

# Grand Challenges for Education



**Gregory Washington, PhD**  
President



# Unprecedented Disruption

Thousands of businesses still closed

Pandemic destroyed millions of jobs

Drop in unemployment 14x the Great Recession

College completion rates must overcome remote learning and educational transition

Pandemic highlights racial inequities in economics and health





# Unprecedented Global Challenges

## Level 1

Climate change  
Water scarcity  
Energy security  
Cyber security  
Global financial structure  
Biodiversity and ecosystem losses  
Fisheries depletion  
Deforestation  
Infectious disease

**Eliminate our  
way of life**



## Level 2

Aging population  
Poverty  
Education  
The digital divide  
Urbanization  
Intellectual property  
International labor and migration  
E-commerce rules  
Biotechnology rules  
The Quest for Talent  
Maritime safety and pollution

**Disruptive to our  
way of life**

# Unprecedented Change



**47% of total US employment is at risk**



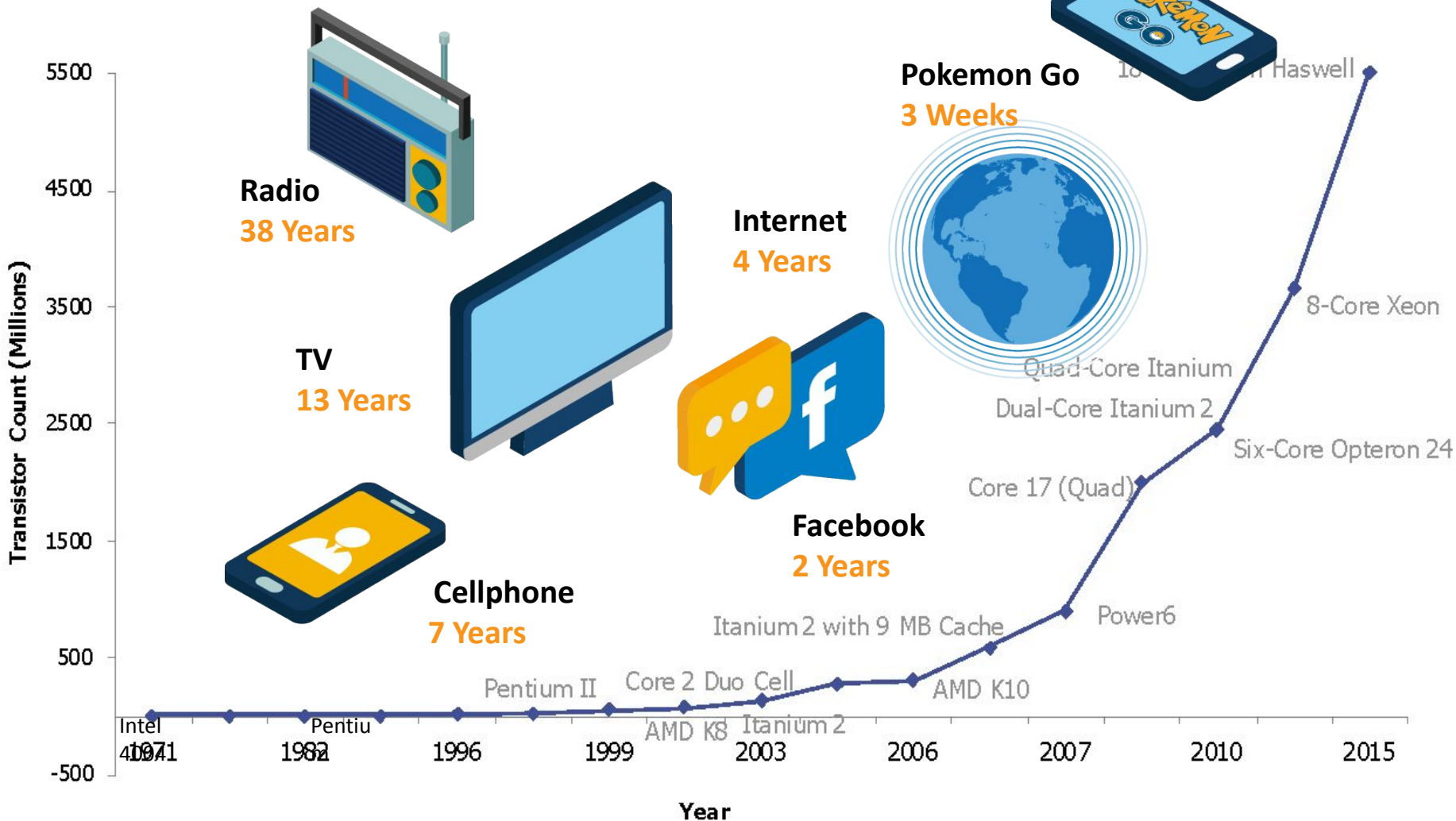
# Change Is All Around Us



# Unprecedented Speed of Change

Years to 50 million users

More than half of the top 10 in-demand jobs in 2021 did not exist in 2008





# Oakley - Radar Pace



**Craig Alexander 3X  
Ironman Champ**



# Unprecedented Competitors

SHANGHAI  
1987 2019



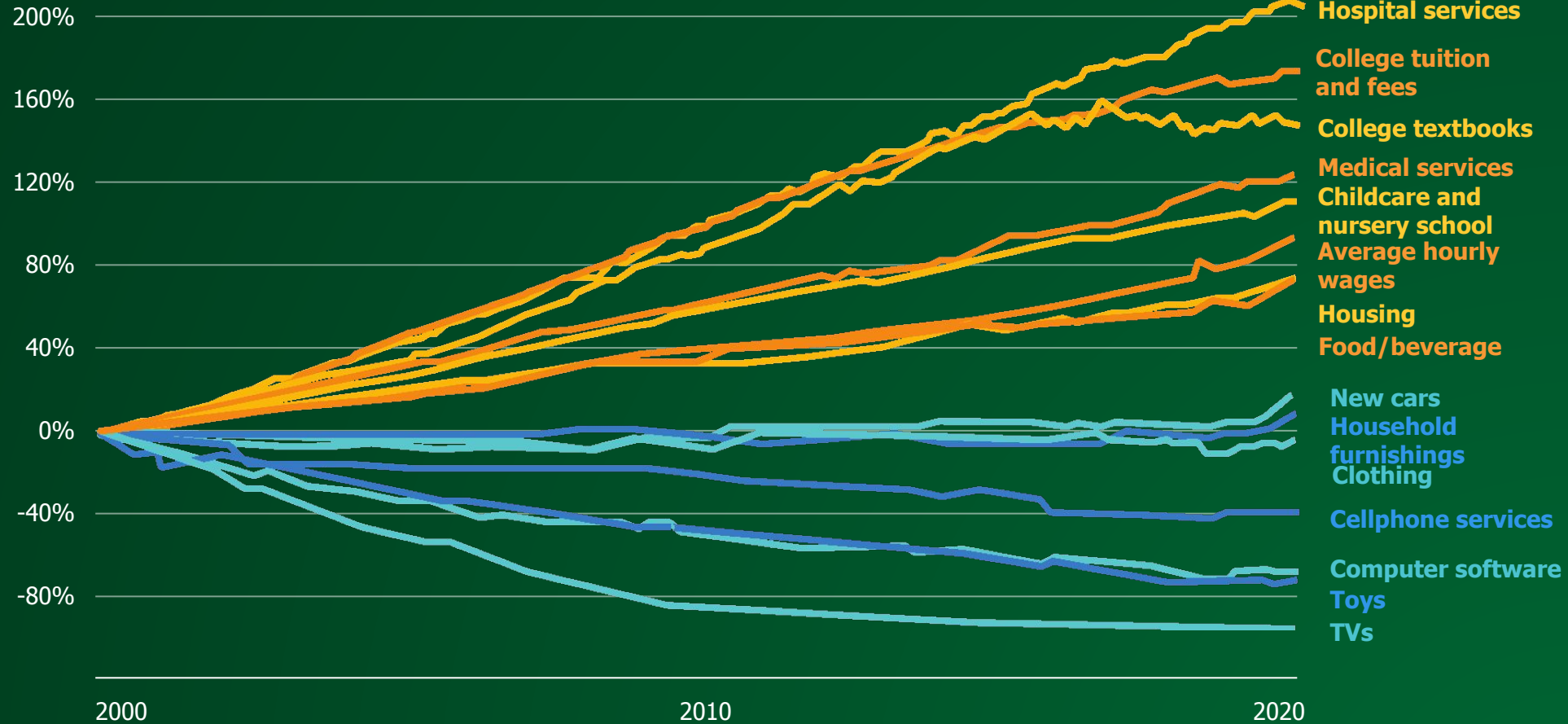


# Price Changes: January 2000 to December 2021

Selected U.S. consumer goods, services, and wages

More expensive

More affordable



Source: Mark Perry, Bureau of Labor Statistics

# Item Costs Hardest Hit by Inflation



Used Cars  
**+37.3%**



Hotel Rooms  
**+27.6%**



Furniture  
**+13.8%**



New Cars  
**+11.8%**



Groceries  
**+6.5%**



Appliances  
**+6.0%**



Shoes  
**+6.0%**



Clothes  
**+5.8%**



Shelter (Rent)  
**+4.2%**



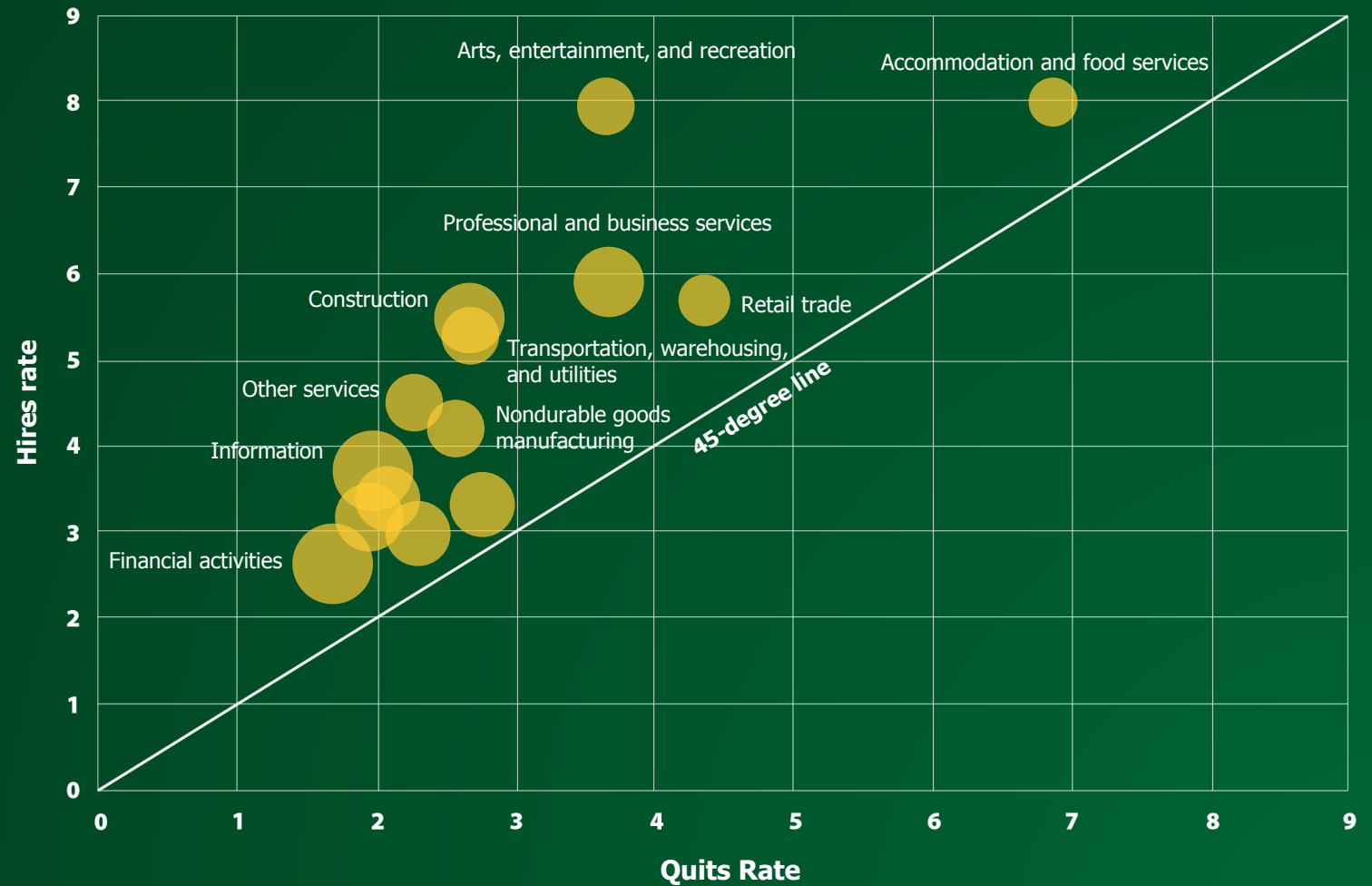
# Pandemic Positives

- Via remote work, more people have more flexibility over when, where and how they earn their living
- Managers forced to become better communicators, improving employees' job satisfaction
- Governments doing more to reduce inequality and formulating better-designed systems of employees' rights and benefits
- Technology has smoothed reallocation. Job-search websites such as Indeed and Monster are now more widely used. This makes it easier for firms to find workers, and vice versa.
- It is also stimulating helpful and long-overdue changes in employment law.

# Great Resignation is actually the Great Upgrade

Hires and quits rates by major sector, November 2021

**Notes:** The private-sector hourly wage rates correspond with the size of the bubbles (the smaller the bubble, the lower the wage rate). The 45-degree line represents where hires rates are equal to quits rates.



**Source:** EPI analysis of Bureau of Labor Statistics Job Openings and Labor Turnover Survey and Current Employment Survey public data series



# The Pandemic Increased Need for Digital Skills



## Digital Delivery

- Web development
- User interface design
- Data visualization
- Automated testing techniques
- Application programming interface



## Data Science

- Mathematical modeling
- Big data analytics
- AI and machine learning
- Web analytics
- Simulation



## Data Engineering

- Data wrangling
- Cloud computing
- Cloud security architecture
- Data mining
- Data techniques

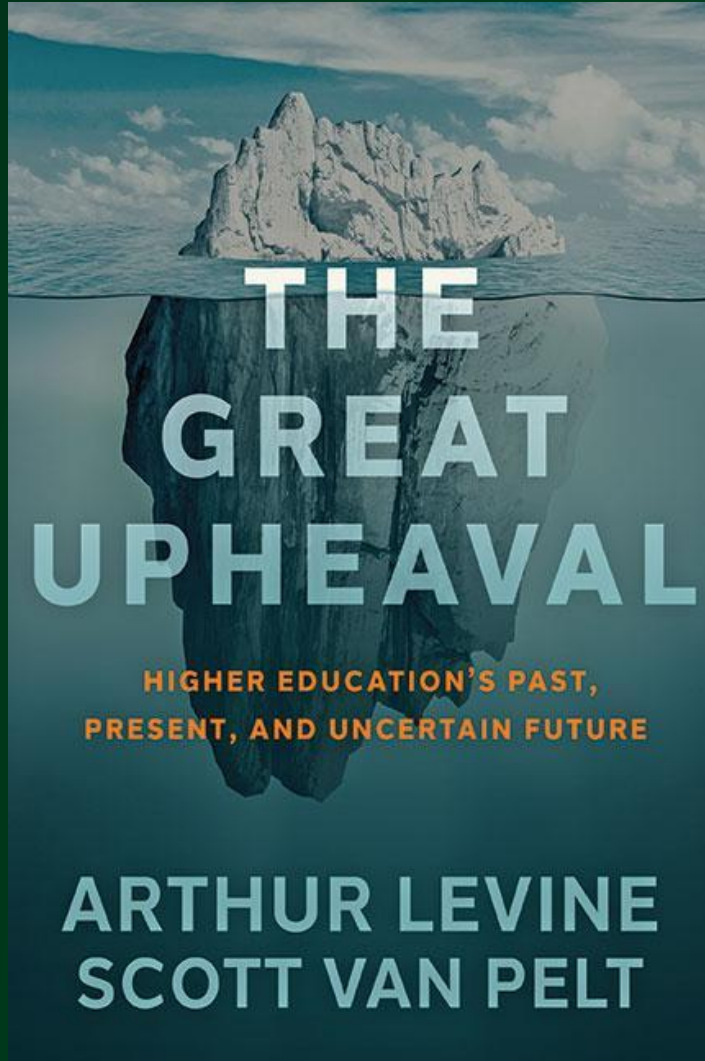


## Automation & Robotics

- Robotics
- Automated testing
- Automation
- Computer-aided manufacturing
- Industrial automation

We must prepare graduates in these areas

# What does all this mean?



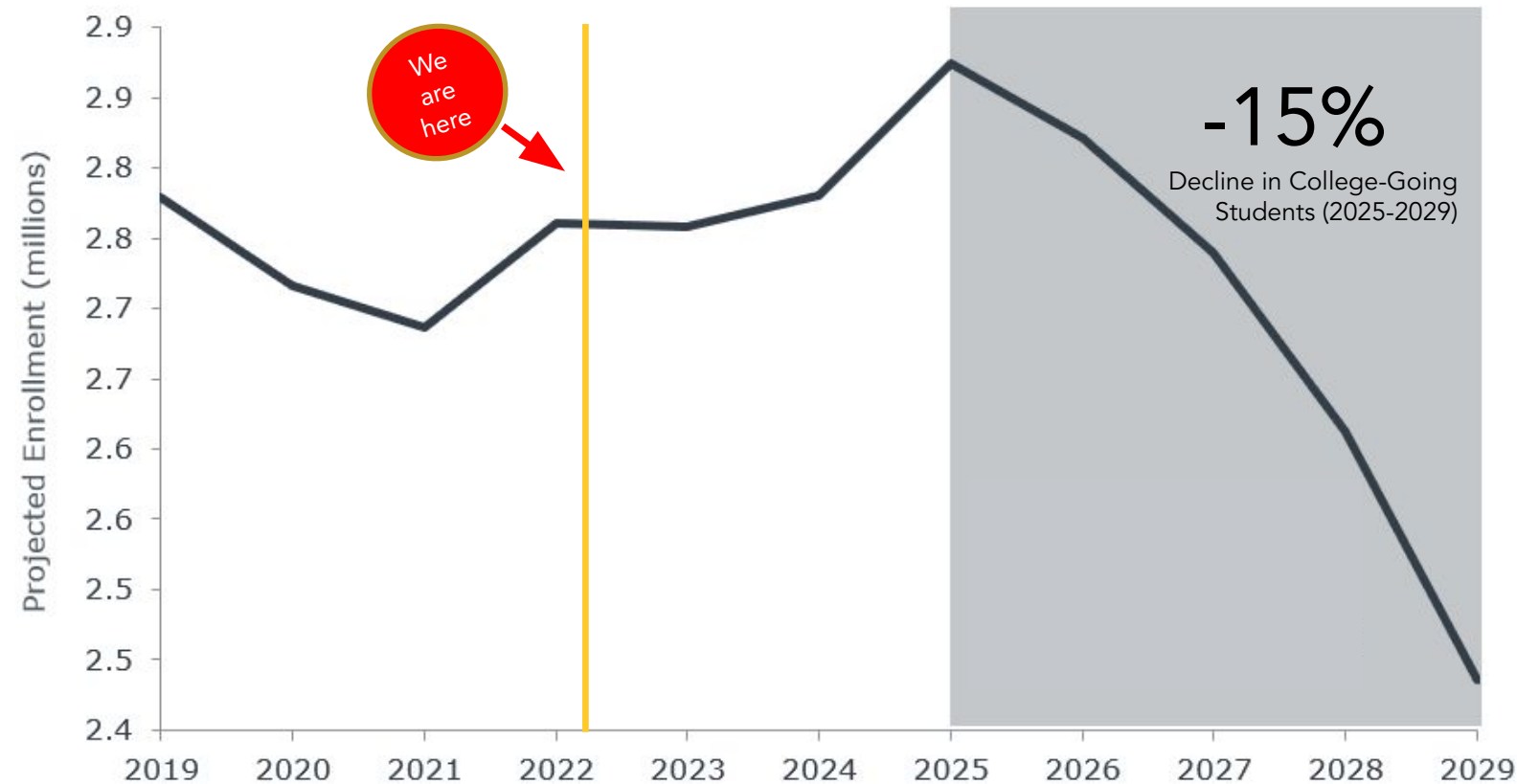
- US is transitioning from a national, analog, industrial economy to a global, digital, knowledge economy
- Simultaneous unprecedented grand challenges, change, and competitors
- Exacerbated by the pandemic
- Universities will be transformed dramatically in the aftermath and engineering is key
- Greatest opportunity for massive change and innovation in 50 years!



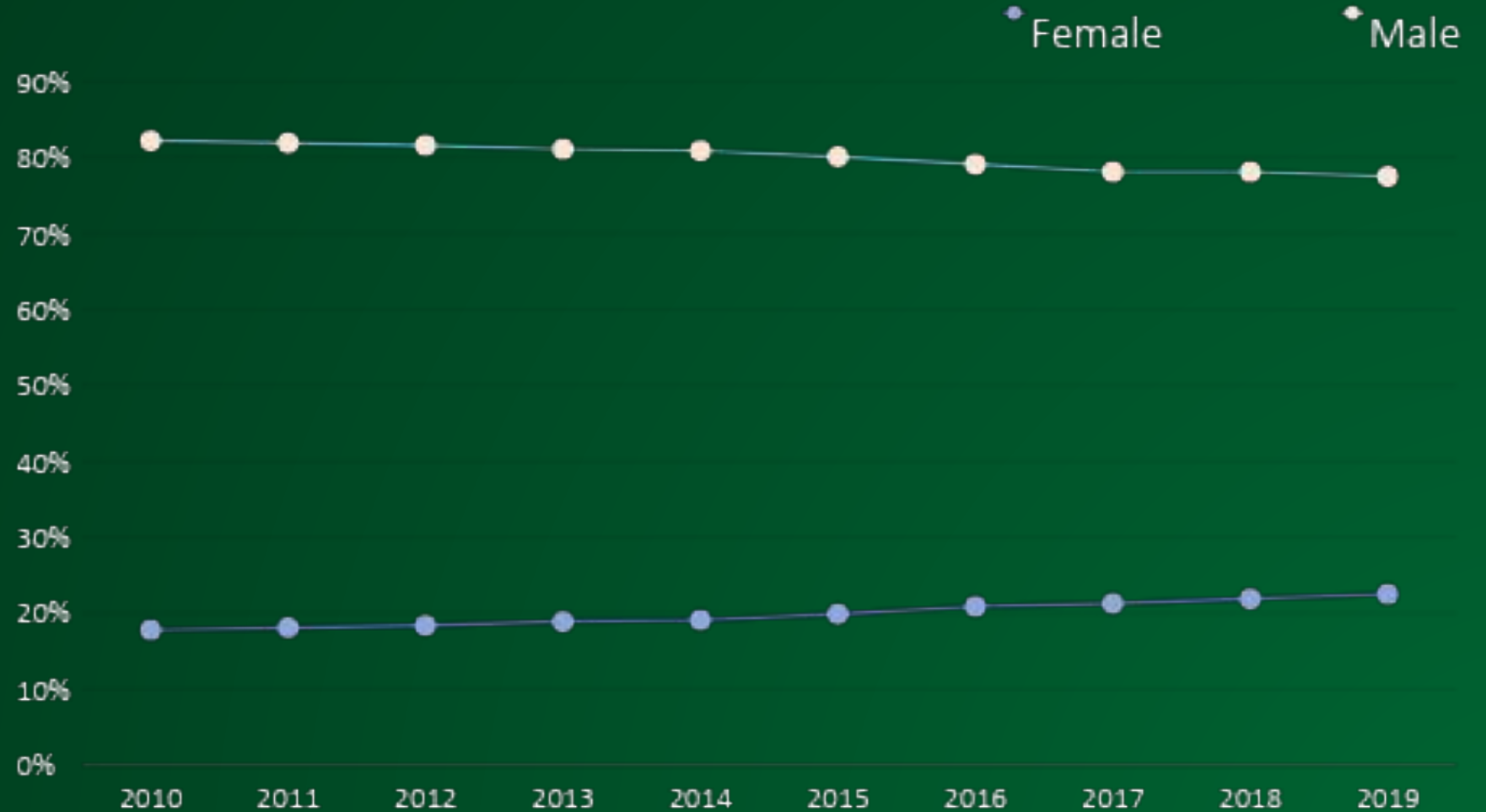
# Demographic Challenges

## Enrollment Projected to Drop Sharply After 2025

*Forecasted Number of College-Going Students in the U.S. (millions), by Year of High School Graduation*

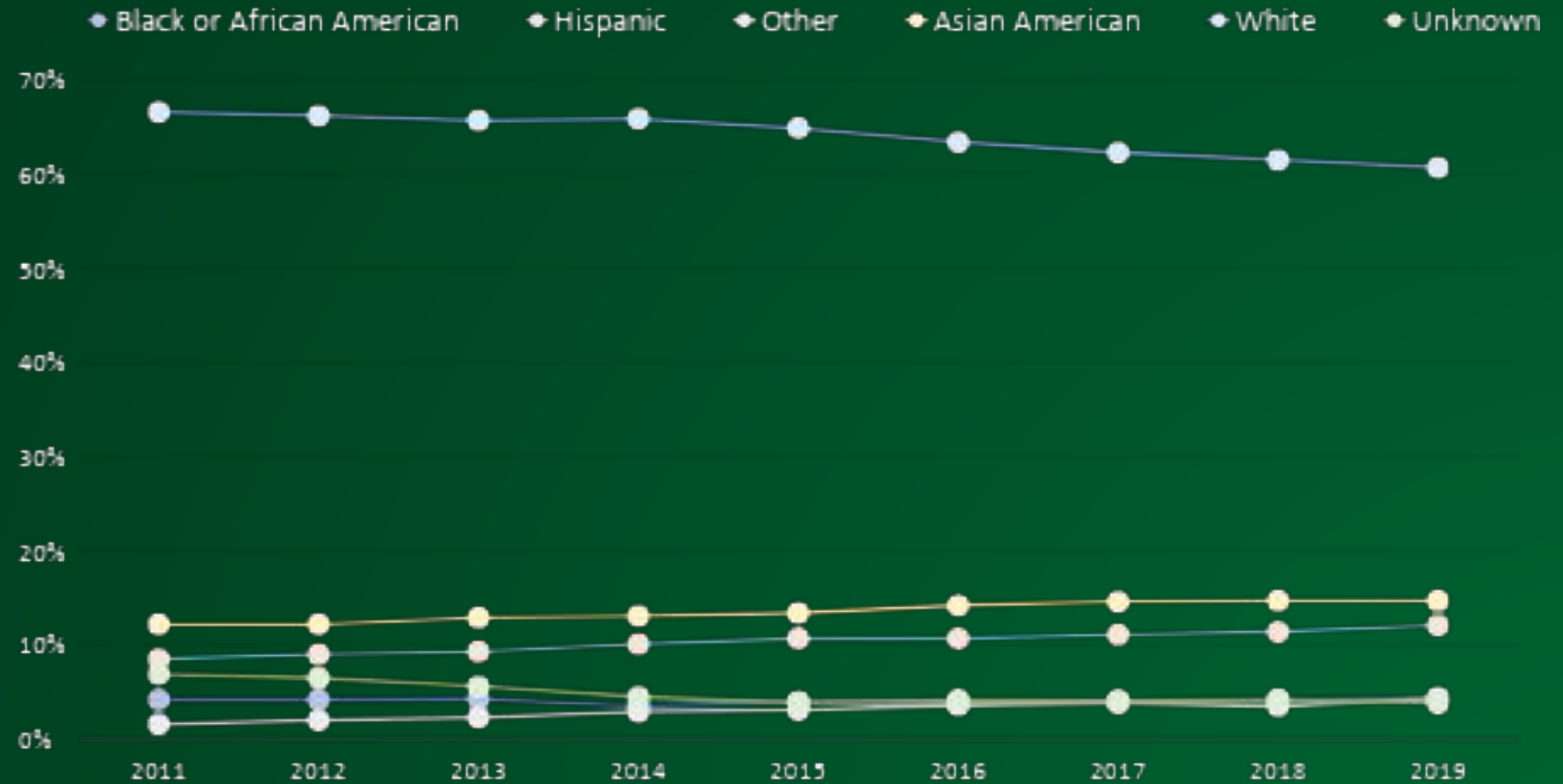


# Engineering Bachelor's Degrees by Gender





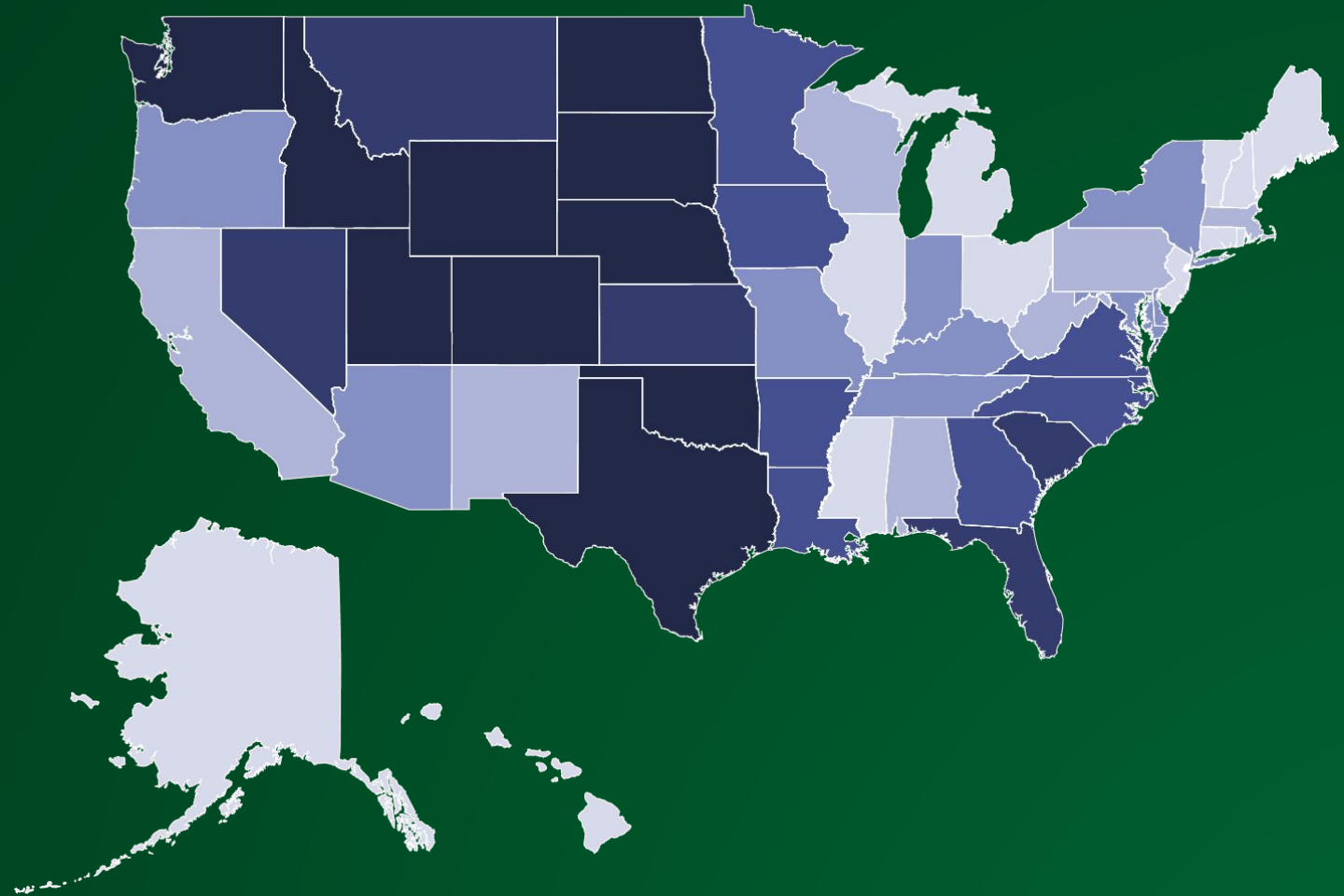
# Engineering Bachelor's Degrees by Race/Ethnicity



\*Data on ethnicity does not include foreign nationals. American Indian/Alaska Native (0.4%), Native Hawaiian/Other Pacific Islander (0.2%) and Multiracial (3.7%) are combined under Other.

# It gets worse...

Between 2026 and 2031 the number of high school graduates is expected to drop by 9 percent and those students who remain are likely to be more diverse (fewer White students and more Hispanic) with a greater range of academic abilities (fewer high scorers on SAT and ACT) and stagnant family income.

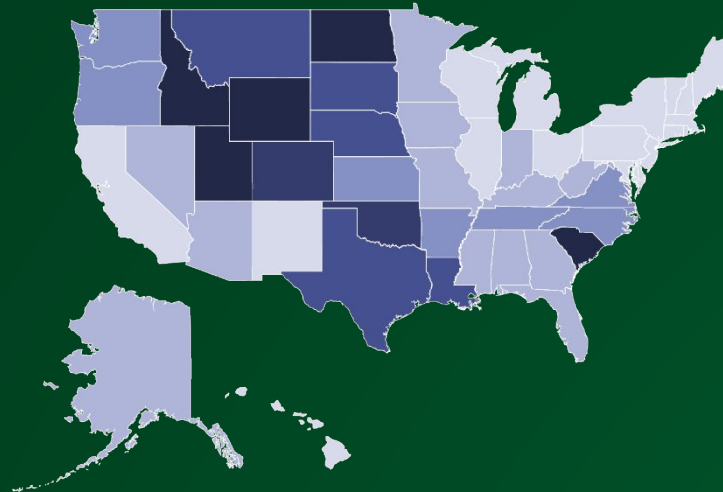




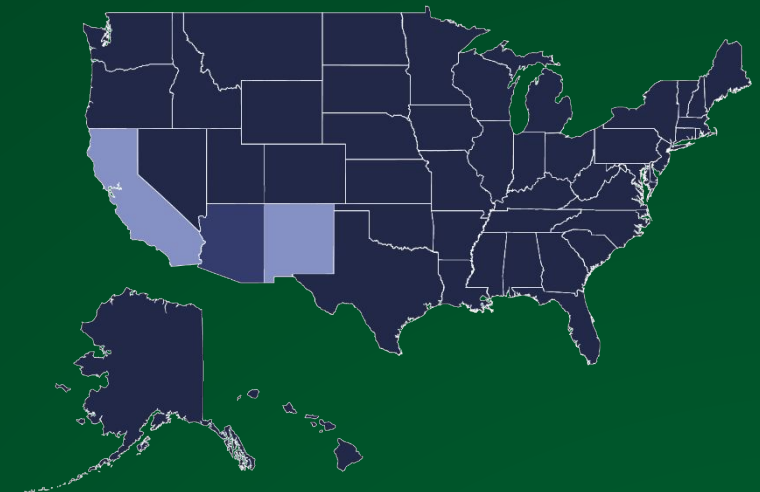
# Much worse...

Given that engineering typically engages between 5%–6% of first-year engineering students, what are the implications for engineering enrollments with these indicated changes?

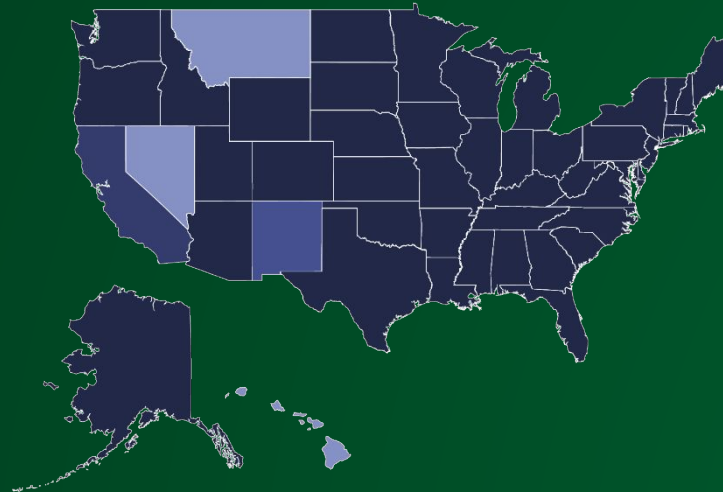
Non-Hispanic White



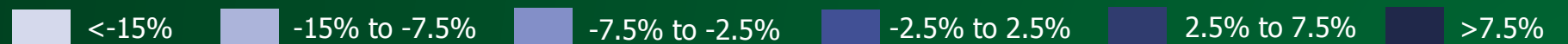
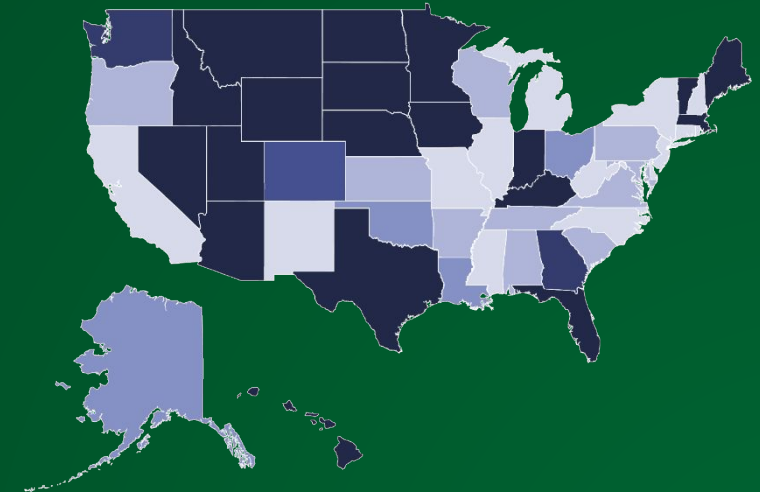
Hispanic



Asian and Pacific Islander



Non-Hispanic Black



# Post-Pandemic Success

- Moonshot-sized K-12 outreach and engagement, coupled with a similarly sized internship effort
  - Foundations, NSF, Department of Education, Department of Energy, and Department of Defense must work together to triple the number of national successful programs in STEM
- We know what works. Implement and scale!
- Meet students where they are
  - The system is broken, not the student!
  - Mason ADVANCE program and the **Mason Virginia Promise**
- Establish Upskilling – Reskilling programs based on certificates and badges (not degrees)
- Partner with employees – Mason Talent Exchange



# Scale Programs that Work

- Expand transfer pathways
- Corporate talent partnerships
- Culturally relevant K-12 outreach
- Rethink our budget model (3-year degrees, certificates)
- From Summer Bridge to Summer Transition programs
- **100% of student-need scholarships**
- Faculty development programs
- **Collaborative learning (and living) environments**
- Positive self-efficacy and identity development





# Access to Excellence

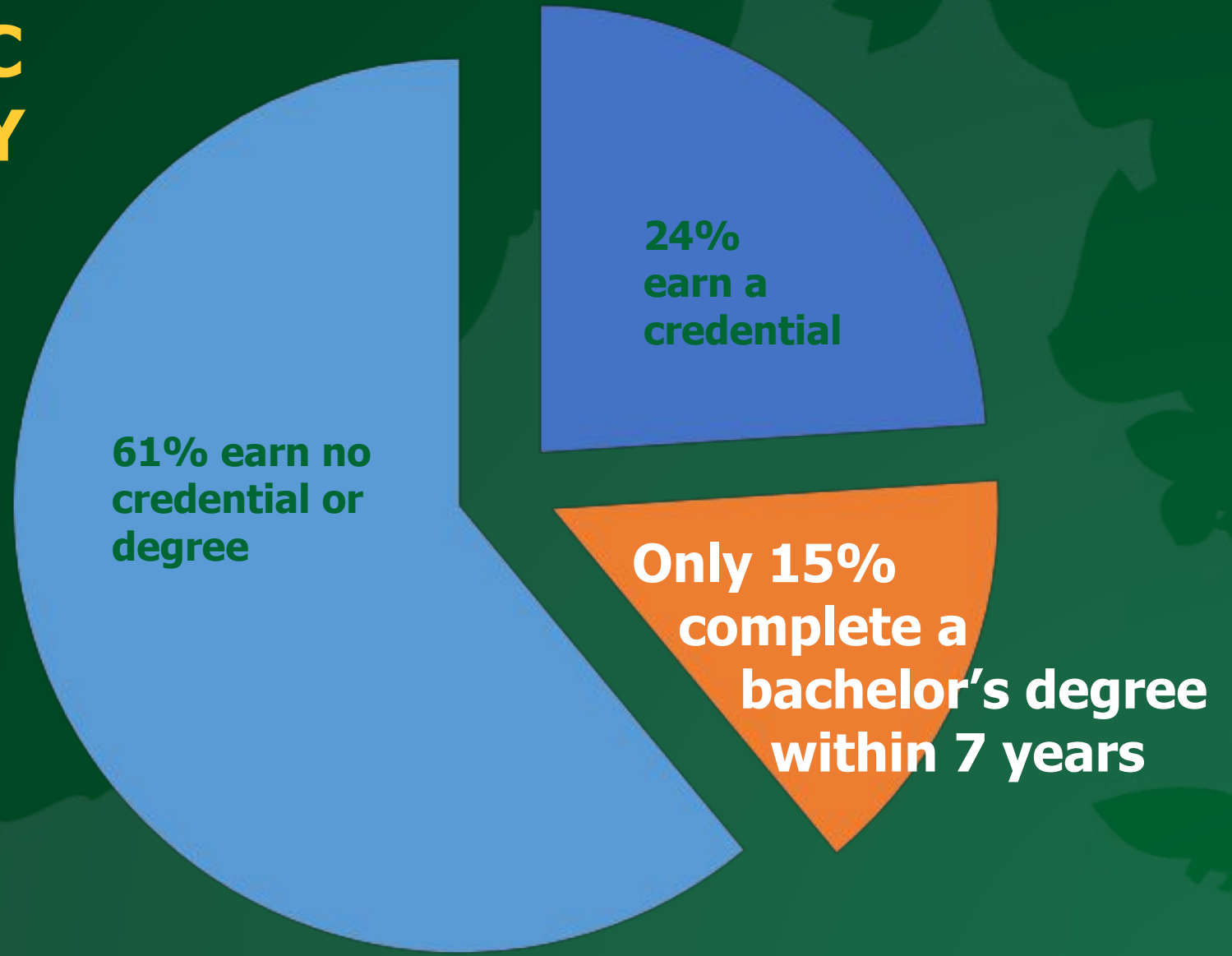
## The Mason Virginia Promise:

A pathway toward a bachelor's degree or your own business for **EVERY** Virginian who wants it.

- **Plan to meet 100% of student need**
- **Expanding into other community colleges**
- Based on expanding ADVANCE and our Early Identification Program (EIP)

# The Mason NOVA CC ADVANCE PATHWAY

Virginia community college students accumulate nearly a semester's worth of excess credits by the time they earn a bachelor's degree





# The Purpose of ADVANCE



Increase number of  
NOVA students who  
**GRADUATE** with  
2-year and 4-year degrees



Decrease  
**TIME**  
it takes to  
graduate



Decrease the  
**COST** and  
the excess  
credits



Improve **ADVISING**  
and **STUDENT**  
**SUPPORT** for  
transfer students

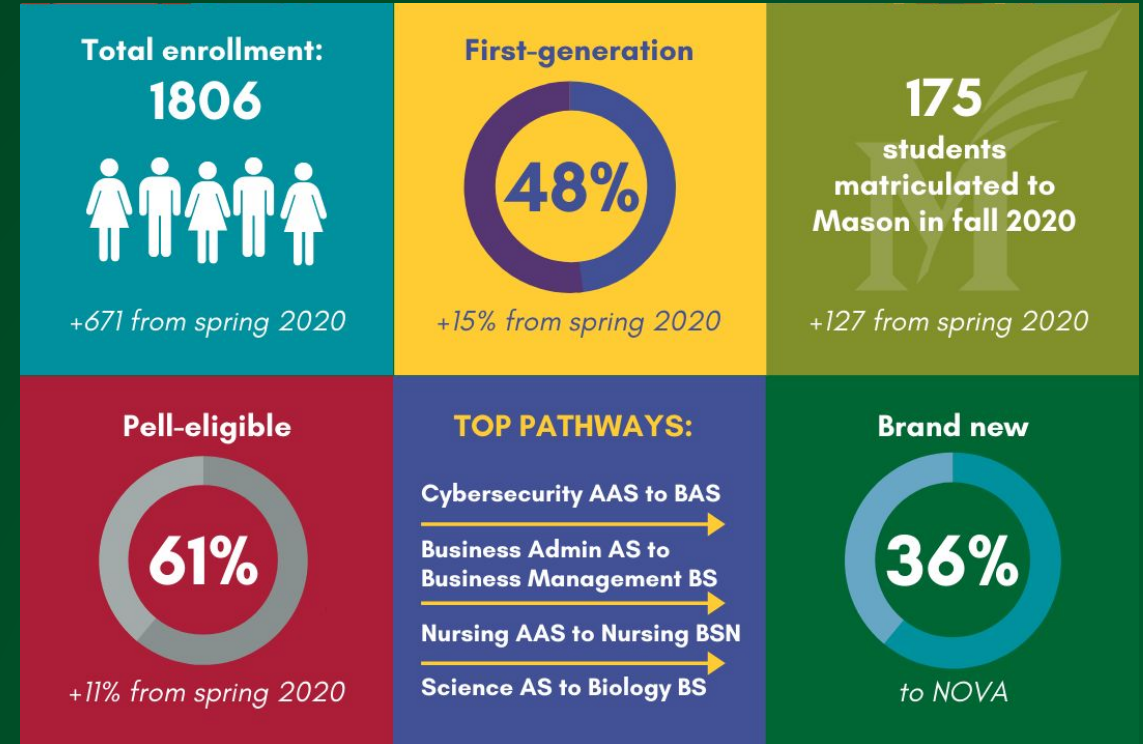
# Program Highlights

## Enrollment Highlights

- 1,708 active students, 155 for Spring 2021
- 60% students of color
- Fall 2018 retention rate of 83% and the Spring 2019 cohort of 190 students has a retention rate of 89%, compared to First-Time at NOVA Associate Degree-Seeking Students at 65%
- 4 students graduating this year

## Notable Mentions:

- Started scholarship fund for unpaid internships through the Strada Grant
- Distributed over \$200,000 to more than 100 scholarship recipients
- Launched the Career Accelerator Tool
- Created All-ADVANCE Team Meeting and Community Resources Site



## WHAT EMPLOYERS NEED



ACCESS TO  
TALENT

WITH HIGH-QUALITY  
CREDENTIALS



AND PROFESSIONAL  
EXPERIENCE

## HOW WE CAN HELP



**MASON  
TALENT  
EXCHANGE**



# The Solution: The Mason Talent Exchange

## Employer Needs

Employer describes skills, certifications, job needs

## Mason Aligns Micro-Credentials

Mason creates micro-credentials (non-credit)

- *Fast* — Can be completed in 90 days
- *Low cost* — via Mason Presidential Scholarships

## Employer Provides Support

- Resumé review/ interviews
- Experiential learning opportunities
- Scholarships

# JOBS



# Thank You!

**Merci Bien!**

**Vielen Dank!**

**感謝!**

**Obrigado!**

**Ευχαριστώ!**

**დიდი მადლობა!**

**СПАСИБО!**

**Tak!**

**Grazie!**



**谢谢!**

**Asante Sana!**

**¡Muchas Gracias!**

