

First2 Network Improvement Science Tool Kit

The aim of the First2 Network is to double the college graduation rate of rural, first-generation and other underrepresented STEM students in West Virginia and beyond. When First2 began as a launch pilot program in 2016, we investigated several collective impact models, and landed on Networked Improvement Communities using improvement science as our way to accomplish systems change. We have learned so much since those early days. As a novice Alliance in 2018, First2 Network created affinity groups around primary drivers of change across multiple institutions of higher education throughout the state of West Virginia. After the first three years, First2 moved to transform our Networked Improvement Community from a collection of affinity groups to institutional teams based at each college and university. These teams, composed of students, faculty, and staff, test high-impact change ideas within an environment of support for first-generation and other underrepresented students. We recognized that a ‘human touch’ was required to support teams' use of the Plan Do Study Act (PDSA) process for carrying out tests of change to assure a consistent level of quality across our institutions. To ensure each institutional team has the support they need, we created an improvement science team (IST) of trained improvement science coaches to work directly with the institutions on their PDSAs to meet the quality standards First2 has upheld.

To support this, the IST:

- Developed a coaching process whereby each institutional team reviews and improves its PDSA plans; this process includes requirements that ensure the use of common change ideas and common metrics aligned with the key drivers of system change within the First2 network.
- Undertook a process to obtain IRB approvals at each institution to enable data sharing across the Network.
- Continued to document and promote the use of improvement science, with the goal of making it part of each institution’s culture.

This toolkit shares the processes and tools that we have developed. We hope it helps other organizations and higher education institutions apply what we have learned to their own communities.

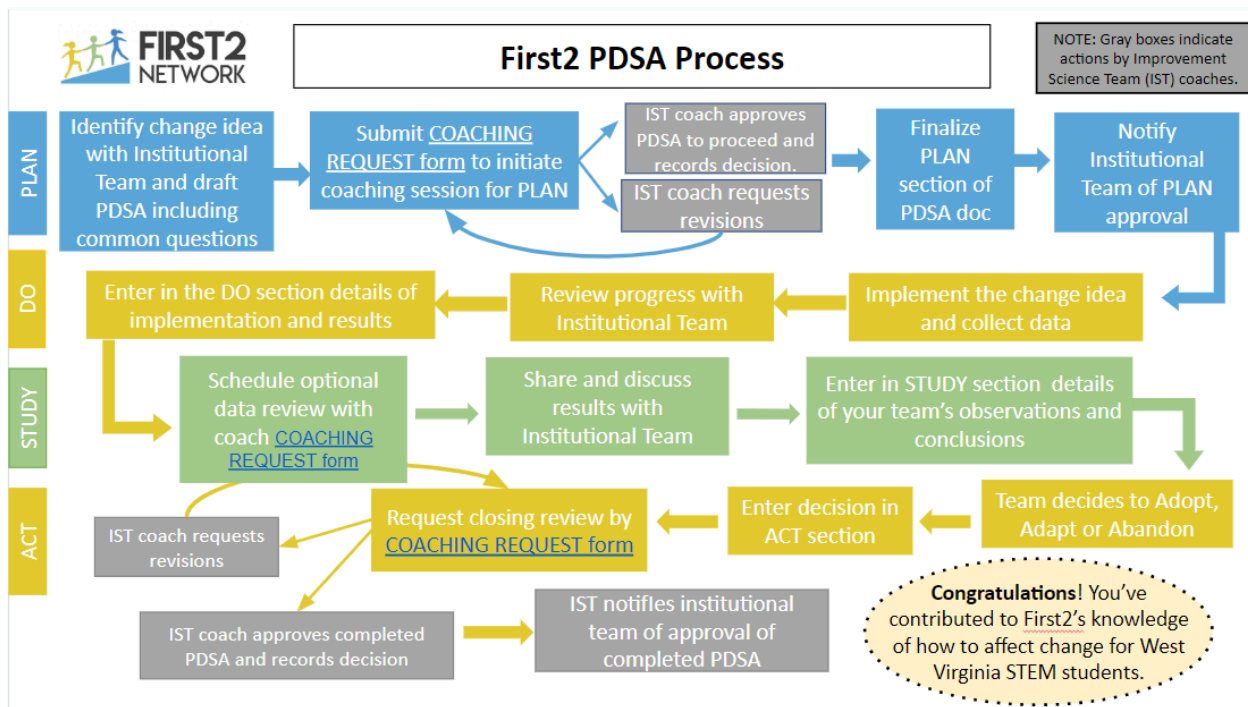


the National Science Foundation.

This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of

About Improvement Science, Improvement Science Team & process

- The Improvement Science Team coordinates improvement science work throughout the network, provides a central place for coaches to discuss questions about PDSAs, and supports institutional teams in their efforts to lead PDSAs.
- [IST meeting links](#) – This frequently-updated spreadsheet is a quick reference to many First2 Network improvement science resources. This spreadsheet includes templates, trackers, guidance, coaching forms, and contacts to ensure institutional teams have the most up to date information.
- Flow charts provide a visual representation of the process for institutional team members and another version for internal users (Improvement Science Team members).
 - [PDSA Process Flow Chart for Institutional Teams.pptx](#)



PDSA Templates and Change Idea Compilations

Like coaching, templates are used to standardize the process and completion of PDSAs. They provide valuable guidance and direction to make the process as easy as possible. These are based on the Driver Diagram and Outcome Measures listed below.

- [Finalized Templates](#)
- [First2 Change Ideas by Driver](#)
- [First2 Menu of Change Ideas.xlsx](#)



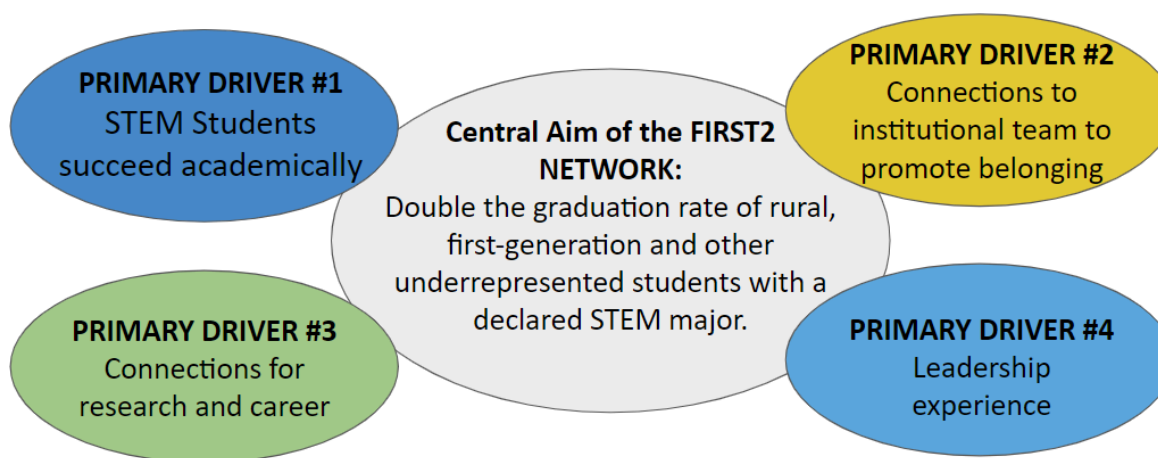
This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Driver Diagram

A driver diagram is a visual display of a team's theory of what contributes to the achievement of our aim to double the graduation rate of rural, first-generation and other underrepresented students with a declared STEM major.

- [First2 Driver Diagram 2.0 6-slide.pptx](#) and
- [Driver Diagram Simplified](#)

FIRST2 Drivers: how First2 Network achieves its central aim



Outcome Measures

These outcomes are based on the primary drivers and provide a goal for each PDSA; as such, each PDSA is required to address one of these outcomes.

- [First2 Measurement Examples 2024.xlsx](#)
- [First2 Priority Common Questions for surveys](#) (with links to partial and full scales) were developed to promote easier comparisons across schools and projects.

PDSA Tracker

Our PDSA tracker is a common place for institutional teams to check on their status, see other PDSAs, and address any upcoming deadline

- [PDSA Status Tracker](#)



the National Science Foundation.

This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of

Coaching (Handbook, request form, update form)

Coaching is one of the most important parts of Improvement Science. Coaches provide guidance to ensure institutional teams have the best resources and are also complying with the standards and initiatives of First2 Network. Techniques for managing shared or parallel work across the network are included in the Coaching Handbook (e.g., file naming.)

- [Coaching Handbook](#)
- [PDSA Coaching Request Form](#)
- [PDSA Coaching Updates Form](#)
- Going into our 7th year, as more people have become familiar with PDSA processes, we have evolved towards having local coaches at some of our institutions as a step towards sustainability.
- Training for coaches is available for institutional teams, please refer to page 5 of the coaching handbook above.

IRB Guidance

IRB approval is essential to First2 Network's ability to aggregate and share data. To that end, IRB applications and approvals and CITI training certificates are linked in the PDSA Status Tracker.

- [IRB Guidance FAQ](#)
- At least one representative from each school is required to provide documentation of an updated CITI training certificate.
- All institutions have designated one team member to serve as an IRB liaison to coordinate the process of IRB applications and provide documentation to the Network.

Outside assistance

- We contracted with SRI to serve as a mentor backbone, including providing significant guidance and expertise with improvement science, and in developing capacity within our institutional teams to complete IRB applications.
- We send Network members, including core staff, improvement science coaches, and improvement science team members, to learn and present at the annual Carnegie Foundation Summit on Improvement in Education organized by the Carnegie Foundation for the Advancement of Education.
- ICF, our external evaluator, provided formative feedback to the improvement science team on the extent to which teams were understanding the improvement science process, and using PDSA cycles to test change ideas.



the National Science Foundation.

This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of

Data collection and analysis

- Most survey data have been collected using a central First2 Qualtrics account, and then shared back with teams.
- PDSAs report de-identified summaries of data back to the Network.
- [First2 Improvement Science Data Process](#) is an FAQ document about how First2 uses data.
- [Step by Step Institutional Data Collection Needed for First2.docx](#) gives guidance to institutions on how to provide persistence and graduation data as well as overall PDSA impact data.
- Data storytelling efforts:
 - [2024 Campus Club Data.pptx](#)
 - Example of learning across campuses about a change idea
 - Worked well to allow compilation because one type of Qualtrics survey data was gathered across multiple campuses around one change idea
 - Improvement needed:
 - missing data that was planned in the PDSAs
 - lack of reflection
 - Newsletter Improvement Science stories
 - [First2 May 2024 Newsletter Content.docx](#)
 - [First2 February 2024 Newsletter Content.docx](#)
 - [First2 December 2023 Newsletter Content.docx](#)
 - Improvement Science Compendium from 2023
 - [Improvement Science Compendium.docx](#)
 - Additional Data collection and analysis. In addition to data collected by each tester of change, we have combined data across the network where appropriate and also measure the aggregated impact on the persistence of students impacted by one or more change ideas. We note that students who participate in First2 change idea activities show greater persistence than students who do not. Below see results from two First2 higher education institutions:



the National Science Foundation.

This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of

Persistence and First2 Engagement

BIG SCHOOL: WVU student persistence from 63% to 84%

Of the **1106 WVU STEM majors** who participated in at least one First2 Change Idea test (PDSA) activity this academic year, 927 (**83.8%**) **remained in a STEM degree** and 179 (16.2%) left STEM. Students participating in at least one First2 activity had a higher persistence rate in STEM (83.8% persistence) than the current WVU STEM persistence rate (**63.4%**). The rate of 63.4% is the persistence rate of our comparison group.

SMALL SCHOOL: Fairmont student persistence from 34-46% to 92%

Of **68 Fairmont students** impacted by First2 Change Idea tests (PDSAs) in 22-23 and 23-24, 36 (=54%) started college as STEM majors. They have substantially higher persistence rates of **92% persistence** overall average to date than the overall STEM population during those years. For comparison, the 5 or 6 year graduation rates are **43-46%** for all STEM students and **34-38%** for first-gen STEM students who started in 2018 or 2019.

Bibliography

- [Carnegie Poster](#)
- [Carnegie Recording link](#)



the National Science Foundation.

This material is based upon work supported by the U.S. National Science Foundation under Grant Numbers 1834595, 1834601, 1834575, 1834569, 1834586. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of