

# North Dakota Higher Education STEM Asset Map Project

Presented by Project Management Consultants
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ND EPSCoR Annual Conference
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**Table of Contents** 

Introductions

Project Overview and Timeline

**Institutional Profiles** 

Case Use

Next Steps

### Introductions

Dr. Kathy Froelich North Dakota In Region Consultant Dr. Loren Intolubbe-Chmil Project Management Consultant

#### <u>Dashboard Development Team</u>

Diana Jimenez



**Angel Nunez** 



Daniel Intolubbe-Chmil



Collective expertise in qualitative & quantitative economic methods, data visualization & geospatial analysis, socio-economic, education & public policy research, and digital technology strategy & geospatial analysis



## **Project Overview**

All North Dakota higher education institutions and Tribal colleges are invited to participate in this project. The objective of this asset mapping project is to produce a clear, data-driven understanding of the research and education assets within the higher education sector across the state. The information gathered will be used to:

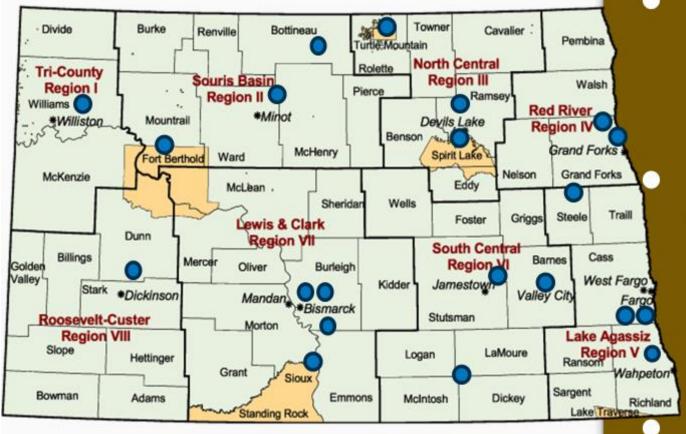
- Identify existing strengths in research capabilities, research administration, and infrastructure.
- Identify educational programs, areas of expertise, and interdisciplinary initiatives.
- Identify workforce development programs and industry partnerships aimed at skill-building and employment readiness.
- Assist in ND EPSCoR efforts for creating strategic partnerships.

#### **Goal**

Development of a robust, dynamic ND Higher Education STEM focused platform that amplifies assets and promotes capacity enhancement across ND institutions and regions







North Dakota Higher Education Landscape

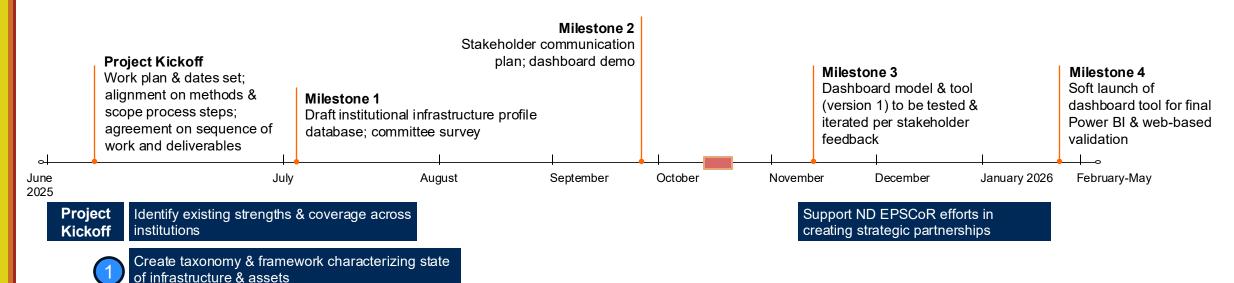
North Dakota Department of Commerce

Ecosystems

North Dakota EPSCoR
Science & Technology Plan

CONTEXT

## **Project Timeline**





Design & deploy institutional stakeholder survey for program feedback (design, validate and activate communication plan)



Develop visualization tool & dashboard depicting asset & infrastructure analysis

V1 (concept): Excel-based mock dashboard to validate functionality, data & input dimensioning, and Power BI / web integration plan

V2 (demo): Excel-based dashboard with integrated secondary & primary research inputs – final design & functionality testing V3 (MVP): Power BI based dashboard with web integration; final design & feature testing for final development of packaged tool V4 (Final): Complete web-based tool with comprehensive data & analysis inputs, reference documentation & stakeholder collaboration workflows



## **Asset Mapping Framework & Process**

**Layer 1 | Asset Segments** 

**Layer 2 | Asset Categories** 

**Layer 3 | Composite Metrics & Indices** 

**Asset Mapping Taxonomy & Framework** 

**Cultural Engagement Programs** 

**Business & Workforce Development** 

**Technology & Digital Infrastructure** 

**Research & Development** 

**Scope of Accredited Programs** 

**Grants & Funding** 

**Categorical Metrics** 

Tribal & Indigenous Engagement

**Rural Community Coverage** 

**Career Resources** 

**Industry Linkages** 

**Training Programs** 

**Diversity of R&D Initiatives** 

**Research Capacity** 

Scale & Scope of Grant Activity

**Certificate Programs** 

**STEM Program Coverage** 

**Funding & Research Capacity** 

Federal & Private Support

Each of the asset categories will be assessed across target institutions, prioritization EPSCoR specified metrics

Criteria & Traits Assessed Across 21 Identified Institutions

PUI, Rural & Tribal Engagement

- ✓ Directly designed for underserved communities
- ✓ Inclusive recruiting or indirect benefits
- ✓ No mention

Collaboration & Workforce Alignment

- ✓ 3+ institutions + industry/tribal/government + internship track
- ✓ Single partner or no clear industry tie-in
- ✓ Internal only

**Education & Credential Pathways** 

- √ Transferable credit or formal academic link
- ✓ Enrichment/course-based only
- ✓ No pathway info

Criteria are in initial state of development and will change and expand with additional research – illustrative, not exhaustive

Strategic Fit & Recency

- √ General STEM relevance & active in past 3 years
- √ Weak alignment or status unclear
- ✓ Inactive

Funding & Research Capacity

- √ Federally funded and has a research center or shared lab
- ✓ Internal funding only; partner lab and/or online STEM platform (digital lab)
- √ No funding or infrastructure



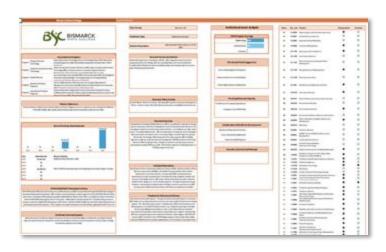
## Dashboard Overview & Timeline

Features, Data Integration & UX Validation Data Collection & DB Development **Excel-Based Dashboard Development** Dashboard UX & Analysis Validation Power BI Integration Mid-September Dashboard Iteration Committee feedback Institutional on Dashboard Profile DB **Asset Analysis** Data organization & & Metrics / Stakeholder feedback staging Index Mapping on Dashboard Dashboard 1.5 Review Power BI Web Tool Development Power BI Dashboard Development February | Dashboard 3.0 Nov. / Dec. | Dashboard 2.0 Committee feedback on Dashboard Stakeholder feedback on Dashboard

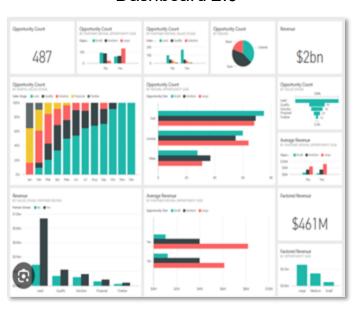
**Current Status:** Finalizing Dashboard

## Dashboard Development Roadmap

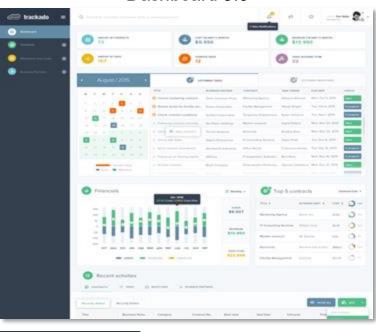
#### Dashboard 1.0



#### Dashboard 2.0



#### Dashboard 3.0



#### **KEY FEATURES**

- 1. State-wide exploratory institutional database
- 2. Institution program comparison & resource mapping
- 3. Collaborative opportunity identification & strategic guidance
- 4. Living, interactive data inputs for institutional stakeholder configuration & updates



## Padlet Exercise | Collaborative Opportunity & Persona-Based Mapping

Scan code to submit feedback





## Institutional Profiles | Bismarck State College

Live Dashboard demo still in development, will be distributed to institutional stakeholders & committee members upon completion



City / County	Bismarck, ND						
Institution Type	Polytechnic Institution						
Student Population	~4,200 students (Fall 2024)						

STEM Program Coverage				
STEM Fields	60%			
Undergraduate	60%			
Graduate	3			

#### **Certificate/Training Programs**

Medical Assistant Certificate, Dialysis Technician Certificate, Artificial Intelligence & Machine Learning Certificate, Cybersecurity Certificates, Lineworker Certificate, Welding Certificate, Commercial Driver's License (CDL) Training, Certified Nursing Assistant (CNA)

		Key Academic Programs
Program 1	Energy & Process Technology	Power Generation Technology, Process Technology, Power Plant Operations, Energy Management (BAS), Renewable Energy, Industrial Operations, Water Treatment
Program 2	Cybersecurity & Information Technology	Cybersecurity and Computer Networks (AAS), Cybersecurity and Information Technology (BAS), Computer Science, Computer Support, Network Administration, Information Security, Intelligent Machine Learning
Program 3		Associate Degree Nursing (ADN/RN), Practical Nursing (LPN), Dental Hygiene, Dental Assisting, Radiologic Technology, Surgical Technology, Medical Laboratory Technology, Pharmacy Technician
Program 4	Business & Finance Programs	Finance (BAS), Business Administration, Accounting, Organizational Management and Leadership (BAS), Integrated Marketing & Communication (BAS), Strategic Communication, Entrepreneurship
Program 5	Liberal Arts & Transfer Programs	General Liberal Arts, Engineering Transfer, Education Foundations (Early Childhood, Elementary, Secondary), Integrated Behavioral Sciences, Sports and Exercise Science (BAS), Behavioral Health (BAS)
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#### **Mission Statement**

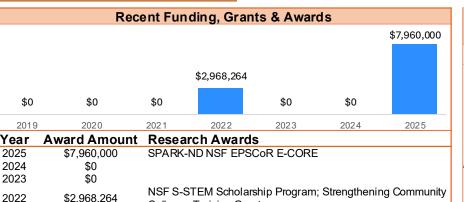
As North Dakota's Polytechnic Institution, Bismarck State College focuses on student success through the delivery of affordable, flexible, high-quality, experiential learning enhanced by publicprivate partnerships.

#### **Research Centers & Institutes**

National Energy Center of Excellence (NECE): BSC's flagship center focused on energy education and training, BSC has specialized labs such as the Lineworker Training Field in Mandan (for electrical utility training) and simulation labs for process plant and power grid operations

#### **Research Office Contact**

Annette Martel – Director of Grants. She leads BSC's grants and sponsored programs efforts. Contact: phone 701-224-2410, email annette.martel@bismarckstate.edu



Colleges Training Grant

### EPSCoR/NSF/NIH Participation History EPSCoR (ND EPSCoR): North D

NSF EPSCoR (ND EPSCoR): North Dakota is an EPSCoR state, and BSC has benefitted through ND EPSCoR's funding for primarily und ergraduate in stitutions. BSC students and faculty have received support from the ND EPS CoR State Office, which aims to broaden STEM capacity statewide, NASA EPS CoR / Space Grant: BSC is an affiliate member of the North Dakota NASA EPSCoR and Space Grant Consortium, A BSC physics faculty member (Dr. Tony Musumba) serves as campus contact for NASA EPS CoR programs, NSF Grants: Outside of EPS CoR. BSC has directly received NSF grants (as noted above, via the ATE pro gram).

#### Research Expertise

- 1. Energy Industry Training & Applied Research: BSC is recognized for expertise in energy systems operations,
- 2. Workforce Development and Technical Education Research: An emerging strength is in technical education methods essentially researching "what works" in training skilled workers.
- Cybersecurity and Information Technology: With the growth of its cyber program, BSC is building expertise in cybersecurity education and training labs.
- 4. STEM Education & Community Outreach: BSC faculty also have strengths in outreach and education research, particularly in making STEM accessible. This includes expertise in delivering hands-on STEM learning in rural areas,

#### **Industry Partnerships**

Basin Electric Power Cooperative & Montana-Dakota Utilities, ND Association of Rural Electric Cooperatives (NDAREC), Great River Energy and Other Power Plants, Harvestone Low Carbon Partners: As described, BSC and Harvestone (a biofuels/processing company) have a formal partnership to pipeline students into Process Technology careers, BSC works with local hospitals and clinics (Sanford Health, CHI St. Alexius, etc.) for its health programs. Through the Dakota Nursing Program, rural hospitals in Ashley, Hazen, Hettinger, Garrison and others host BSC nursing cohorts. Bobcat/Doosan, Infosys, ND Cybersecurity Industry Coalition



\$0

\$0

2021

2020

2019

## STEM Program Coverage | Bismarck State College

**215 STEM fields** assessed across undergraduate & graduate programs for each institution

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40	40.0500	Chemistry.		0		
40	40.0600	Geological and Earth Sciences/Geosciences.	0	0		
40	40.0800	Physics.		0		
40	40.1000	Materials Sciences.	0	0		
40	41.0000	Science Technologies/Technicians, General.	0	0		
41	41.0101	Biology/Biotechnology Technology/Technician,	9	0		
41	41.0299	Nuclear and Industrial Radiologic Technologies/Technicians, Other.	•	0		
41	41.0303	Chemical Process Technology.	•	0		
41	41.9999	Science Technologies/Technicians, Other.	0	0		
42	42.2799	Research and Experimental Psychology, Other.	•	0		
43	45.0102	Social Sciences, Research Methodology and Quantitative Methods.	0	0		
45	45.0301	Archeology.	0	0		
45	45.0501	Demography and Population Studies.	2	0		
45	45.0603	Econometrics and Quantitative Economics.		0		
45	45.0702	Geographic Information Science and Cartography.		0		
45	49.0101	Aeronautics/Aviation/Aerospace Science and Technology, General.		0		
49	51.1002	Cytotechnology/Cytotechnologist.		0		
51	51.1005	Clinical Laboratory Science Medical Technology/Technologist.		0		
51	51.1401	Medical Science/Scientist.		0		
51	51.2003	Pharmaceutics and Drug Design.	2	0		
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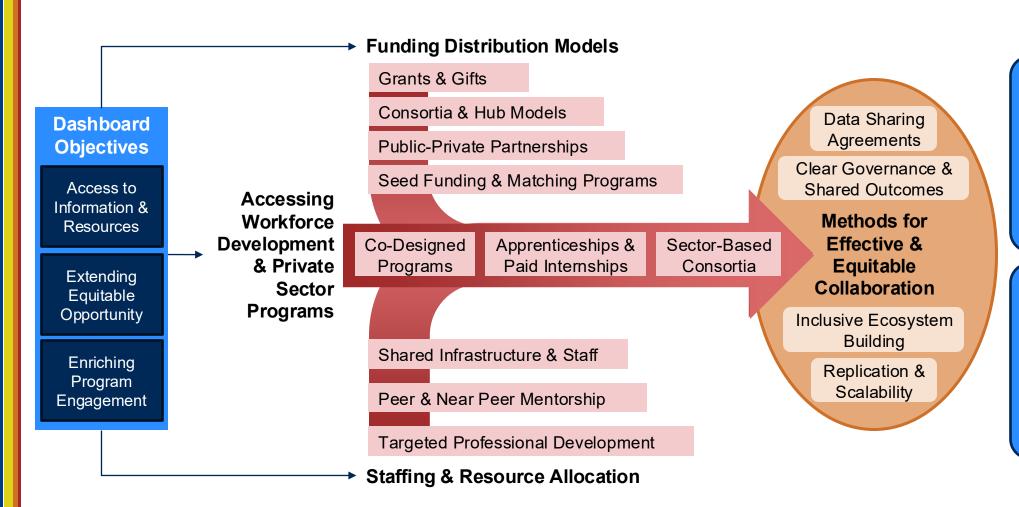
## Stakeholder Survey Overview & Methods

Survey to committee members summer 2025

- Feedback from stakeholders on profiles
- Responses from Padlet exercise
- Generate survey items for function of dashboard



## Facilitating Cross-Institutional Collaboration



#### **Target Outcomes**

Provide students with greater accessibility to a diverse range of program resources, staff expertise and workforce development opportunities

Extend equitable and competitive funding opportunities across scope of state / public, private, community, and polytechnic institutions



## Dashboard Use Cases | Promoting Value-Added Collaboration Opportunities



User: **Graduate Student** 

Use Case: Collaborative Research Extension

**Problem Statement:** graduate student at smaller institution is developing research that requires lab space and expertise that is not accessible at current campus.



**Dashboard Engagement** 



Outcomes: student identifies partner institutions & programs that provide opportunity to enhance scope of STEM field focus. Establishes clear line of sight to allocation & extension of partner institution staff & resources, as well as available research infrastructure (e.g., labs, field research programs, etc.)

#### **Benefits to Partner Institution**

- ✓ Enriches talent pipeline and provides opportunity to diversify niche research areas
- ✓ Presents opportunities for intra- & inter-institutional program expansion & funding opportunities

#### **Benefits to Student**

- ✓ Provides research infrastructure to pursue desired field of study
- ✓ Creates networking & professional development opportunities with expanded staff & program community



User:
Program
Administrator

Use Case: **STEM Program Expansion** 

**Problem Statement:** administrator at large state school is looking to establish / expand technical focus area but is lacking visibility into state-wide institutional program strengths, weaknesses and resource needs, making strategic investments difficult to target



**Dashboard Engagement** 



Outcomes: administrators leverage the dashboard's aggregated views to compare program infrastructures, grant distribution, student outcomes, and field coverage. They use insights to allocate funding, identify partnership opportunities and monitor equity gaps or workforce alignment.

#### **Benefits to Administrator Institution**

- √ Strategic, evidence-based planning
- ✓ More competitive grants
- √ Targeted expansion of STEM fields
- √ Improved equity measures
- ✓ Increased cross-institution program scalability

#### **Benefits to ND Network**

- ✓ Increased access to shared resources
- ✓ Collaborative grant opportunities
- ✓ Data-informed decision making



## Next Steps

- Dashboard Development
  - Continue to enrich and validate source data feeding dashboard
  - Power BI Integration translate excel-based data, features and functions into interactive visualization tool
  - Early November: Distribute Power BI dashboard to core stakeholders
- Stakeholder Communication
  - Finalize & disseminate survey to collect data from institutional stakeholders
  - Schedule additional information sessions



## Open Q&A

