Promising Practices for Strengthening the Regional STEM Workforce Development Ecosystem

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Speakers

Dick Celeste

- Committee Co-chair
- Former President, Colorado College
- Former Governor of Ohio

Susan Lavrakas

- Committee member
- Workforce consultant, the Aerospace Industries Association

Outline

- The Approach of the Report
- Key Findings
- Selected Recommendations

The National Academies have conducted dozens of studies on STEM workforce

Universities are essential to the creation and transfer of new knowledge that drives innovation.

The National Academies have conducted dozens of studies on STEM workforce

However, our understanding of how universities receive, interpret, and respond to industry signaling demands for STEM-trained workers is far from complete.

Committee decided instead to look at

Regional

STEM Workforce Development

Ecosystems

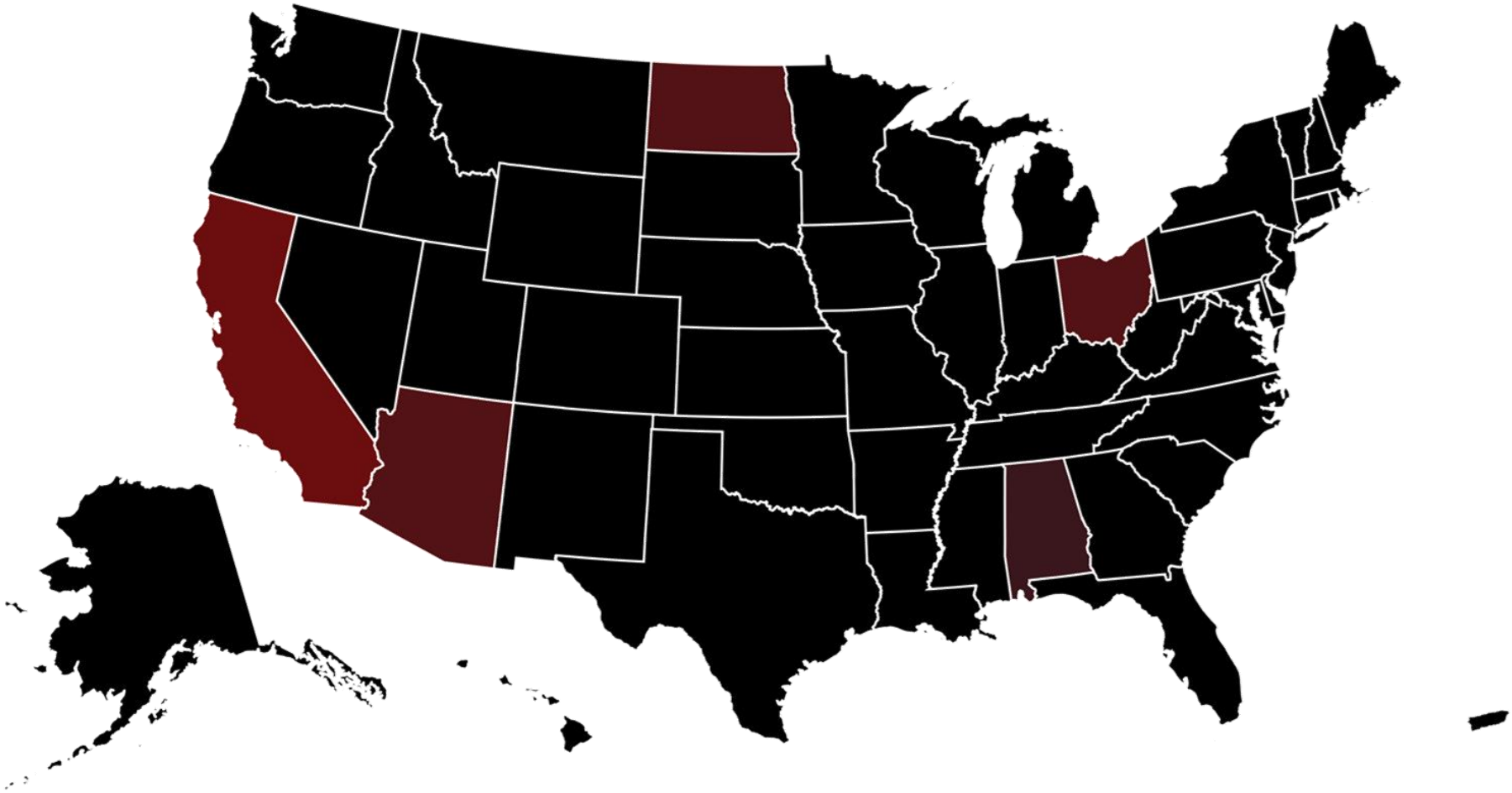
Ecosystems

highlight many of the elements of effective, regionally-focused workforce development partnerships

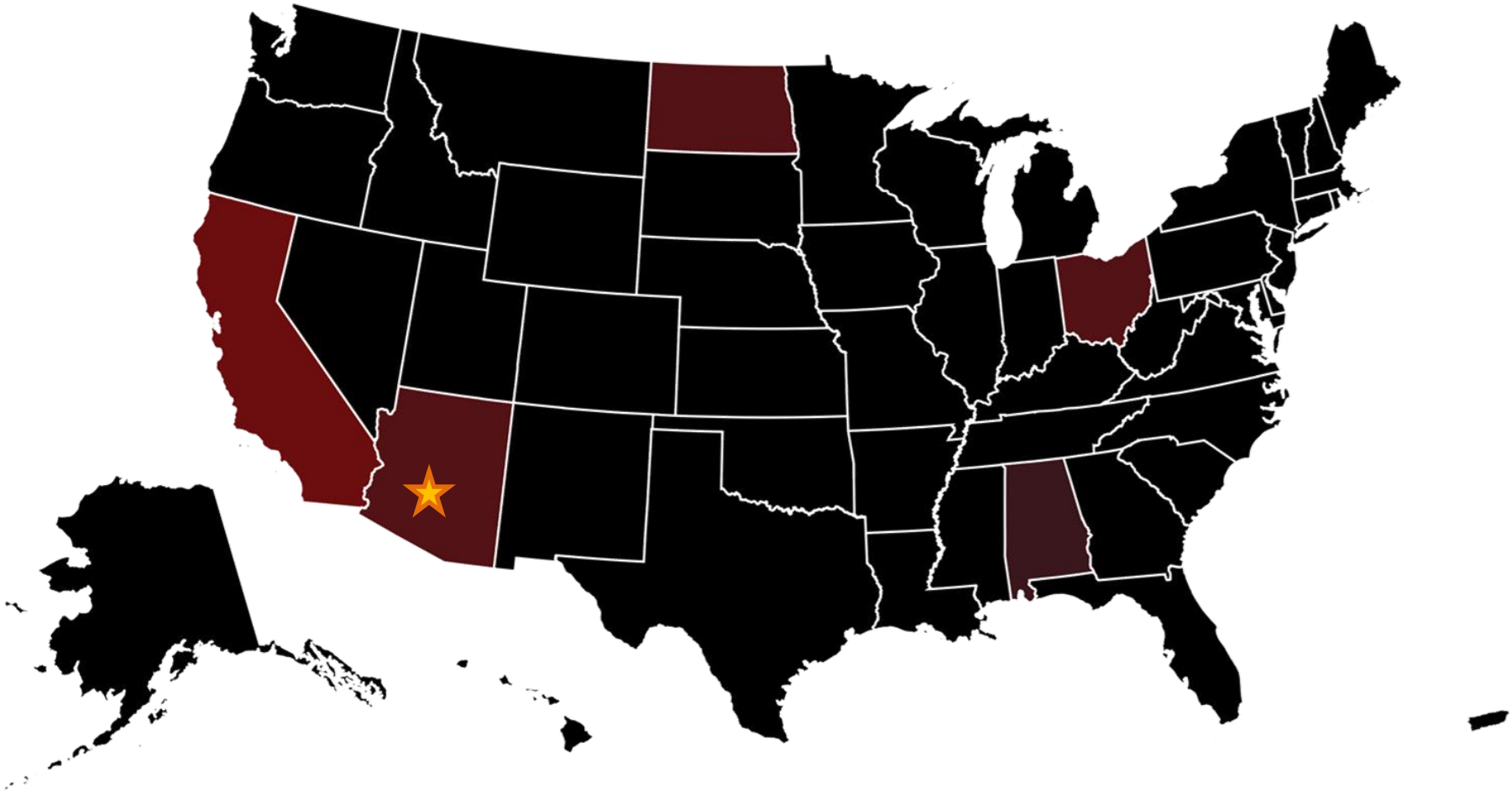
include colleges and universities, local employers, and intermediary entities whose objective is to facilitate regional economic development

involves partners who are interconnected with others in symbiotic relationships that adapt and evolve as both inputs and desired outcomes change

The committee hosted five workshops to study these types ecosystems around the country



Phoenix, AZ



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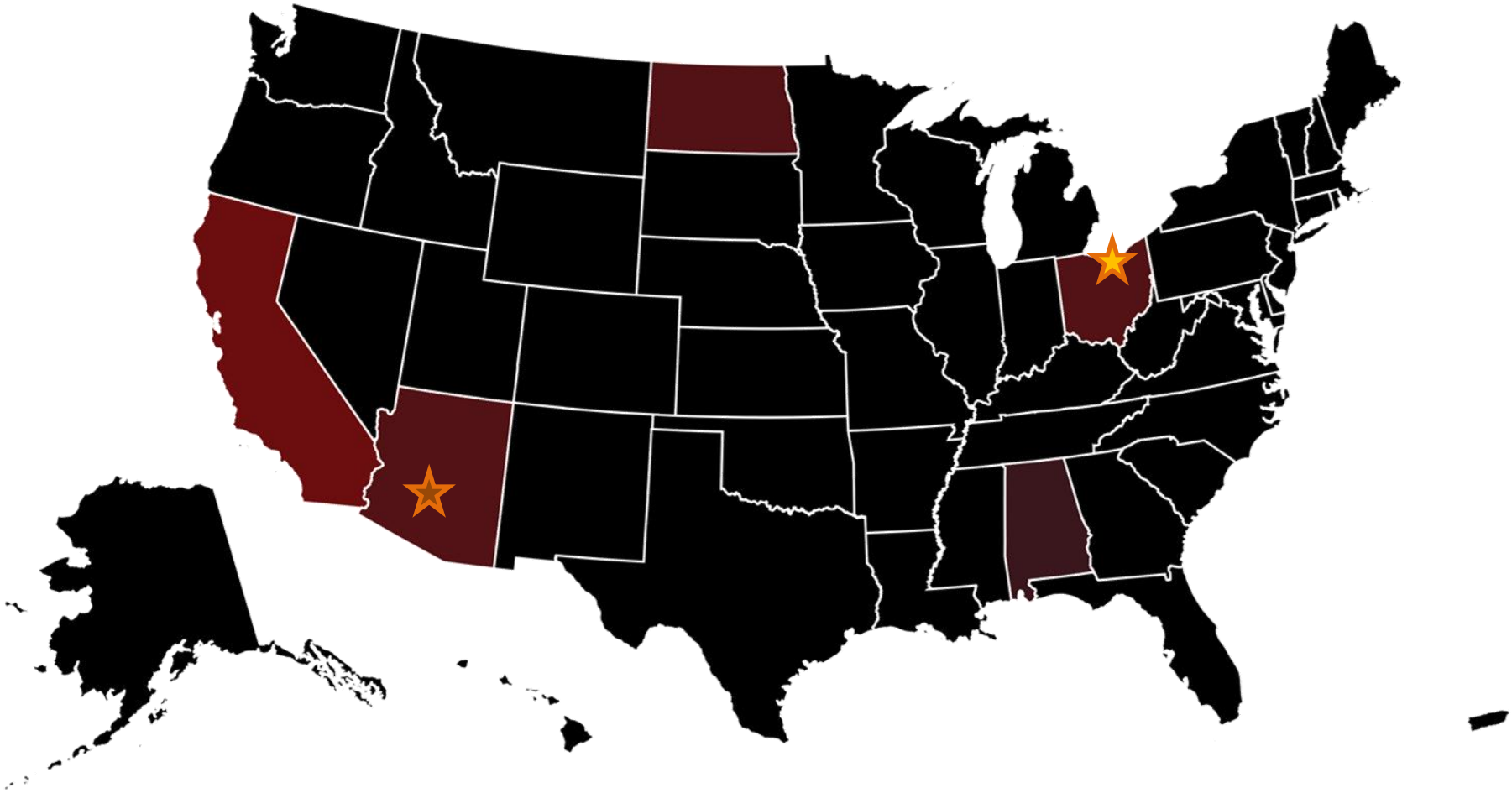
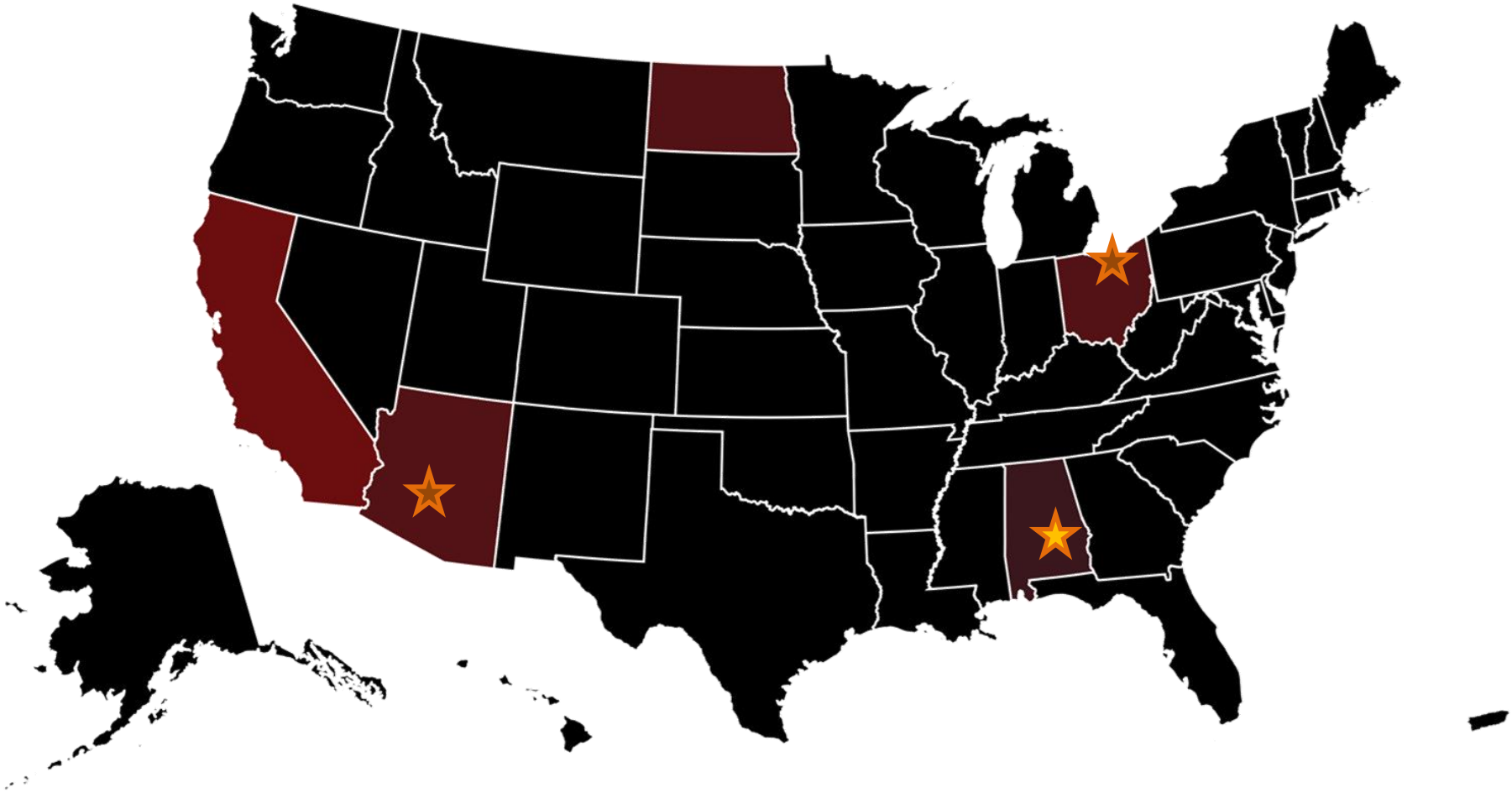
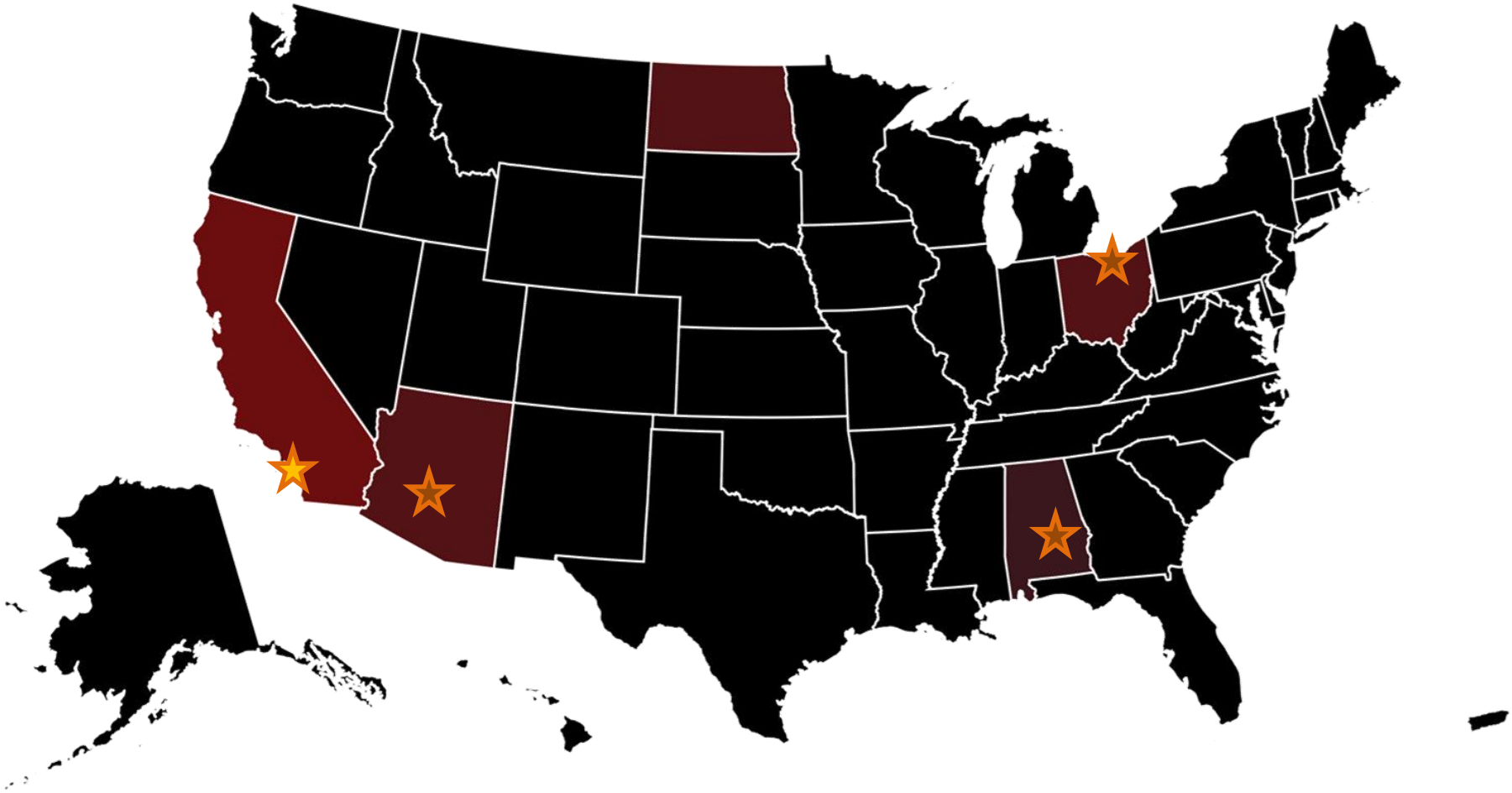


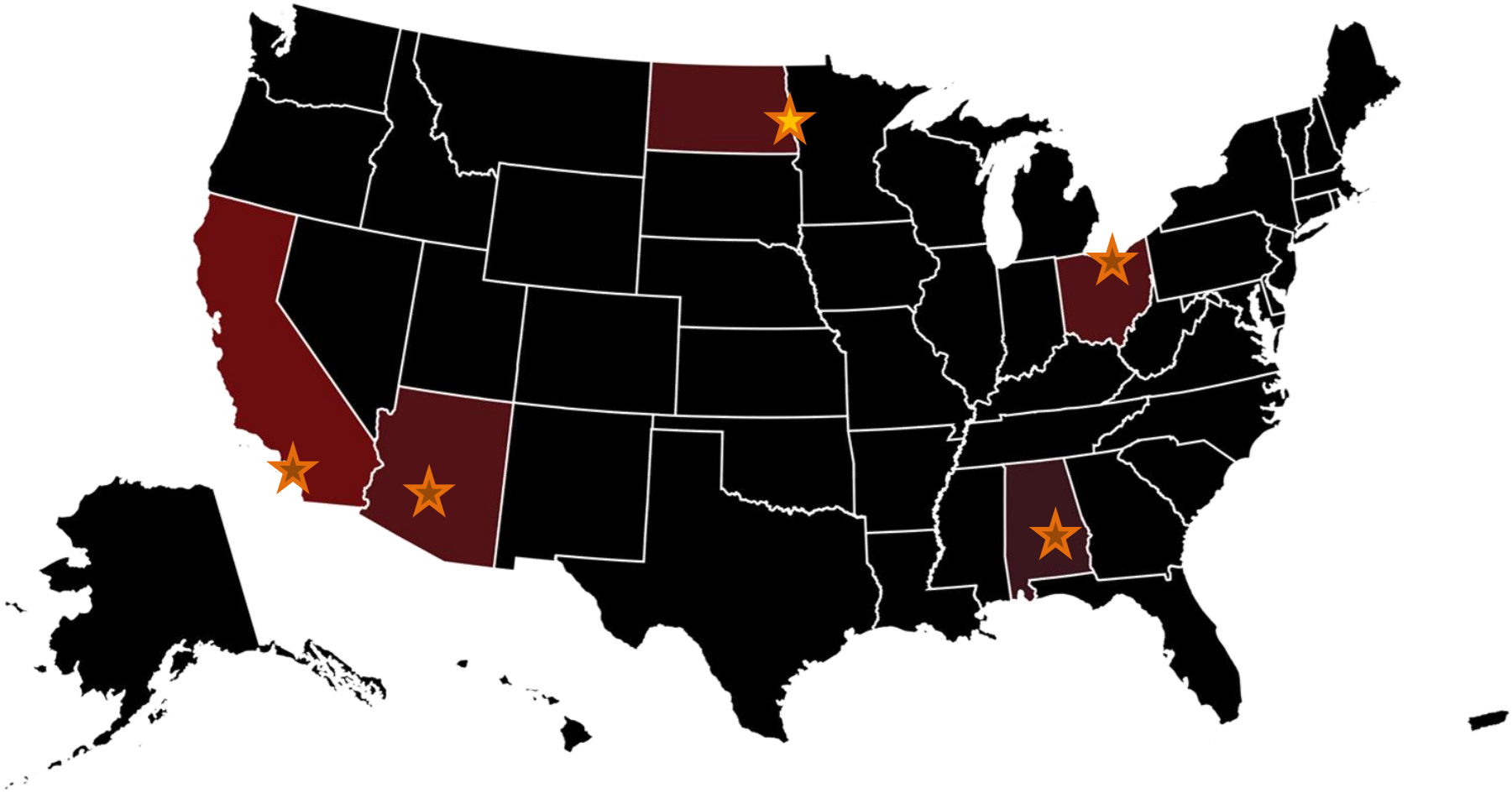
Montgomery, AL



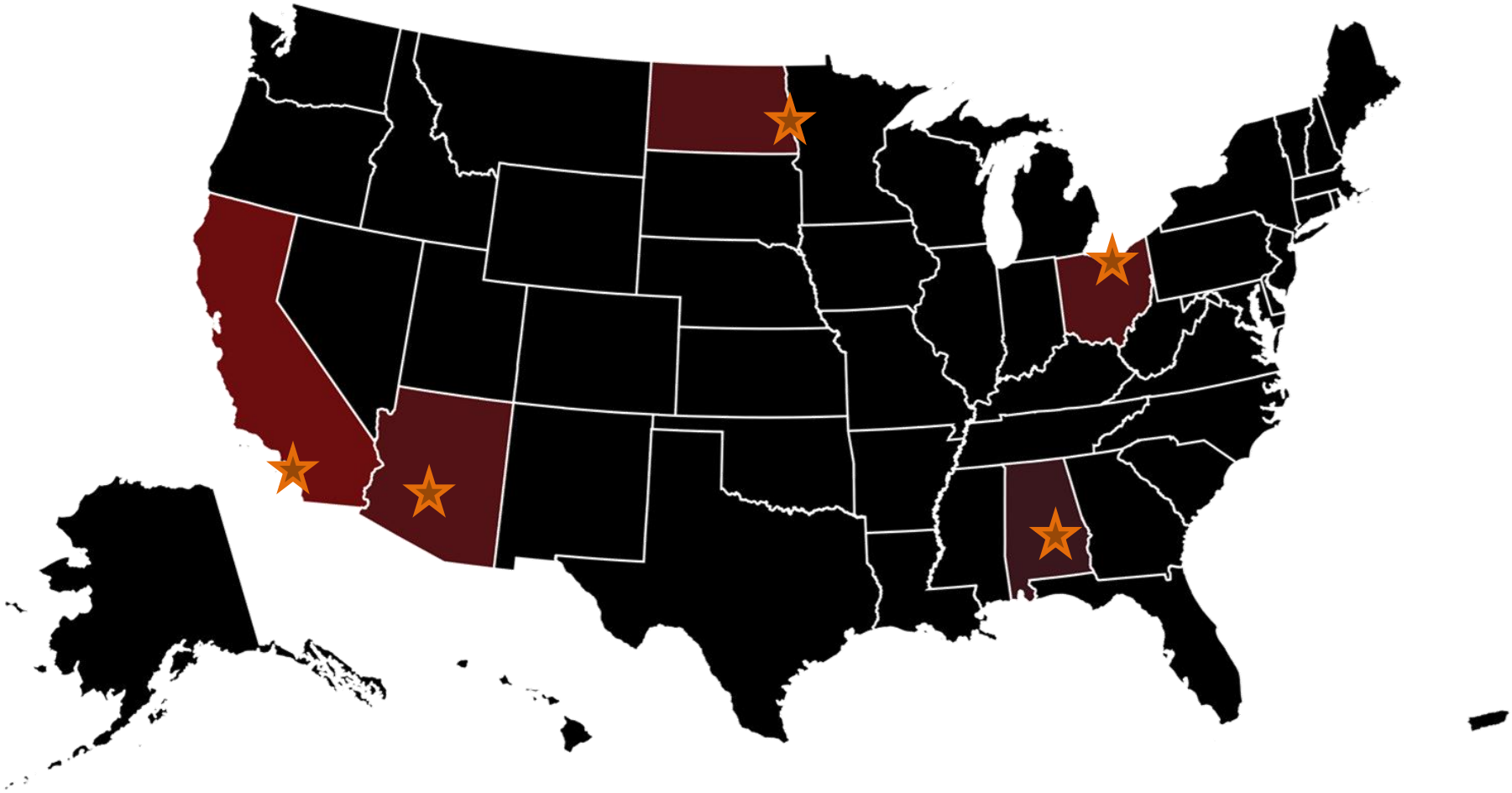
Los Angeles, CA



Fargo, ND



Each workshop convened a broad selection of individuals from that region's STEM Workforce Development Ecosystem



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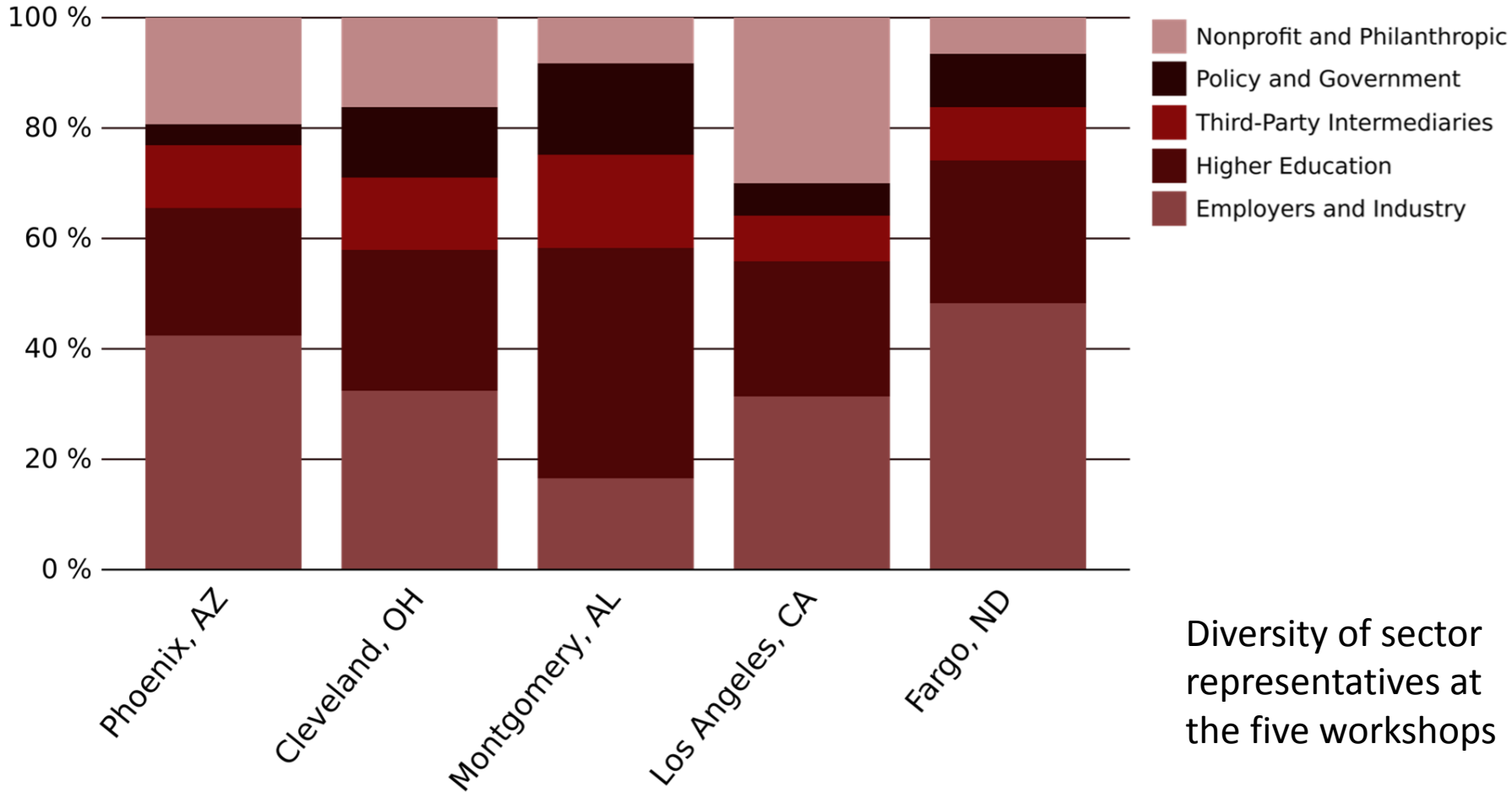

Diversity of sector representatives at the five workshops

Although each workshop reflected the different specific needs and industries of the regions in which they were held, the committee found many common **promising practices**

The STEM workforce is not monolithic

The heterogeneity of the STEM workforce and lack of consensus on how to define it has spurred debates about the level of current and future demand for STEM workers.

Actuaries; Aerospace engineering and operations technicians; Agricultural and food science technicians; Anesthesiologists; Atmospheric and space scientists; Biological scientists; Biomedical engineers; Broadcast technicians; Budget analysts; Cement masons and concrete finishers; Chemical technicians; Chiropractors; Civil engineering technicians; Computer and information systems managers; Computer hardware engineers; Computer programmers Instructional coordinators; Computer user support specialists; Computer, automated teller, and office machine repairers; Database administrators; Diagnostic medical sonographers; Electrical and electronics drafters; Electrical and electronics engineering technicians; Electromechanical technicians; Electronics engineers; Environmental engineering technicians; Environmental engineers; Environmental science and protection technicians; Environmental scientists; Extruding and drawing machine operators; Financial managers; Financial specialists; Food scientists and technologists Life scientists; Forensic science technicians; Foresters; Foundry mold and core makers; Heating, air conditioning, and refrigeration mechanics and installers; Hydrologists; Industrial engineering technicians; Industrial engineers; Installers and repairers of electronic home entertainment equipment; Lathe and turning machine tool setters; Machinists; Materials engineers; Materials scientists; Mechanical drafters; Mechanical engineering technicians; Medical equipment repairers; Mobile heavy equipment mechanics; Nuclear engineers; Occupational therapists; Operations research analysts; Operators, credit authorizers; Optometrists; Oral and maxillofacial surgeons; Other computer occupations; Other health care practitioners and technical workers; Other physicians and surgeons; Pediatricians; Power plant operators; Precision instrument repairers; Prepress technicians and workers; Psychiatrists; Purchasing managers; Sales engineers; Secondary school career/technical education teachers; Software and applications developers; Soil and plant scientists; Statistical assistants; Statisticians; Structural iron and steel workers; Surgeons; Surveyors; Tool and die makers; Urban and regional planners; Veterinary assistants; Veterinary technologists and technicians; Web developers; Welders

The STEM workforce is not monolithic

STEM Narrow

Careers in the Sciences (biology, chemistry, physics); Technology (including computer sciences); Engineering; and Mathematics (including analytics)

Typically requiring at least a bachelor's degree

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STEM Broad

Occupations that exhibit a high degree of STEM knowledge, often did not require more than an industry certification or a 2-year associate's degree

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While there is a critical need for STEM graduates who will work as professional research and development scientists and engineers (using so-called **STEM narrow skills**), there is a growing need for individuals who have a facility with STEM concepts, but not necessarily a bachelor's degree (so-called **STEM broad skills**).

Three overarching findings emerged

Employers are increasingly focused on the skills and abilities new hires possess, rather than the specific field in which an individual has obtained a degree or credential.

There is also a growing need for students with broad skills outside of their core STEM discipline, including skills that are perhaps best developed through an education that includes humanities courses and experiences in the arts along with STEM courses. These skills include problem solving, critical thinking, teamwork and collaboration, communication, and creativity.

Three overarching findings emerged

Significant numbers of university students are graduating with STEM degrees, but many lack the right combination of technical and employability skills needed to thrive in the workplace. This situation is particularly acute with minority students and female students, who remain significantly underrepresented in the STEM workforce.

Three overarching findings emerged

A robust and effective STEM workforce development ecosystem requires proactive steps on behalf of **university leaders, local employers, and intermediary organizations** to build and sustain alliances that benefit students and regional economic development.

Recommendations

concrete steps for various stakeholders to initiate and expand university-employer partnerships

Institutions of Higher Education

while often drivers of regional economic development, are linked to the prosperity of the surrounding community

- can increase the supply of educated and skilled local college graduates who can meet the workforce needs of the region.
- can enhance regional economic development via their roles as an employer, purchaser, real estate developer, workforce developer, and through technology development and its commercialization.
- **must actively engage and partner with other stake-holders concerned with regional economic development.**

College and University Presidents

should **designate a high-level administrator or faculty member to serve as the initial point of contact** with local businesses and give this individual the power and authority to enter into formal relationships with them.

College and University Provosts and Deans

should **encourage the creation of STEM advisory board on campus**—housed in various academic departments and coordinated by the individual with responsibility for serving as the point of contact for business—for the purpose of engaging the local employer community in discussions about workforce needs, collaboration, engagement, and mutual support.

Faculty

should recognize that the workplace is often characterized by challenging, multilayered problems that require teamwork and collaboration and good interpersonal relationships to identify possible solutions—and **provide classroom and work-based experiences to all students** that enable them to develop these problem-solving, critical thinking, and teamwork skills.

Employers

the returns—in terms of stronger economic development and better jobs—will far exceed any modest investments

- cannot not stand aside and simply bemoan the fact that some students are leaving college with a degree or certificate but without the knowledge, competencies and skills required to succeed at work
- need to be active partners with colleges and universities to ensure that higher education provides students the experiences they need to graduate and begin their careers with work-ready skills and competencies

Employers

should **designate at least one individual to serve as a liaison to local universities**; that person should maintain a high profile on campuses—regularly engaging with deans, department heads, and faculty to identify specific strategies for formal alliances.

Employers

should **make the development of work-based learning opportunities for students and faculty a priority**—including paid internships, apprenticeships, and other experiences that provide hands-on, experiential learning at the worksite.

Employers

should **encourage their employees to serve as mentors** to local college and university students, especially to underrepresented minority students and female students.

Governors

should work with universities, employers and third-party intermediaries such as state workforce commissions and chambers of commerce to **organize and facilitate a rigorous data analysis** effort to understand the current and future workforce needs in the state and across its regions.

Governors

should **pursue strategies to incentivize partnerships, collaboration, internships, and other activities** that bring students and faculty into regular and sustained contact with local employers.

Third-Party Intermediaries

(e.g., chambers of commerce, economic development organizations, and industry consortia)

should **facilitate the creation of effective workforce development partnerships** among local employers and universities by bridging some of the cultural and communication barriers that can present obstacles to partnerships, helping employers and universities understand a region's competitive advantages by addressing data needs, and bringing promising partnership activities to scale.

Takeaways

- The rapid pace of technological and economic change requires more **timely and continuous signaling of STEM workforce demand** from employers to education and training institutions
- Though regional circumstances differ somewhat, across the country **many challenges and efforts are similar**
- Any effort to do right by the STEM workforce requires the recognition of contributions from **both STEM Narrow and STEM Broad** positions
- Training for both STEM Narrow and STEM Broad positions benefits from **hands-on, experiential learning**
- Success for students requires **participation of all stakeholders** in a regional workforce development ecosystem
- Leaders in all sectors must be proactive in **developing collaboration**, encouraging **institutional adaptation**, and **adopting innovative solutions**
- Ongoing communication, continuous improvement and sustained effort are **required**

Committee on Improving Higher Education's Responsiveness to STEM Workforce Needs: Identifying Analytical Tools and Regional Best Practices

Richard Celeste (Co-Chair), Colorado College; **Teresa Sullivan** (Co-Chair), University of Virginia

Rita Colwell, University of Maryland; **Brian Fitzgerald**, Business-Higher Education Forum; **Elsa Garmire**, Dartmouth College; **William Kirwan**, University of Maryland; **Susan Lavrakas**, Aerospace Industries Association; **Mary Wright**, Jobs for the Future

Thomas Rudin, Director, Board on Higher Education and Workforce (BHEW); **Elizabeth O'Hare**, Study Director, BHEW; **Nina Boston**, Research Associate, BHEW; and **Irene Ngun**, Research Associate, BHEW.

For more information… contact the Board on Higher Education and Workforce (BHEW) at 202.334. 2700 or bhew@nas.edu. Copies of the report are available from the National Academies Press; call (800) 624-6242 or (202) 334-3313 or visit the NAP website at www.nap.edu.

Questions?