



New North Business Intelligence Committee

Developing a Forward-Looking Regional Strategy



David Beurle, CEO,
Future iQ

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The first part of morning program...

Review scenarios

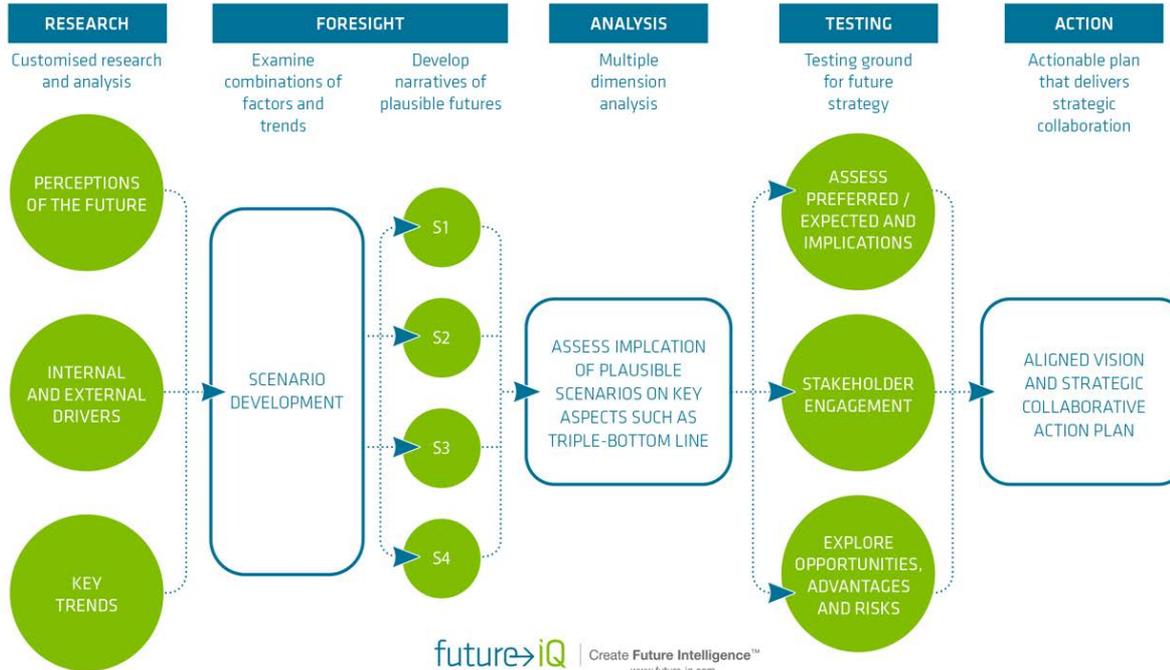
Explore trends

Score drivers

Building a regional business intelligence dashboard that can visualize, and track
key agreed influential trends



De-briefing on August 9 Scenario planning workshop



Program for 9 August

- Context for the day
- Key drivers of the future – deep-dive
- Scenario development and implications
- Expected and Preferred futures





Explored Macro themes:

- **‘Digital Transformation’**
- **‘Workforce and workplace’**

Drivers are events, trends, developments, catalysts or forces that actively influence or cause change.



Digital Transformation



1. Digital manufacturing
2. Catalytic and disruptive technologies
3. Cybersecurity requirements and compliance
4. Company and organizational orientation towards technology
5. Changes in supply chains and consumers / clients demands
6. Impact of internet of things and mass connectivity
7. Artificial intelligence and predictive analytics
8. Automation and robotics
9. Additive manufacturing
10. Material science and product innovation



Workforce and workplace



1. Leadership and management styles and needs
2. Role of education systems in training and retraining
3. Demographic transition (baby-boomer to millennials)
4. Workforce housing access and availability
5. Wage levels and workplace incentives
6. Changing skill-set needs
7. Women in the workforce and cultural inclusivity
8. Changing societal values and impact on work ethic
9. Political impacts – skilled immigration policy
10. Evolving workplace models (company culture, job sharing, remote work, flexible work hours)

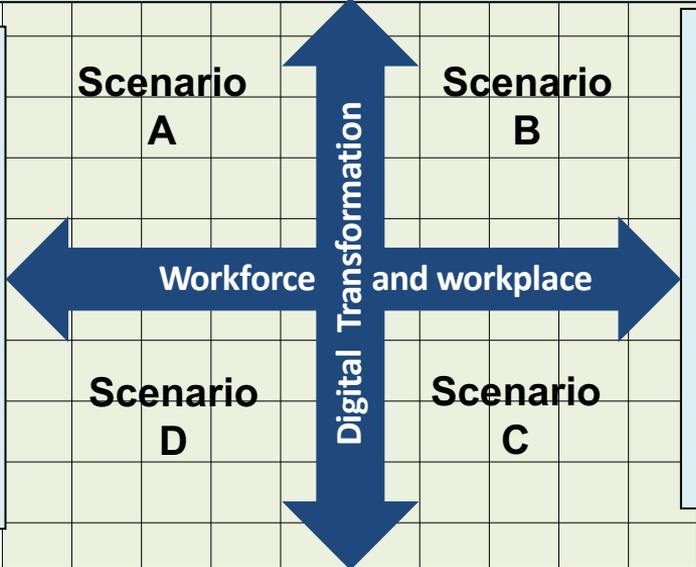


Plausible Scenario Matrix 2030



Connected systems approach
 There is deliberate investment in developing an integrated multi-disciplinary approach to industry digital transformation and technology solutions. Exponential technologies are deliberately integrated. Resources are shared between technical and supply chain clusters, and issues are explored in a connected systems-wide approach.

Retool, home-grown and attraction
 The regional and industry approach to solving talent and skills shortage is retraining and retooling existing people, and attraction of new talent. The primary approach focuses on continually upskilling and retaining the local workforce. Strong connections are made through the whole education system. Workers are incentivized to stay loyal and stay local.



Workplace transformation
 Radical reinvention of the workplace drives more automation, outsourcing and flexible workplace roles. The workplace becomes more flexible, and new work styles and patterns are embraced. A central group of primary workers, coupled with automation and technology provide the core operations, with a more fluid supporting network of workforce and workplace solutions.

Single technology approach
 Key technology areas are dealt with separately and within specific technical expertise areas. Deep investment is made in building expertise and competency in each main area to develop excellence, but there is little significant overlap between disciplines, or integration of approaches across industry sectors or businesses.

New North Business Intelligence Workshop
 9 August 2019

Scenario Characteristics - Dimensions to consider



Industry innovation and collaboration profile

- Levels of innovation and where is it occurring
- Industry partnerships and alliances
- Regional and industry competitiveness



Technology application and adoption

- Adaptability to changing technology and integration approach
- Resilience, cybersecurity and compliance levels
- Speed, scale and nature of technology adoption



Supply chain configuration and behavior

- Supply chain impacts and distribution of supply
- Levels of trust and integration
- Flexibility, diversification and agility

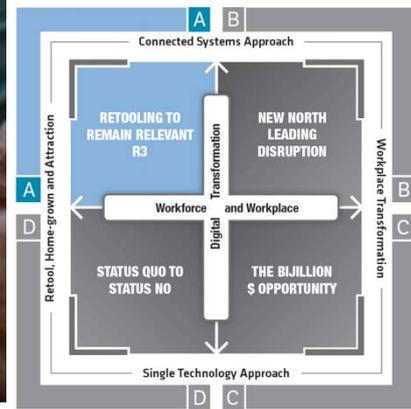


Workforce system and profile

- Workforce and economic profiles – where is there growth or decline
- Training and workforce Pipeline – origin of workers / role of education
- Shape of workforce - skills and age profiles, career paths and distribution



R3 Retooling To Remain Relevant



Industry Innovation and Collaboration Profile

Shared regional resources enable increased industry innovation in the New North region.



Technology Application and Adaption

Industry takes a multidisciplinary approach to technology solutions.



Supply Chain Configuration and Behavior

Supply chains are broad and cross sectored to create a highly connected regional systems approach.



Workforce System and Profile

Labor pool continues to tighten as industry growth increases demand for workers.

2020 HEADLINE NEWS:

"W.E.D.C. launches new WI supplier network based on New North SCMP"



2025 HEADLINE NEWS:

"Early adopters are surviving – Closures for those that don't"

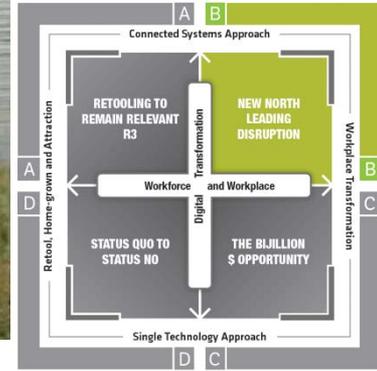


2030 HEADLINE NEWS:

"Incarceration goes down and skills go up – Get to meaningful employment"



New North leading disruption



Industry Innovation and Collaboration Profile

New North is a center of excellence in innovation and collaboration.



Technology Application and Adaption

Industry embraces digital transformation and technology solutions.



Supply Chain Configuration and Behavior

Supply chains are global and connected with a high level of shared resources.



Workforce System and Profile

Regional workforce solutions are diverse and innovative.

2020 HEADLINE NEWS:

"New North launches new academy for future skills"



2025 HEADLINE NEWS:

"New North awarded 'Best place to work'"

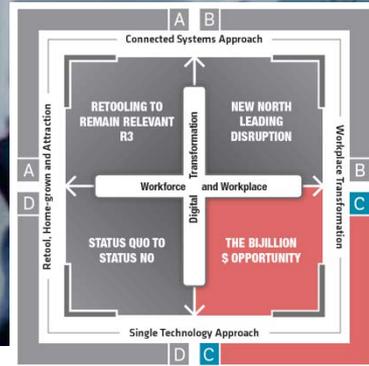


2030 HEADLINE NEWS:

"New North wins first ever technology Nobel Peace Prize"



The Bijillion \$ Opportunity



Industry Innovation and Collaboration Profile

Collaboration and innovation within industries is high.



Technology Application and Adaption

Single technologies are highly developed and innovative.



Supply Chain and Configuration Behavior

Supply chains are well defined within disciplines but lack flexibility.



Workforce System and Profile

Workforce systems are customized due to automation.

2020 HEADLINE NEWS:

"Paper is the new plastic"



2025 HEADLINE NEWS:

"Employers evaluate need for contract workers vs full time"

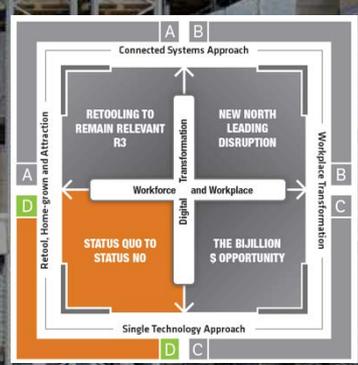


2030 HEADLINE NEWS:

"New North patents a supply chain integration process"



Status Quo To Status No



Industry Innovation and Collaboration Profile

Industry innovation is siloed and capped as competition for workforce and resources is high.



Technology Application and Adaption

Resources are localized and intense technological specialization occurs.



Supply Chain Configuration and Behavior

Supply chains are regionally centric and limited in scope.



Workforce System and Profile

Workforce development is regionally focused and closed to outside talent sources.

2020 HEADLINE NEWS:

"Local manufacturing announces major investment in 3-D printing"



2025 HEADLINE NEWS:

"Amazon launches blimp fleet"



2030 HEADLINE NEWS:

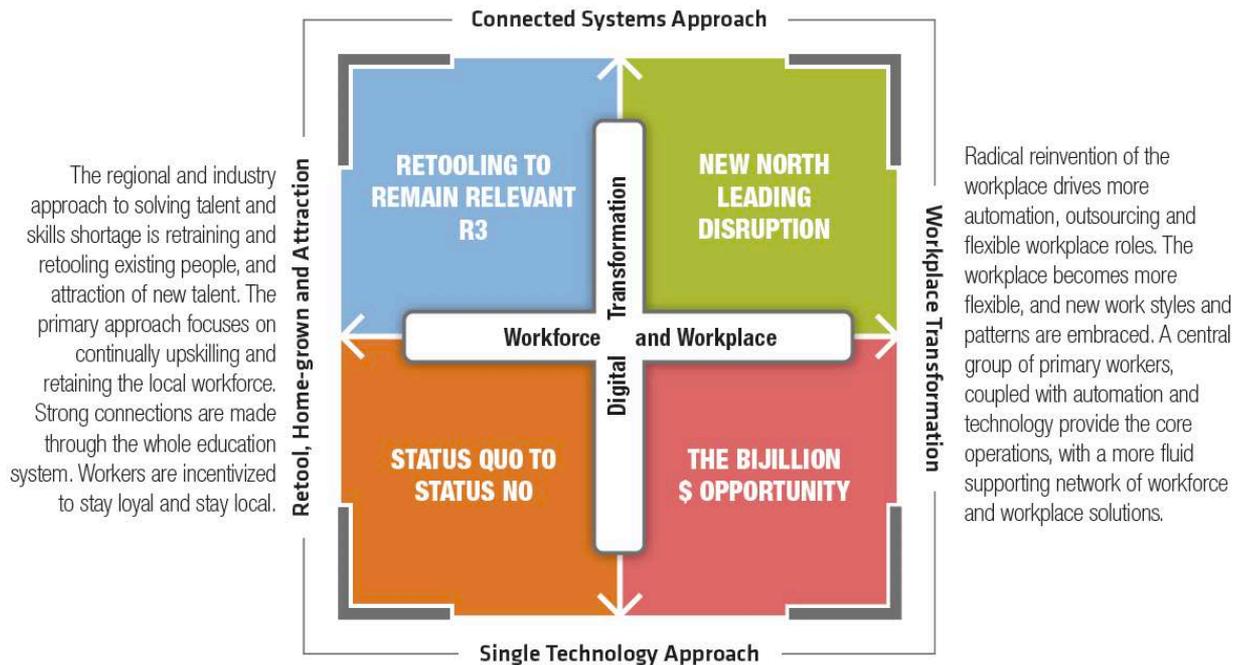
"Local headquarters move out of state"



A

B

There is deliberate investment in developing an integrated multidisciplinary approach to industry digital transformation and technology solutions. Exponential technologies are deliberately integrated. Resources are shared between technical and supply chain clusters, and issues are explored in a connected systemswide approach.



The regional and industry approach to solving talent and skills shortage is retraining and retooling existing people, and attraction of new talent. The primary approach focuses on continually upskilling and retaining the local workforce. Strong connections are made through the whole education system. Workers are incentivized to stay loyal and stay local.

Radical reinvention of the workplace drives more automation, outsourcing and flexible workplace roles. The workplace becomes more flexible, and new work styles and patterns are embraced. A central group of primary workers, coupled with automation and technology provide the core operations, with a more fluid supporting network of workforce and workplace solutions.

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A

D

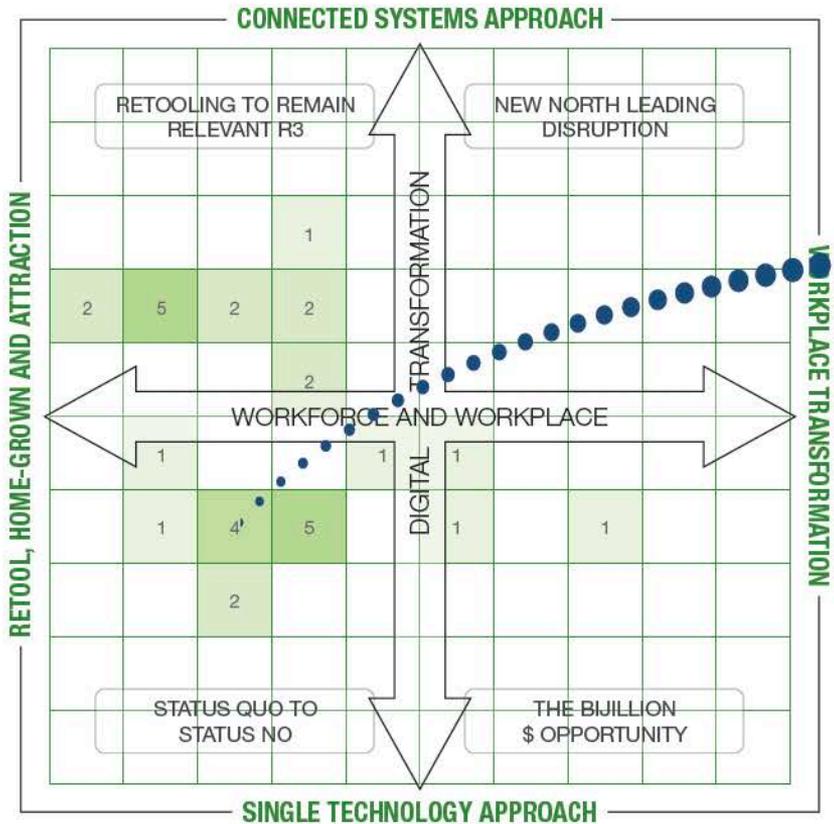
B

C

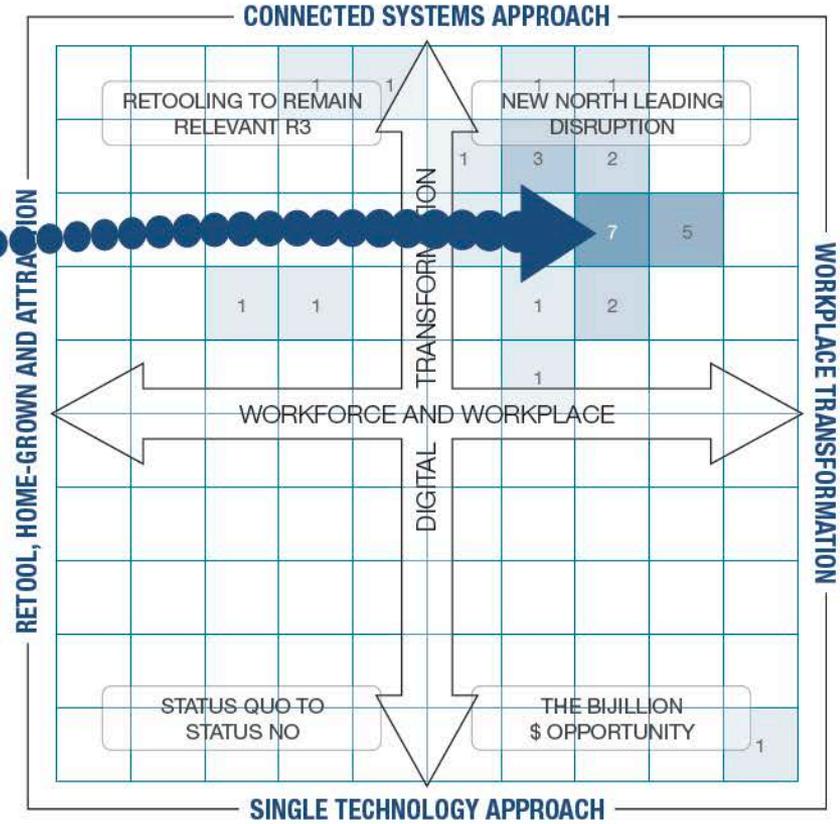
D

C

EXPECTED FUTURE – 2030



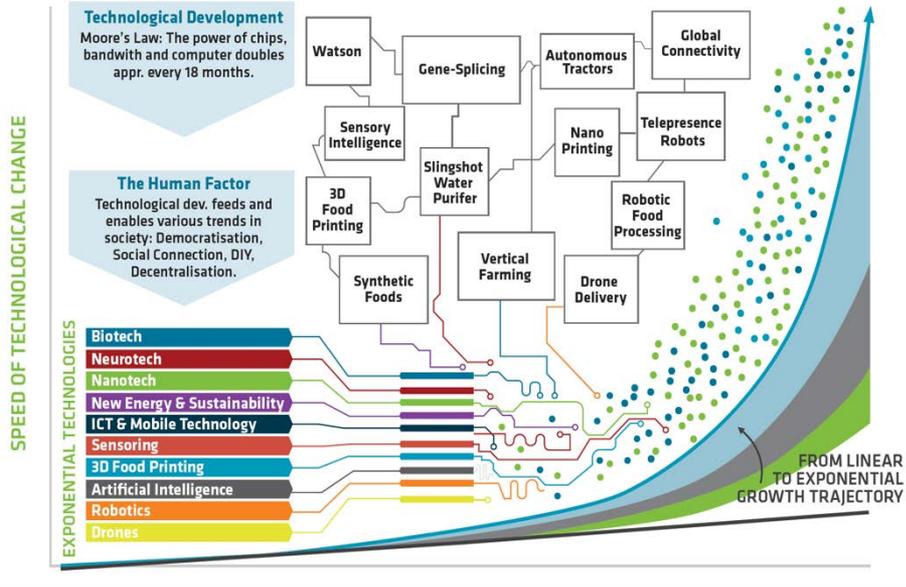
PREFERRED FUTURE – 2030



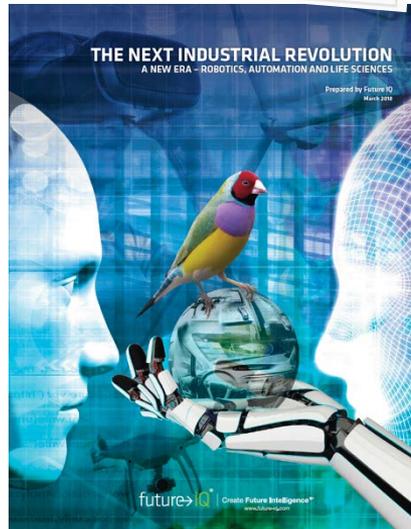
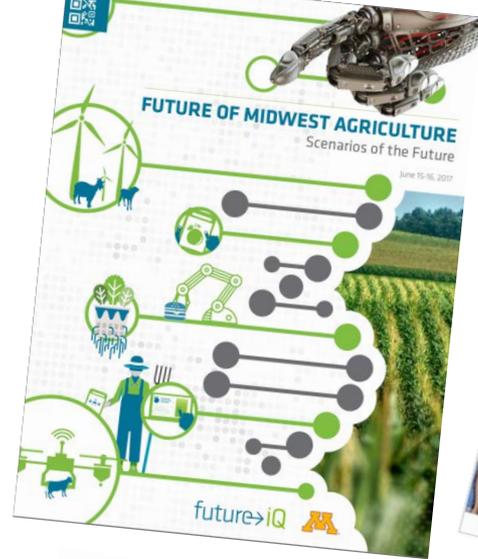
**What will it take to pivot from
expected to preferred future?**



Future trends and speed of change



Building a regional business intelligence dashboard that can visualize, and track key agreed influential trends



Macro Trends and Forces of Change Related to . . .

- **Population driving manufacturing**
- **The evolving workforce**
- **Technology and speed of change**





Population driving manufacturing

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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%

1950



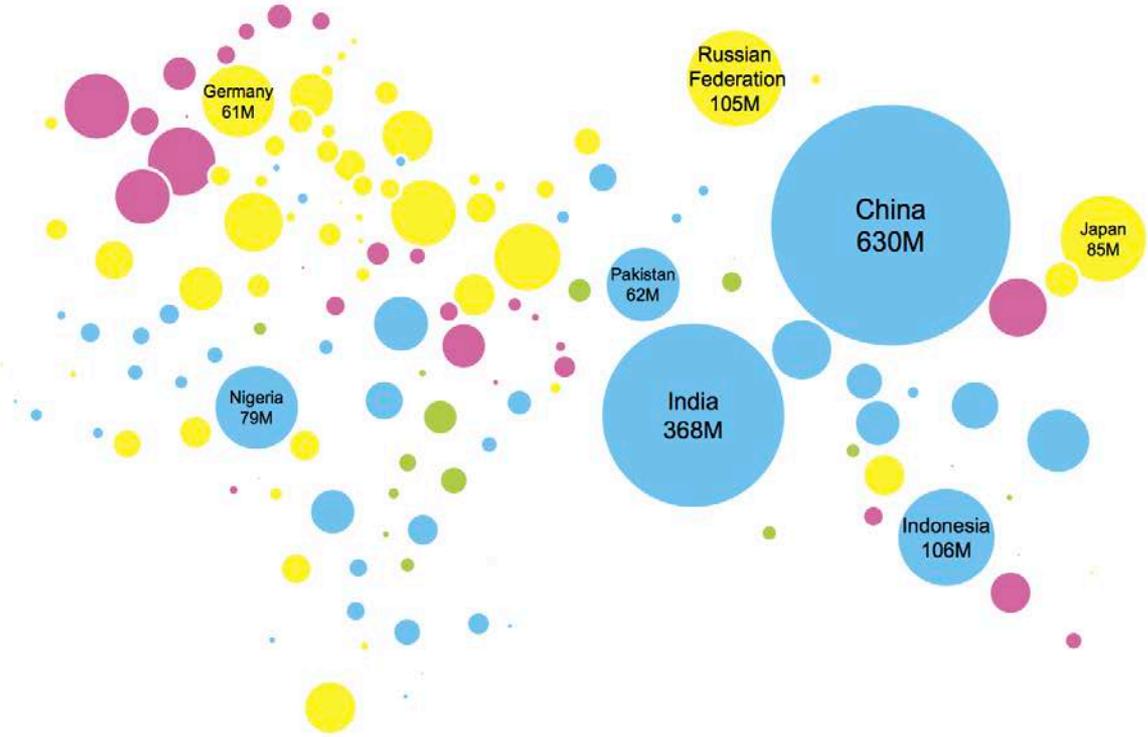
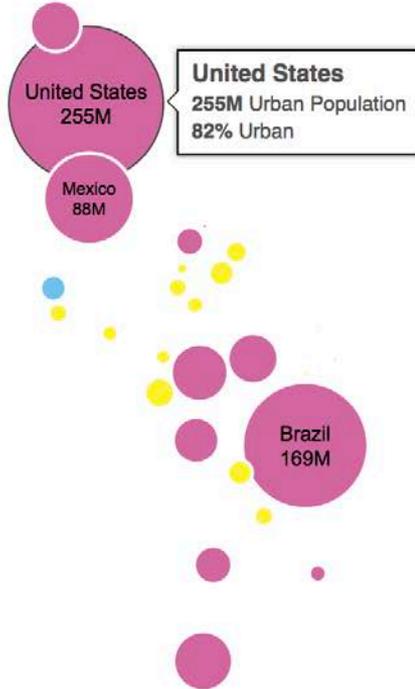
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 2010



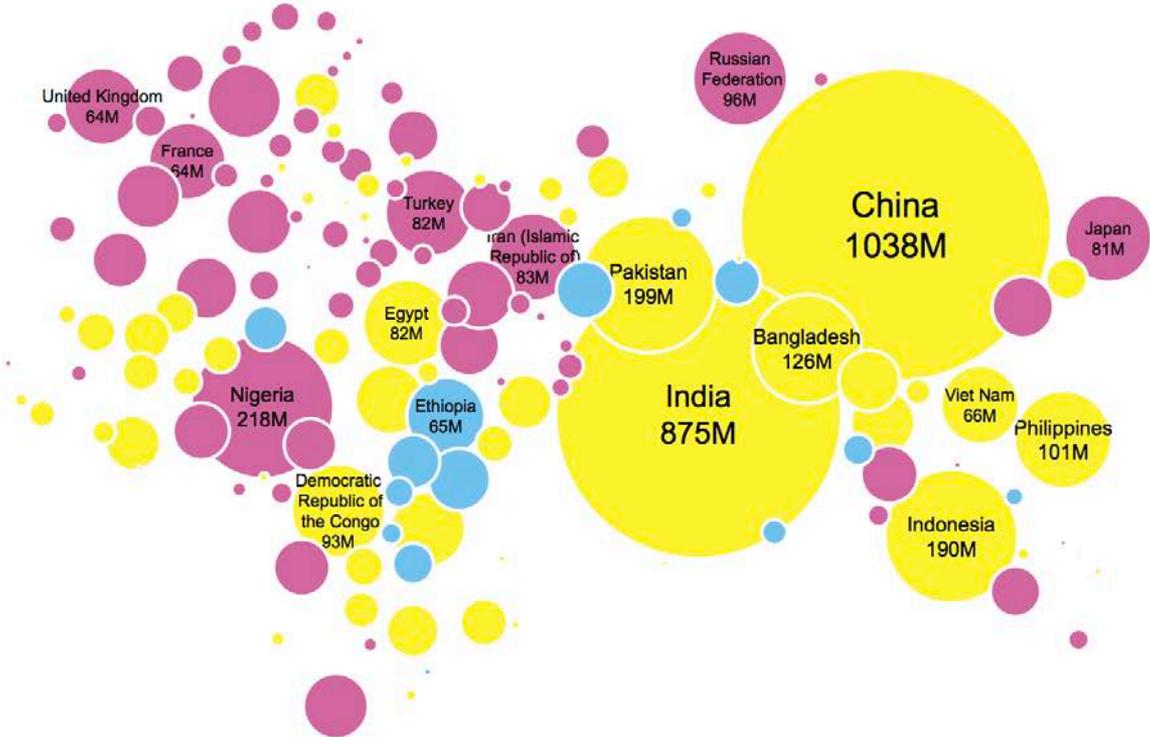
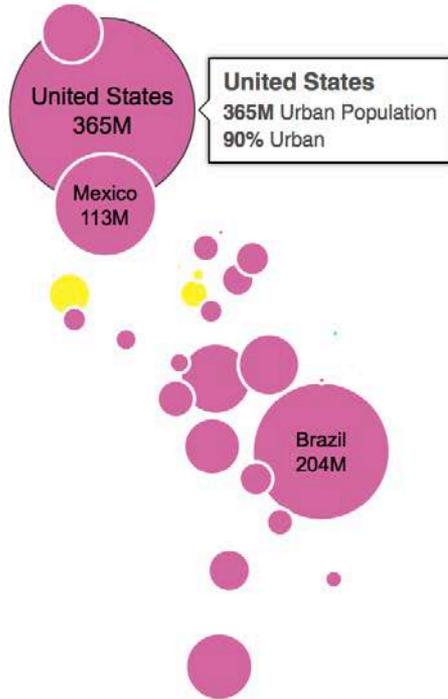
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Urban Population

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- Less than 25%

 2050



Our 2019 Annual Letter

BY BILL & MELINDA GATES



We didn't see this coming



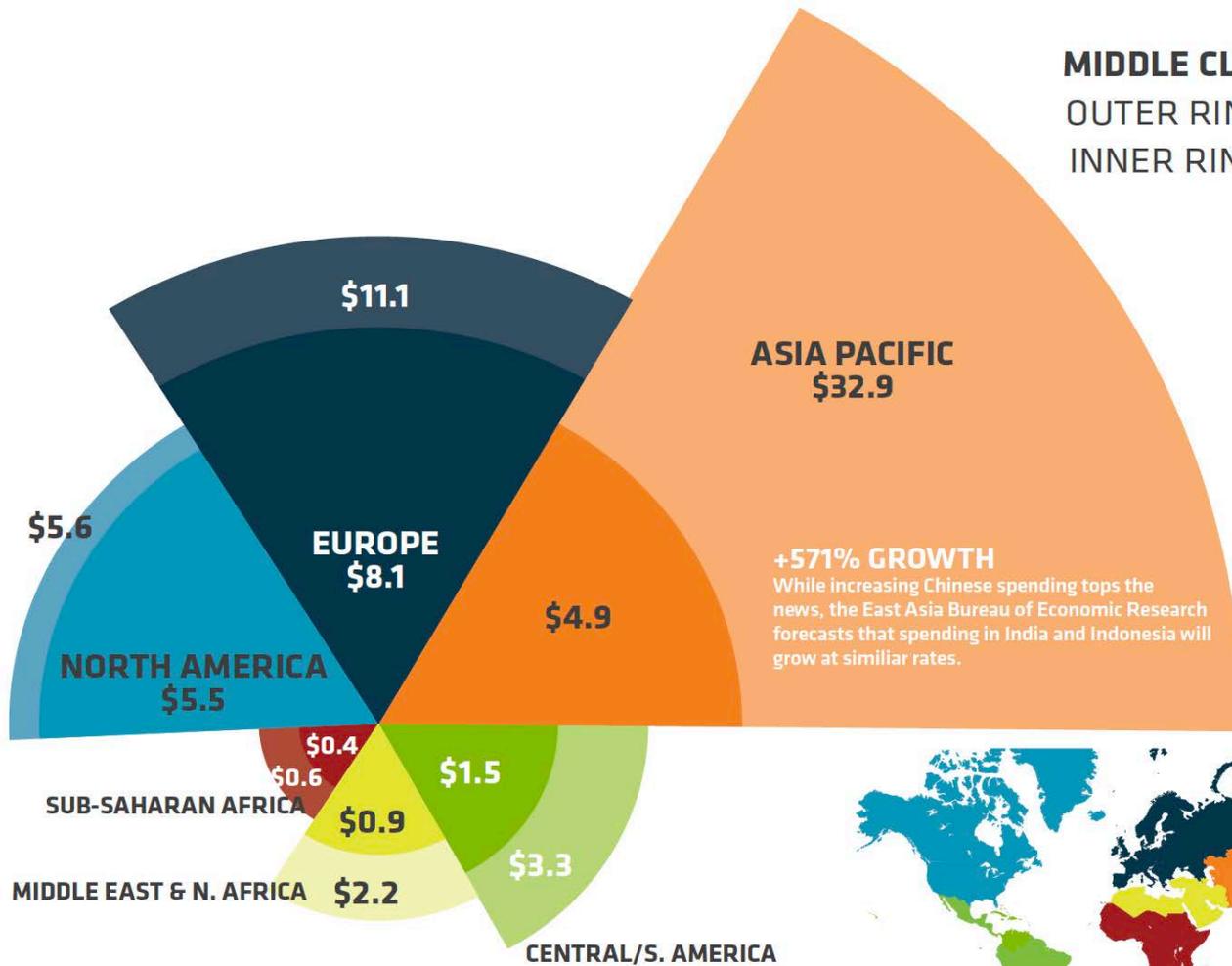
SURPRISE #3

We will build an entire New York City every month...

... for 40 years! The world's building stock
will double by 2060.

MIDDLE CLASS CONSUMER SPENDING

OUTER RING: 2030 IN TRILLIONS, USD
INNER RING: 2009 IN TRILLIONS, USD



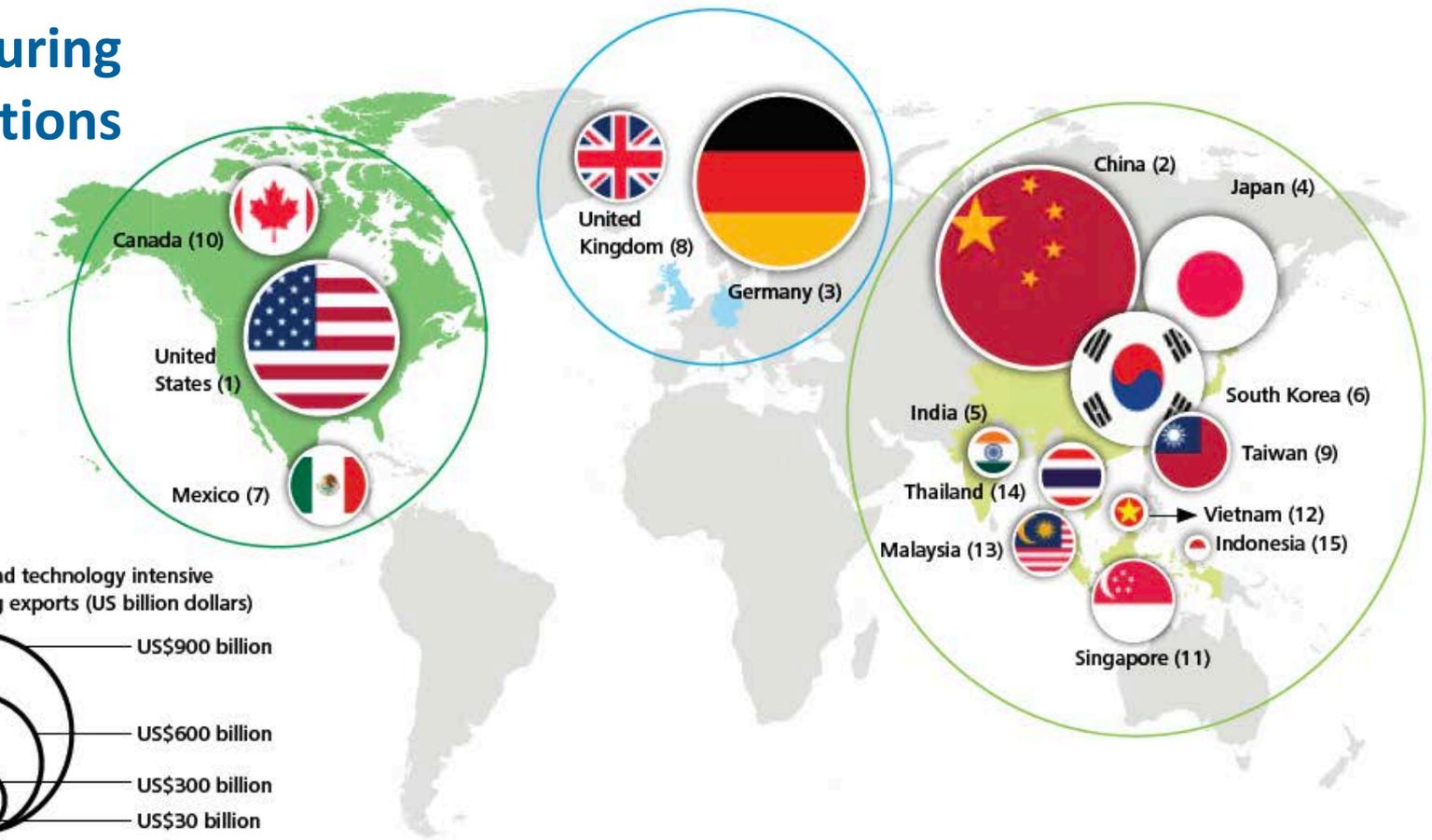
+571% GROWTH

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

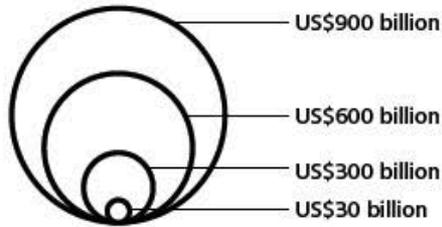


Source: Kou, L. 2013. The world's middle class will number 5 billion by 2030. Quartz.
Figures based on OECD, 2012. An emerging middle class.

Manufacturing concentrations



High skilled and technology intensive manufacturing exports (US billion dollars)



Note: Figure in parenthesis represent the projected 2020 GMCI rank by CEOs

Source: Deloitte Touche Tohmatsu Limited and US Council on Competitiveness, 2016 Global Manufacturing Competitiveness Index, Deloitte analysis based on UNCTAD data⁰⁰

Built Environment is a Direct Reflection of the Underlying Economy



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”



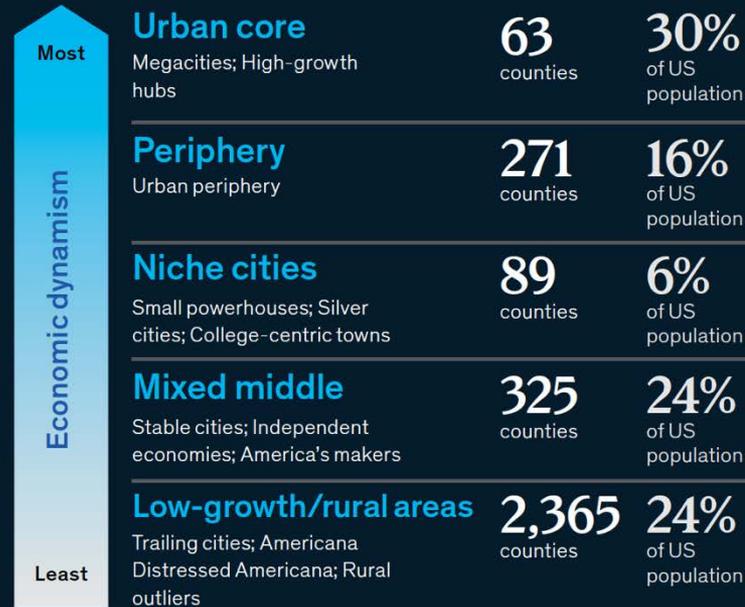
Knowledge/Experience Economy

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

America is a mosaic of local economies on diverging trajectories

Automation could widen existing disparities

13 community segments have varying economic and demographic profiles

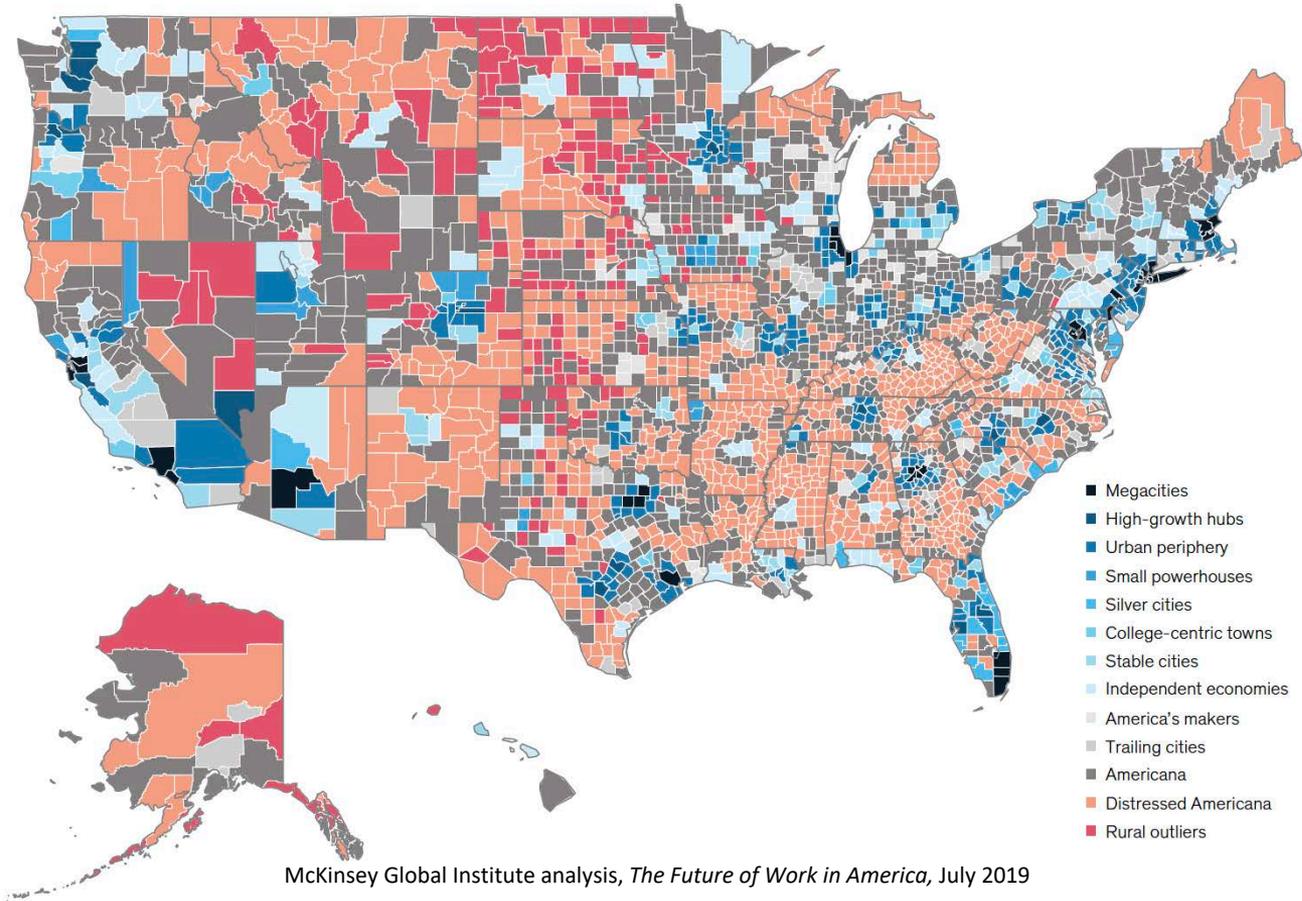


Employment change for select community segments, % of 2007 employment

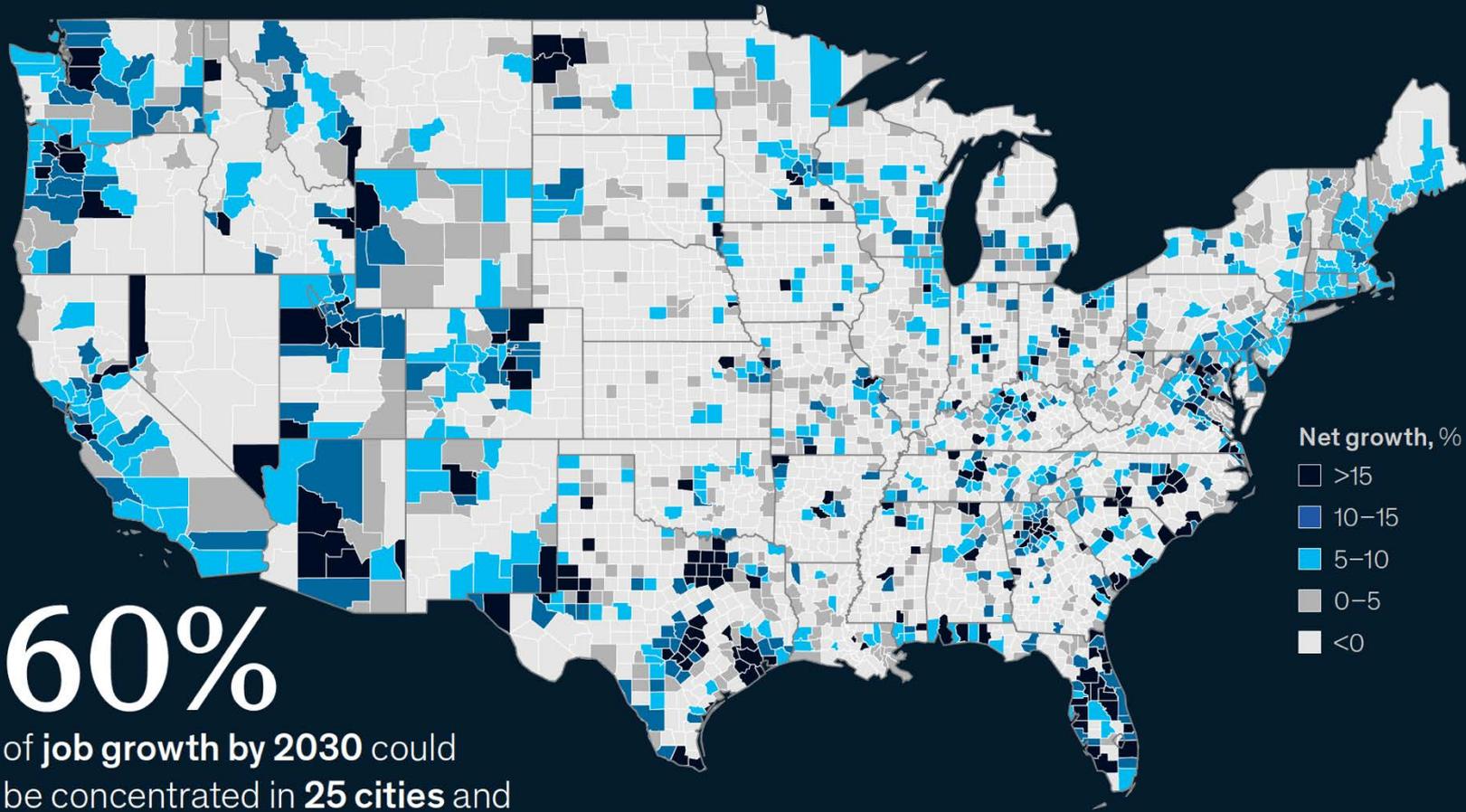


The United States is a complex mosaic of local economies, with 13 distinct community archetypes.

Map of county types (color-coded by segment)

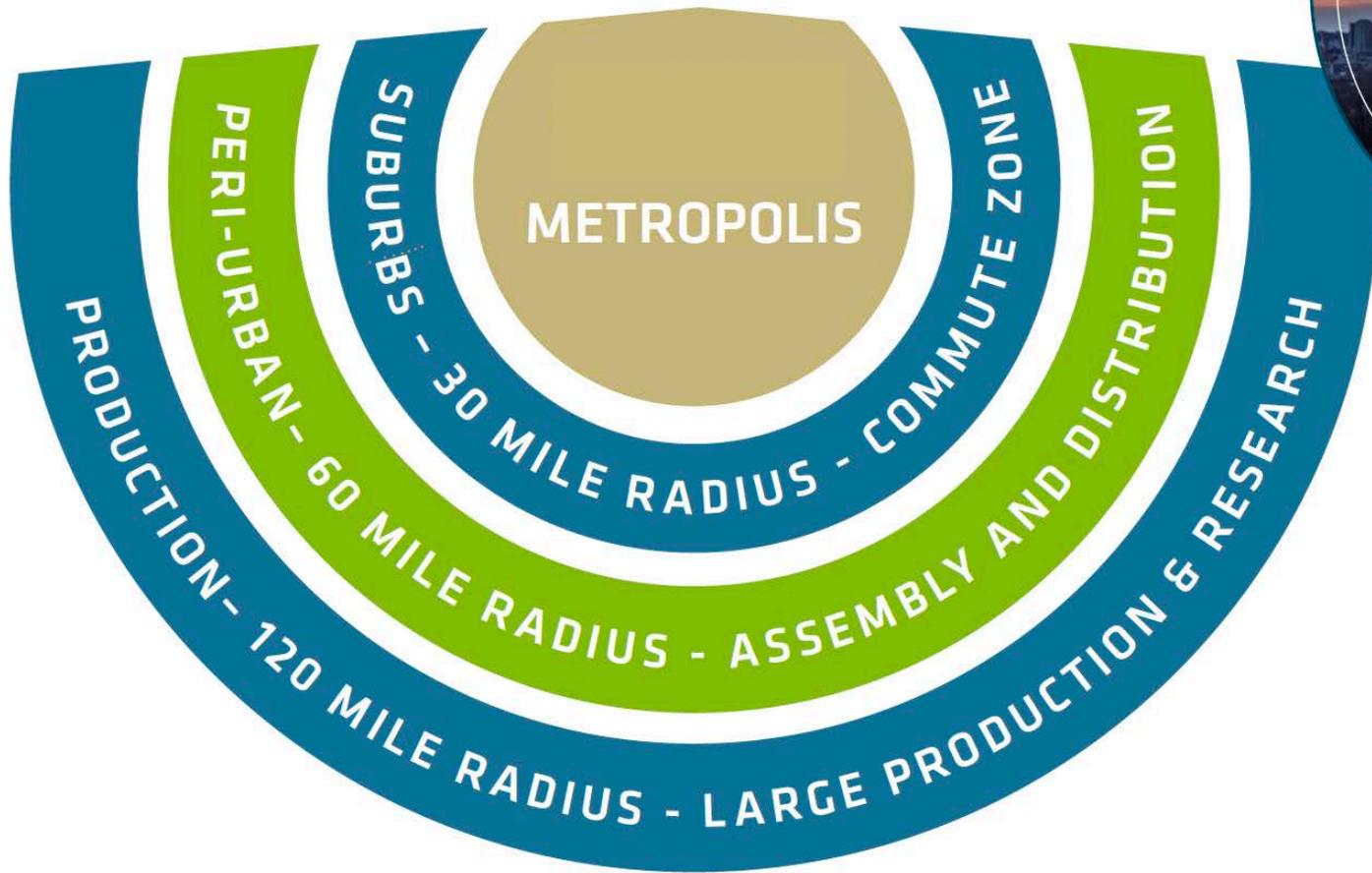


Estimated net job growth in midpoint adoption scenario, 2017–30, %



60%

of job growth by 2030 could be concentrated in **25 cities** and their peripheries

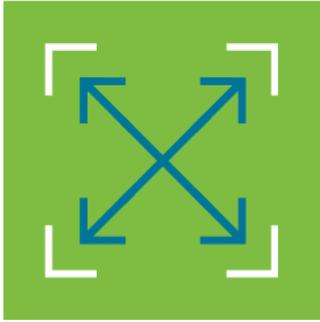


Population driving manufacturing

- Mass urbanization redefines supply chains and competitive locations
- Global population and wealth growth will fuel sustained and massive expansion of consumption
- US leadership and dominance is being challenged
- Transition from industrial to technology economies



Population driving manufacturing



Future-Splitting
Questions™

Example: Does mass urbanization drag manufacturing closer to mega-cities, or push it into specialized cities?



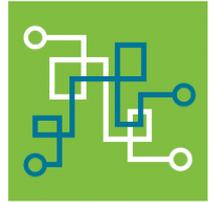
Predictions and observations

- There is a first mover advantage, and it will remain.
- Supply chains will cluster around mega-cities.
- US will figure it out, and lead in innovation.

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Population driving manufacturing

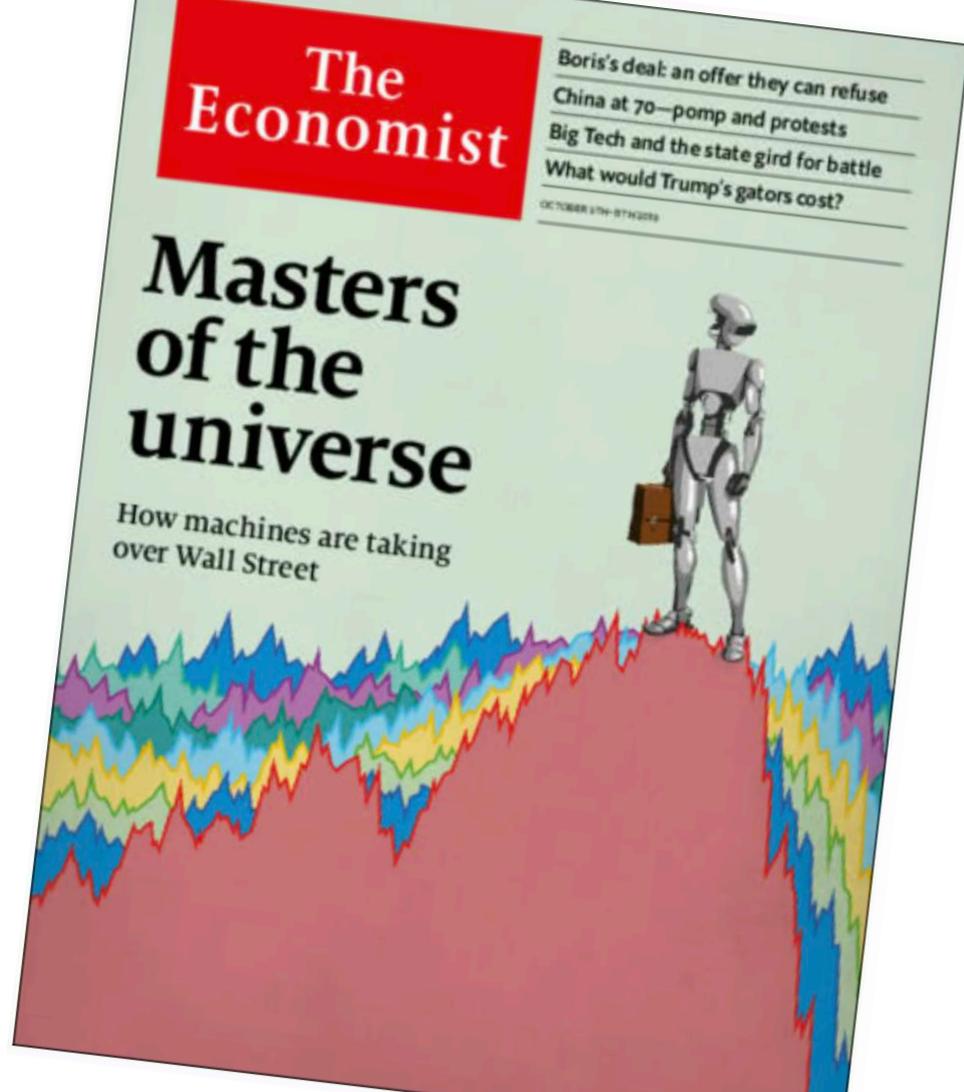
**What does this mean for
manufacturing industries
and regions?**



The evolving workforce

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Unemployment Dips To 3.7 Percent

CIVILIAN UNEMPLOYMENT RATE



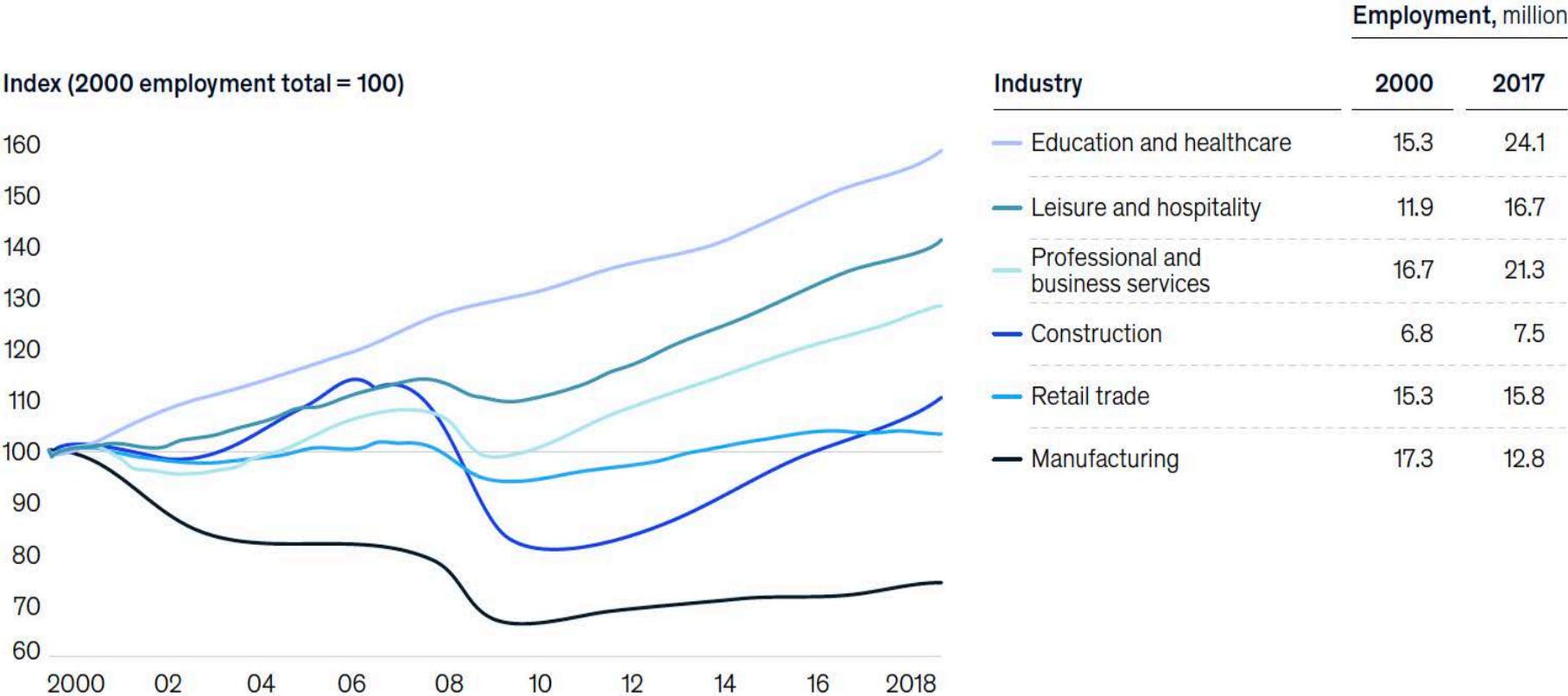
Notes: All values are seasonally adjusted. In the bar chart, figures for the two most recent months are preliminary and may be revised later.

Source: [Bureau of Labor Statistics](#), [Federal Reserve Bank of St. Louis](#) (unemployment rate, payrolls, wages)

Credit: Alyson Hurt/NPR

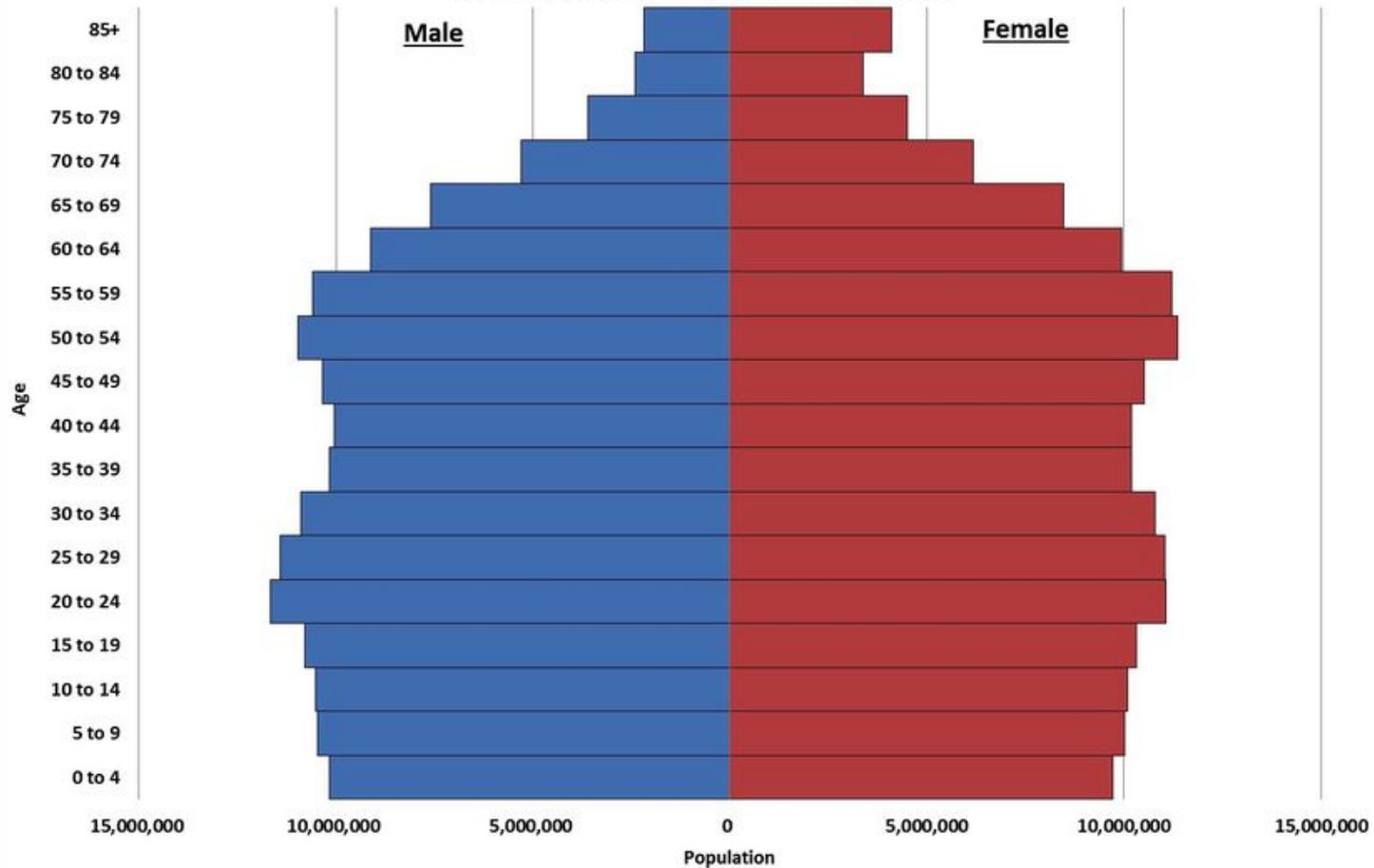
Manufacturing employment has declined by more than 25 percent since 2000.

Employment growth for select industries since 2000



McKinsey Global Institute analysis, *The Future of Work in America*, July 2019

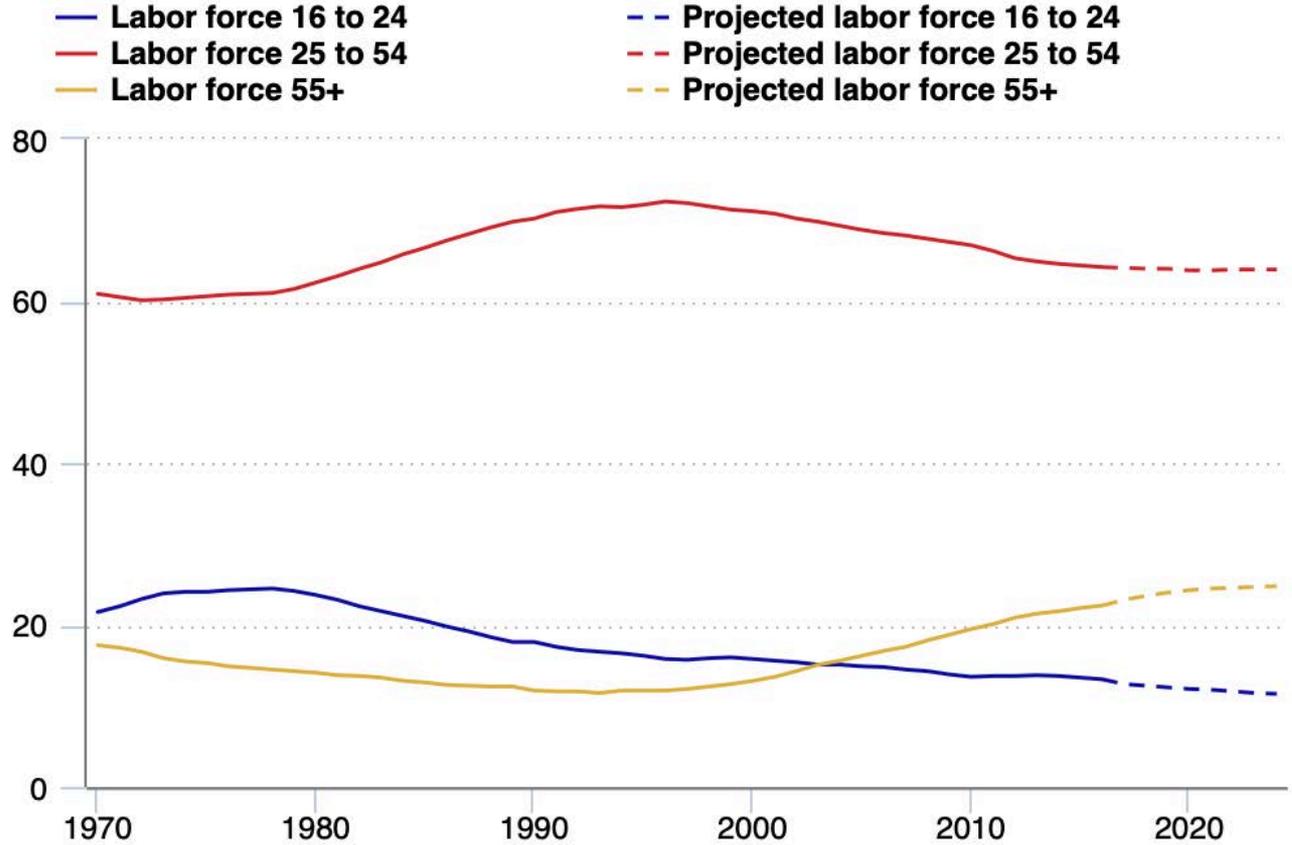
**Chart 1: Population Pyramid of the U.S.
Total Resident Population in 2015**



Source: U.S. Census Bureau, Vintage 2015 Population Estimates.

Chart 1. U.S. labor force shares by age, 1970 to 2014 and projected 2014–24 (percent)

U.S. Labor Force Projections by Age (2014-2024)



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.



The Future Workforce – impact of technology

STAGE 1: Sharing Economy Platforms The Gig Economy

- Nonemployee freelance workers
- Temporary assignments



40%

of US workers independent contractors by 2020

STAGE 2: Artificial Intelligence and Robotics The Machine Economy

- Massive labor disruption
- Human labor displaced and supplemented
- Jobs unbundled into tasks



40%

White collar and creative work not immune



5.1 MILLION

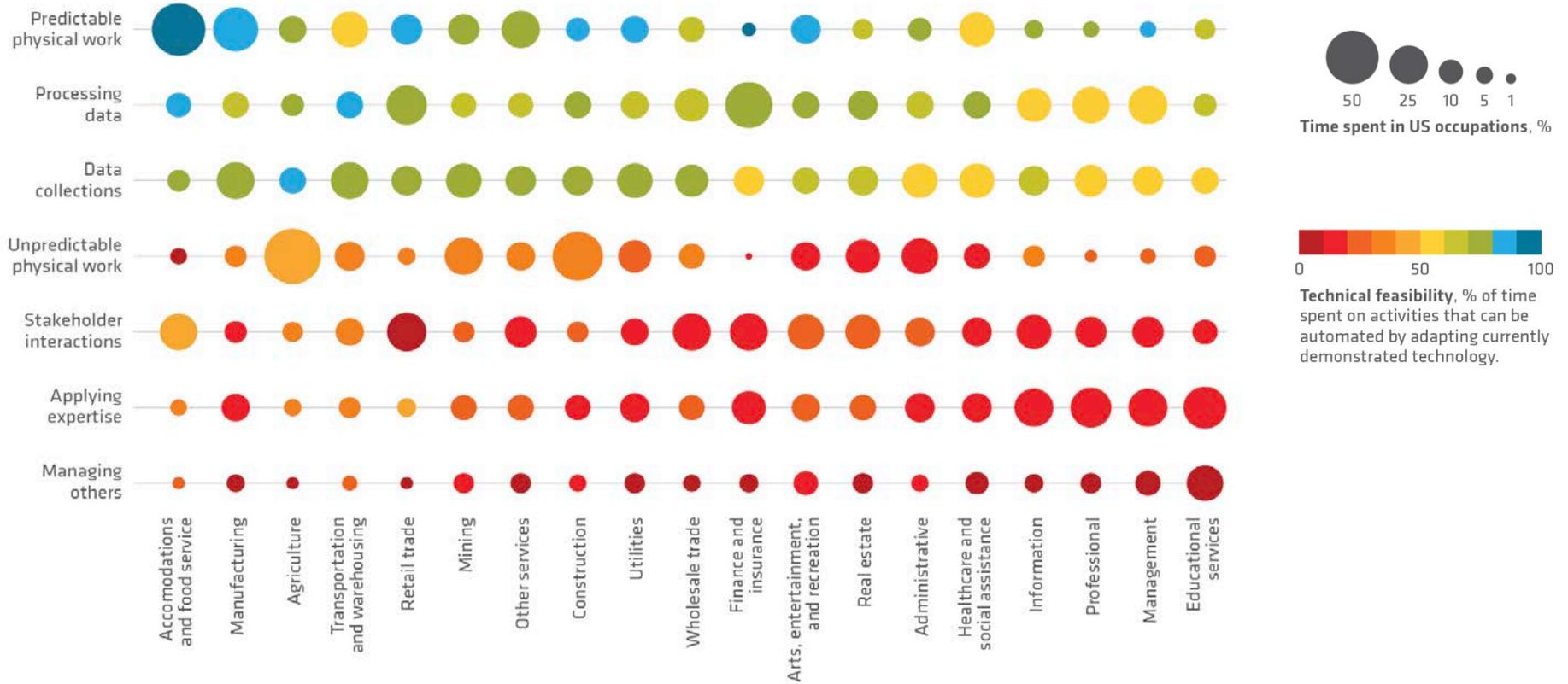
net job loss by 2020

Source: *The Upside of Disruption: Megatrends shaping 2016 and beyond*, EYQ 2016

Reproduced from *Next Industrial Revolution*, Future iQ, 2018



Vulnerability to automation



Source: *Where Machines could replace humans - and where they can't* by Michael Chui, James Manyika, and Mehdi Miremadi, McKinsey Quarterly 2016.

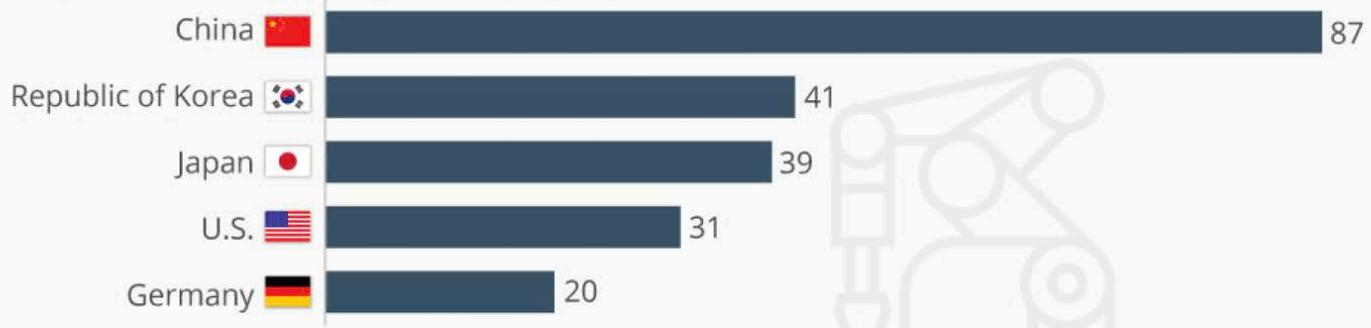
Reproduced from *Next Industrial Revolution, Future iQ, 2018*

Rise of the Industrial Robots

Estimated and forecast supply of industrial robots worldwide 2013–2020 (in thousand units)



Countries which supplied the most in 2016



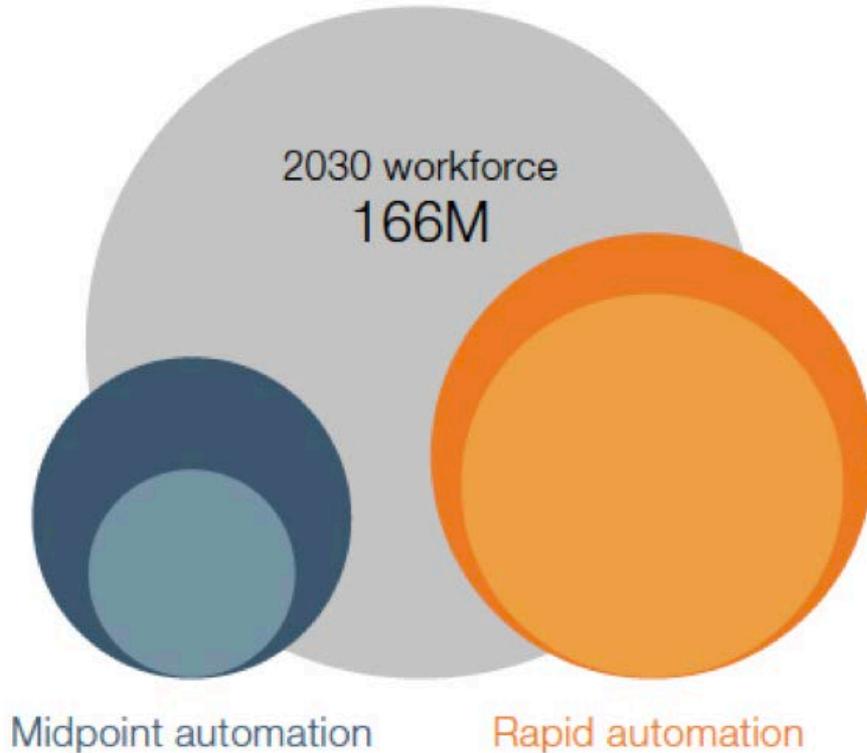
* Forecast

@StatistaCharts Source: International Federation of Robotics



Number of workers displaced by automation, and those needing to change occupational categories²

Workforce displacement and retraining



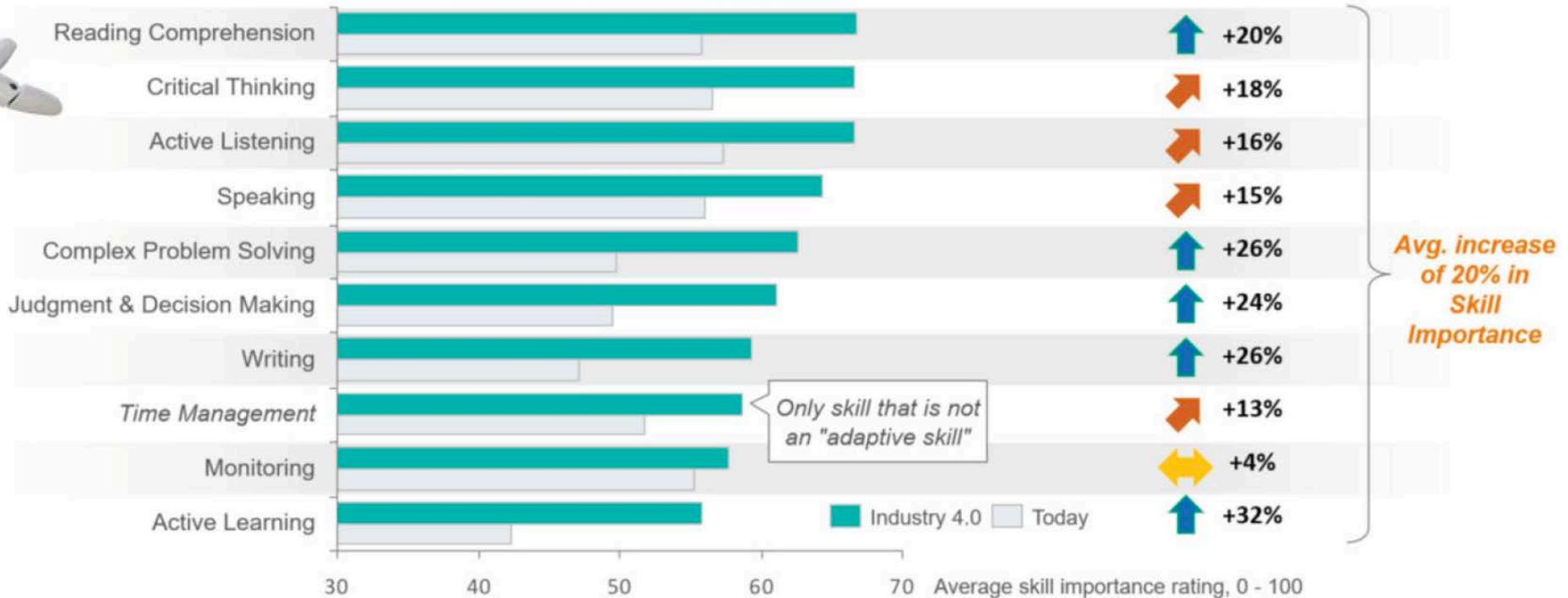
Midpoint automation	Rapid automation
39M displaced	73M displaced
13M–16M changing occupations	48M–54M changing occupations

Up to 33% of the 2030 workforce may need to switch occupational groups

Adaptive Skills Expected to be ~20% More Critical across Top Industry 4.0 Jobs than They are in Manufacturing Today

Most important skills for Industry 4.0 compared with today¹

Change in skill importance

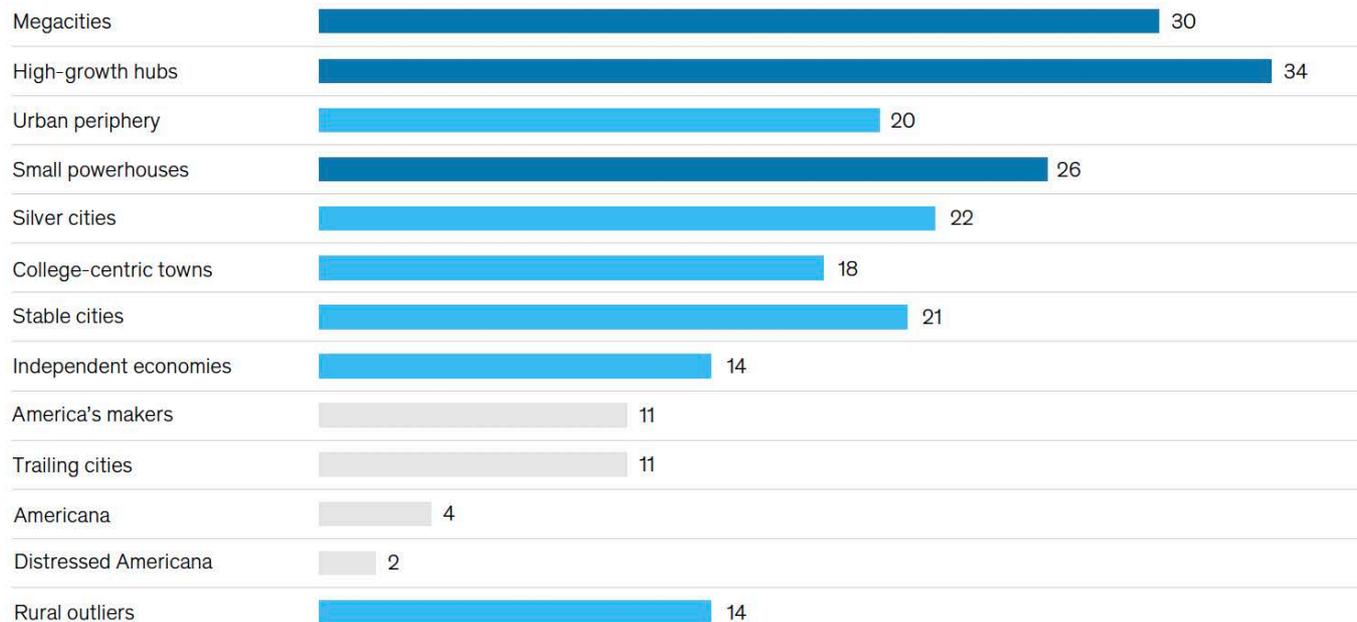


Work patterns are changing

Independent work is growing more urban.

Growth in nonemployer establishments, 2006–16, %

Low High



Source: US Census Bureau data on nonemployer establishments; McKinsey Global Institute analysis

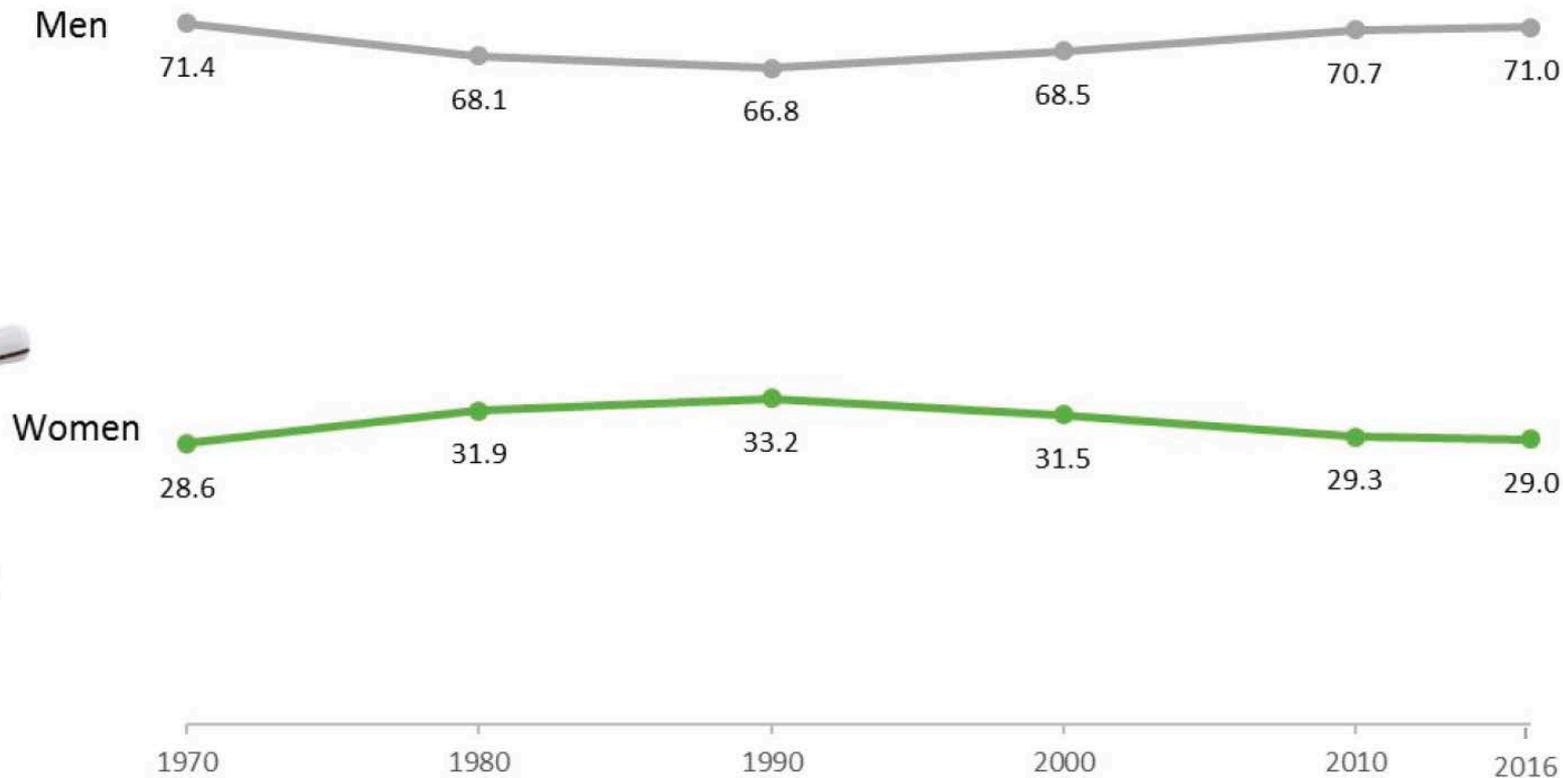
Keeping and Attracting Millennials

Figure 5: The values that support long-term business success are people treatment, ethics, and customer focus



Q. In general terms, what are the most important values you think a business should follow if it is to have long-term success?

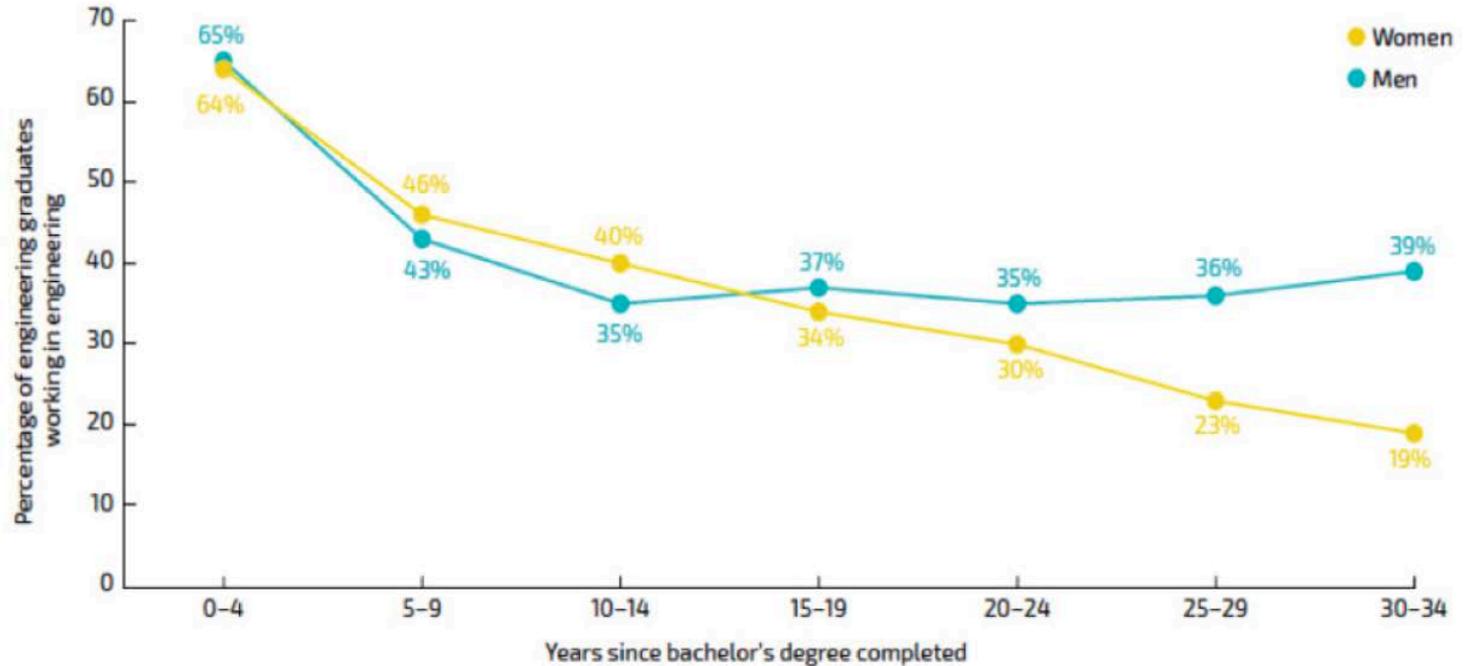
MANUFACTURING INDUSTRY WORKERS BY SEX: 1970-2016



Note: For information on the American Community Survey, see <www.census.gov/programs-surveys/acs/>.

Source: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Decennial Censuses; 2010 and 2016 American Community Surveys.

RETENTION IN ENGINEERING, BY GENDER, 2010

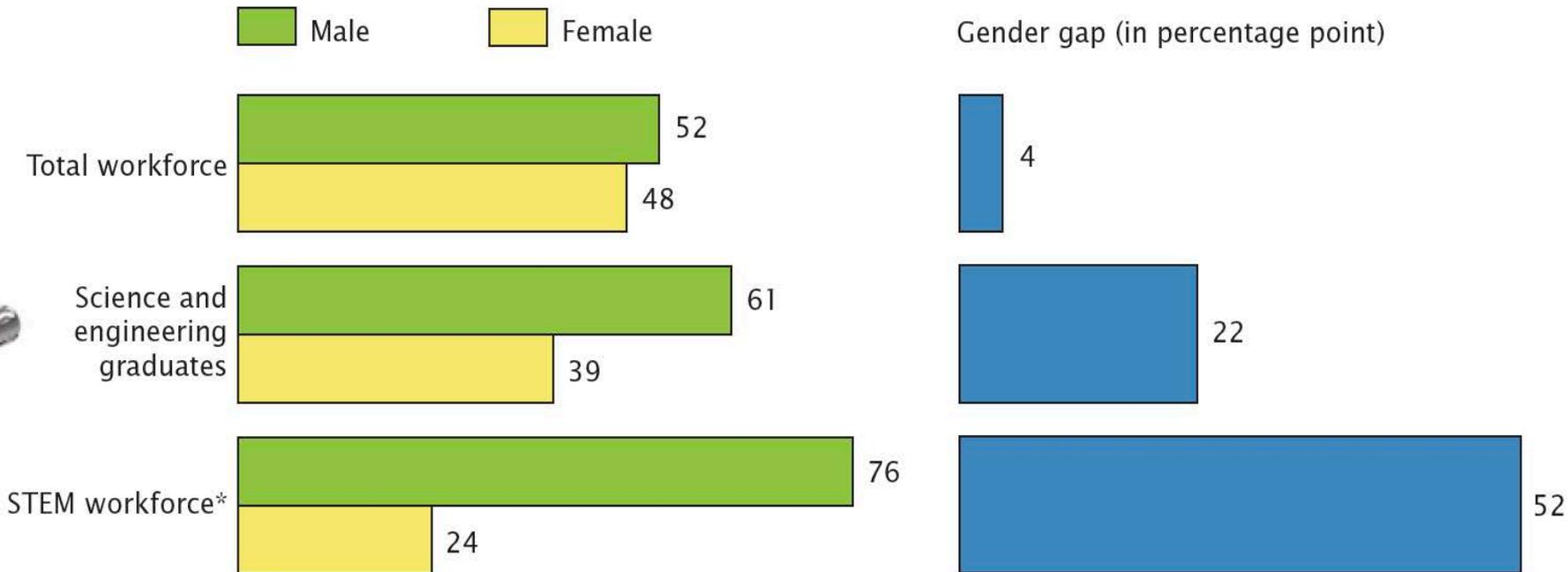


Notes: Includes only individuals who reported a bachelor's degree in engineering and no additional educational credential as of 2010. Includes women and men who reported earning a bachelor's degree in engineering as well as working in an engineering occupation in either the National Survey of College Graduates or the National Survey of Recent College Graduates administered in October 2010.

Source: L. M. Frehill analysis of National Science Foundation, National Center for Science and Engineering Statistics (2010a, 2010b).

SHARE OF TOTAL EMPLOYMENT, SCIENCE AND ENGINEERING DEGREES, AND STEM EMPLOYMENT

BY SEX (In percent, Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/acs/www/)



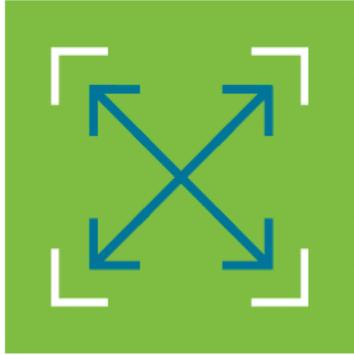
*With a science or engineering bachelor's degree.
Source: U.S. Census Bureau, 2011 American Community Survey.

The evolving workforce

- Constrained workforce
- Potential massive displacement and retraining
- Required skill sets are changing quickly
- Women in manufacturing workforce has been a blind spot



The evolving workforce



Future-Splitting
Questions™

Example: Is it best to
focus on AI adaptation,
or talent retraining?



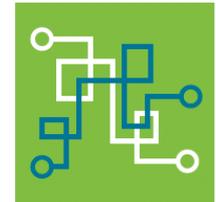
Predictions and observations

- Everything that can be automated, will be.
- Humans will adapt better than we think.
- Young people see technology as THE solution.
- Generational change is coming which will trigger widespread upheaval of norms.
- The workplace will transform.

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The evolving workforce

**What does this mean for
manufacturing industries
and regions?**



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

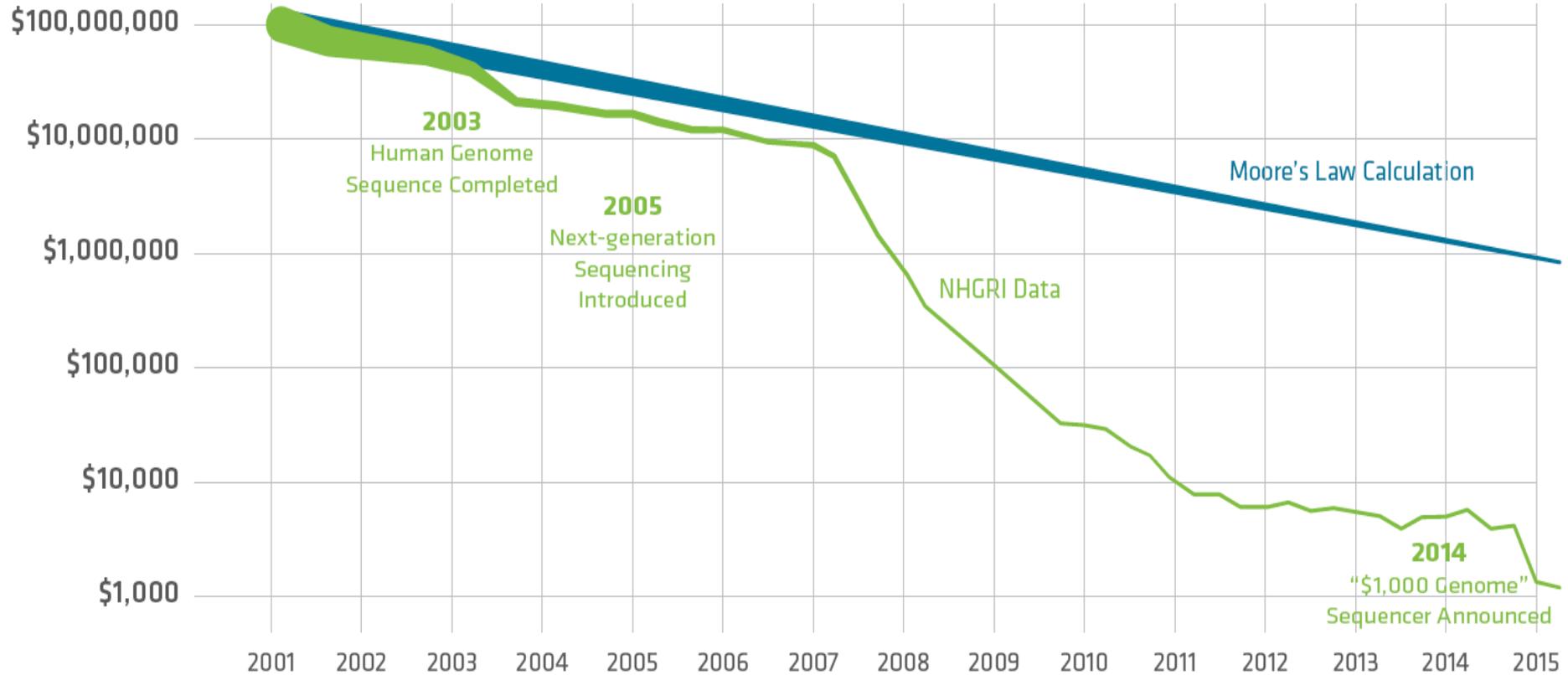
3.5

- ◆ **1980 - Globalisation**
Offshoring of production to low-cost economies

4.0

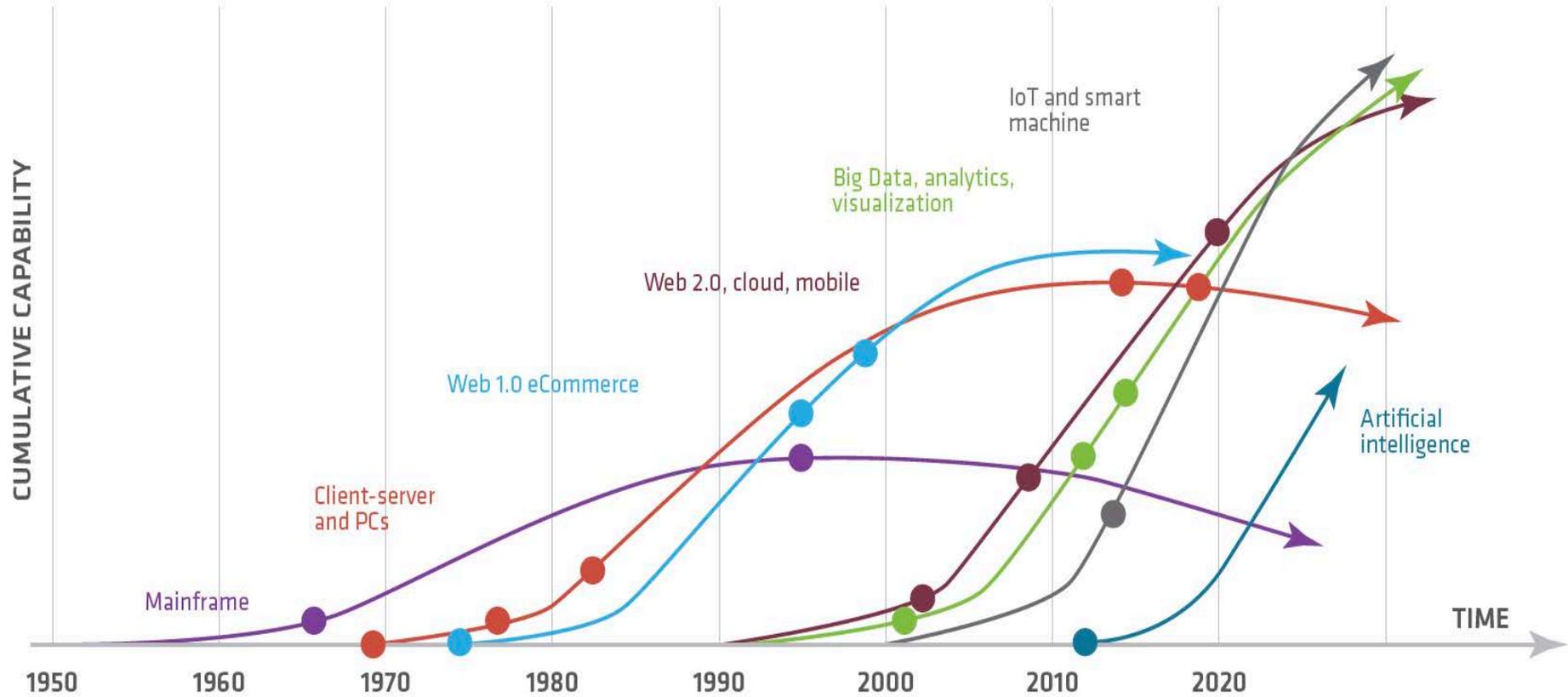
- ◆ **Today - Digitalisation**
Introduction of connected devices, data analytics and artificial intelligence technologies to automate processes further

DNA SEQUENCING COSTS OVER TIME



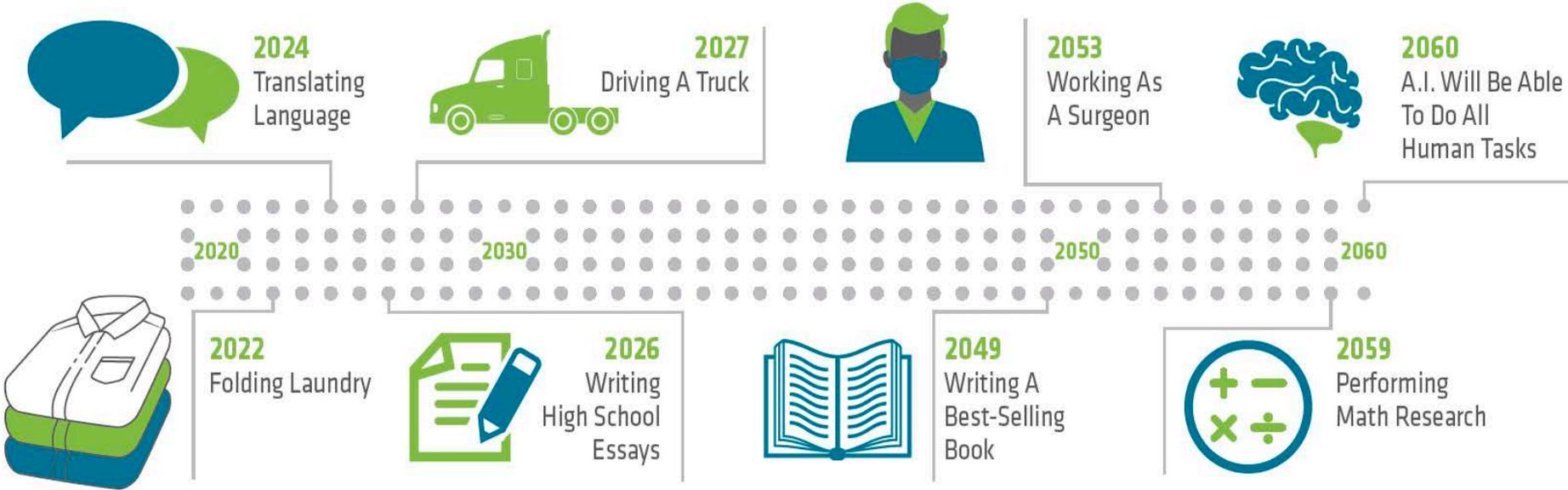
Decline in real costs compared to expected declines based on Moore's Law. Trend line: Cost per human genome. Line width: Cost per megabase (Mb). (Data: NHGRI <https://www.genome.gov/27541954/dna-sequencing-costs-data/>)

THE INCREASING CAPABILITY OF DIGITAL TECHNOLOGIES



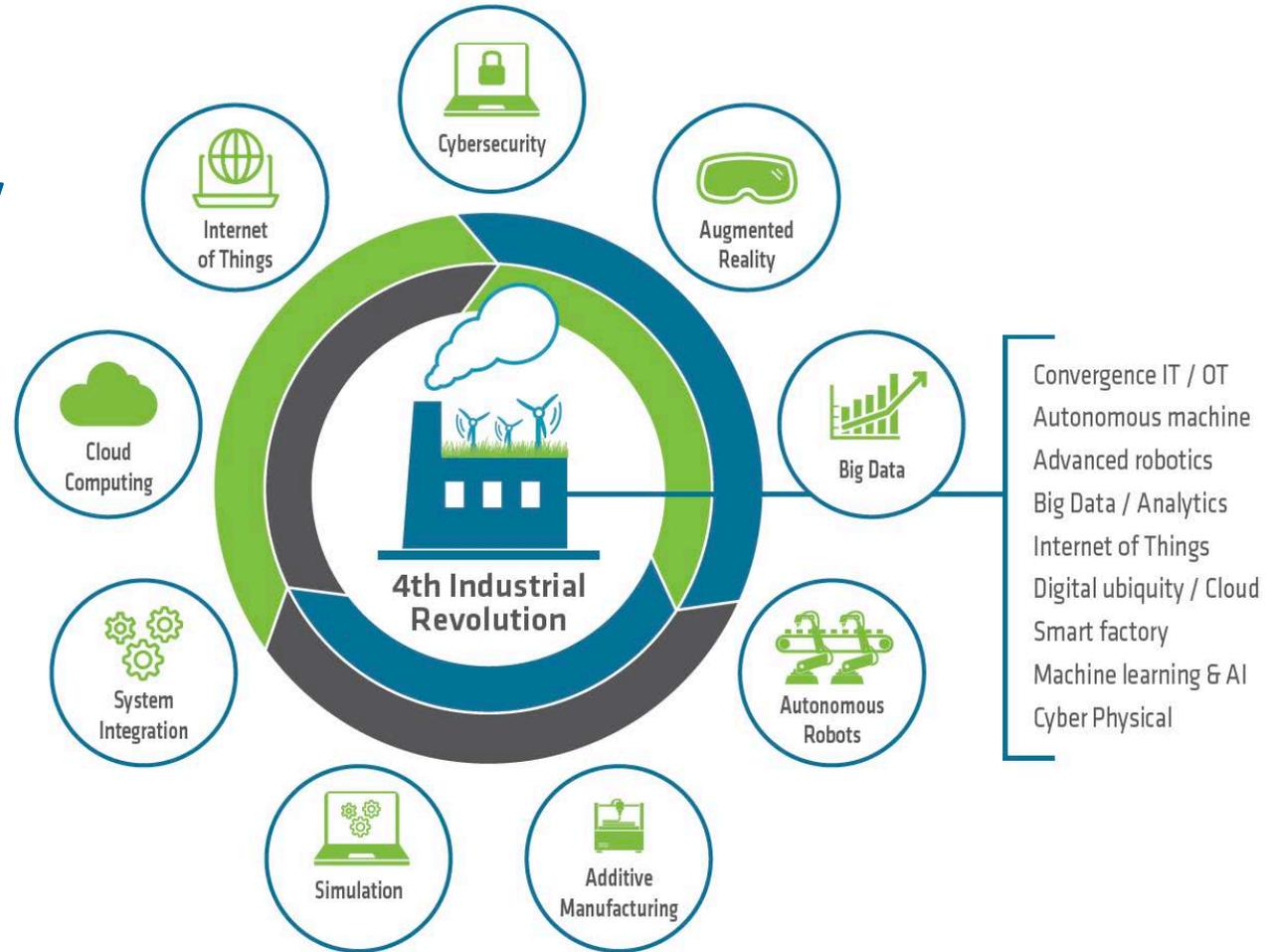
When will machines outperform people?

AI WILL LIKELY OUTPERFORM HUMANS AT...

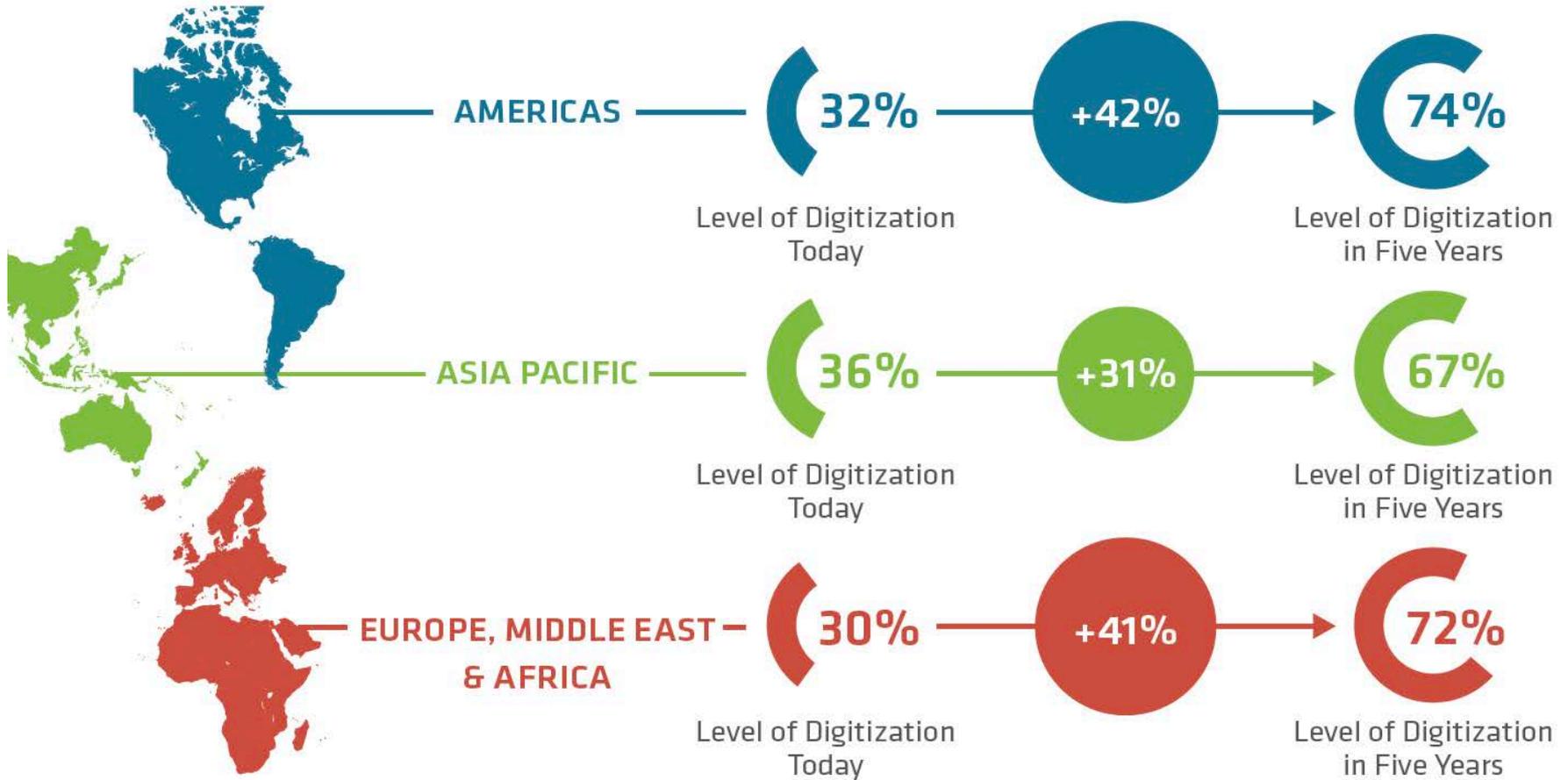


Source: 'You Will Lose Your Job to a Robot—and Sooner Than You Think'. Kevin Drum, Mother Jones, November / December Issue, 2017. (adapted from 'When will AI exceed human performance? Evidence from AI Experts', Oxford and Yale University 2017) ¹²

Manufacturing transformed by technology

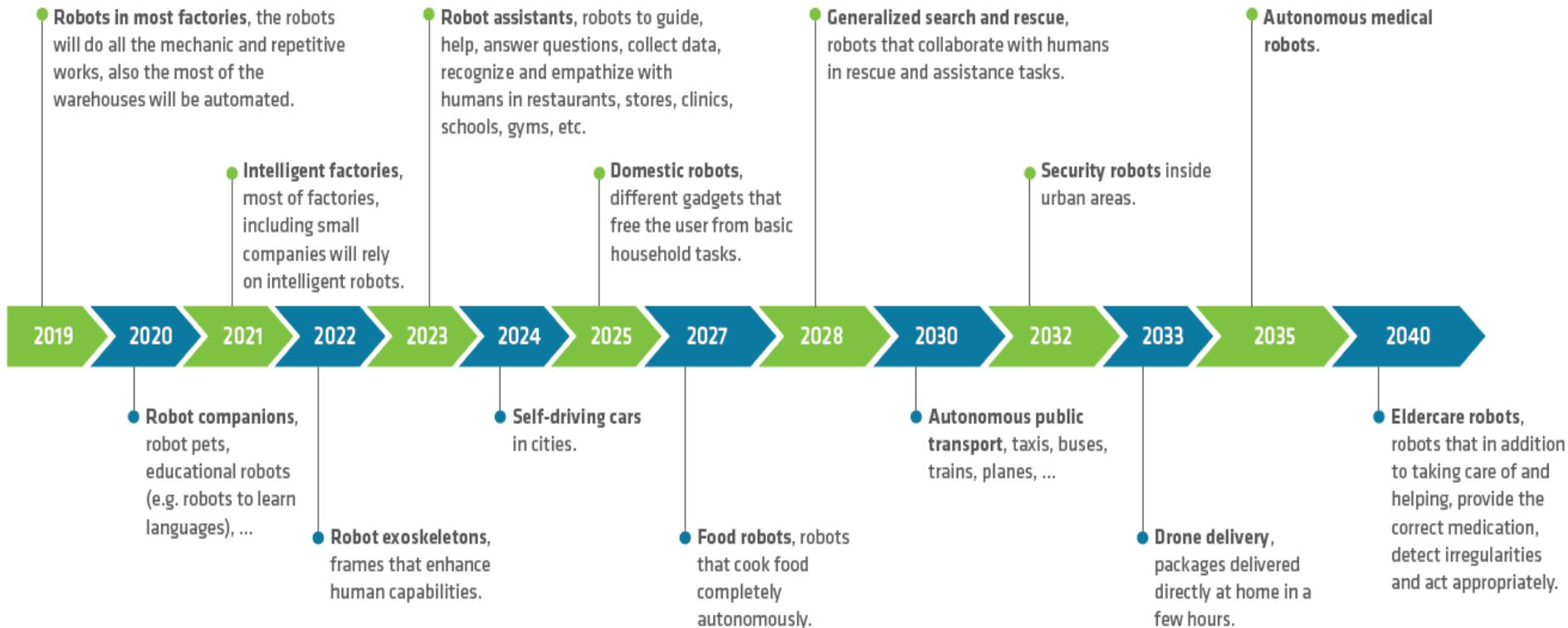


COMPANIES ALL OVER THE WORLD ARE EXPECTING TO DRAMATICALLY INCREASE DIGITIZATION OVER THE NEXT FIVE YEARS



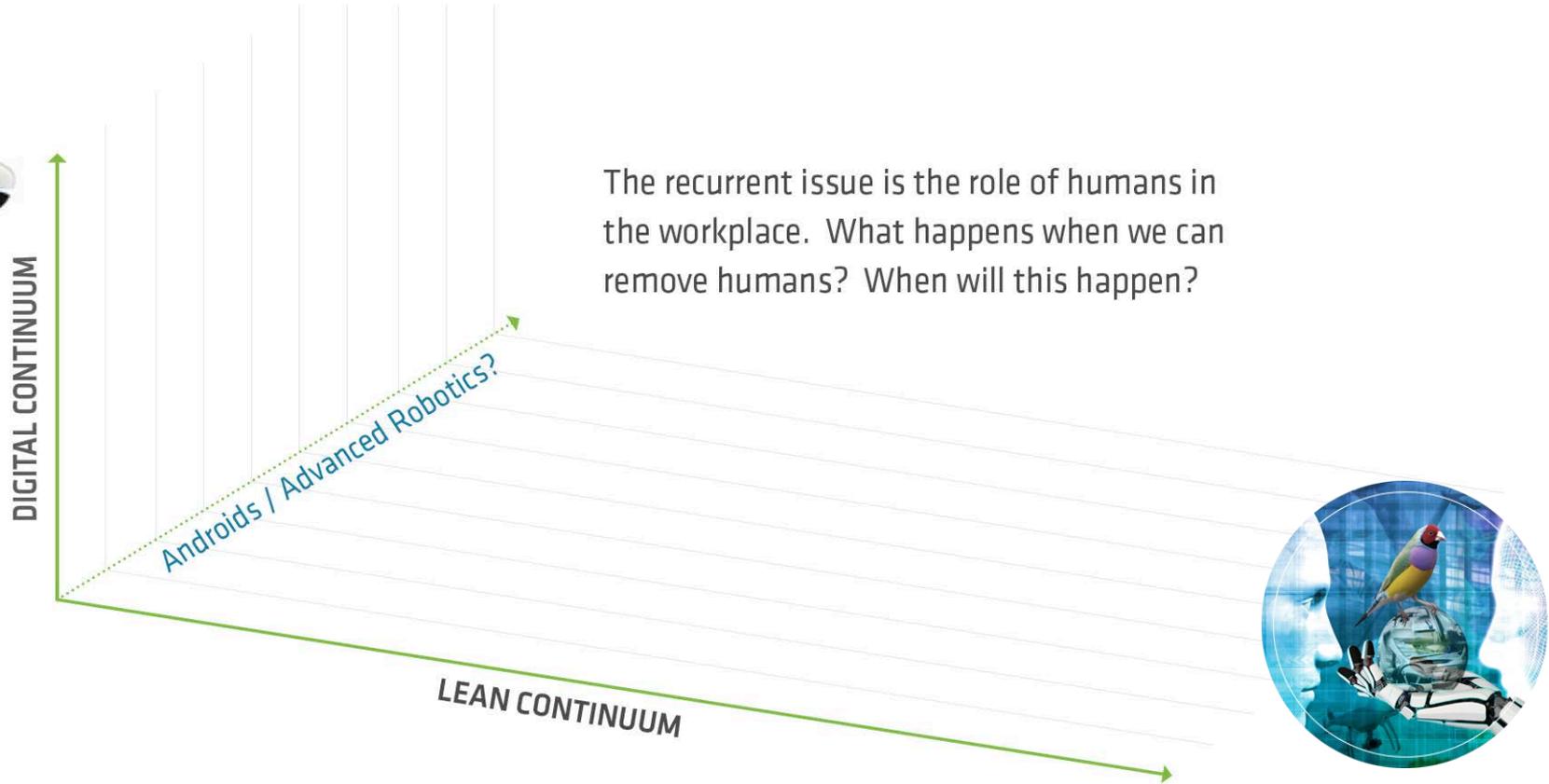
Source: 2016 Global Industry 4.0 Survey. 2016 Pricewaterhouse Coopers LLP.

THE FUTURE OF ROBOTS 2019-2040



Source: *Envisioning Robotics, Robots Technology for Society, Acutronic Robotics, 2017*, in *Envisioning the future of robotics, Víctor Mayoral Vilches, CTO of Erle Robotics, March 26, 2017.*

MANUFACTURING PRODUCTIVITY DRIVERS: LEAN...THEN DIGITAL...THEN ADVANCED ROBOTICS / ANDROIDS?



The recurrent issue is the role of humans in the workplace. What happens when we can remove humans? When will this happen?



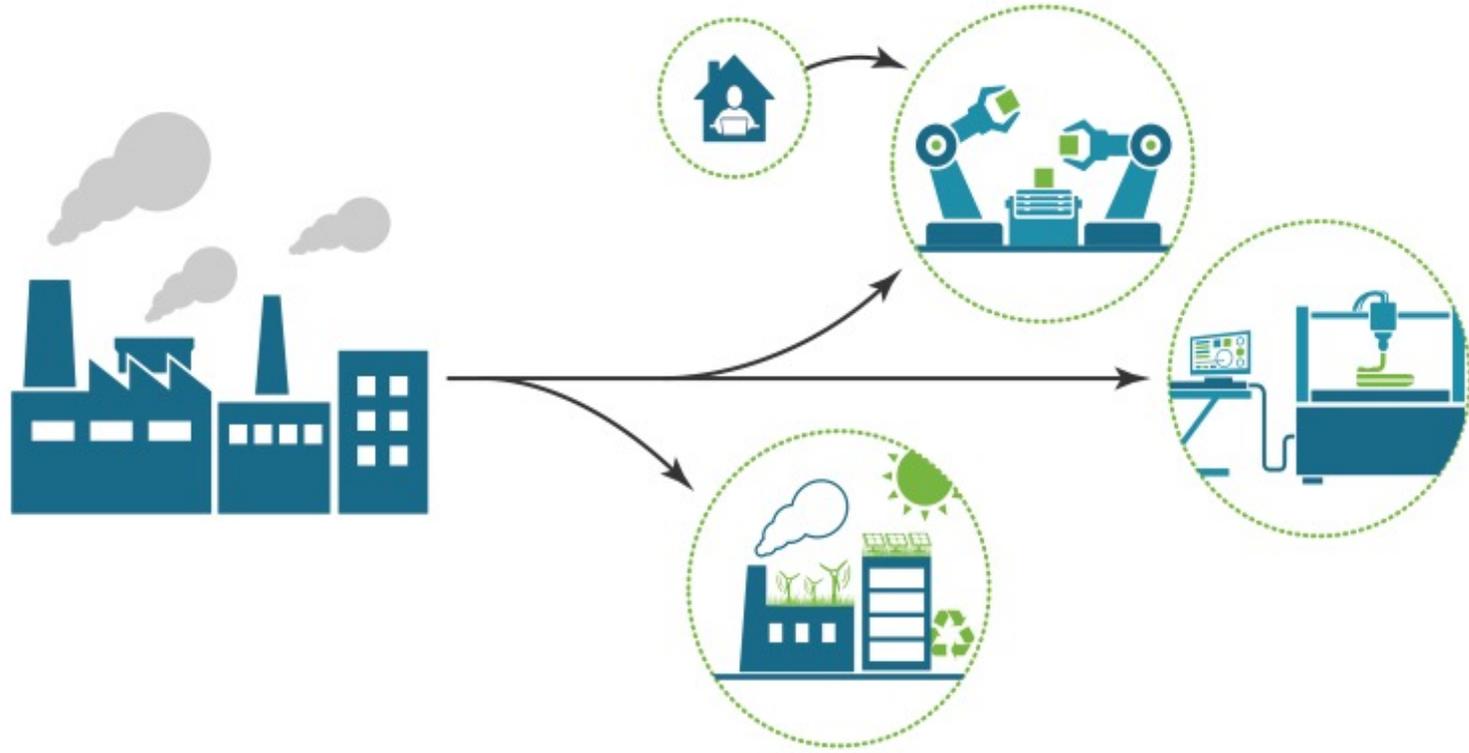


Source: New Yorker Oct 23, 2017, and Max Planck Research 2009

How will things be made?



Where will things be made?



What will things be made of?

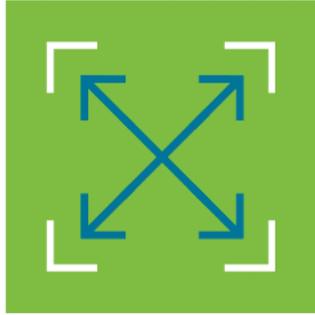


Technology and speed of change

- Waves of disruption and technology are reshaping industries and manufacturing
- Speed of change is exponential
- Digital manufacturing is delivering simultaneous productivity gains and cost reductions



Technology and speed of change



Future-Splitting
Questions™

Example: Can we invest enough (and fast enough) in the right priorities, to stay competitive in an exponential world?



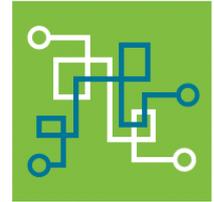
Predictions and observations

- There will be those that can keep up, and those who get left behind.
- Traditional small and medium manufacturers are most vulnerable.
- Regions need to build 'future business intelligence' and collaborative systems.

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FutureInsight



Technology and speed of change

**What does this mean for
manufacturing industries
and regions?**



Driver assessment

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Driver assessment – over next 5 years

- **Nature of Impact:** -5 = very negative; +5 = very positive
- **Preparedness of region:** -5 = Not at all prepared; + 5 = Very well prepared
- **Size of impact:** 1 = Very small impact; 10 = Very large impact
- **Speed of change:** 1 = Very slow; 10 = Very fast



	DRIVER	Nature of impact -5 to +5	Preparedness of region -5 to +5	Size of impact 1 to 10	Speed of change 1 to 10
1	Digital manufacturing				
2	Catalytic and disruptive technologies				
3	Cybersecurity requirements and compliance				
4	Company and organizational orientation towards technology				
5	Changes in supply chains and consumers / clients demands				