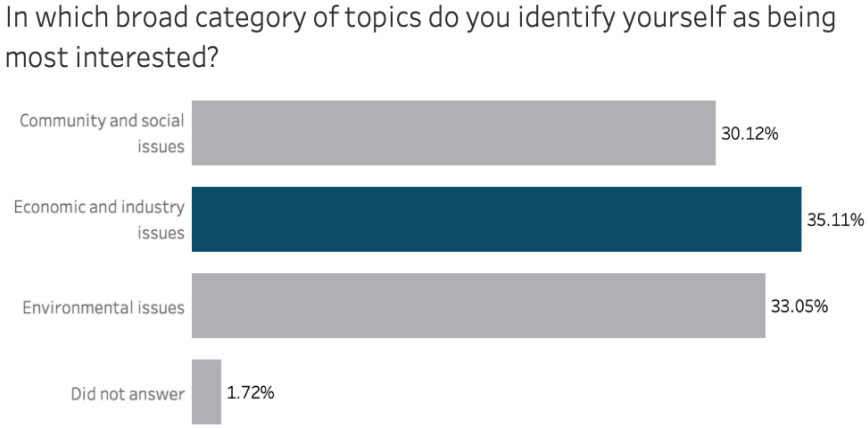
Profile of respondents

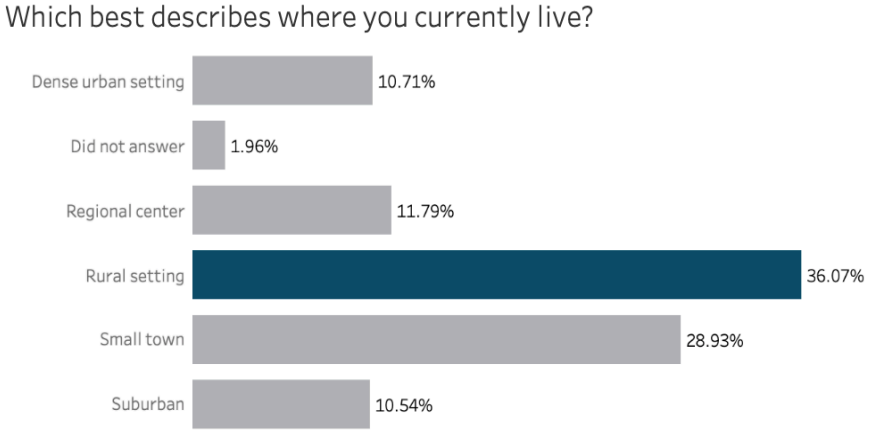


Collector
(All)

Year of Birth Range
(All)

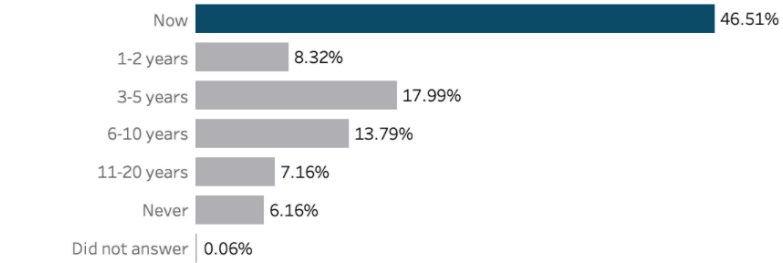
Gender
(All)



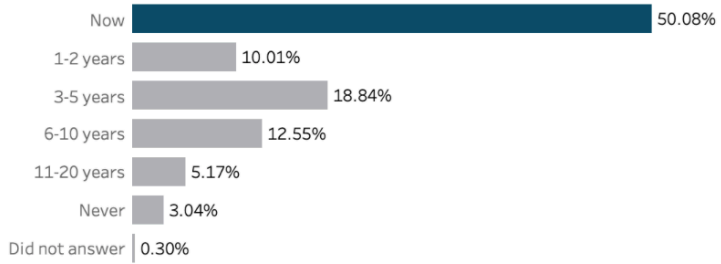


Time to impact

When do you think the following factors will significantly change YOUR life?
Factor: All
Scale: Now to Never



When do you think the following factors will significantly change the agricultural industry in the Midwest?
Factor: All
Scale: Now to Never



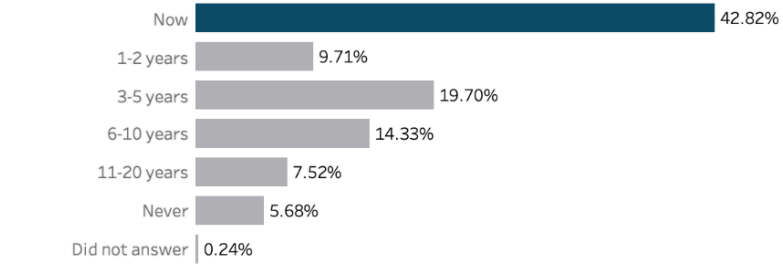
Collector
(All)

Change Factor
(All)

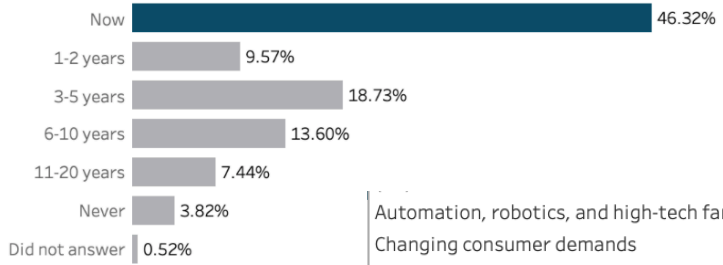
Year of Birth Range
(All)

Gender
(All)

When do you think the following factors will significantly change the environment in the Midwest?
Factor: All
Scale: Now to Never

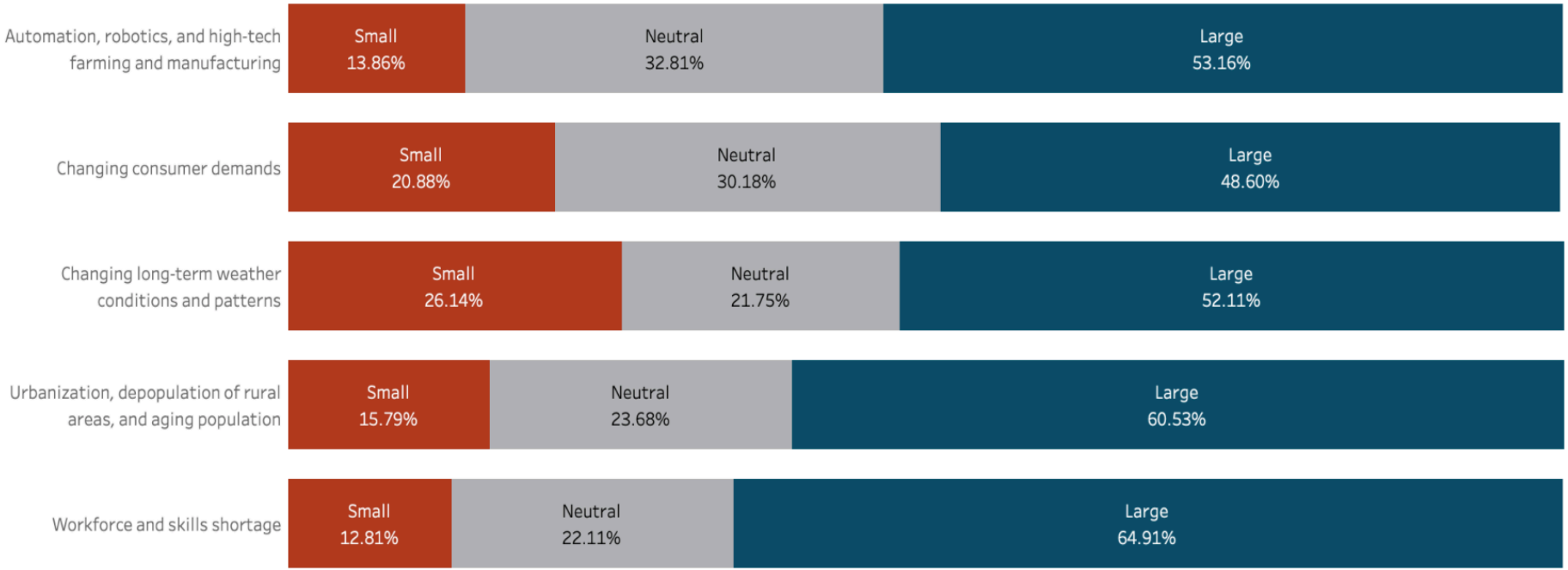


When do you think the following factors will significantly change rural communities in the Midwest?
Factor: All
Scale: Now to Never



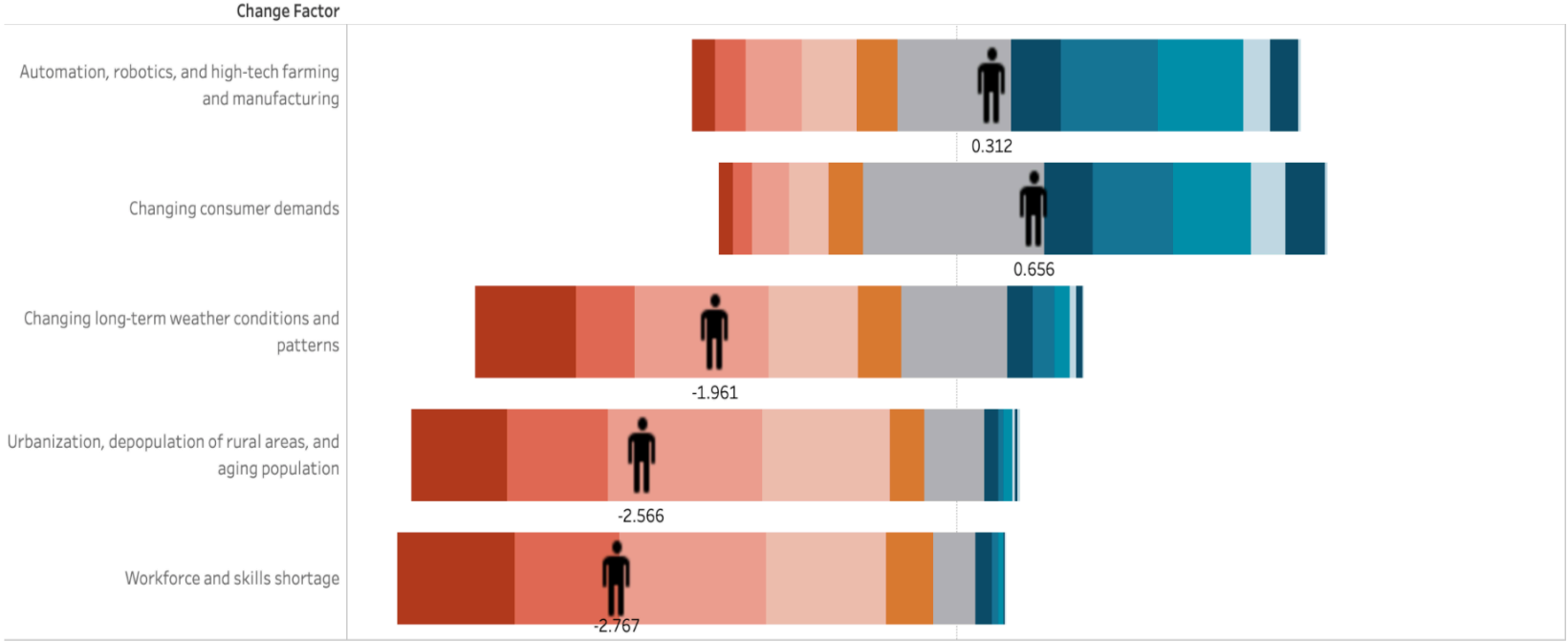
Automation, robotics, and high-tech farming and manufacturing
Changing consumer demands
Changing long-term weather conditions and patterns
Urbanization, depopulation of rural areas, and aging population
Workforce and skills shortage

Size of impact

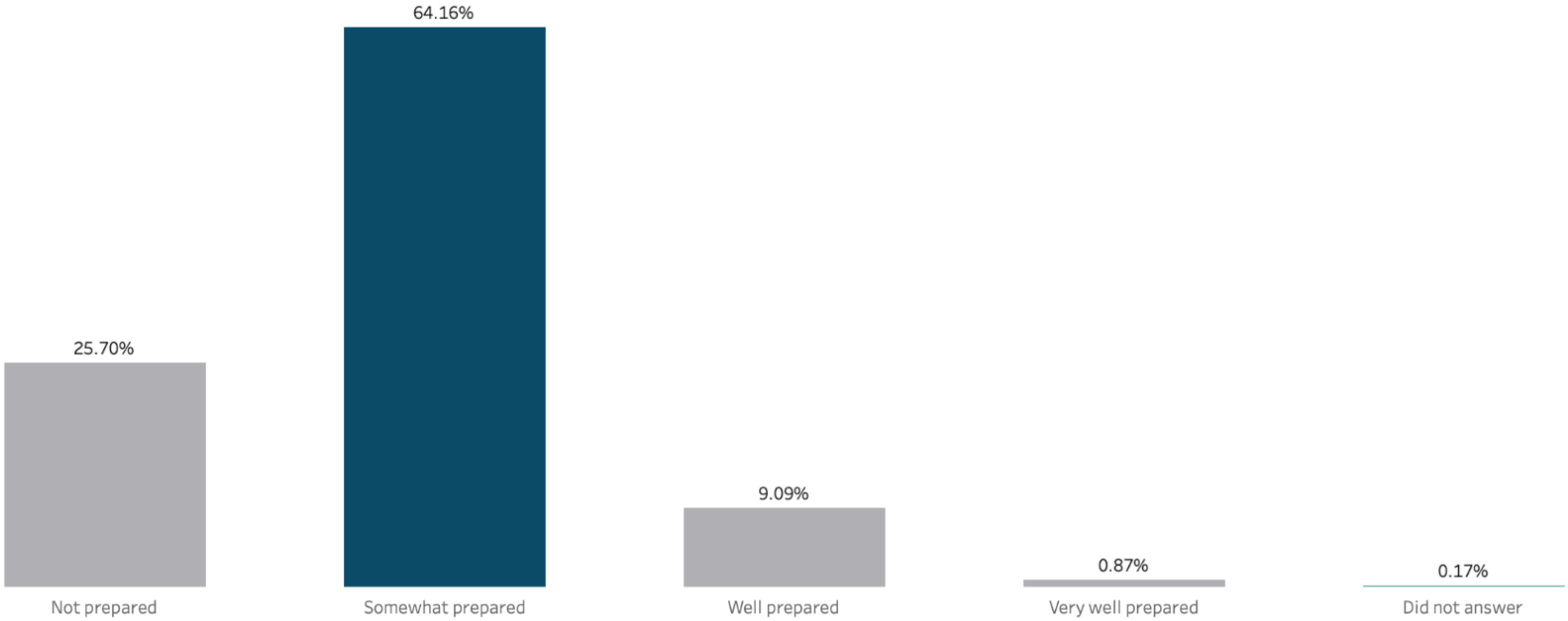


Nature of impact

Considering your answers to the above questions, how positive or negative do you think the changes will be within each topic area?



Preparedness



Summary and observations

- Change is disrupting life now
- Impacts are large
- Impacts are mostly negative
- People are generally not prepared

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Future-Splitting Questions™

How do we help regions, communities and industries build "future intelligence" (foresight capability) and collaborative systems, in order to anticipate and respond?

Thank you

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CEO, Future iQ