

# Eyes on the Future:

Monitoring your exam, program, audience, & industry



# The Future Will Arrive Faster Than We Think



A lily pad is 0.00000018626% of the surface of a lake. The lily pad doubles every day for 30 days.

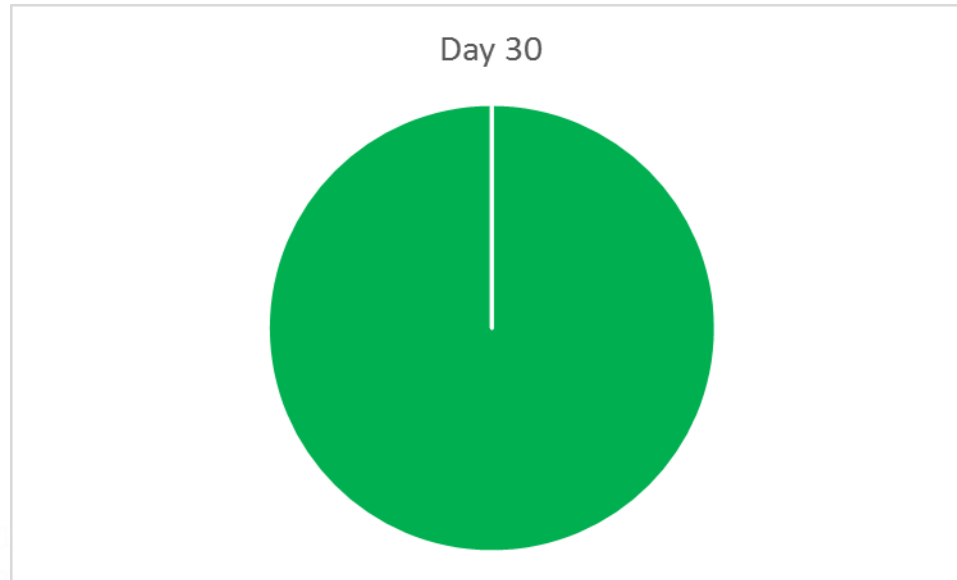
How much of the lake will be covered on day 20?

How much of the lake will be covered on day 30?



Jack Ulrich

# The Future Will Arrive Faster Than We Think



20	21	22	23	24	25	26	27	28	29	30
0.10%	0.20%	0.39%	0.78%	1.56%	3.12%	6.25%	12.50%	25.00%	50.00%	100.00%

# When was the last time you...



- » Called a theater for times?
- » Purchased a VHS?
- » Purchased a CD?
- » Used a printed map?
- » Asked directory assistance?
- » Hand wrote a letter?
- » Received a hand written letter?
- » Sent a post card?
- » Paid your bills by mail?
- » Googled theater times?
- » Streamed a movie?
- » Streamed music?
- » Used GPS?
- » Asked Alexa?
- » Posted to Instagram?
- » Checked Facebook?
- » Texted someone?
- » Paid your bills online?

# Who would have guessed...



“There are 2.5 quintillion bytes of data created each day..that pace is only accelerating with the growth of the Internet of Things (IoT). Over the last two years alone 90 percent of the data in the world was generated.”

Forbes, May 21, 2018 (Bernard Marr)

The Weather Channel receives 18,055,556 forecast requests

There are 154,200 calls on Skype

We send 16 million text messages

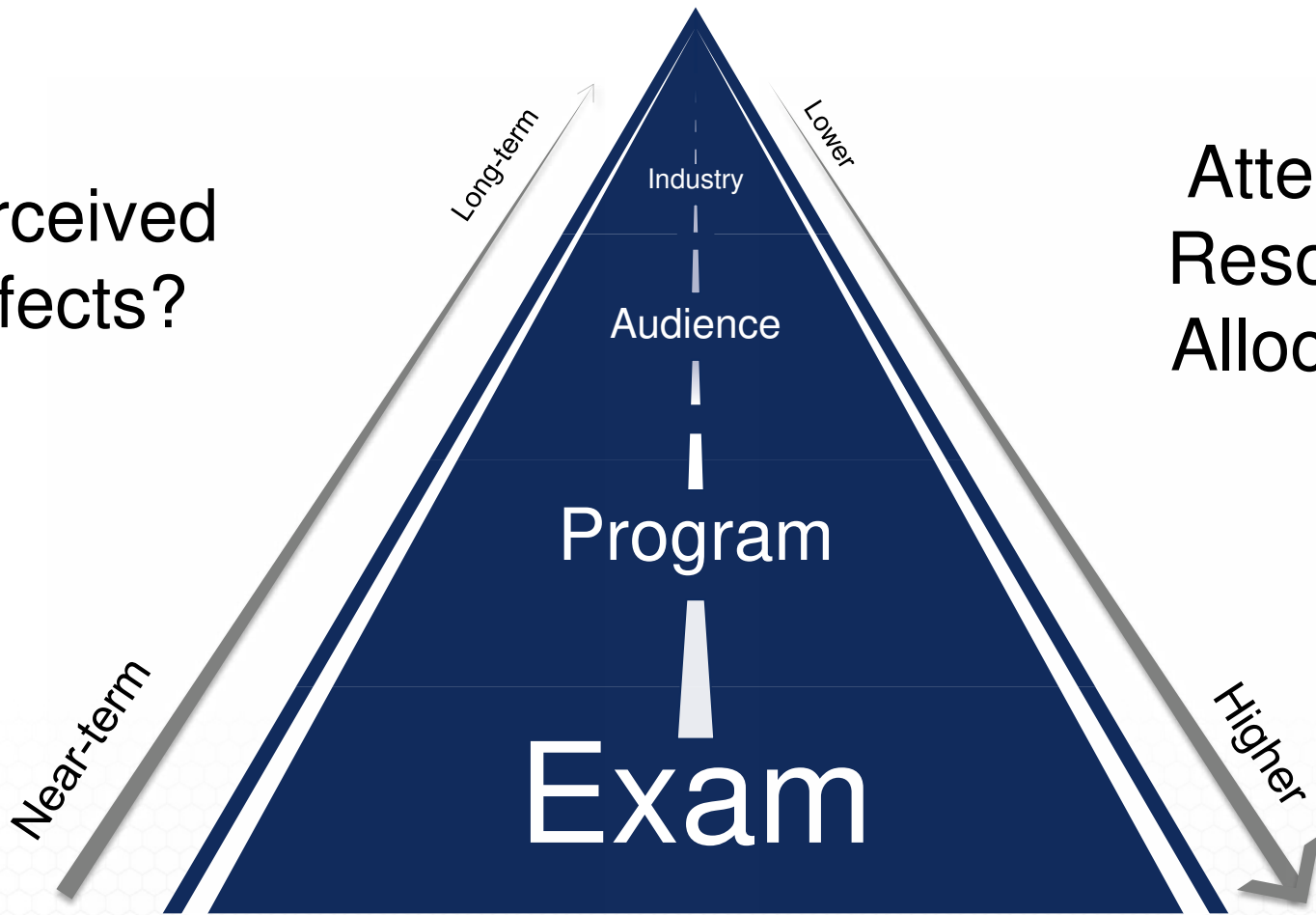
Uber riders take 45,788 trips

Spotify adds 13 new songs

There are 990,000 Tinder swipes

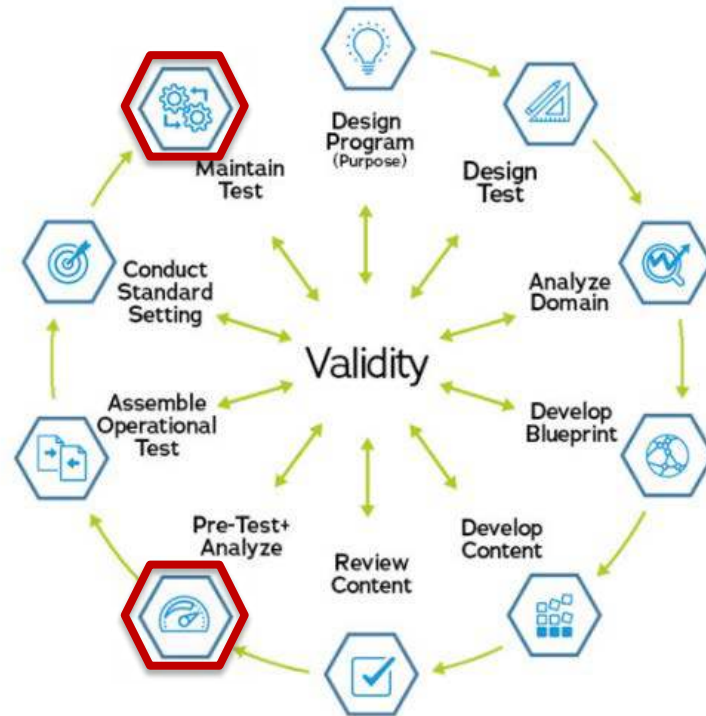
**per minute!**

Perceived  
Effects?

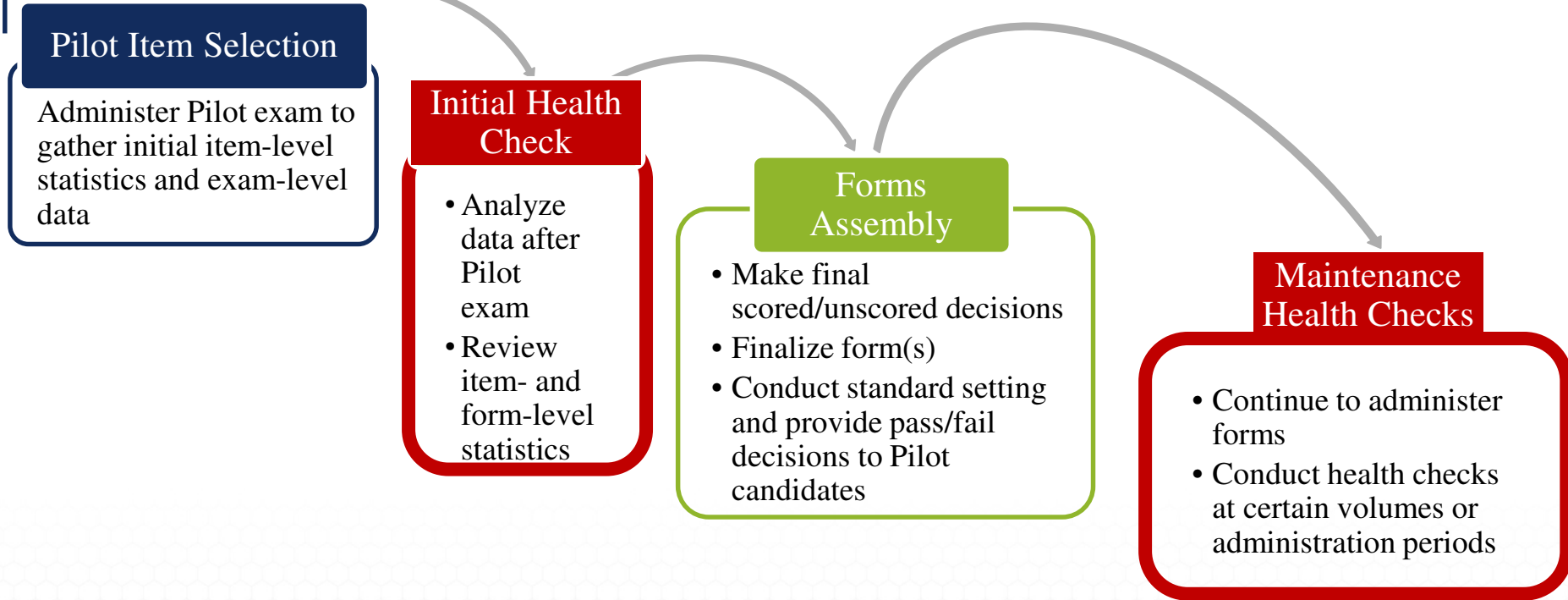


Attention/  
Resources  
Allocated?

# Monitoring Your Exam: Item/Form Analyses (“Health Checks”)



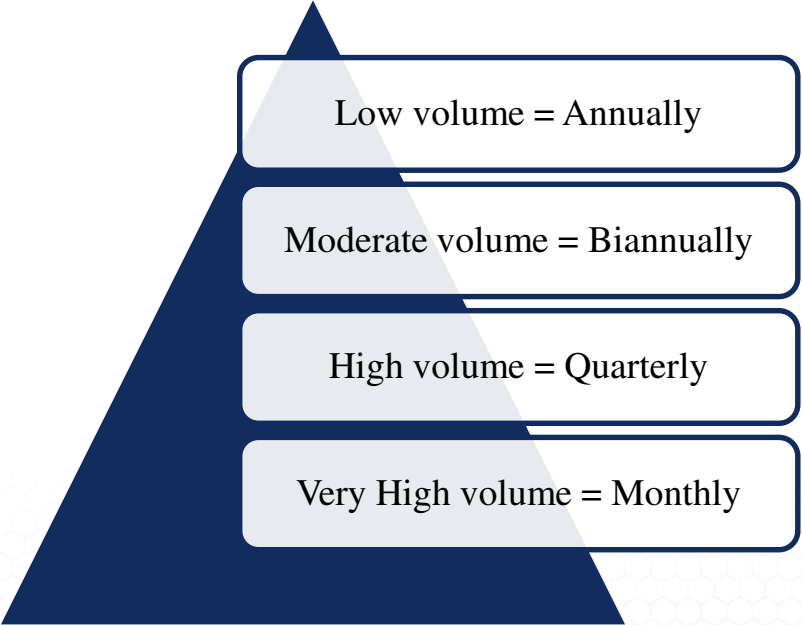
# Exam Release Cycle





# When to Conduct Health Checks

- » Need to determine how often to re-visit exam forms, considering the following:
- Candidates volumes, including target audience, sample size and representativeness,
  - domain and content relevancy and speed of changes/updates,
  - and exposure or other security concerns.



Low volume = Annually

Moderate volume = Biannually

High volume = Quarterly

Very High volume = Monthly

# Why Conduct Health Checks



- » Evaluate statistical data regarding form and item-level performance during operational administration
- » Continually provide evidence of the following:
  - Adherence to the defined purpose of the exam
  - Quality of psychometric and statistical attributes
  - Appropriateness of standard setting results
  - Exposure and security review
  - Evaluation of fairness
  - Alignment with policy and administrative goals (NCCA Standards 19, 20, 23)
- » Inform future decisions regarding exam, forms, and items

# Item & Form Analysis: Adding forward-looking elements



- » Consider Results Longitudinally
  - Item Level Drift
    - Item exposure
    - Changing Content
  - Form Performance Changes
    - Security Concerns

# Item & Form Analysis: Adding forward-looking elements



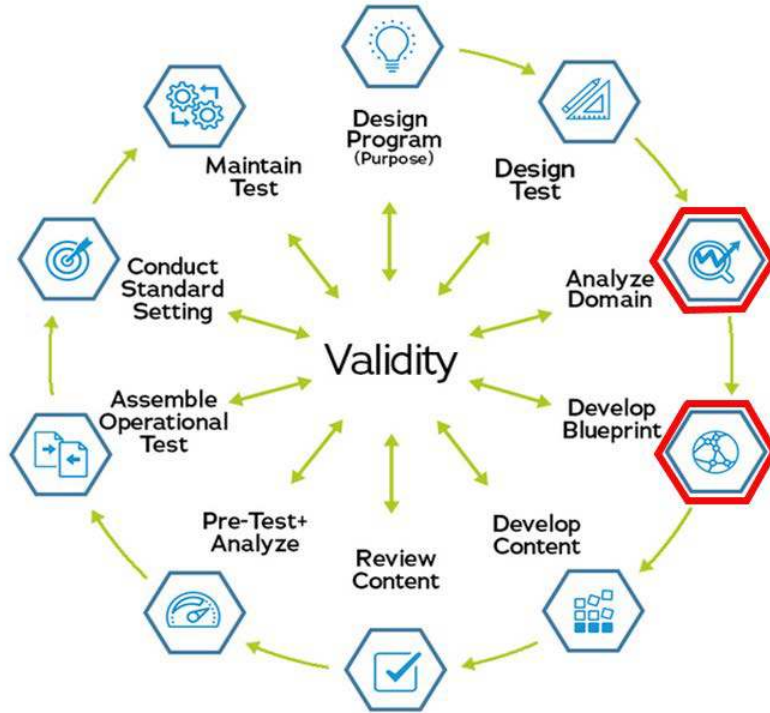
## » Add Detail:

- Regional/Test Center Analyses
  - Security
  - Local differences in relevance/training
- Section-level analysis
  - More Equitable/Actionable feedback
  - Low performing areas may benefit from innovation

## » Add Depth: Advanced Security Analyses

- Earlier detection of breach/pre-knowledge

# Monitoring Your Program: Job Analyses



# Monitoring Your Program: Job Analyses

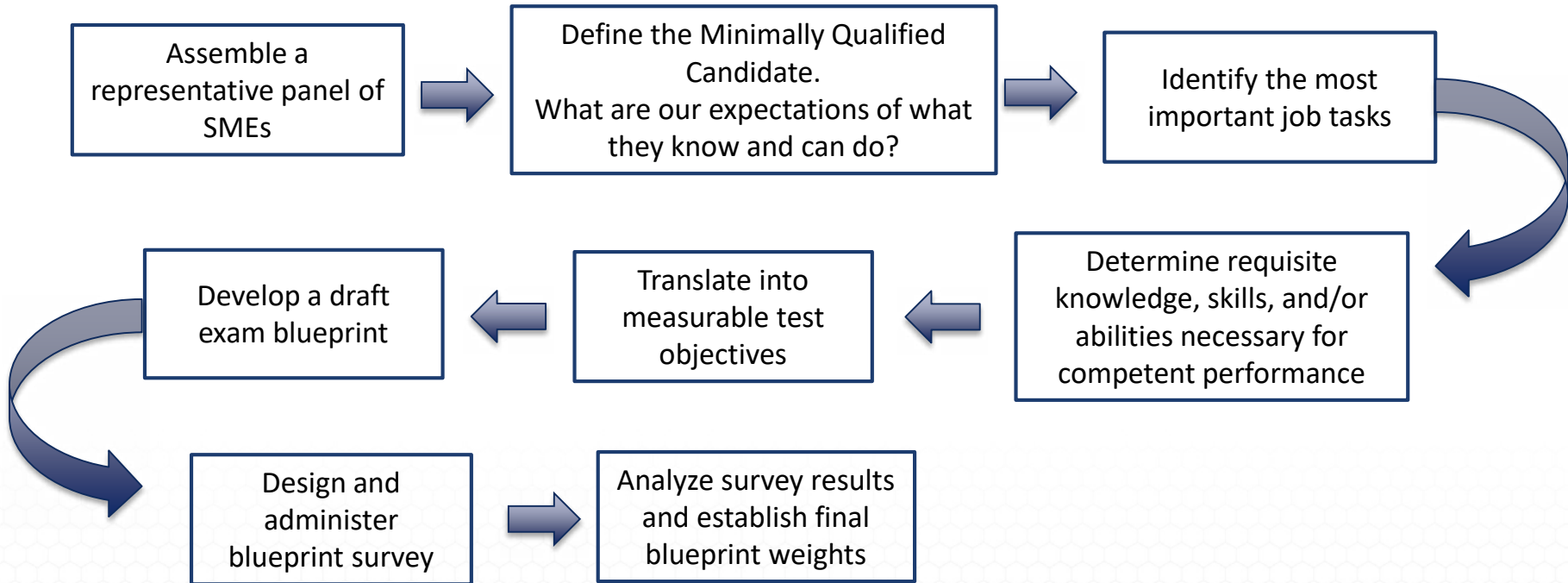


- » In credentialing, it is a systematic method used to identify the tasks, responsibilities, and corresponding knowledge, skills, and abilities (KSAs) necessary for successful performance in a job or domain of practice.
- » Often referred to as “Job Analysis,” “Job Task Analysis,” or “Practice Analysis”

# Why analyze the domain?

- » Results of the JTA form the basis for what is measured in exam (i.e., the test domain or construct)
  - Differs from a curriculum domain
- » Provides information to be translated into the test blueprint
  - Test objectives, targeted cognitive level, and content weighting
- » Provides content-related validity evidence in support of score interpretation and use
- » Industry best practices, standards, and legal considerations
  - NCCA Standard 14

# Steps in a Typical Job Task Inventory





# Job Analysis: Adding forward-looking elements



- » Build panels with representative SME characteristics (Standard 13)
  - Emphasize newly credentialed participation (SME ≠ “Rock Star”)
  - Consider areas of emerging practice
  - Inclusion of underrepresented groups (“aspirational” representation?)
  
- » Provide evidence-based rationale for the length of the recertification period (Standards 14, 22)
  - Add questions about “pace of change” to survey
    - Already asking SMEs to talk about the necessary KSAs for the job
    - Add additional question to determine how frequently those KSAs change in a meaningful way

# Job Analysis: Adding forward-looking elements



- » Identify ways to improve survey response (Standard 14)
  - Expand sampling frame
  - Incentives/alternate means?
    - Continuing education credit
    - Requirement of renewal
  - Shorten survey
    - Collapse KSAs into objectives/tasks before survey
    - Split survey?

# Monitoring Your Audience: Market Research Study



- » Jobs of Today vs. Jobs of Tomorrow
- » Value/Relevance of Credential
- » Utility of Credential Structure
- » Regional/National/International Differences

# Monitoring Your Industry: Watching Trends



- » Opportunities/Threats
- » Emerging Technologies

# Question The Future Framework



- » What don't we know?
- » To what trends might we pay closer attention?
- » How might we stay on top of new, emerging trends and issues?
- » Who might we learn from?
- » How might the things change faster than we expect?
- » What won't change?
- » What questions aren't we asking?
- » What is tomorrow's problem that needs to be solved today?
- » What is today's can't that needs to turn into a can?

Jack Ulrich

# Credentialing has a huge market share



- » 24% of all US employees hold a license or certification
- » Higher for some professions:
  - Healthcare: 77%
  - Legal: 66%
  - Education: 53%



## Percent of employees holding a certification or license, 2015-2017

# Downward trend?

- » 1.2% drop (2015-2017)
  - ~ 1.8M people
- » Negative trend consistent across most professions

	2015	2016	2017		Change
Total, 16 years and over	25.5	25.0	24.3		-1.2
Management, professional, and related occupations	37.6	37.0	36.0		-1.6
Management, business, and financial operations occupations	23.5	22.9	22.2		-1.3
Management occupations	23.3	22.5	21.9		-1.4
Business and financial operations occupations	23.8	24.0	22.9		-0.9
Professional and related occupations	47.7	47.1	45.9		-1.8
Computer and mathematical occupations	15.8	14.2	14.4		-1.4
Architecture and engineering occupations	26.6	26.4	25.5		-1.1
Life, physical, and social science occupations	27.2	25.4	26.2		-1.0
Community and social services occupations	39.7	38.5	37.0		-2.7
Legal occupations	68.1	66.8	65.5		-2.6
Education, training, and library occupations	55.5	55.5	52.7		-2.8
Arts, design, entertainment, sports, and media occupations	10.8	11.6	10.6		-0.2
Healthcare practitioners and technical occupations	76.9	77.0	77.0		0.1
Service occupations	22.8	21.9	21.7		-1.1
Healthcare support occupations	51.8	50.9	48.9		-2.9
Protective service occupations	40.0	37.6	37.5		-2.5
Food preparation and serving related occupations	8.2	7.7	7.6		-0.6
Building and grounds cleaning and maintenance occupations	7.9	7.6	7.8		-0.1
Personal care and service occupations	31.9	31.1	30.7		-1.2
Sales and office occupations	13.1	12.6	12.0		-1.1
Sales and related occupations	16.2	16.1	15.0		-1.2
Office and administrative support occupations	10.3	9.6	9.4		-0.9
Natural resources, construction, and maintenance occupations	21.3	20.2	19.3		-2.0
Farming, fishing, and forestry occupations	8.0	9.1	8.4		0.4
Construction and extraction occupations	20.4	19.7	18.7		-1.7
Installation, maintenance, and repair occupations	25.4	23.6	22.9		-2.5
Production, transportation, and material moving occupations	16.6	16.5	15.3		-1.3
Production occupations	10.9	10.2	10.2		-0.7
Transportation and material moving occupations	22.0	22.2	19.9		-2.1

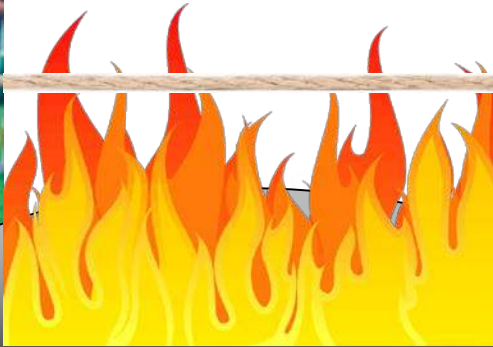
Source: BLS (<https://www.bls.gov/cps/certifications-and-licenses.htm>)

# There exists an ongoing tension...

- Protect public health, safety, welfare
- Ensure competence



- Avoid over-regulation
- Remove barriers to employment





# Individual vs Broad Challenges



## » Legal Challenges to Credentialing Programs

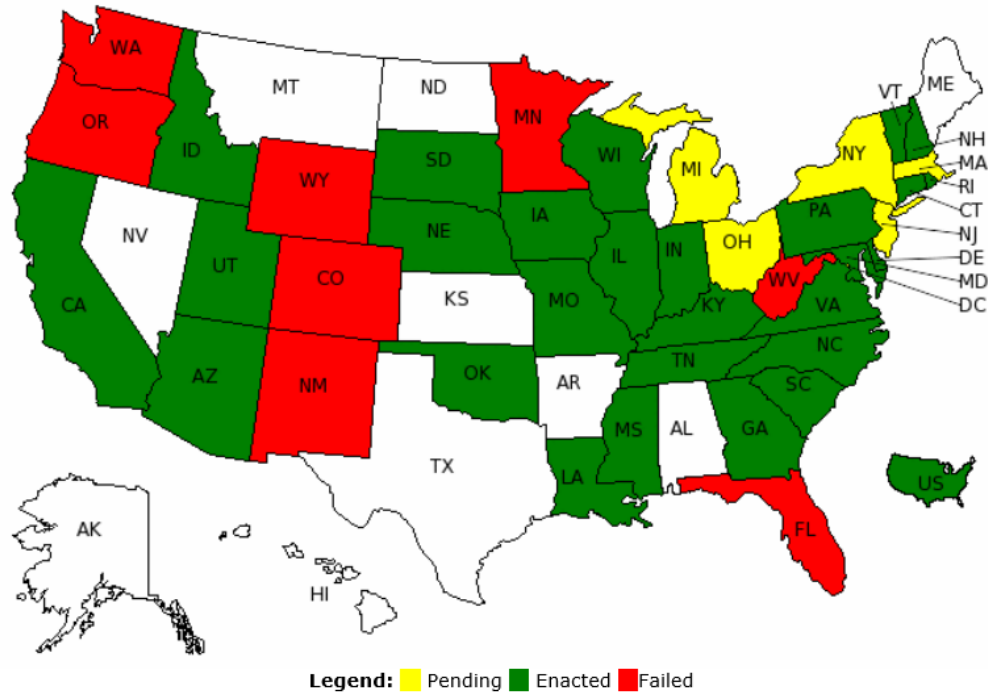
- Testing Accommodation Policies
- Test Security Policies
- Test Construction Procedures
- Protecting the Public

## » Legislative Challenges to the Field of Credentialing

- Deregulation
- Active Supervision
- Interstate Compacts
- Sunsetting
- Least Restrictive Regulation
- Maintenance of Certification

*Phillips (2017, p. 229)*

# Example: Legislation related to Licensure of Architects



# Legal Challenges

- » From Candidate Side
- » From Public Side

# Emerging technologies

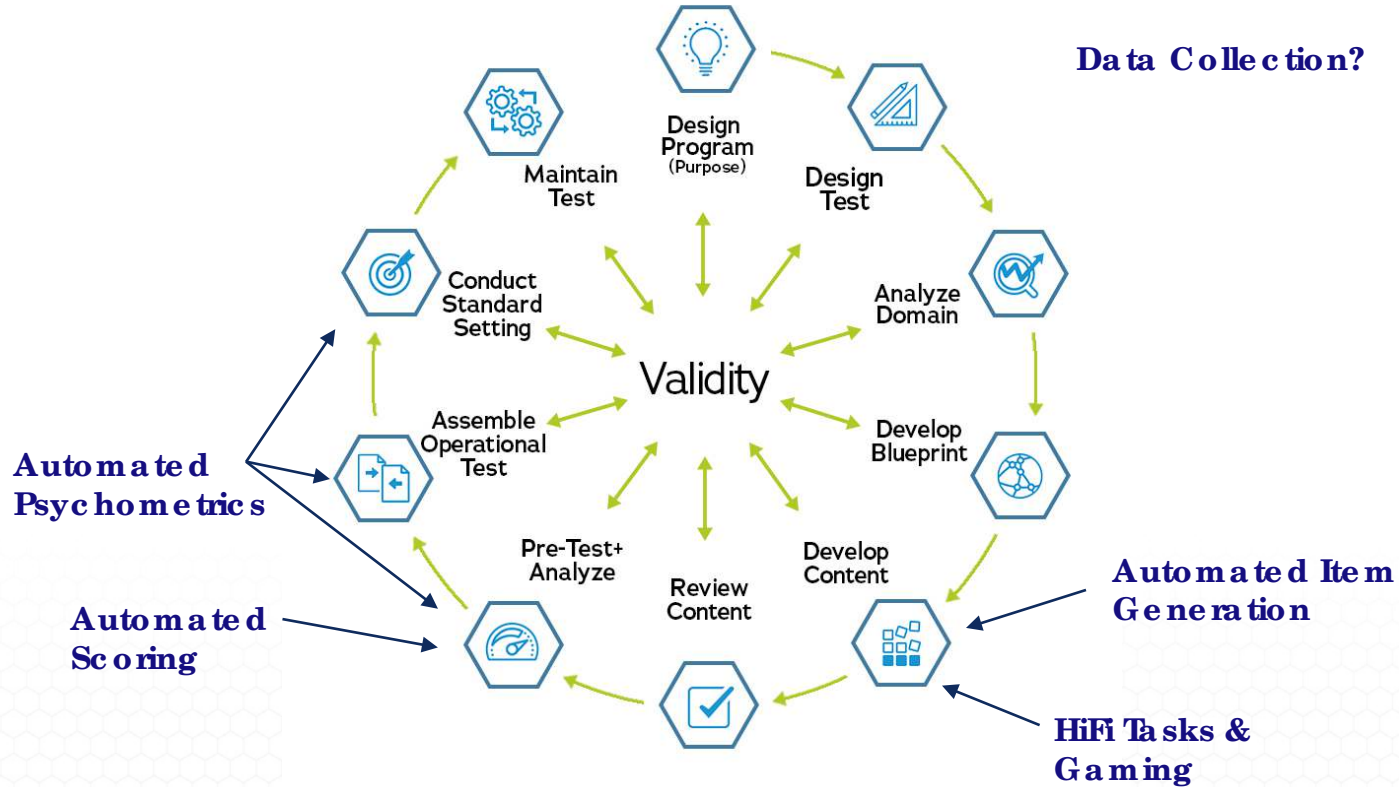
- » Cognitive Computing (AI, ML, DL)
- » Wearables
- » Brain Imaging (fNIRS, EEG, etc.)
- » xReality (VR, AR, MR)
- » Big Data Analytics



## Artificial Intelligence

A screenshot of a news article from The Weather Company website. The article title is "IBM Plans to Acquire The Weather Company's Product and Technology". The page includes a navigation bar with "Products", "Resources", and "Video" links, and a sub-navigation bar with "Industry Solutions", "About Us", and "News &amp; Events". There are social media share buttons for Twitter and LinkedIn. A small inset image on the right shows a person using a sensor, with text describing it as a "Lidar\* for 360° object detection".

# Emerging technologies in testing



# Certification of People and/or Algorithms



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Questions, discussion, and...

**THANK YOU!**