



Industry Focus. Powerful Results.™



## Emerging Trends

October 10, 2017



# About FMI

For over 60 years, FMI has been the leading management consulting and investment banking firm dedicated exclusively to engineering and construction, infrastructure and the built environment.

FMI serves all sectors of the industry as a trusted advisor. More than six decades of context, connections and insights lead to transformational outcomes for our clients and the industry.

## Sector Expertise

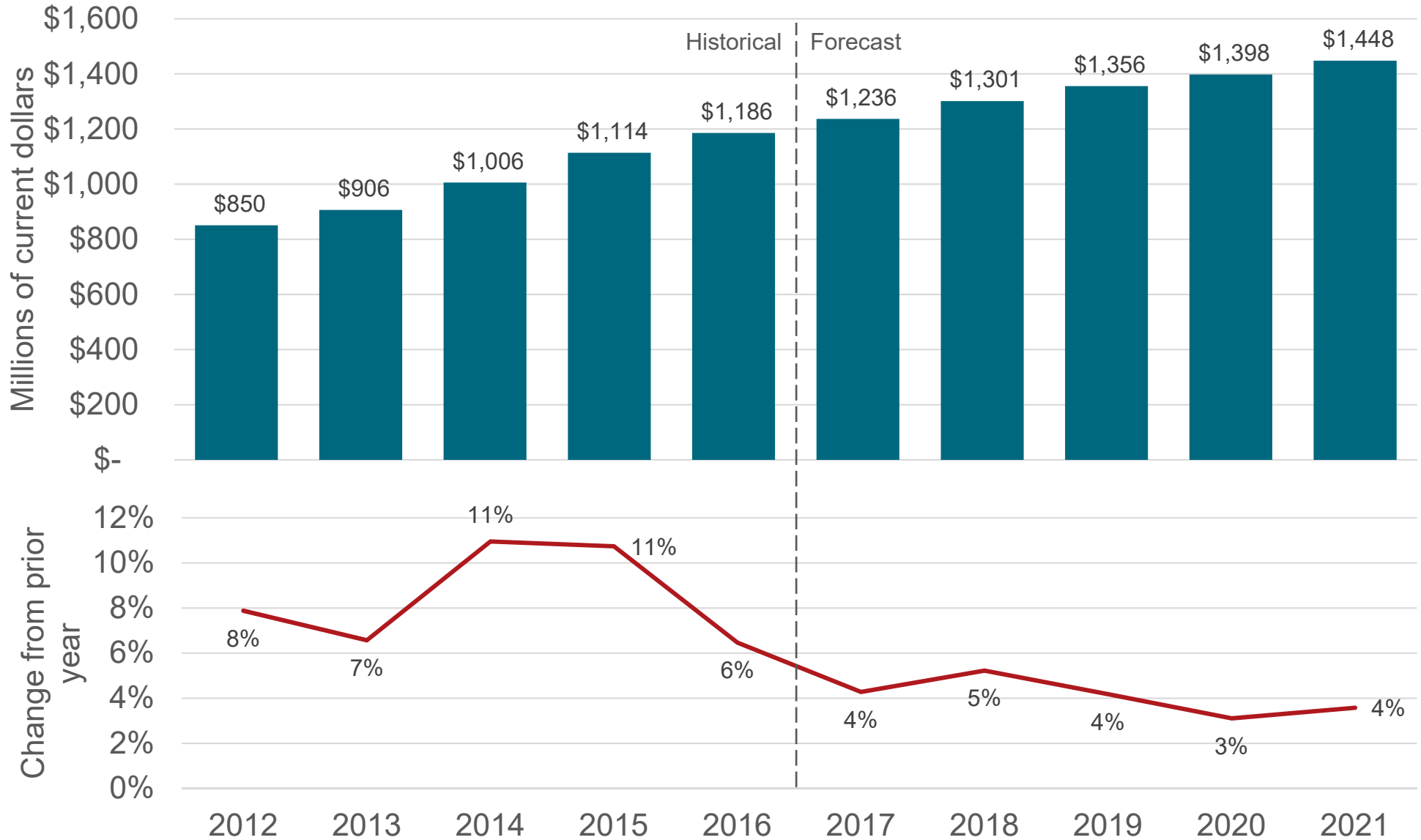
- A/E and Environmental
- General Contractors/CM
- Heavy Civil
- Industrial
- Specialty Trades
- Utility T&D
- Cleantech and Energy Services
- Construction Materials
- Building Products
- Oil and Gas
- Private Equity
- Owners

## What we'll be talking about today

- Overview of FMI's most updated construction industry forecast
- Demographic trends
- Skilled labor shortage and mitigation techniques

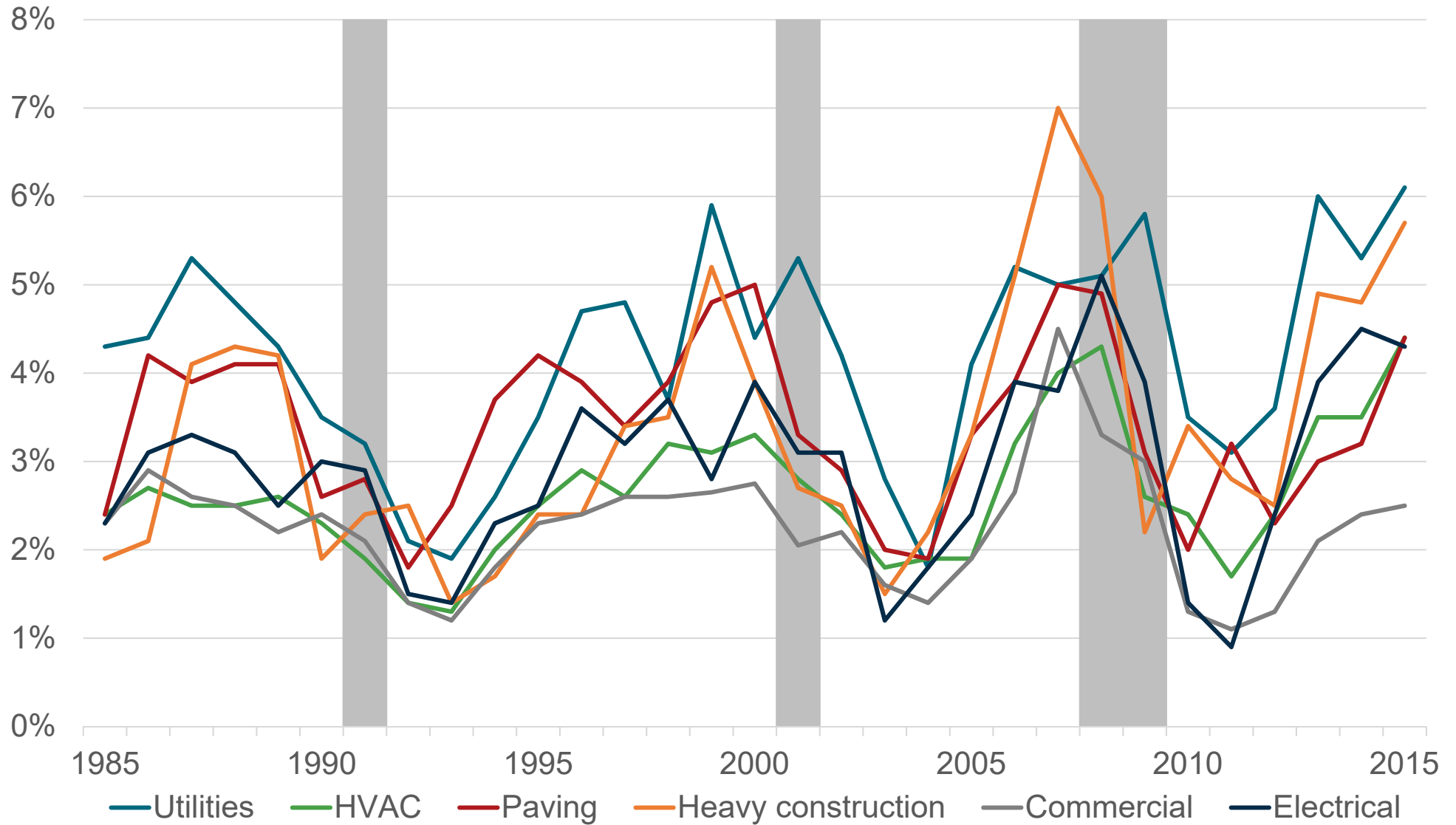
FMI projects a slowing of growth in 2017 compared to 2016, primarily due to the manufacturing and institutional segments.

Total construction put in place, 2012-2021



# Contractor profits continue to rise.

Contractor profit before tax\*

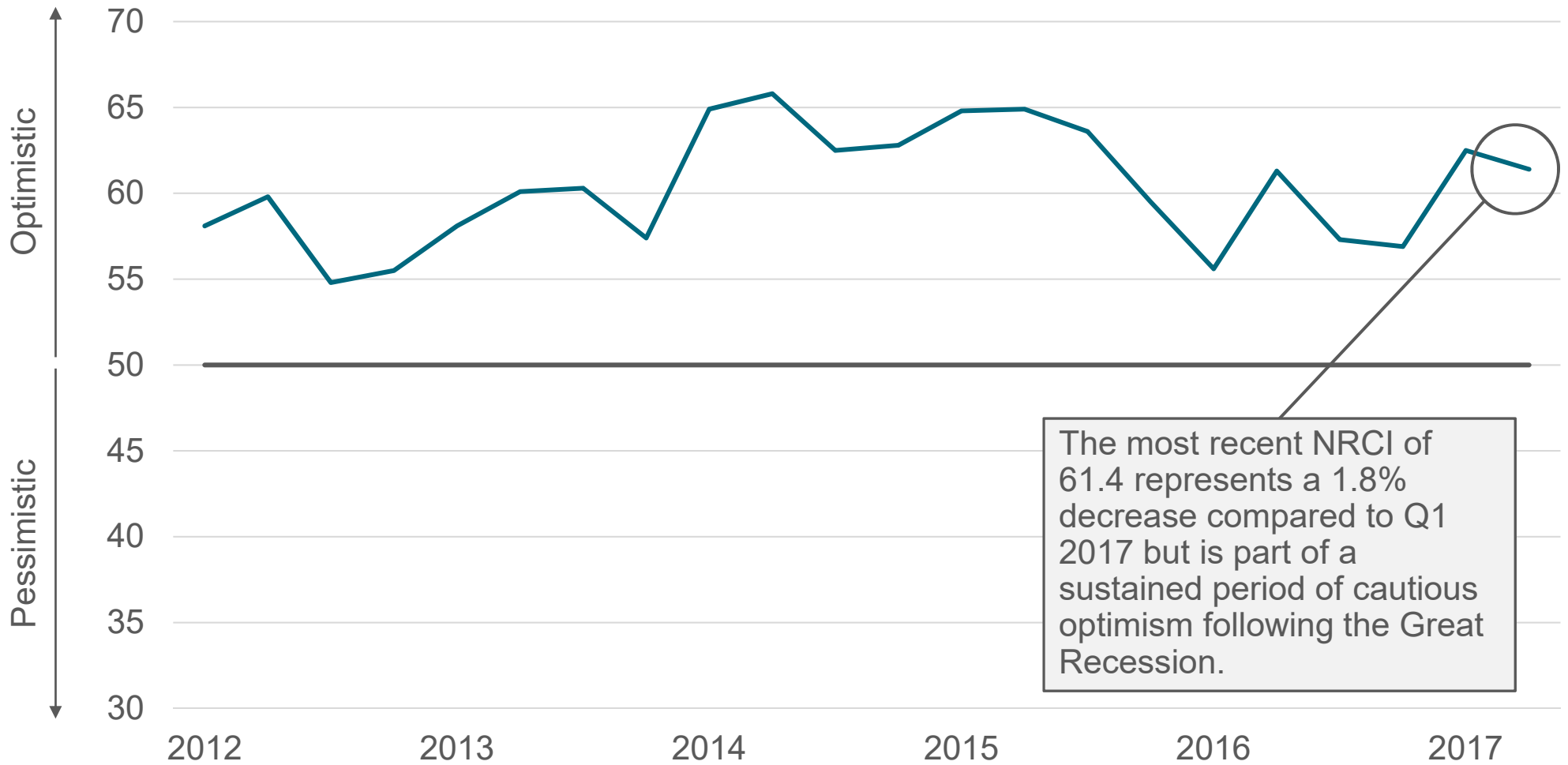


\* Grey areas in the chart indicate recessions.



# FMI's Nonresidential Construction Index (NRCI) indicates continued cautious optimism following the Great Recession.

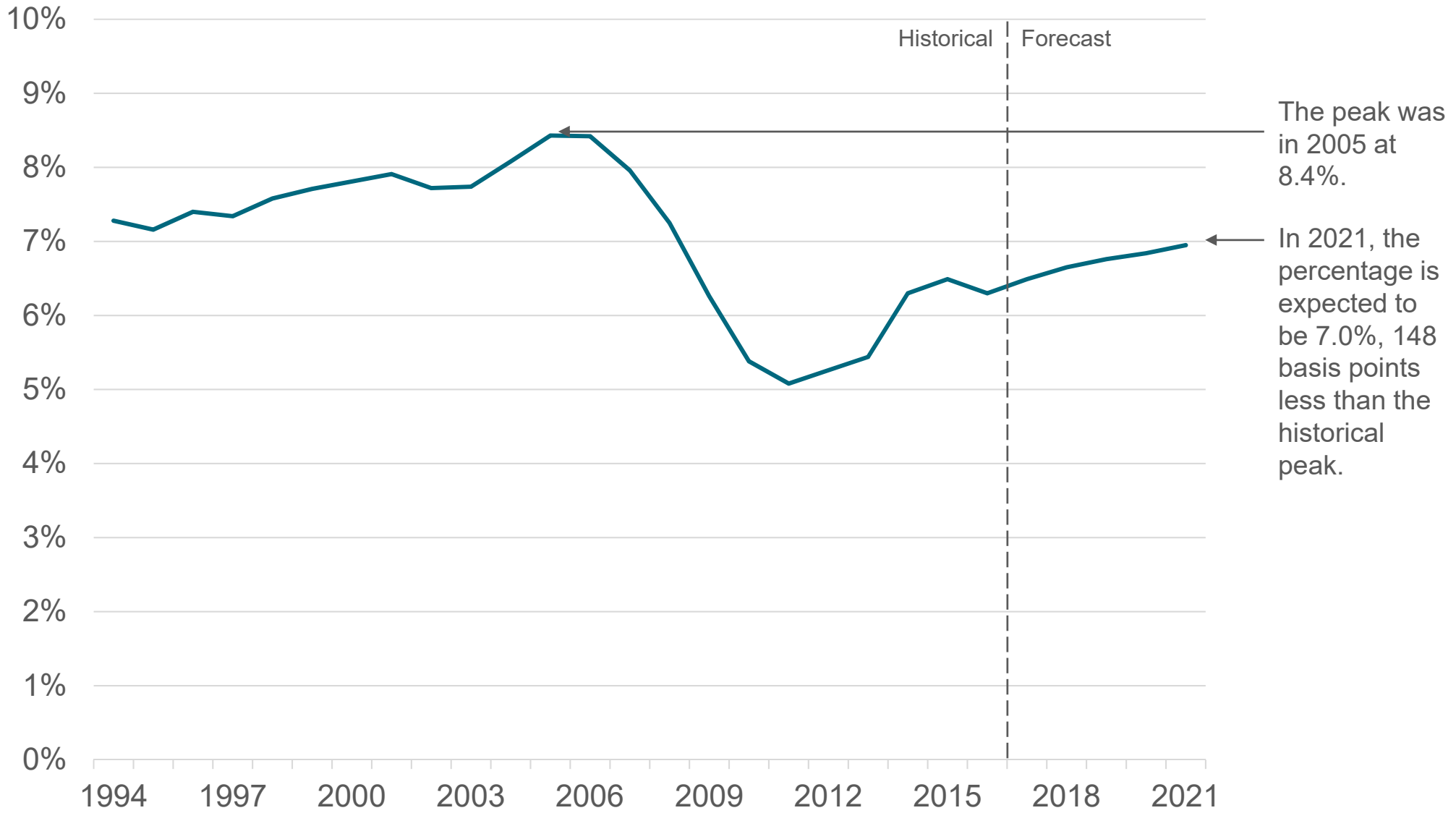
## Nonresidential Construction Index (NRCI)



The most recent NRCI of 61.4 represents a 1.8% decrease compared to Q1 2017 but is part of a sustained period of cautious optimism following the Great Recession.

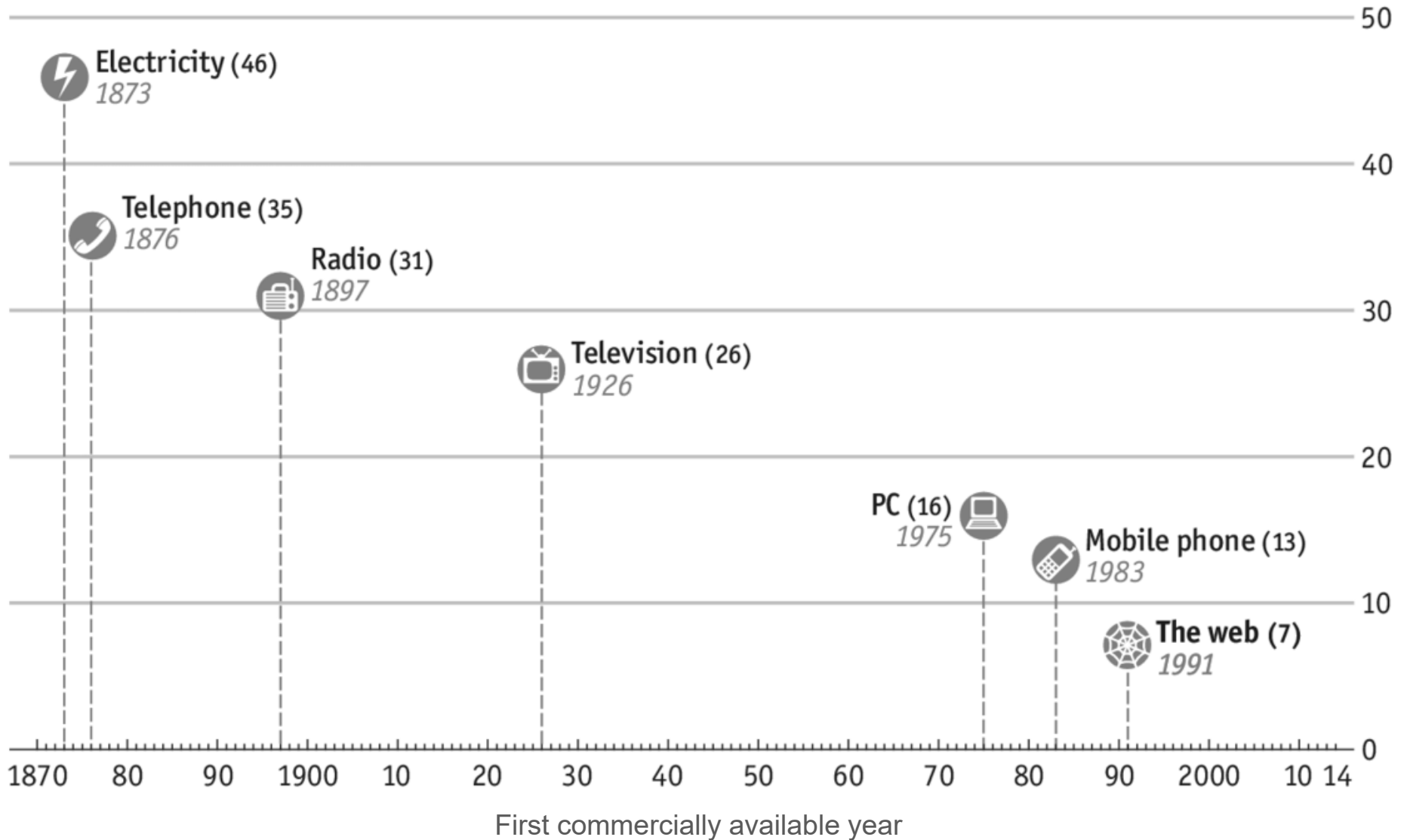
# Is E&C losing its place in the broader economy?

## Construction put in place as a percentage of GDP



# Our world is evolving at an exponential rate

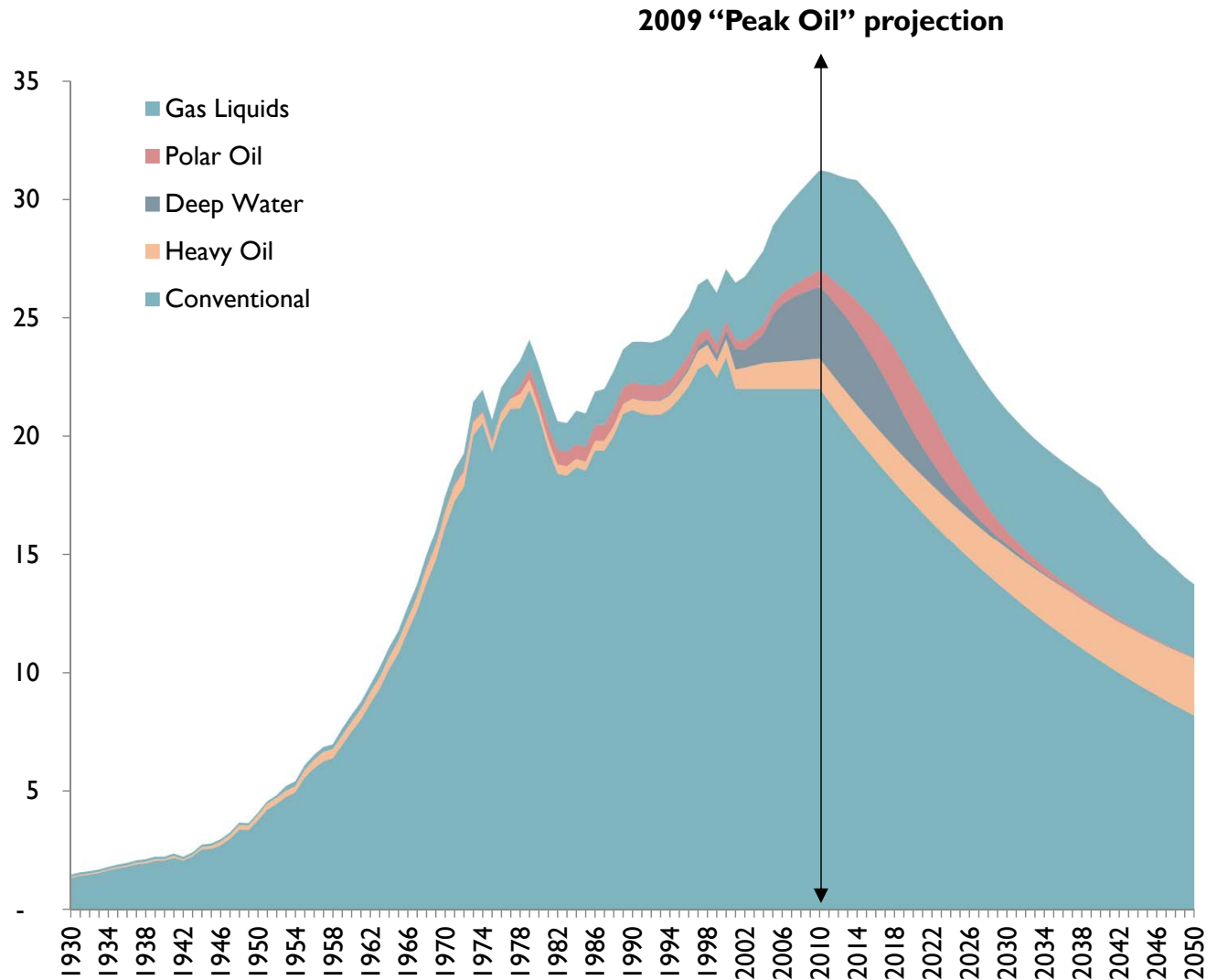
Adoption rates for various technologies and the number of years until used by 25% of the U.S. population.





# PARADIGM SHIFTS WILL BECOME MORE FREQUENT

Worldwide oil production – 2002 estimate; gBoe



*“...peak oil has arrived. What the commodity markets are telling us, is that we’re living in a finite world, in which the rapid growth of emerging economies is placing pressure on limited supplies of raw materials, pushing up their prices. And America is, for the most part, just a bystander in this story.”*

**Paul Krugman**  
**Professor of Economics**  
**City University of New York**

Source: Association for the Study of Peak Oil (ASPO)

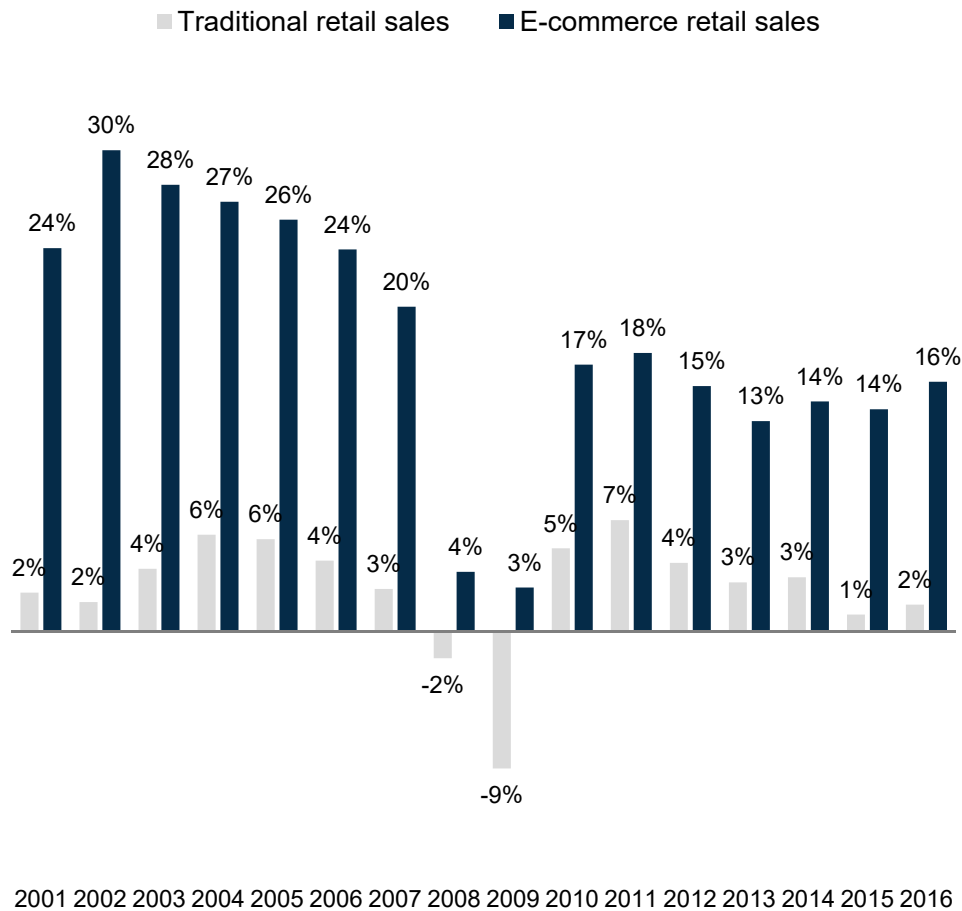
# E-COMMERCE SHIFT

*“Retail is the first category whereby technology is impacting construction.”*

**Alex Carrick, Construct Connect**

## Annual percent change in US retail sales

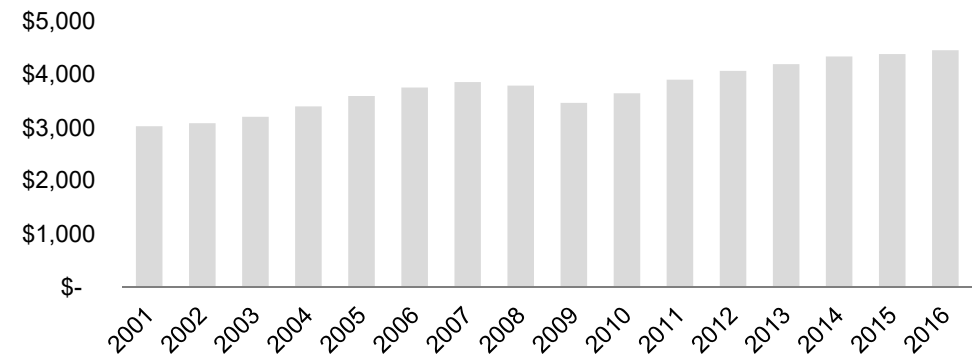
Source: Census Bureau



## US retail sales (traditional)

Billions of USD

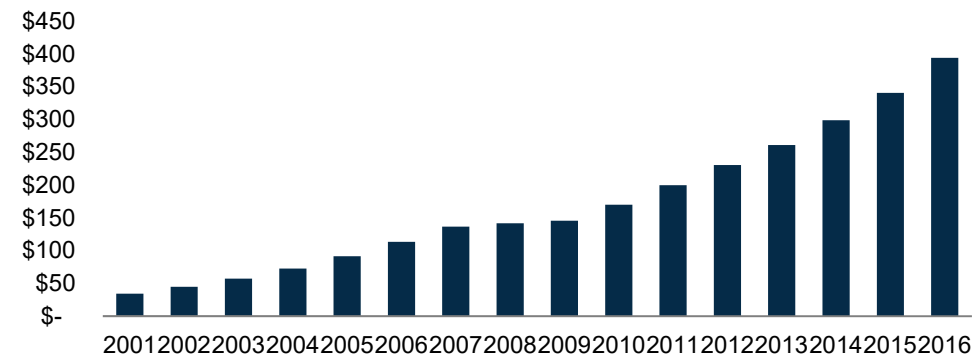
Source: Census Bureau



## US retail sales (e-commerce)

Billions of USD

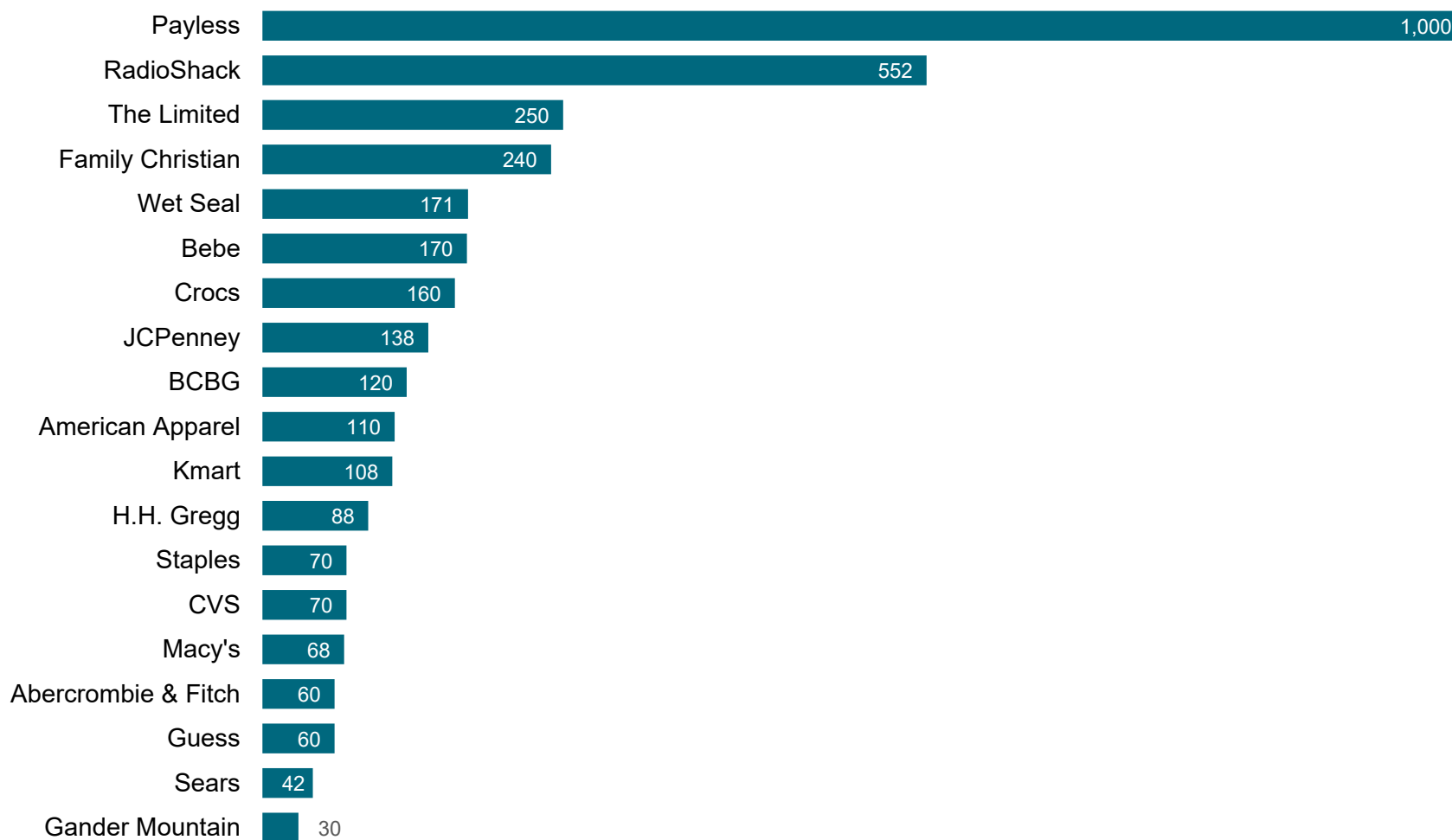
Source: Census Bureau



# RETAIL CASUALTIES

## Number of retail stores closing in early 2017

Source: Business Insider





The past doesn't always match the future. That's the nature of disruption. Patterns of change build gradually until they merge and rapidly reshape the business landscape. At that point it's too late to respond.

*Dr. Stefan Hajkowitz*  
*Senior Principal Scientist CSIRO*

## AN INCREASINGLY FLUID ECONOMY

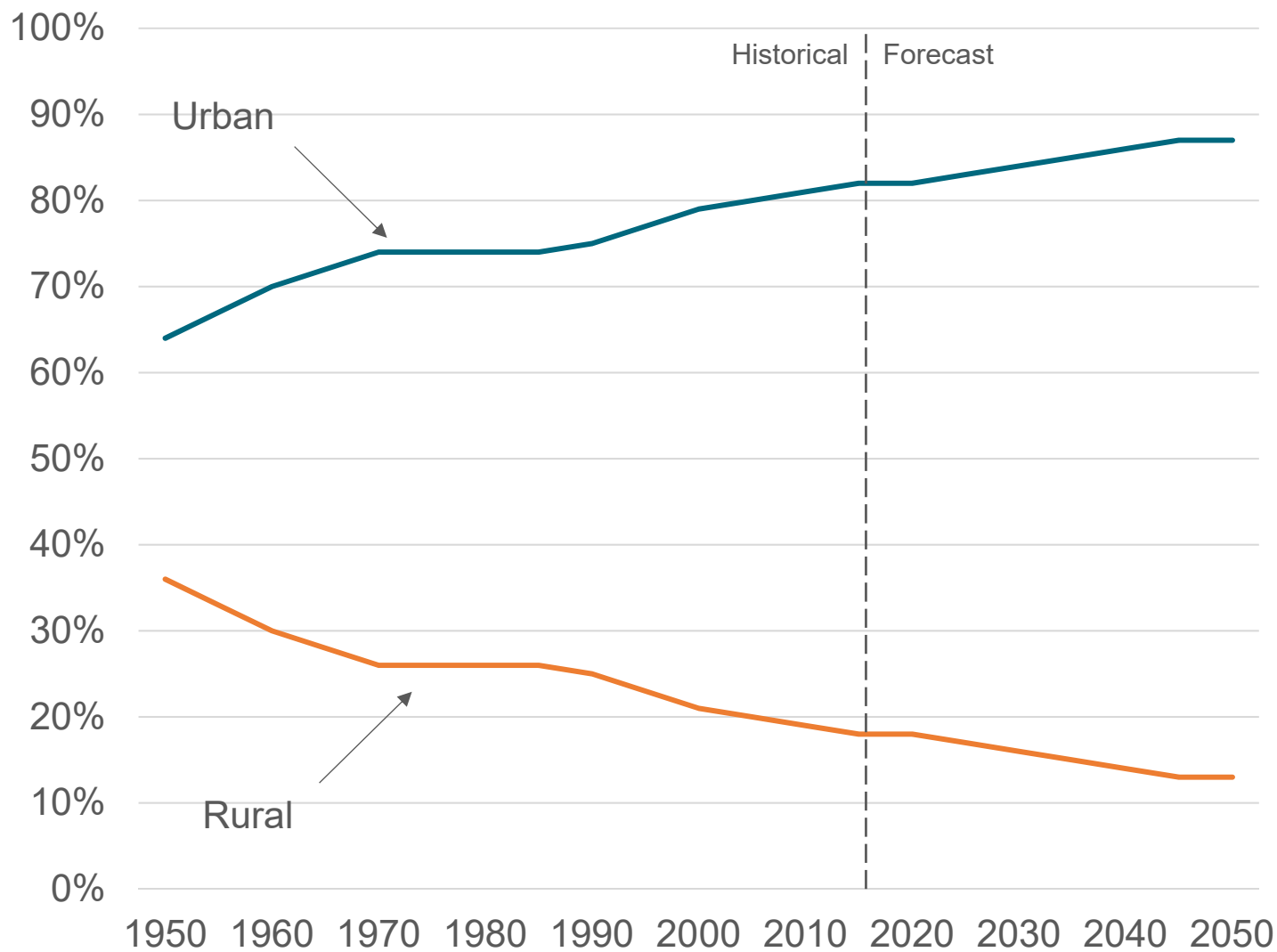
*Contrary to many of the assumptions and stereotypes of Millennials and Post Millennials, these generations share many similar aspirations and traits as previous generations. However, it is a mistake to consider them the same or that they will make life and business decisions no different than Baby Boomers or Generation X.*

Millennial/Post Millennial and prior generations...

Similarities	Differences
Four out of five say they want to get married and the majority that have married in their 20s	Social media highly influences relationships and consumer behavior
Aspire to own homes, but are hindered by affordability	Most do not see value in owning a car
The majority expect to stay more than five years at their current employer	They have never lived without the Internet, smart phones, tablets, etc.
Desire regular feedback not for trophies but for knowledge	Comfortable with technology driven decision making if not relying on it in some instances
Most are willing to work beyond what is required of them to help the business succeed	First generation to have a scheduled childhood

# Deindustrialization of cities, changing demographics, and shifting tastes are causing a migration from suburban and rural areas to downtown areas.

Percentage of population residing in urban and rural areas, United States






The American Institute of Architects' Q3 2015 Home Design Trends Survey reports an increased preference among homeowners for mixed-use developments.

# Different generations have very different motivations and preferences as it relates to renting a home.

## Views on renting by generation

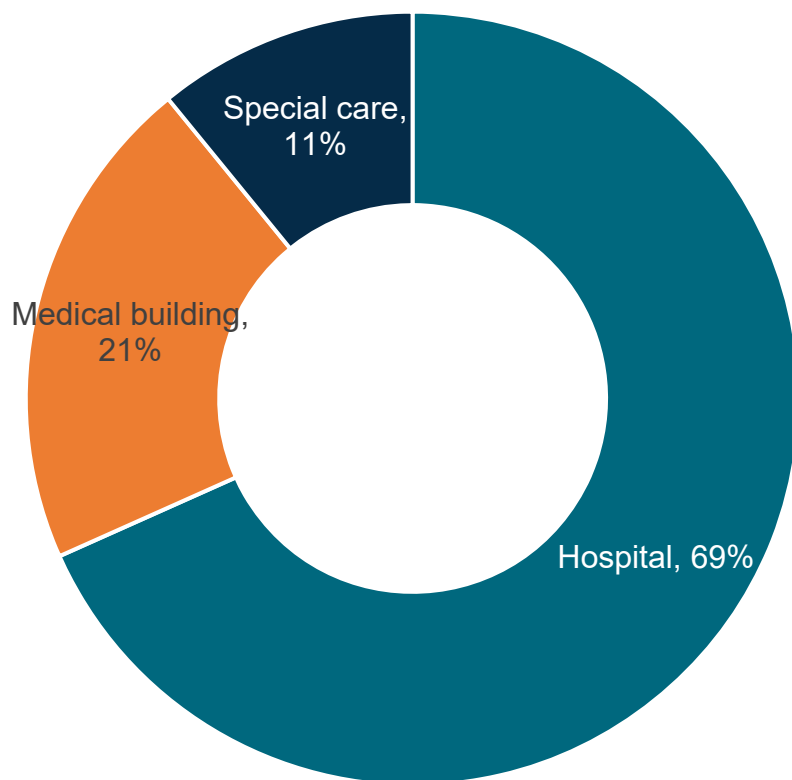
From a survey of 4,000 U.S. adults.

Source(s): Freddie Mac

Millennials	Gen-Xers	Baby Boomers
 <ul style="list-style-type: none"> <li>• See renting as more affordable than owning. They also see it as a good choice regardless of being able to afford a home or not.</li> <li>• More Millennials plan to exit the rental market compared to last quarter – however, most are from the “older” Millennial cohort (age 25-34).</li> <li>• Safety is the most important thing when choosing a rental property.</li> <li>• More likely to say renting allows them to save money (main reason for renting).</li> <li>• Tend to see renting as best choice based on life stage (compared to Gen-Xers).</li> <li>• Feeling slightly better about their financial situation than in the past.</li> </ul>	 <ul style="list-style-type: none"> <li>• This quarter saw an even greater decline in Gen-Xers’ ability to manage their debt and feel financially secure.</li> <li>• More likely to say they plan to rent in the next three years.</li> <li>• Reasons for renting include not being able to afford a down payment for a home and lacking a good credit history.</li> <li>• More believe owning is more affordable and consider renting not the best option for their current life-stage (when compared to other generations).</li> <li>• Compared to Millennials, convenient location is more important to them when choosing a rental property.</li> </ul>	 <ul style="list-style-type: none"> <li>• Overall, more committed to renting and more likely to say they have no interest in buying whether they can afford it or not.</li> <li>• Not wanting the responsibility of owning a home is one of the main reasons for renting.</li> <li>• Tend to see renting as best choice based on life stage and more affordable than owning (compared to Gen-Xers).</li> <li>• Feel optimistic about their ability to manage debt and live beyond each payday.</li> </ul>

## Growth in healthcare construction has shifted to non-hospital facilities.

Healthcare construction put in place by segment, 2016



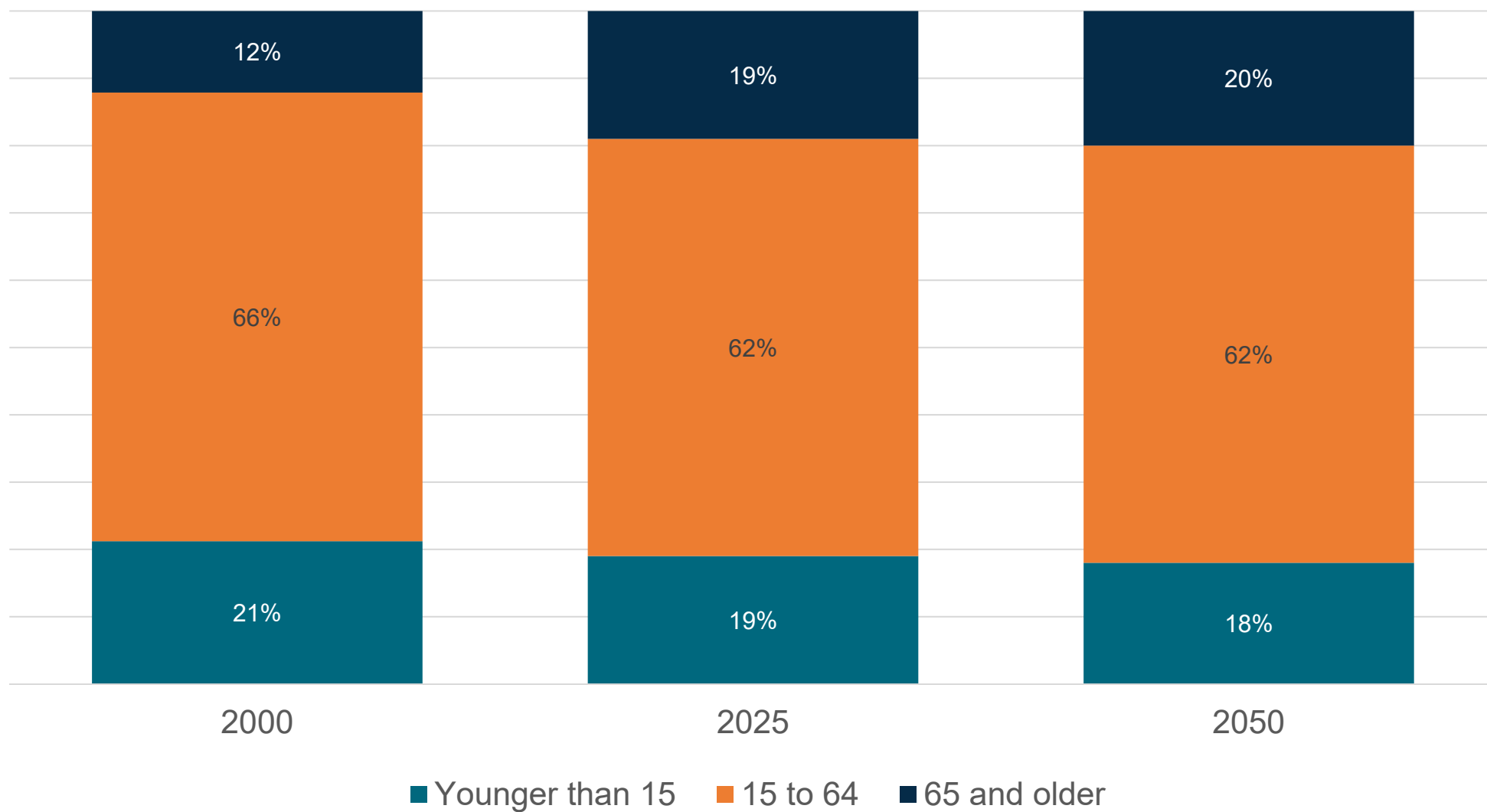
*“The shift to outpatient is really coming to fruition. Hospitals are expanding their brands into their communities. It’s coming to fruition because of the Affordable Care Act, but it also has been in the works for the past five to eight years.”*

**Andrew Quirk**  
Senior Vice President and National Director  
Skanska USA Building



## The “silver tsunami” is approaching.

Age as a proportion of the U.S. population, historical and forecast



# AUGMENTING A CARBON-BASED WORKFORCE WITH A SILICON-BASED ONE

## *Artificial intelligence*

Replicating or replacing  
knowledge-work tasks

## *Internet of Things*

Process optimization via a  
network of sensors and  
other devices for data  
collection, monitoring, etc.

## *Advanced robotics*

Human augmentation  
and/or task automation  
that enhances precision  
and speed of delivery



## *Iterative manufacturing*

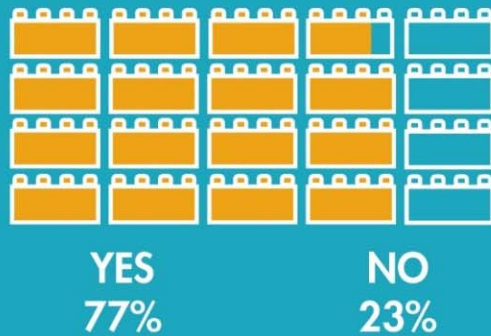
Increased customization, creation  
of unique products, and reduction  
of waste

## *Autonomous vehicles*

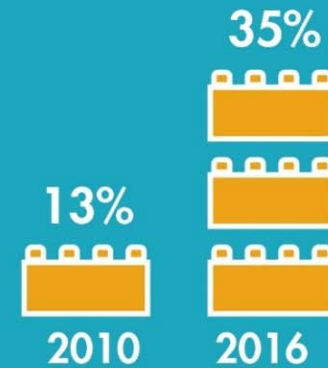
Machine-to-machine  
communication and  
elimination of human  
operation

# TODAY'S PREFAB ENVIRONMENT IS DIFFERENT

**77%** of respondents think today's prefab environment is different than in 2013.



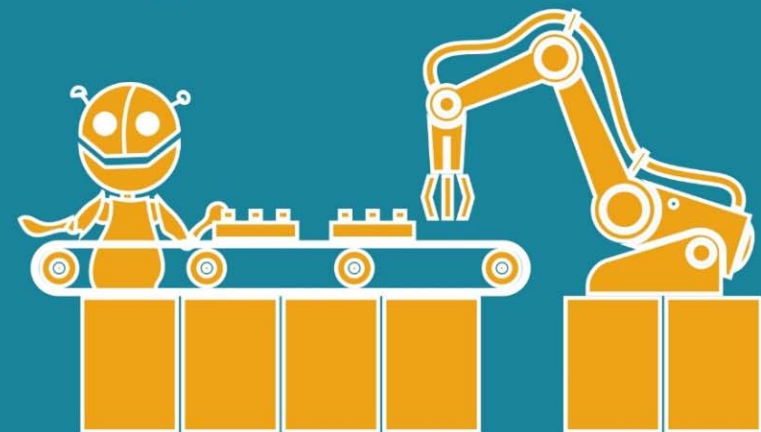
The amount of project work using prefab has **almost tripled** between 2010 and 2016.



Most contractors **perform single-trade prefabrication**.



Project **inefficiencies** and **improved technologies** are driving prefabrication.



# THE BIG STRUGGLE TO MAKE IT WORK

Contractors **struggle** to make prefabrication effective.



Contractors using prefab on more than **50%** of their projects **are more effective** compared to those who do less prefab.



**Three key** challenges for making prefabrication effective:



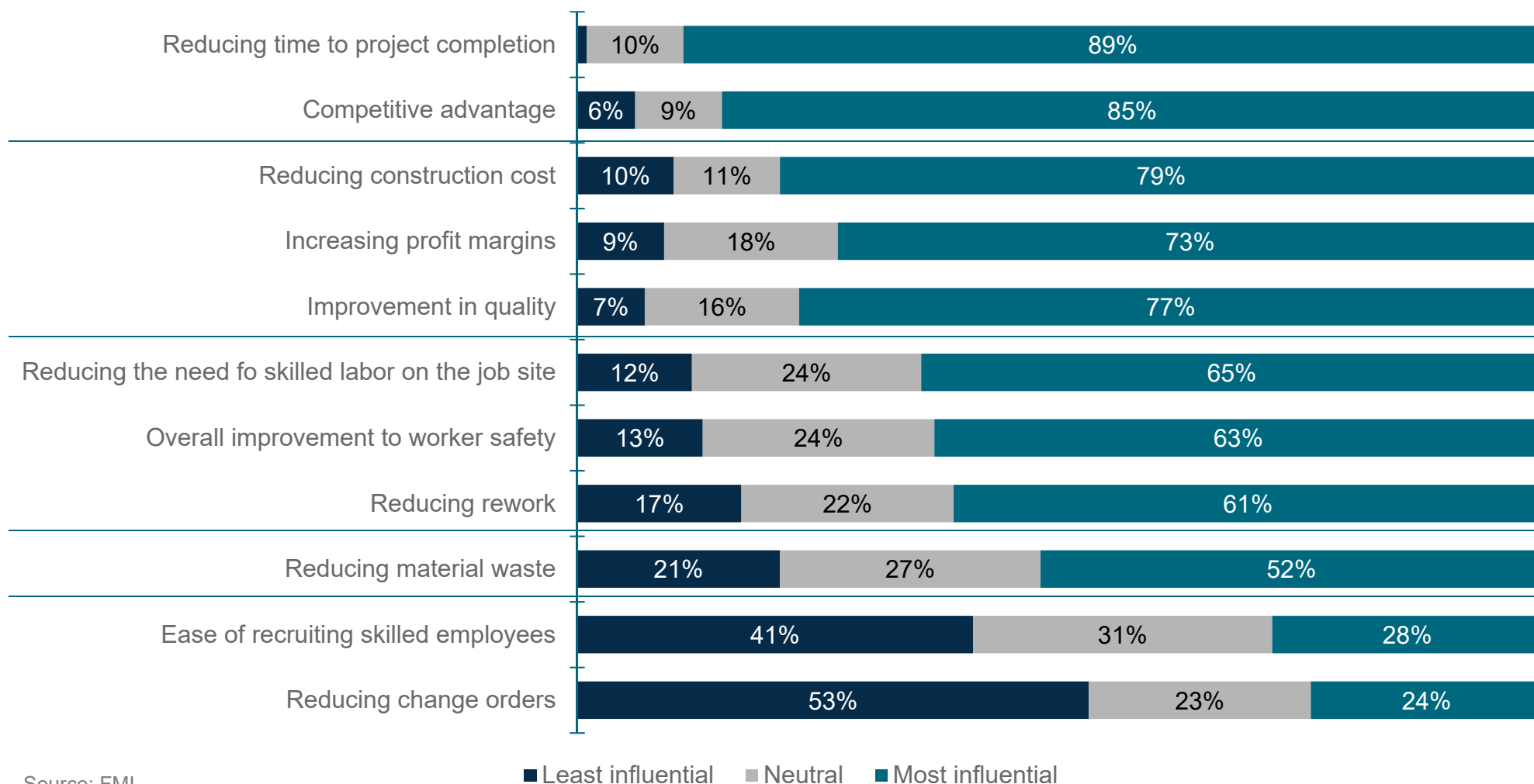
**48%** of respondents see less than **5%** in savings on total annual labor hours related to prefabrication.



# PREFABRICATION BENEFITS

*Rank the benefits of prefabrication most important to project success.*

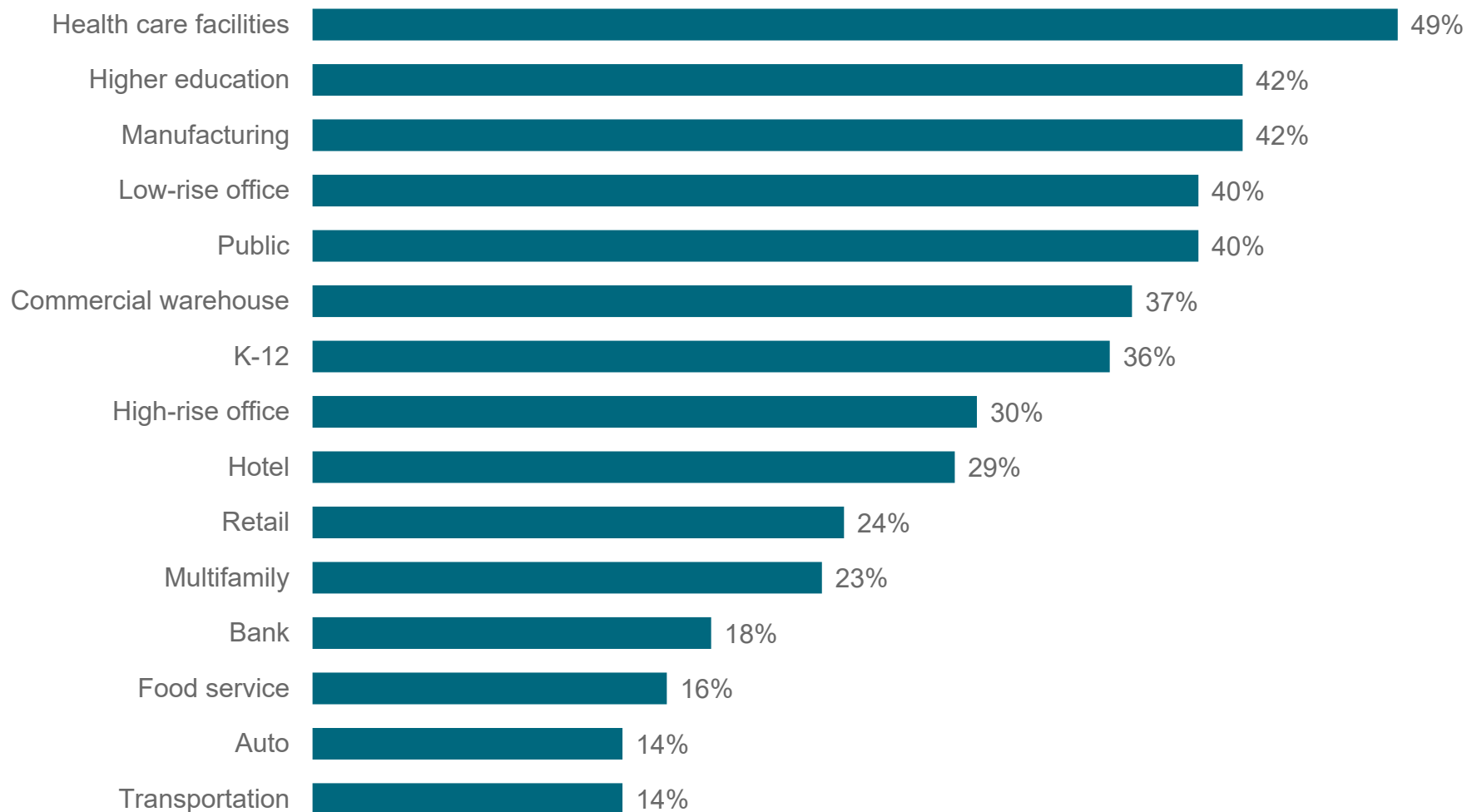
(1=Least influential, 5=Most influential)



Source: FMI

## MOST FREQUENT APPLICATIONS

### *Building sectors using prefabrication/modularization (2011).*



Source: McGraw-Hill Construction

## Possible results

### *Mortenson's Exempla Saint Joseph Heritage Project*

Schedule reduction	72 work days
Indirect cost savings	\$4.3 million
Direct cost	6.0% premium
Overall required labor	29,500 fewer hours
Diverted labor off-site	150,500 hours
Reduced safety incidents	7 incidents
Productivity enhancement savings on- and off-site	\$2.6 million
<b>Benefit-to-cost ratio</b>	<b>1.13</b>

# BUSINESS IMPLICATIONS

*“We always saw prefabrication as a three-step process: Create, Innovate and Revolutionize. Create so it functionally works. Innovate so it holistically works. Revolutionize to improve the industry.”*

**Geoffrey Golden**  
**President**  
**Golden Construction**

## Vision

Start by identifying a compelling prefab vision and communicate that vision clearly to the company.

Ask yourself: Why are we doing prefab, and how does it fit within the broader company vision.

Establish clear objectives for your prefabrication efforts and investments.

## Culture of Innovation

Spend your time, energy and resources on your organization’s people and culture. Helping them learn and grow in their thinking, experiences, and competencies will pay dividends when you need an innovative shift.

## Talent Strategy and Change Mindset

Develop a talent strategy that aligns with your corporate prefab vision and strategy.

Communicate regularly on the organization’s philosophy around embracing change and explain why that change is necessary.

Pay attention and give credit for embracing and driving change.

Develop a “manufacturing” mindset and culture:

- Minimize rework and waste
- Maximize throughput
- Track equipment utilization
- Look to improve or eliminate bottlenecks



.....

Companies can take two human capital approaches to the skilled worker shortage.



Churn and burn



Nurture and retain

## Key takeaways

- FMI predicts slowing growth in the forecast period 2017-2021 of between 3-5% YoY changes.
- There is continued cautious optimism about the state of the E&C industry.
- The rate of technology advancement is increasing, producing paradigm shifts.
- Demographic shifts (Millennials, Baby Boomers) are shaping the built environment, sometimes rapidly.
- The skilled worker shortage can be mitigated in several ways:
  - Prefabrication
  - Technology
  - Human capital approach



**ANY  
QUESTIONS?**

.....  
**Thank you!**



**Bridget Wandelt**

**Consultant**

**919.785.9242**

**[bwandelt@fminet.com](mailto:bwandelt@fminet.com)**

**[www.fminet.com](http://www.fminet.com)**

As a consultant with FMI, Bridget Wandelt advises clients in the engineering and construction industry. Primarily, she collects market intelligence to inform client strategy.

Prior to joining FMI, Bridget was a senior analyst with ScottMadden, a management consulting firm focused on the energy and utilities industry. There she developed expertise in project management, operations improvement, process redesign, and research. Previously, Bridget worked in electric power project development in the United States and Europe.

Bridget has an MBA from the UNC-Chapel Hill Kenan Flagler Business School with a concentration in Strategy and Leadership. She also holds a bachelor's and master's from the University of Virginia in environmental sciences.

# About FMI

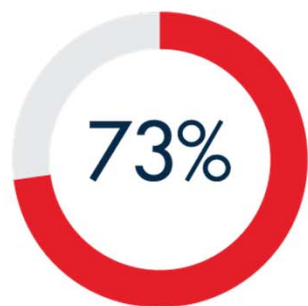
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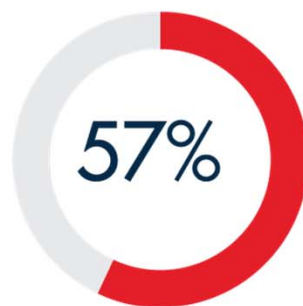
## FMI client highlights



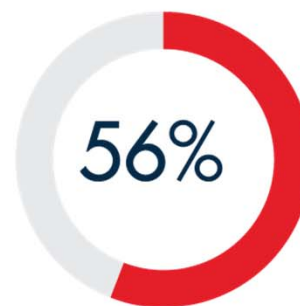
of the ENR  
**Top 400**  
Contractors



of the ENR  
**Top 200**  
Specialty  
Contractors



of the ENR  
**Top 100**  
Design  
Firms



of the ENR  
**Top 200**  
Environmental  
Firms



of the ENR  
**Top 100**  
CM for  
Fee Firms