Strategic Plan

FIRST2
NETWORK

EXECUTIVE SUMMARY

The **First2 Network** brings together a growing number of organizations representing higher education institutions, K-12 education, federally funded research labs and industry associations aimed at improving the graduation rate of undergraduate STEM students, with emphasis on rural, first-generation students through their first two years of college. Our shared goals are to 1) double the number of STEM graduates (from 30% to 60%) in West Virginia within 10 years, 2) build a collaborative culture that results in a sustainable, long-lived improvement network through defining common barriers faced by rural first generation students and testing changes towards improvement, 3) complete a comprehensive research study to advance understanding of the factors affecting rural, first-generation student entry into and persistence in STEM career pathways, and 4) create a model program for other EPSCoR states and expand our Alliance to 2 additional EPSCoR states within 5 years.

The First2 Network strategic plan is a roadmap to guide the development of infrastructure, partnerships, and sustainability over the course of the next 2 years. Its major components include the goals, objectives, indicators, timelines and roles/responsibilities. The goals of the First2 Network are:

1. The First2 Network has the infrastructure and leadership to support network goals and activities.
2. First2 partnerships are intentional, extensive, strong, and diverse to support STEM success.
3. First2 institutions have the infrastructure and leadership to implement First2 initiatives.
4. The First2 Network embraces a culture of learning, improving, and sharing learnings in efforts to improve STEM persistence.

Development of this plan has been underway for roughly 4 months. First2 Network members including student leaders, the steering committee, and the leadership team participated in 3 retreats to flesh out its major components. Many of the elements of the strategic plan are in response to recommendations from the Reverse Site Visit and the Year 2 Evaluation report provided by our external evaluator, ICF. You may click the links embedded within the strategic plan to see this alignment. You can view our progress on accomplishing these goals by clicking the links found under "Accountability."

OUR NATIONAL NETWORK: First2 Network is a member Alliance of the National Science Foundation IN-CLUDES National Network, established to "catalyze the STEM enterprise to work collaboratively for inclusive change, resulting in a STEM workforce that reflects the population of the nation". NSF INCLUDES recognizes that "for the United States to remain the world leader in STEM innovation and discovery, it must identify and develop talent from all sectors to become STEM professionals". First2 works to meet this need, making it possible for West Virginians to fill the growing number of STEM jobs projected for West Virginia's economy in the coming decade and beyond.

STRATEGIC CONTEXT

    a. Trends in STEM graduation rates in WV
    b. SWOT Analysis

CORE IDEOLOGY: OUR MISSION, VISION, AND VALUES

STRATEGIC PLAN DOCUMENT

    a. Goals and Objectives
    b. Rationale
    c. Measurement
    d. SMART Objective
    e. Implementation Steps
    f. Accountability

THE FIRST2 NETWORK RATIONALE:

    a. Theoretical Framework
    b. Logic Model
    c. Driver Diagram (Primary Drivers)
    d. Fishbone Diagram

STRATEGIC CONTEXT

Trends in STEM Graduation Rates in WV:

West Virginia falls below the national and regional statistics related to persistence and degree completion. In the 16 state Southern Region Education Board (SREB) region, the one-year persistence rate for the 2014 cohort of full-time, first-time, bachelor's degree seeking freshmen at public four-year institutions was 90 percent. West Virginia is currently tied with Mississippi in last place among the 16 SREB states in overall first-year persistence with a rate of 76% for 2015 [3]. The annual report card produced by West Virginia's Higher Education Policy Commission reports a 30.2% on time graduation rate compared to 39.8% nationally. In West Virginia, low income students, most of whom are first-generation college students graduate at a rate of just 21.5%.

SWOT ANALYSIS

This SWOT analysis was performed by members of the leadership team as a tool to identify the strengths, weaknesses, opportunities, and threats of the First2 Network.

STRENGTHS

- Energetic and deeply networked leadership
- Collaboration skills in leaders
- Dedicated leaders
- Committed core team
- Great, passionate leadership
- Strong leaders
- Breadth of member content and state knowledge
- Authenticity of voice in the work (not doing work on behalf of people, but with people)

WEAKNESSES

- Limited human capacity
- Too much work, too few people
- Too many priorities to do good work
- Inability to prioritize

OPPORTUNITIES

- Become national voice for Best Practices
- Catapult WV to forefront of a national conversation spotlight
- Becoming an Expert: Real knowledge about rural STEM persistence to share
- WV legislators see First2 as a potential partner to improve workforce development
- Demonstrate making partner institutions stronger so they want to adopt and support initiatives

THREATS

- No real money in landscape for sustainability after NSF funding ends

MISSION: The mission of the First2 Network is to increase the number of students graduating in science, technology, engineering and math (STEM) by 1. focusing on students who are rural and first in their families to go to college or are otherwise underrepresented in STEM, and 2. focusing on these students' first two years of college – a critical breaking point in the college and career pathway for many of our brightest and best students. If we can improve outcomes for these students, all students, especially those underrepresented in STEM, and stakeholders will benefit.

AIM: The aim of the First2 Network is to:

- Double the number of STEM graduates (from 30% to 60%) in West Virginia within 10 years
- Build a collaborative culture that results in a sustainable, long-lived improvement network through defining common barriers faced by rural first-generation students and testing changes towards improvement.
- Complete a comprehensive research study to advance understanding of the factors affecting rural, first-generation student entry into and persistence in STEM career pathways
- Create a model program for other EPSCoR states and expand our Alliance to 2 additional EPSCoR states within 5 years

VISION AND VALUES: We believe that students are necessary co-creators of our solutions; they understand better than anyone the challenges and barriers they face. We make sure students speak first and come first in our network. We take a holistic approach to student success. We know that successfully navigating the first two years of college starts well before the first day of freshman year and predicts success well into students' career pathways. We are a state-wide network of stakeholders and students, committed to doing two things hand-in-hand to create lasting and impactful change. First, we are working to better serve rural, first-generation and other underrepresented STEM students on the ground. At the same time, we are working with systems and institutions to learn and evolve, developing practices and policies to better serve these students. We celebrate diversity and inclusion.

Objective 1.1 First2 communicates the vision and work, and research findings of the network throughout the state and beyond by December 2020.

Measurement: Monthly newsletters, post surveys of bi-annual conferences, and utilize social media analysis resources to communicate the successes and challenges of the Network.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 has an effective and impactful communication plan to engage diverse stakeholders across WV by January 2021. **(Eval report p. 127, bullet 3)**	External communication efforts identify and target intentional audiences including but not limited to: WV legislature, industry, state agencies. External and internal communication includes updates on the progress that shared metrics reveal about the First2 Network. **(Eval report p. 126, bullet 1)** Internal communication, through a monthly newsletter to network members and the First2 Network website, presents news, event updates, and new learnings emerging from working groups. **(Eval report p. 127, bullet 1)** Strong student-led social media presence. Engage experts, researchers and orgs to better understand student success of underrepresented and underserved populations in STEM. December 2020: curate an online resource library of all of our research, improvement science, by-laws, policies, reports etc.	Leadership Team; Steering Committee; First2 Program Coordinator; Partner Organizations; Student Leaders
First2 has a strong orientation and onboarding process for new members, as measured by feedback from and responsiveness to First2's newest members by October 2020.	First2 website and other materials clearly indicate ways for Network members and other organizations to contribute and/or become active in the First2 learning community.	Backbone Organization
First2 leverages connections with other NSF initiatives and the STEM community at large by September 2021	Partner institutions create and distribute monthly communications about First2 within their institution and to their community at large First2 leadership attends NSF affinity group meetings and other STEM events	First2 Program Coordinator; Partner Institutions; Student Leaders
First2 leadership informs the WV Legislature about First2's impact by September 2021 **(Eval report p. 127, bullet 5; p. 128 bullet 2)**	First2 leadership speaks with House and Senate Education Committee yearly	Leadership Team; Steering Committee; First2 Program Coordinator; Student Leaders

Objective 1.2 HEPC has the staffing, capacities, and resources to support First2 as the backbone organization by August 2023. **(RSV Recommendation 3.1)**

Rationale: To serve as the sustaining backbone organization, it is necessary for the HEPC to allocate the staffing, capacities, and resources needed to support the First2 Network.

Measurement: HEPC will have a minimum of 1 full-time permanently funded staff person dedicated to the First2 Network. Additionally, HEPC division directors will appoint personnel to assist with data collection and data sharing processes.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
HEPC DSR has the equivalent of one permanently funded staff person to coordinate First2 by August 2023	Engage HEPC leaders in discussions about reallocating resources to fund Coordinator position	HEPC Senior Director of Science and Research
HEPC Division Directors are aware of and promote the vision of First2 and contribute data, technology infrastructure by November 2020	Facilitate bi-monthly meetings with Divisions of Policy and Planning, Student Services, and Academic Affairs to identify areas in which staff members can contribute data and technology infrastructure to First2 **(Eval report p. 127, bullet 5)**	HEPC Senior Director of Science and Research; First2 Program Coordinator; Backbone Organization
HEPC mobilizes, coordinates, and facilitates the collaborative infrastructure across First2 by August 2021	Meet bi-monthly with key liaisons at partner institutions/organizations to assess progress towards key aspects of the collective impact approach: common agenda, shared measurement, mutually reinforcing activities, and communication.	HEPC Senior Director of Science and Research; First2 Program Coordinator; Backbone Organization

Objective 1.3 First2 has the human resource capacity to support implementation of its initiatives by August 2021.

Rationale: To effectively implement First2 Network's programming, it is necessary to have adequate human resources to support and carry out First2's initiatives.

Measurement: PI organizations, the backbone organization, and partners will all have a team of no less than 3 professionals to support First2's initiatives.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 has a sustainable organizational structure by December 2020.	Anchor organizations commit long-term to the network through signed MOUs. Key additional leadership roles are defined. First2 identifies and addresses remaining governance issues including determining the division of labor between HEPC DSR and the Leadership Team. **(Eval report p. 127, bullet 4)** Leadership team, steering committee, and backbone organizations clarify roles and responsibilities. **(Eval report p. 127, bullet 2)** Add human resources to capacity/development, student leadership, and administrative support for working groups to enable scalability.	Partner institutions; Backbone Organization; Student Leadership
All partner institutions and organizations have adequate staffing to support and implement First2 initiatives by August 2021	Lead liaisons at partner institutions meet bi-monthly with backbone to discuss best practices and human resource needs. Partner institutions bring resources to the table to support First2 work. Institutions who need additional support to participate will work with the backbone organization to leverage resources to address disparities.	Partner institutions; Backbone Organization
First2 has leadership training and professional development for members by on a quarterly basis or as needed by September 2021	First2 identifies vulnerabilities within working groups, and offers trainings to members. **(Eval report p. 126, bullets 1 and 4)**	Backbone Organization; First2 Network co-chairs; Student Leaders

Objective 1.4 First2 has the funding and resources to sustain its infrastructure and support implementation of its initiatives by August 2023.

Rationale: To double the graduation rate by 2028 of rural, first-generation STEM students and underrepresented STEM students, it is necessary to fund First2 programming that is advancing this goal.

Measurement: First2 will have state appropriations, financial donations from partner organizations, and in-kind donations to sustain the infrastructure and support implementation of initiatives by August 2023.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 has a detailed financial sustainability plan in place by December 2020. (Eval report p. 127, bullet 5) The plan contains the following: Annual organizational budget and budget overview to clearly articulate network costs, committed funding, and needed funding for 2021-2028	Submit 10+ proposals annually for core network sustainability by December 2021 and each year following. Prioritize the continuation of existing, core, successful initiatives over new, additional work. Strategically prioritize new program initiatives that best leverage the top opportunities as identified by the network learning. Develop a calendar with targeted funding opportunities and asks through 2023.	Leadership Team; First2 Program Coordinator; Backbone Organization; Industry Advisory Board
Partner institutions and organizations allocate resources to sustain First2's initiatives by August 2021	First2 has signed MOUs with partner organizations that outlines the need for partners to allocate resources to sustain First2	Leadership Team; First2 Program Coordinator; Backbone Organization; Partner Institutions; Partner Organizations
The West Virginia legislature supports passage of a bill to appropriate funds towards First2's initiatives by January 2022	First2 leadership works with the Chancellor's office to develop a bill in support of state funding for First2	HEPC Senior Director of Science and Research; Leadership Team

Objective: 2.1 First2 establishes deliberate and productive partnerships with diverse organizations across the state, including those that are working towards the same goals as measured by MOUs established with 10 organizations by January 2022.

Rationale: Partners who have shared concrete goals will work together to achieve those goals.

Measurement: MOUs or other written agreements are in place; partners report progress on goals. Processes are established to bring partners on board.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
A prioritized "living" list of current and potential partners is created, which clearly articulates the goals and benefits of each partnership and is approved by the Steering Committee and put into use by December 2020.	A comprehensive list of potential partners is prioritized by the opportunity, the purpose of the connection, and the alignment with First2 mission, vision, and objectives. First2 updates and expands the list of current and potential partners by December 2020. **(Eval report p. 125, bullet 1)**	Leadership Team; Steering Committee; Industry Advisory Board; Backbone Organization
A process for establishing and managing connections with current and potential partners is established, approved by the Leadership Team, and put into use by January 2021. Partner participation is available at a variety of levels to capture the goals and benefits for different types of partners.	The Backbone creates a draft process for Leadership Team consideration and refinement which is then shared with stakeholders for input and approved in final form. The process will advertise for and formalize a variety of roles for participation by diverse partners, using best practices from STEM Ecosystem. **(Eval report p. 127, bullet 2)**	Backbone Organization; Leadership Team; Steering Committee
Over the next two years, steady growth in purposeful partnerships is observed and partners find value in the partnerships established. First2 engages a diverse set of partners and affiliates across geography, sector, organizational size and type, system level	First2 Partnerships are assessed annually through the use of a partner survey and evaluation by the First2 Steering Committee.	Evaluation; Steering Committee

Objective 2.2 First2 establishes deliberate partnerships with other organizations beyond the state that are working towards the same goals by February 2021.

Rationale: The work of First2 has relevance for partners outside West Virginia. Partners outside West Virginia bring important and needed knowledge, strategies, connections and leverage to West Virginia efforts.

Measurement: First2 is disseminated in EPSCoR states and First2 is a valued partner with at least 5 national networks or organizations.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 increases dissemination, replication and scaling of promising practices by establishing formal partnerships with at least 5 like-minded organizations outside of West Virginia by Spring 2022	Identify and prioritize potential partners outside of West Virginia including existing multi-state networks, other INCLUDES projects, and EPSCoR initiatives. Pursue MOUs with highest priority partners.	Industry Advisory Board; Leadership Team; Backbone
First2 leverages the EPSCoR network to disseminate our model and identifies two EPSCoR states willing to test our model by Fall 2021.	First2 submits a proposal which is chosen for a NSF EPSCoR workshop in 2021 First2 uses the EPSCoR and INCLUDES networks to publicize available opportunities for other EPSCoR states to partner with us. First2 connects with WV EPSCoR programs from agencies other than NSF, and leverages these for our state capacity building.	Leadership Team; Backbone

Objective 2.3 First2 establishes partnerships with industry that provide effective routes to workforce development for First2 students by January 2021 (including internships, mentoring, funding).

Rationale: Economic development in the state depends on industry finding qualified employees who want to live in WV and on WV students effectively translating STEM interest into rewarding STEM careers.

Measurement: Number of First2 students who interact with industry by 2023, number of MOU's with industry partners, number of industry employees who interact with our students by 2023.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
Students in First2 Network are actively engaged in co-ops and internships in the private and/or nonprofit sectors by August 2021.	Industry Advisory Board identifies meaningful industry connections and creates opportunities for First2 student interactions with industry. First2 works with partners to build internship opportunities for First2 students. Alumni remain engaged and develop First2 projects at their workplaces.	Evaluation; Backbone; Industry Advisory Board; Alumni WG; Measurement; Student Leadership
A feedback loop is established between industry employers, First2 alumni and Career Services offices at higher education institutions by Spring, 2022.	Industry Advisory Board invites Career Services representatives and alumni to events to discuss effective means of feedback. Feedback mechanism is identified and implemented.	Leadership Team; Backbone; Industry Advisory Board; Alumni WG
Mentoring of students by industry professionals is initiated by December 2020 and steady growth occurs for the next two years.	Industry advisory board members and Alumni WG develop and test a mentoring program	Industry Advisory Board; Alumni WG

GOAL 3: First2 institutions have the infrastructure and leadership to implement First2 initiatives by March 2023. Click here for details.

Objective: 3.1 First2 develops resources, guidance, and tools to support First2 institutions in building capacity to implement and sustain First2 initiatives by May 2021

Rationale: Building infrastructure at First2 institutions (e.g., higher education institutions) needs to be intentional and strategic. Institutions need guidance on how to effectively build capacity for sustainability.

Measurement: Results of needs assessment, number and type of resources and guidance documents developed, number of institutions receiving support and guidance by the Institutional Support Team

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
Institutional Support Team is created by the Backbone by January 2021	Develop team roles and responsibilities by December 2020. Recruit members by January 2020	Backbone Organization; Leadership Team
First2 members understand the role of the Institutional Support Team and the First2 Implementation Teams by February 2021	Communicate roles and functions of the Institutional Support Team and First2 Implementation Teams in First2 publications by February 2021	First2 Coordinator; First2 Communication Director
Resources, tools, and guidance are developed to support institutional capacity building by May 2021	Solicit input from students, faculty and staff on supports needed to build institutional infrastructure by March 2021 Develop plan for how to support institutional capacity building and the First2 Implementation Teams by April 2021 Develop initial resources, guidance, and training by May 2021 Work with First2 Implementation Teams to provide the support they need by May 2021	Backbone Organization; Institutional Support Team; Student Agency Lead

Objective: 3.2 First2 institutions create implementation teams that meet at least monthly and facilitate communication and coordination of First2 initiatives at their institutions by September 2021. **Eval Report pg. 127 bullet 2**

Rationale: Institutional-level teams provide an internal support structure for implementing initiatives at institutions by facilitating communication and coordination, promoting vision and activities, and collecting information on progress. They receive support and guidance from the Backbone's Institutional Support Team

Measurement: Number of institutions with First2 Implementation Teams established, number of training sessions, progress assessment results

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 Implementation Teams are created at current First2 institutions, and team members understand their roles and responsibilities in building institutional infrastructure by April 2021. Teams are created at subsequent institutions within 6 months of launching First2 activities	Communicate with upper level leadership at current First2 institutions to garner commitment to supporting First2 Implementation Teams by February 2021 Develop written roles and responsibilities for First2 Implementation Teams by March 2021 Recruit First2 Implementation Team members from current First2 institutions by March 2021 and subsequent institutions within 6 months of launching First2 activities.	Backbone Organization; Institutional Support Team; Steering Committee; Student Agency Lead; Student Leadership
With support from the Backbone, teams meet regularly and implement strategies to build infrastructure and facilitate coordination of First2 initiatives within their institution by September 2021	Provide training on how First2 Implementation Teams can build institutional infrastructure and leadership by May 2021 and ongoing. Teams from current First2 institutions meet at least monthly by September 2021 Institutional Support Team assesses progress by attending First2 Implementation Team meetings quarterly by September 2021. Backbone works with teams to develop an efficient process for sharing data on shared metrics by July 2021	Backbone Organization; Institutional Support Team; Student Agency Lead; First2 Implementation Teams
First2 Implementation Teams communicate with and bring together First2 students, faculty, and staff to facilitate coordination of First2 initiatives at their institution by October 2021	Develop internal communication mechanism for First2 members at institution by May 2021 Hold periodic First2 Campus/institutional meetings (2-4 times/year) by June 2021 Develop and implement a plan to promote First2's vision and activities to institutional members, including social media posts by student leaders, by October 2021	Backbone Organization; First2 Implementation Teams; Student Agency Lead; Student Leadership

Objective: 3.3 First2 implementation teams communicate and coordinate with other programs at their institutions to support rural, first generation STEM students by January 2022. **RSV Recommendation 4.0**

Rationale: Coordinating with other institutional programs aimed as promoting student success will help institutions better understand the barriers facing rural, first generation students. Working collaboratively across departments and programs will improve the effectiveness of efforts to address these barriers.

Measurement: Number of institutions that create a collaborative process; number of departments, programs, and individuals involved in collaboration; number of cross-departmental meetings, measure of the level of collaboration within institutions

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
A process for collaboration among departments and programs involved in improving student persistence (e.g., First2, student success, financial aid, residential life, academic advising) is set up at current First2 institutions by October 2021 and subsequent institutions within 12 months of launching First2 activities	Create opportunities for inter-departmental people who work with First2 students to engage with each other at First2 conferences by June 2021 Develop or identify a model for collaboration among departments by August 2021 Recruit individuals from the relevant departments and programs to be involved in collaboration model by October 2021 Provide training and guidance for collaboration by October 2021	Backbone Organization; First2 Implementation Teams
Current First2 institutions host meetings where individuals from different departments and programs, including First2, discuss barriers to rural, first generation STEM students' persistence by January 2022. Subsequent institutions host meetings within 12 months of launching First2 activities	Prepare information on barriers and promising practices for improving STEM persistence of rural, first generation students by November 2021. Current institutions host at least one meeting by December 2021	Backbone Organization; First2 Implementation Teams
At First2 institutions, First2 initiatives are coordinated with student advising, student success, and other programs aimed at student persistence and success through regular meetings and written communication by September 2022	Hold regular meetings (monthly or bi-monthly) by March 2022 Create written plans for coordination and collaboration between programs and departments to improve STEM persistence of rural, first generation students	First2 Implementation Teams; Backbone Organization

Objective: 3.4 By March 2023, at least five First2 institutions provide the staff and resources to fully implement First2 initiatives at their institutions. RSV Recommendation 4.4

Rationale: First2 initiatives need to be integrated into and supported by participating institutions to achieve sustainability and broad-scale impact on STEM persistence of rural, first generation students.

Measurement: Number of institutions with sustainability plans; number of institutions with staff supporting First2 initiatives; number of faculty, students, and staff involved in First2 at each institution; dollars dedicated to supporting First2 initiatives at institutions

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
Upper level institutional leaders understand and support First2's vision to improve STEM persistence by September 2021	Communicate with upper level campus leadership about First2's vision and how First2 can help institutions retain students in STEM (by July 2021, ongoing)	Backbone Organization; First2 Implementation Teams
First2 Implementation Teams develop a plan to sustain and scale First2 initiatives at their institution by February 2022. Plan is approved by upper leadership by June 2022	Provide guidance to teams on how to develop a plan by December 2021 Develop institutional sustainability plans by February 2022	Backbone Organization; First2 Implementation Teams
The number of faculty, students, and staff involved in First2 increases by 50% from September 2020 to January 2022 and all STEM departments have faculty and students involved in First2 by January 2022	Provide encouragement, guidance and support to First2 Implementation Teams to help them recruit increasing numbers of faculty, students and staff by May 2021 Invite faculty, students, and staff to participate in First2 activities Collect information from First2 Implementation Teams on numbers of faculty, students and staff involved in First2.	Backbone Organization; First2 Implementation Teams
At least 3 First2 higher education institutions identify a staff member to coordinate First2 initiatives by June 2022 and at least 5 institutions do so by March 2023	Work with First2 Implementation Teams and upper level institutional leaders to gain support for and identify a staff member to coordinate First2 initiatives at the institution.	Backbone organization; leadership team
At least 3 First2 higher education institutions provide the resources and staffing to fully implement First2 immersive experiences, student clubs, and other First2 initiatives by March 2023	Identify resources and staffing needed by June 2022 Work with campus administrators to dedicate staff and resources to First2 initiatives by March 2023	Backbone Organization; First2 Implementation Teams

Objective: 4.1 First2 implements a system of shared metrics by September 2021, and members and partners regularly use metrics to assess progress by December 2021. **Eval Report pg. 125 bullet 2**

Rationale: Collecting data and measuring results on key indicators will help keep First2 efforts aligned and help the First2 Network assess progress and identify successes and areas for improvement.

Measurement: Results of feasibility assessment, number of institutions sharing data, dashboard displays

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
Key metrics for First2 shared metrics are identified and approved by First2 Leadership Team by January 2021	Review existing First2 measures, identify new measures, as necessary, and select key measures for shared metrics by December 2020 Assess feasibility of collecting shared metrics across partner institutions by January 2021. Obtain approval of proposed shared metrics by First2 leadership team by January 2021	Measurement Team; Backbone organization; Partner institutions; Research and evaluation teams; Leadership Team
System for collecting shared measures across partner institutions and the research and evaluation teams is developed by April 2021	Solicit input from evaluation and research team and institutional partners on how data can be collected and shared with backbone organization by February 2021 Determine how the backbone organization will receive data for shared metrics from evaluation team, research team, and institutional partners by March 2021 Develop data submission procedures by April 2021	Backbone organization; Research and evaluation teams; Measurement Team
First2 Measurement team implements a system of shared metrics by September 2021	Develop dashboard for reporting shared metrics by July 2021 Receive data from evaluation and research teams and institutional partners on a regular basis by August 2021 Display data on shared metrics on the dashboard by September 2021	Backbone Organization; Measurement Team; Institutional partners
First2 members and partners use the shared metrics dashboard to assess progress and identify areas needing attention by December 2021	Provide training on shared metrics and how data can be used for improvement by September 2021 Discuss dashboard results quarterly at Steering Committee meetings by December 2021	Backbone Organization; Steering Committee

GOAL 4: The First2 Network embraces a culture of learning, improving, and sharing learnings in efforts to improve STEM persistence by December 2021. Click here for details.

Objective: 4.2 First2 members use improvement science methods to test, iterate, and scale practices to improve STEM persistence, as measured by all First2 working groups setting and achieving goals for the number of PDSA cycles completed per year by August of each year. **RSV Recommendation 2.5**

Rationale: Improvement science provides principles and tools that can help the First2 Network identify how to improve practices for STEM persistence and adapt and scale up practices to different contexts.

Measurement: Number of trainings, number of PDSA cycles completed, number of individuals participating in PDSA cycles, number of working groups that meet PDSA goals, number of First2 institutions using PDSA cycles to improve STEM persistence

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
First2 members understand improvement science methods and how to use the NILS online system for documenting PDSA cycles by January 2021	Provide training and support to First2 members in the use of improvement science and NILS by January 2021 Promote improvement science principles and practices in First2 communication vehicles by January 2021	Measurement Team; Backbone; Organization; Communications Director
Working groups use PDSA cycles regularly to test practices with First2 population, expand testing to multiple sites and contexts, and investigate supports needed for effective implementation and scale up by June 2021	Assist work groups to conduct PDSAs on practices to improve STEM persistence by January 2021 Develop goals for the number of PDSA cycles to be conducted by working groups by February 2021 Use NILS to assess progress of working groups in conducting and documenting PDSA cycles by March 2021 Provide support to working groups that are not reaching goals for PDSAs by March 2021	Measurement Team; Working groups; Backbone organization
First2 members promote a culture of learning by using PDSA cycles within their institutions to improve STEM persistence by June 2022.	Provide training and support to First2 Implementation Teams on conducting PDSA cycles by January 2022. Identify First2 members in at least 3 institutions who are willing to promote the use of PDSA cycles at their institutions by February 2022 Provide resources and support to First2 members to conduct PDSA cycles to improve STEM persistence within their institutions by March 2022	Backbone organization; Measurement Team

GOAL 4: The First2 Network embraces a culture of learning, improving, and sharing learnings in efforts to improve STEM persistence by December 2021. Click here for details.

Objective: 4.3 Best practices for improving STEM persistence are shared within and beyond the First2 Network by July 2021, as measured by quarterly sharing of PDSA findings within the network and at least 8 dissemination activities beyond the network per year.

Rationale: Sharing research findings and evidence and lessons learned through PDSA cycles will accelerate learning across the network about improving STEM persistence among rural, first generation students and aide others engaged in similar work.
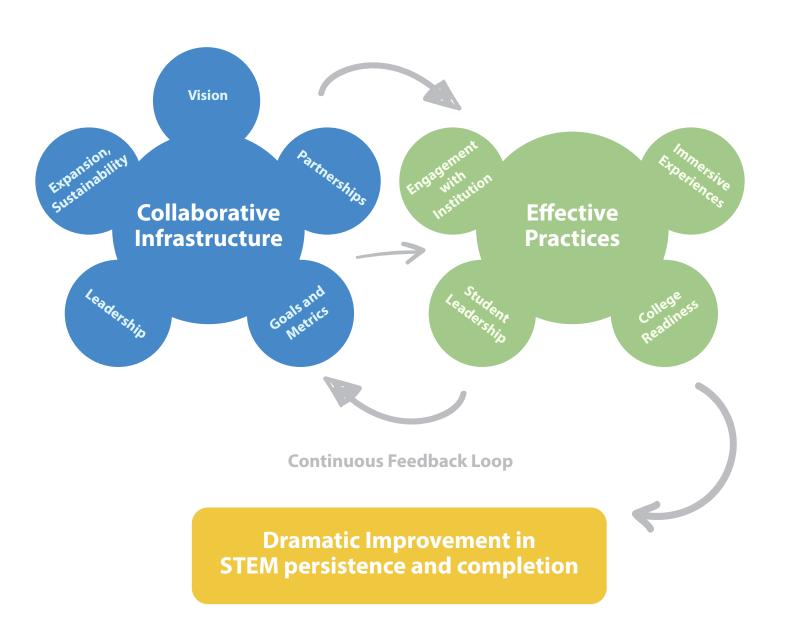
Measurement: Number of PDSAs disseminated, repository created, number of users accessing repository, number and type of dissemination products.

SMART OBJECTIVE	IMPLEMENTATION PLAN	ACCOUNTABILITY
A consistent and well understood process for sharing experiences and results of efforts to improve STEM persistence is developed by June 2021	Solicit input from First2 leaders, partners, and students about effective methods for sharing experiences and results across the network by February 2021 Create a plan for sharing experiences and results by April 2021	Backbone organization; Leadership team
Findings from PDSA cycles are disseminated across the Network by November 2021	Assess NILS usage and documentation to identify successes and areas for improvement for documenting PDSA cycles by March 2021 Findings from PDSA cycles are summarized and highlighted on the First2 website quarterly by July 2021 Findings from PDSA cycles are synthesized to identify practices that have been successful across settings and summarized in a repository of promising practices by October 2021 and ongoing	Backbone organization; Measurement team; Communications director
Promising practices for improving STEM persistence are documented in a repository, disseminated, and used by individuals within and beyond the First2 Network by June 2022	Develop structure, format, and location of a repository of promising practices for improving STEM persistence of rural, first generation students by August 2021 Populate repository with promising practices from existing research, First2 research, and synthesized findings from PDSA cycles by February 2022 Disseminate information about the repository to First2 Network at least quarterly by March 2022 Disseminate findings about promising practices through research publications, conference presentation, social media and other methods by March 2022	Backbone organization; Research team; Evaluation team; Communications team

Theoretical Framework

The theoretical framework shows the relationship between First2 Network's collaborative infrastructure and how the elements of this infrastructure guide effective practices among our working groups. Through continuous engagement in the collaborative infrastructure (also known as the Collective Impact Approach), working groups will create systemic change over time and ultimately see a major improvement in STEM persistence and completion.

LOGIC MODEL

The logic model shows the 5 elements of the Collective Impact Approach and how our assumptions, activities, interim outcomes, and long term outcomes will contribute to the First2 Network having an extensive, sustainable, collaborative infrastructure to support ongoing work in order to increase the STEM persistence of rural, first generation students.

		ASSUMPTIONS	ACTIVITIES	INTERIM OUTCOMES	LONG TERM OUTCOMES	IMPACT
BUILDING COLLABORATIVE INFRASTRUCTURE	**SHARED VISION**	West Virginia stakeholders can coalesce around a common agenda to improve the STEM persistence of rural, first-generation college students. Student voice is necessary to find common agenda	Co-develop with stakeholders a common agenda and engagement plan for increasing statewide awareness of and commitment to First2's shared vision. Communicate shared vision within and outside the network and implement engagement plan. Work to align First2 agenda with similar initiatives in the state.	The Network's common agenda is formalized in Network documents. Network members are aware of the problem of rural, first-generation STEM persistence, the Network's common agenda to understand and address it, and the central role of student voice in the Network. The Network promotes the agenda within and beyond the Network.	Network members are committed to the common agenda and publicly promote the need to improve the STEM persistence of rural, first-generation college students. WV stakeholders outside the network are aware of and committed to the agenda. First2 Network is recognized as a state leader in the effort to improve STEM persistence of rural, first-generation college students.	**Through the First2 Network, West Virginia has an extensive, sustainable, collaborative infrastructure to support ongoing work to increase the STEM persistence of rural, first-generation students.**
	PARTNERSHIPS	The effort to improve STEM persistence of rural, first-generation college students in West Virginia can succeed if state stakeholders representing a diversity of sectors, institutions, and perspectives form a focused, productive, and sustainable partnership.	Conduct statewide outreach to potential stakeholders. Engage in regular communication and collaboration with stakeholders. Develop and execute MOUs with participating institutions, agencies, and industries. Involve partners in Network activities.	The number of Network participants (individuals and organizations) increases and includes an increasing diversity of sectors, organizations, and individuals. Relationships are strengthened through clearly defined roles and responsibilities and capacity building to support meaningful engagement. Partners are actively engaged in the network.	The Network consists of an extensive set of partner organizations representing education, non-profit, government, and industry sectors across West Virginia, which are engaged in meaningful, aligned efforts to improve the STEM persistence of rural, first-generation college students.	
	GOALS/METRICS	Measurable goals and shared measures can assist First2 Network members to track progress, identify challenges, and consider solutions to such challenges.	Identify key shared goals and progress and outcome measures. Establish data collection protocols and systems. Collect, analyze, and report data regularly. Use data to identify successes and areas for improvement.	The Network has a common set of indicators and data collection methods to assess progress. Network partners understand the shared goals and the metrics to assess progress. Regular data collection, analysis, and use cycles are established across the network.	The First2 Network has well-defined and measurable goals, assessed via metrics that members regularly use to gauge progress and make course corrections as needed.	

		ASSUMPTIONS	ACTIVITIES	INTERIM OUTCOMES	LONG TERM OUTCOMES	IMPACT
BUILDING COLLABORATIVE INFRASTRUCTURE	**LEADERSHIP**	Strong leaders at all levels are critical for achieving broad impact. In addition to engaging high-level leaders as Network champions, the Network needs to build leadership among students--those with the relevant lived experiences to address the problem of STEM persistence.	Establish collaborative, distributed leadership structure. Coordinate Network activities through efficient management and communication processes. Offer leadership opportunities and support to Network members. Develop and provide student STEM leadership training, support, and opportunities.	Network leadership structures, member roles and responsibilities, and communication processes are formalized in Network documents. Students play a formative role in Network planning. Leadership is diverse with representation by high-level administrators, faculty and staff, students, and community and industry partners. First2 leaders acquire improved leadership capacity,	First2 Network members and stakeholders, including students, are empowered and well-equipped to lead the collective effort to improve the STEM persistence of rural, first-generation college students.	**Through the First2 Network, West Virginia has an extensive, sustainable, collaborative infrastructure to support ongoing work to increase the STEM persistence of rural, first-generation students.**
	SUSTAINABILITY/SCALE UP	To ensure its long-term viability and capacity to scale, the First2 Network must establish an effective, sufficiently resourced backbone organization and a deep, widely-disseminated research base about how to improve the STEM persistence of rural, first-generation students.	Build capacity of HEPC to serve as the Network backbone organization. Develop a strategic plan for sustainability. Conduct outreach to legislators, state education leaders, and funders to secure financial and public support for the Network. Establish research agenda, instruments, and data collection plans; conduct and disseminate research findings.	HEPC has improved capacity to perform backbone organization functions. A strategic plan for sustainability is implemented. Research Team collects data and summarizes findings. The Network disseminates research findings, lessons learned, and guidance documents to network members, state stakeholders, NSF INCLUDES stakeholders, and stakeholders in other EPSCoR states.	The First2 Network is supported by an effective backbone organization that is sufficiently resourced and staffed to continue its work after Year 5. The network has the resources to implement First2 initiatives. Two EPSCoR states agree to learn from the First2 Network and adapt its approach to improve the STEM persistence of their rural, first-generation students.	
IMPLEMENTING EFFECTIVE PRACTICES	**USING IMPROVEMENT SCIENCE**	Using improvement science methods, First2 Network members can learn how to identify and test effective practices for improving the STEM persistence of rural, first-generation college students.	Provide training and support to stakeholders in the use of improvement science. Assist work groups to conduct PDSAs on practices to improve STEM persistence that emerge from Network driver diagrams and share findings across the Network.	Analysis of the problem of rural, first-generation STEM persistence is conducted. Promising or evidence-based practices are identified. Working groups use PDSA cycles to test practices with First2 population, expand testing to multiple sites and contexts, and investigate supports needed for effective implementation. Findings from tests are disseminated across and beyond the Network.	Improvement science methods are valued and used widely by Network members. Network members regularly use improvement science methods in their own practice to test, iterate, and scale ways to improve STEM persistence.	**Education stakeholders in West Virginia embrace a culture of learning and improvement in efforts to broaden STEM participation.**

		ASSUMPTIONS	ACTIVITIES	INTERIM OUTCOMES	LONG TERM OUTCOMES	IMPACT
IMPLEMENTING EFFECTIVE PRACTICES	BUILDING INSTITUTIONAL CAPACITY	To reach sustained and widescale impact, First2 institutions need to build capacity to implement effective practices for improving STEM persistence	Assist First2 institutions in identifying and securing knowledge, skills, resources needed to implement effective persistence practices. Build capacity of student leaders to implement student-to-student practices.	Staff and student leaders in participating institutions have the knowledge, skills, and resources they need to successfully implement effective STEM persistence practices. Institutions have resources and structures needed to support implementation. Institutions adopt and implement effective practices.	Effective practices for improving STEM persistence become standard operating procedure at member institutions and are implemented widely.	West Virginia higher education and K-12 institutions successfully implement effective practices for improving STEM persistence.
BROADENING STEM PARTICIPATION	IMPROVING STEM PERSISTENCE	Sufficient college readiness, and engagement in immersive research experiences early in students' college careers, strong faculty-student relationships, and student leadership will lead to improved STEM persistence.	Identify, invite, and encourage potential First2 students to participate in First2 activities. Provide financial support.	Students are engaged in STEM student community, are aware of and access resources and opportunities to improve their STEM experiences, and have relationships with faculty and/ or staff who can support them.	Students have a strong sense of STEM identity, STEM efficacy, and belonging in STEM community; have trusting relationships with STEM faculty; and are aware of STEM career opportunities. STEM persistence rate of First2 students improves.	The number of STEM graduates in West Virginia doubles by 2028.

The primary drivers of the driver diagram depict the major activities expected to drive the growth in the graduation rate of rural, first generation STEM students.

Engagement with Undergraduate Institutions: RFG STEM students are meaningfully connected within their undergraduate institutions (faculty, staff and campus) in ways that support retention and success

Measure: Improve Self Efficacy By 2023, measurably improve self-efficacy (academic social and personal) of 70% of RFG by the end of the 2nd year of college.

Engagement with Science Process and Community: RFG STEM students engage in immersive research experi-ences to develop a sense of belonging and competence in a STEM research community of practice.

Measure: By 2023, measurably improve STEM self-efficacy and belonging of 70% of RFG by the end of the 2nd year of college.

Readiness for College: RFG STEM students enter college with requisite knowledge, skills and disposition to succeed.

Measure: Students report a comfortable and confident transition to college. Entering students have an appropriate measure of confidence as correlated with college readiness indicators. Students report they can successfully navigate challenges in college, including money, and report ability to connect with peers, faculty, and STEM opportunity.
Tools: GPA, Test Scores, Math placement.

Engagement in Leadership: RFG STEM students engage in leadership opportunities that identify issues impeding students' success in STEM, help create solutions to these issues, and increase the reach of the network.

Measure: Increase Opportunity for and realization of leadership roles with peers, with hometowns, with faculty/staff and with policy makers

FISHBONE DIAGRAM

The fishbone diagram takes into account the most common factors associated with low persistence among rural, first generation STEM students. Major factors are highlighted in the green boxes. They are further unpacked in the subsequent arrows.

LACK OF PROACTIVE STUDENT SUCCESS PRACTICES

- Failure to ask for help
- Lack of study skills
- Lack of time management
- Missing class and waiting too long to do work
- Lack of relationship building with professors

LACK OF INDUSTRY, COLLEGE, COMMUNITY RELATIONSHIPS

- Lack of network and lack of formal relationships
- Students and teachers don't know diversity of careers available
- Peer pressure
- Industries don't have enough internship opportunities for students
- Lack of infrastructure to organize relationships
- Lack of industry access to schools and classrooms

PATHWAY

- Lack of understanding of graduate and professional schools
- Can't envision STEM careers
- Can't envision self in STEM careers
- Lack of mentorship
- Community pressure
- Parents can't help their kids
- Lack of timely check-ins with relevant mentors

LACK OF LEADERSHIP OPPORTUNITIES

- Unseen leadership roles
- Lack of incentive or time for training
- Reticence to share lived experiences
- Need requirements for formal training
- Failure of experts to seek and value student voices
- Not knowing how to help and fear of misinforming
- Lack of understanding on what it means to be a leader
- Fear of failure leads to dropping out

MANY FIRST GENERATION, RURAL STUDENTS DO NOT PERSIST IN STEM MAJORS

INGRAINED INSTITUTIONAL RESISTANCE

- Faculty rewards not tied to teaching
- Not tied to student relationships
- Lack of recognition for well-prepared schools and programs
- Immediate financial payback not evident
- No incentive to change traditional teaching methods
- Education and industry not working together

TRANSITION

- Lack of math readiness
- High failure rates in math and chemistry
- Desire to persist and overcome barriers
- Lack of knowledge of expectations for graduate school
- Lack of academic and social community
- Lack of incentives for teaching reform
- Cultural challenges

ACCULTURATIVE STRESS

- Tension between moving up and moving out
- Lack of exposure to diversity
- Received message that local youth do not achieve
- Lack of familiarity with college culture
- Increasing sense of difference from hometown people
- Missing access to nature
- Conflict of morals and values
- Sense of isolation

MONEY

- Need to work
- Internships are unpaid
- Broken guidance on college
- Lack of guidance on financial literacy
- Moving in and out of dorms for breaks
- Lack of participation in mentoring
- Families don't understand earning potential of unknown majors