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*Building State Capacity for Reporting Perkins Data*

## Data-Driven Continuous Improvement: The Ohio STEM Equity Pipeline Project

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# NAPE's Professional Development Suite of STEM Equity Pipeline Programs

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## STEM Equity Pipeline™

### PIPESTEM™

Working with institutional leaders to improve enrollment, retention, & completion of girls & under-represented populations in STEM programs of study

### STEM Equity Teacher Training

Training teachers to use pedagogy that improves enrollment, retention, & completion of girls & under-represented populations in STEM courses

### STEM Equity Counselor Training

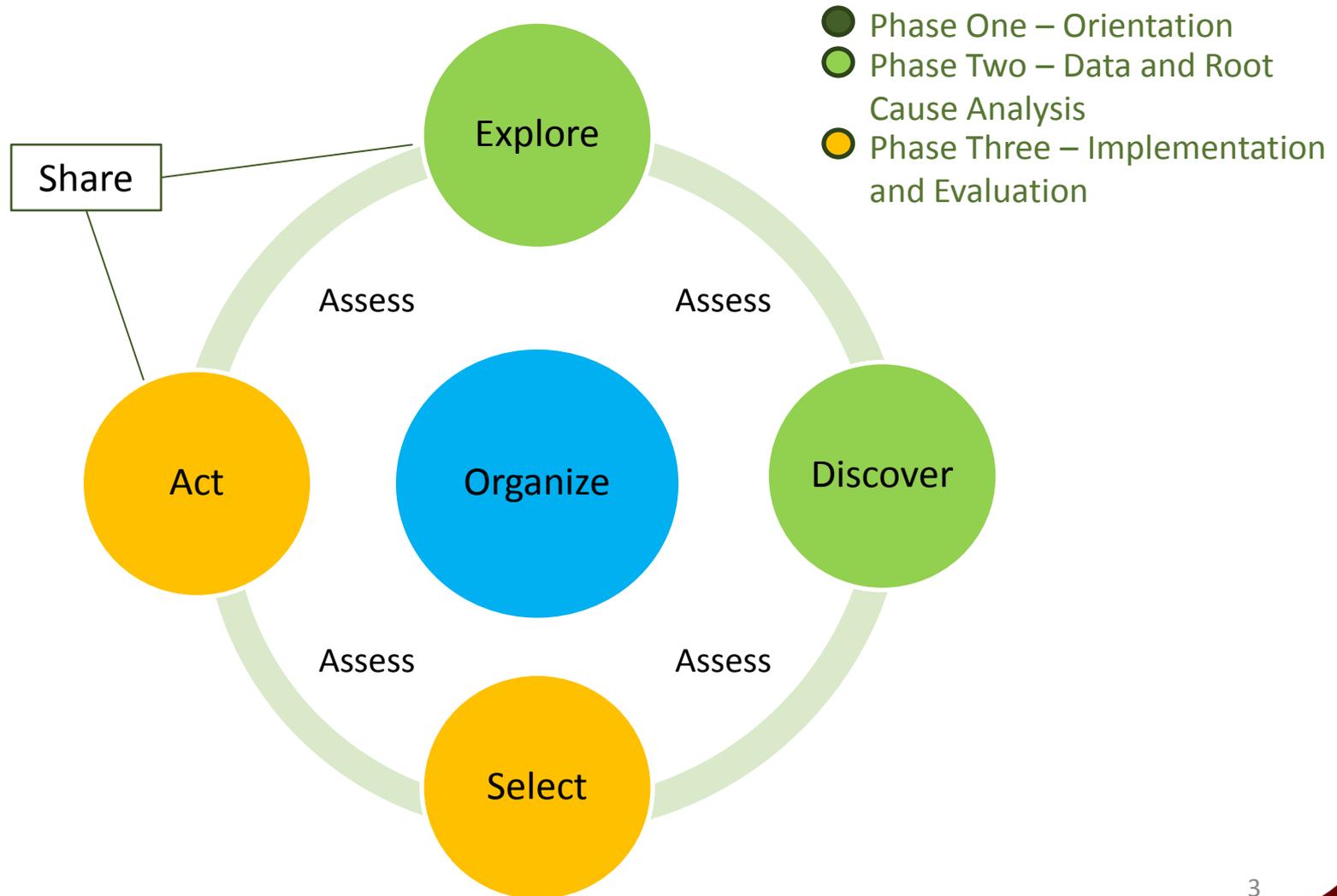
Coaching counselors to encourage girls & under-represented populations in STEM careers

### Tools & Resources

Tools to support teachers' & counselors' learning & assist their students, e.g., camps, partner orgs, print & media resources, & curriculum

# Program Improvement Process for Equity™

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# Ohio STEM Equity Pipeline Project

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- Initially part of the National Science Foundation-funded STEM Equity Pipeline Project
  - Three pilots in community colleges in FY10–FY12
- Expanded through Ohio Department of Education Office of Career-Technical Education through contract with Columbus State Community College
  - Utilized state *Perkins* funds
  - Eight secondary LEAs in FY12–FY13
  - Six additional LEAs in FY14–FY15
- Additional projects contracted directly with NAPE in FY13

# Ohio Department of Education Project

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- LEAs selected
  - CTE secondary programs not meeting nontraditional participation and/or nontraditional completion indicators
    - Some required to submit Performance Improvement Plans (PIPs)
    - PIPE-STEM™ Plan can be their “PIP”
  - Selected in consultation with ODE field agents
  - CTE directors or other administrator designated as “site lead”
- Team information at <http://www.stemequitypipeline.org/> (click on “State Teams”)

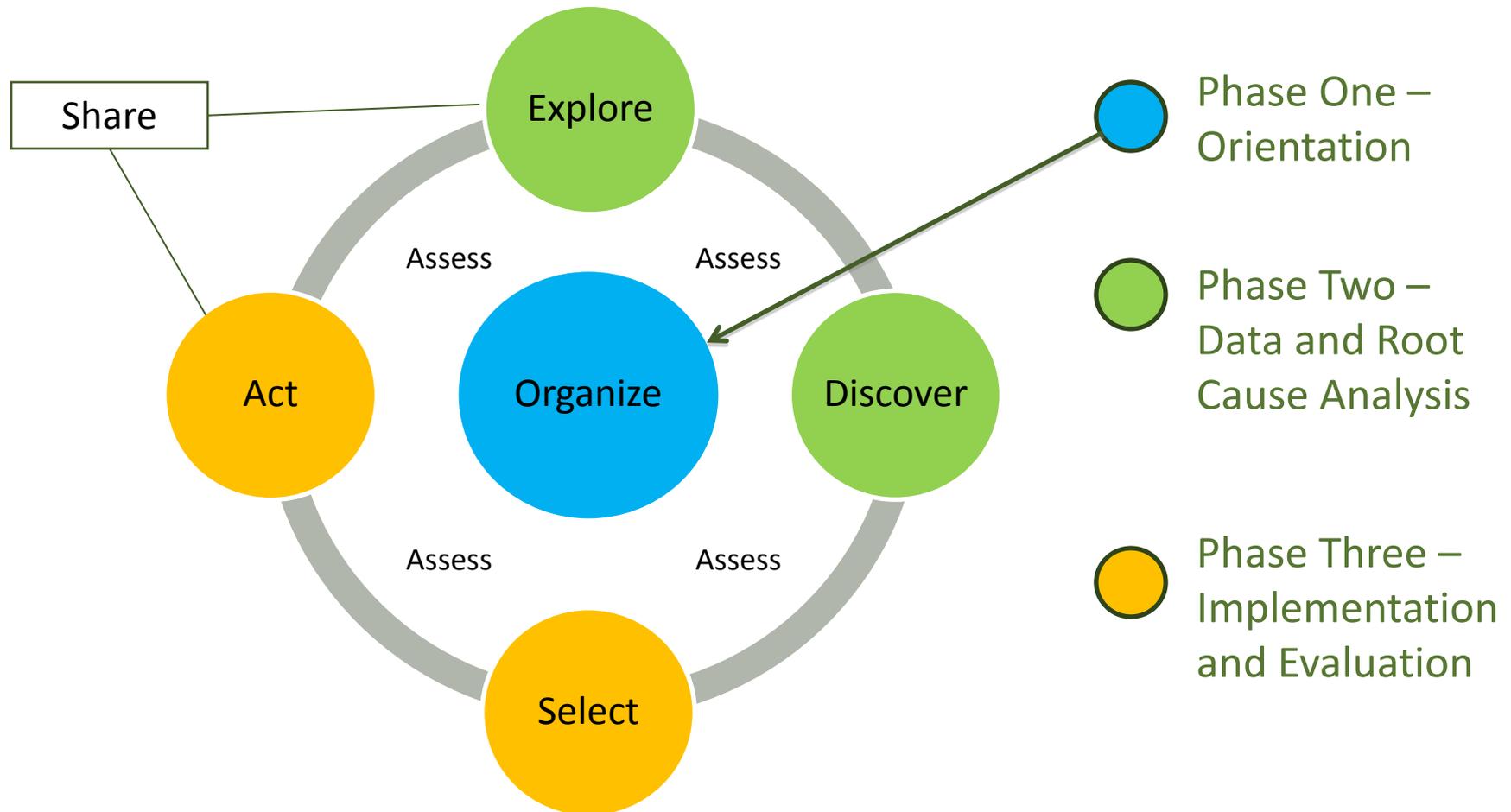
# *Perkins Act Accountability*

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- Core indicators on nontraditional CTE
  - Participation in CTE programs preparing students for nontraditional fields (**6S1/5P1**)
  - Completion of CTE programs preparing students for nontraditional fields (**6S2/5P2**)

# Phase One – Orientation

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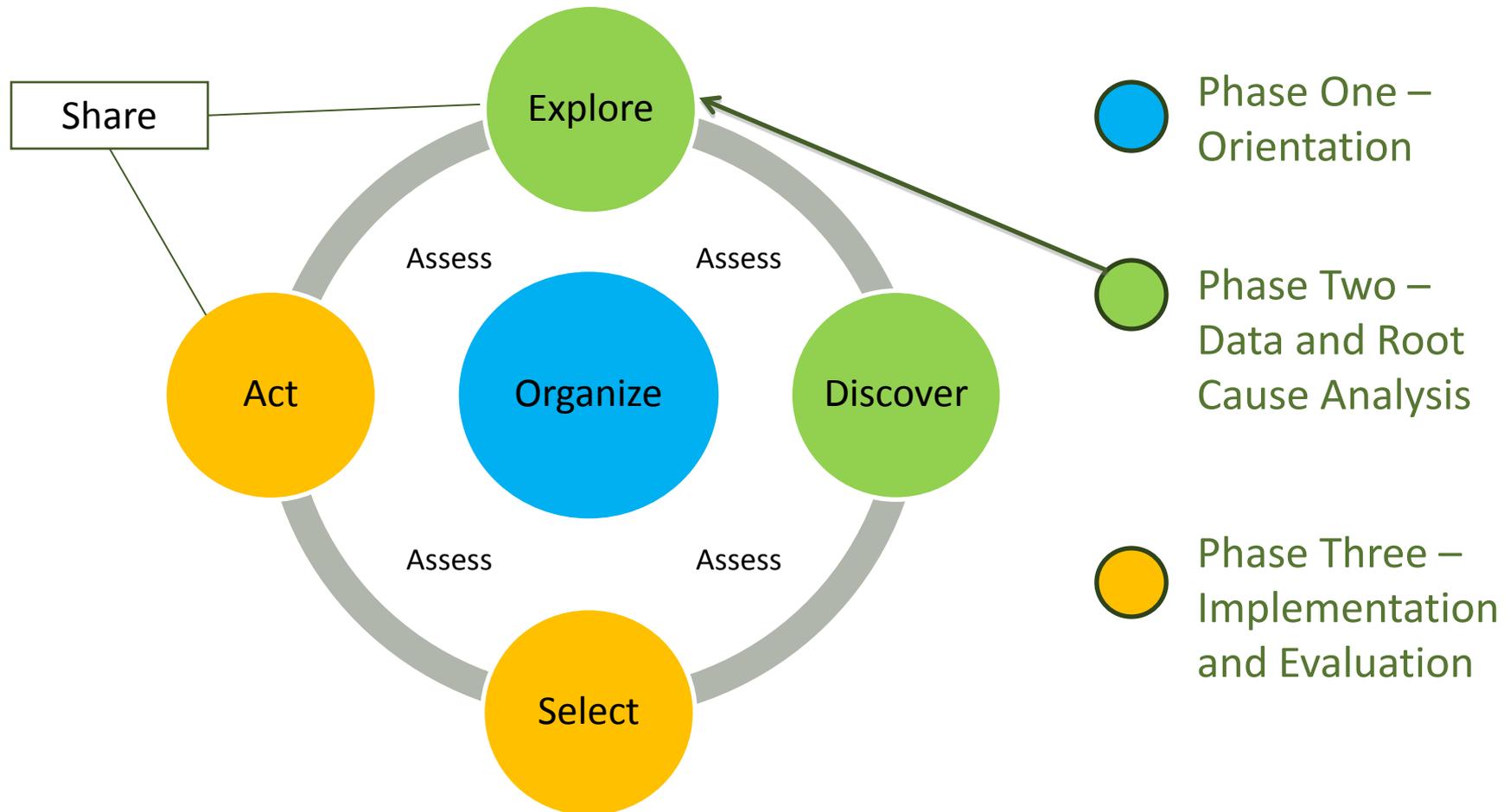


# PIPE-STEM Team

- Site lead – director of secondary CTE or other designee
- Administrator(s)
- CTE faculty
- School counselor(s)
- Middle school administrator or counselor, in some cases
- Postsecondary partner(s)
- Business & industry partner
- Community partner

# Phase Two – Data and Root Cause Analysis

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# Defining STEM

- Science, Technology, Engineering, and Math
- Agriculture, Food, and Natural Resources
- Health Science
- Information Technology
- Manufacturing
- Transportation, Distribution, and Logistics
- Architecture and Construction

# Data Collection Disaggregation Required in *Perkins IV*

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## ***Gender***

- Male
- Female

## ***Race/Ethnicity***

- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black, non-Hispanic
- Hispanic
- White, non-Hispanic

## ***Special Population***

- Underrepresented Gender Students in a Nontraditional CTE Program
- Single Parent
- Displaced Homemaker
- Limited English Proficiency
- Individuals with a Disability
- Economically Disadvantaged

# Recommended Analyses

## ***Comparisons***

- State performance level
- Best performer in state
- Selected peer benchmark
- Set your own benchmark

## ***Trends***

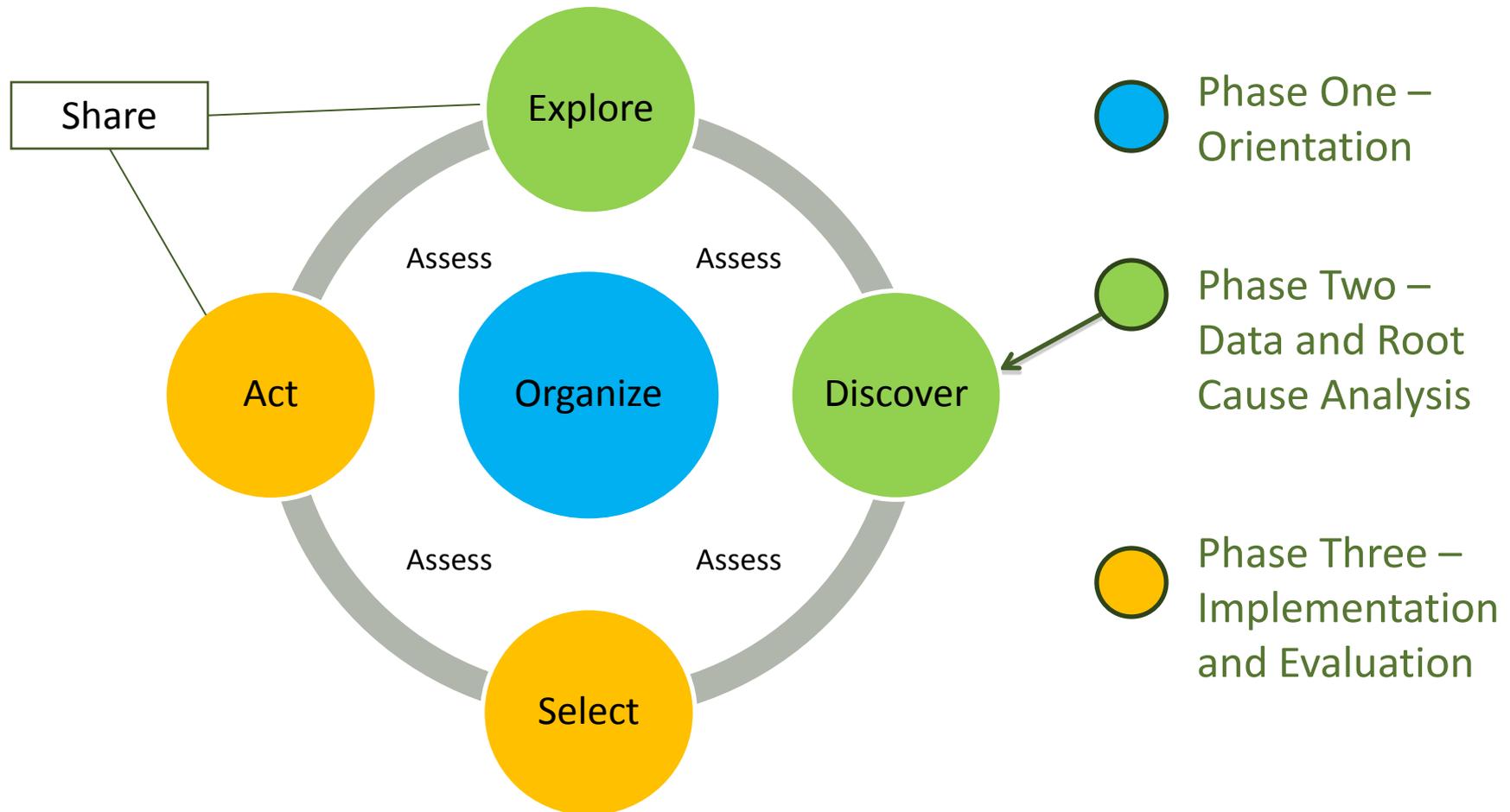
- At least 2 yrs
- Prefer 3–5 yrs

## ***Site Specific***

- Statewide
- District
- School/College
- Programs

# Phase Two – Data and Root Cause Analysis

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# Review Research Summary

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- *“Nontraditional Career Preparation: Root Causes and Strategies”*

Authors: Lynn Reha, ICSPS; Mimi Lufkin, C.E.O. NAPE;  
and Laurie Harrison, Foothill Associates

# Root Causes

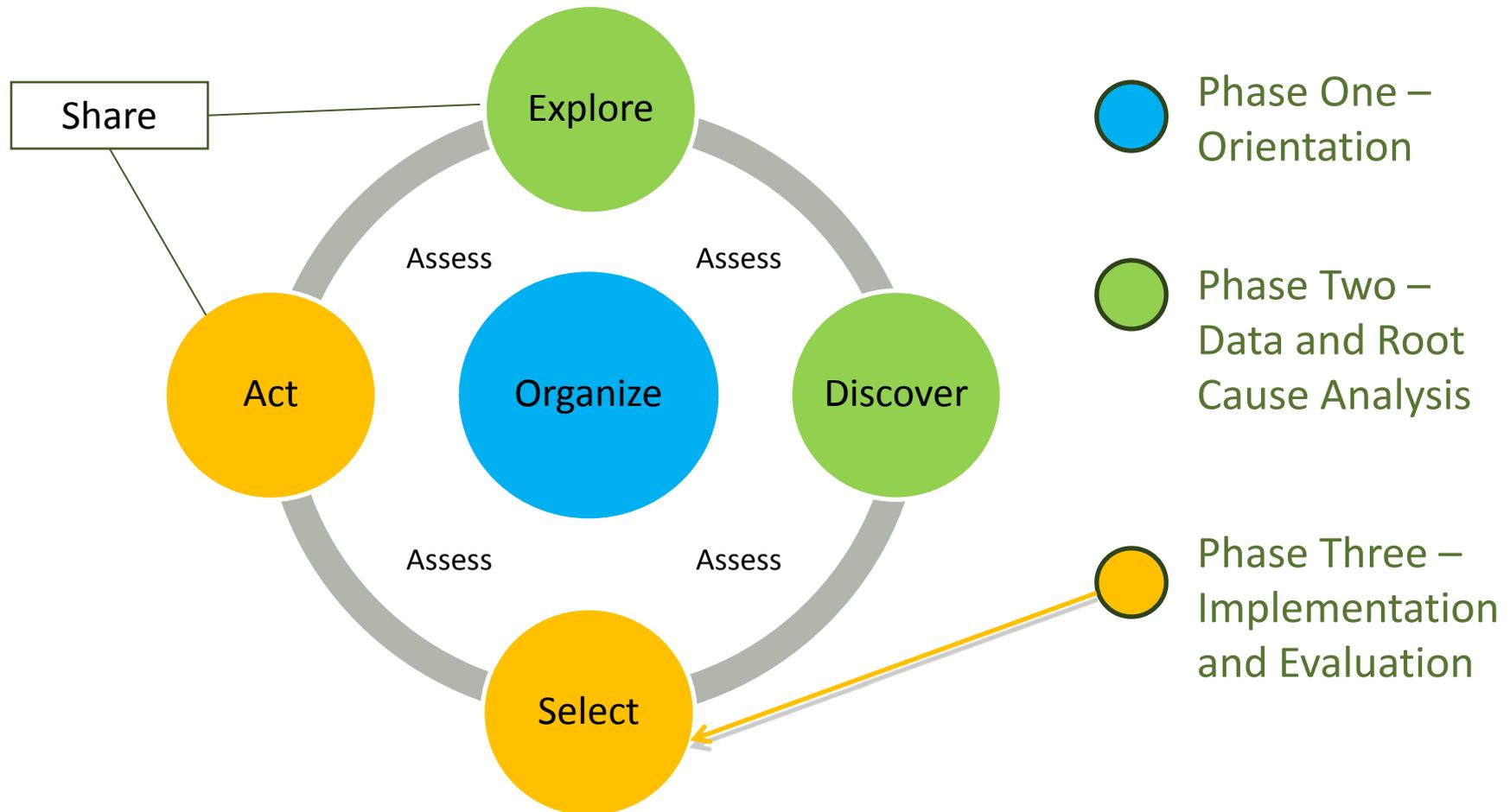
- Educational Environment
- Career Information
- Family Characteristics (Family Perceptions)
- Individual Factors
- Societal Issues

# Confirming Your Hypotheses

- Conduct a root cause analysis
  - **Conduct equity audit**
    - School environment: physical space, support services
    - Curriculum & instruction
    - Publicity (website, recruitment materials, etc.)
  - **Interview students**
    - Who drops out of nontraditional programs?
    - Who stays in nontraditional programs?
    - Who never chooses?
  - **Conduct focus groups**
    - Teachers of nontraditional programs
    - Parents
    - Business/industry/advisory committee members

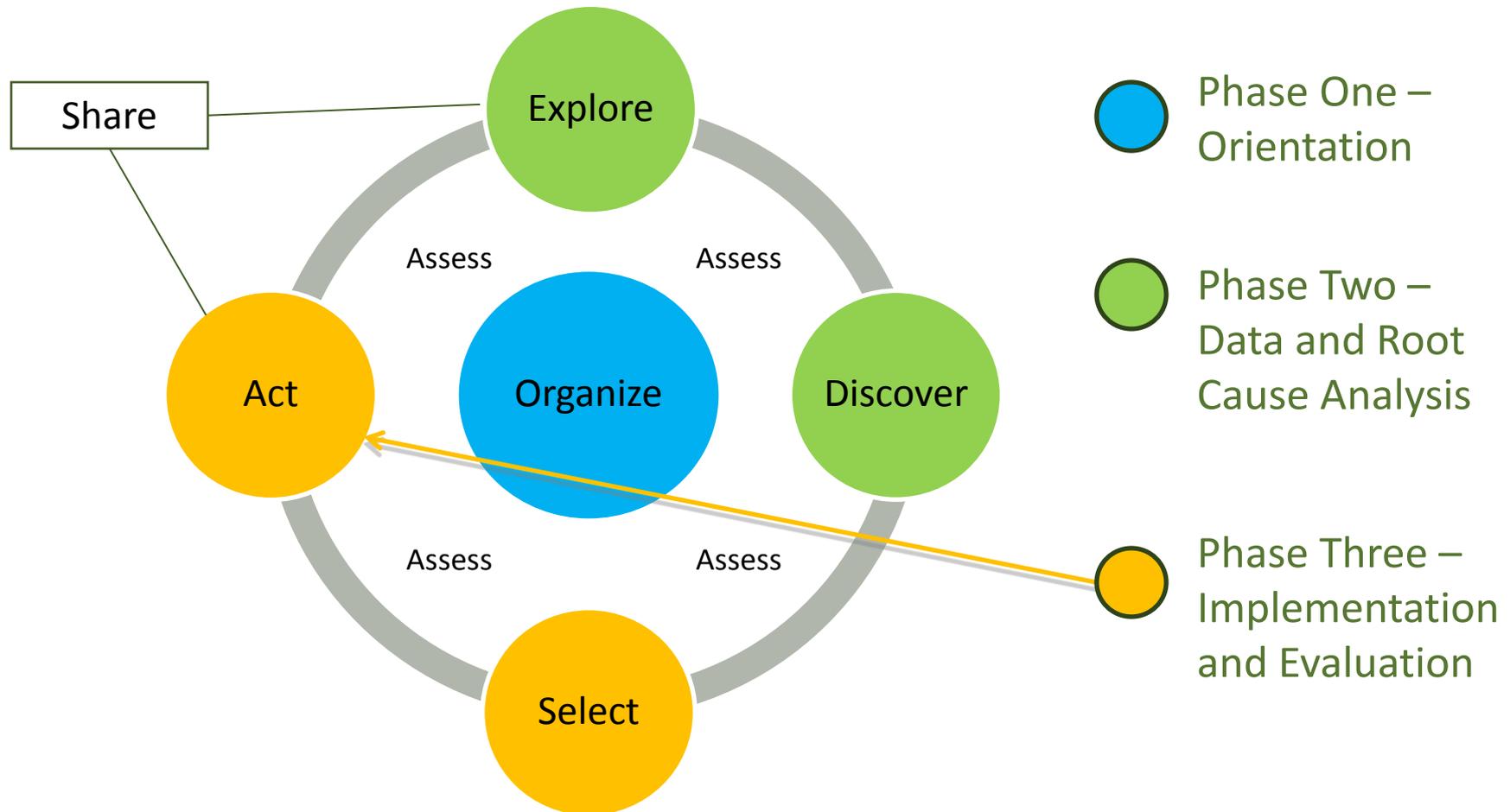
# Phase Three – Implementation and Evaluation

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# Phase Three – Implementation and Evaluation

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# Themes in Strategies

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- Early Intervention – providing career information and characteristics of STEM occupations to middle school and high school students
  - NAPE’s new Counselor Toolkit
- Collaboration between secondary and postsecondary partners in getting students excited about nontraditional STEM occupational pathways
- Educating parents, teachers, school counselors, & administrators about career pathways through STEM in career-technical education, especially for women and others underrepresented in STEM
- Professional development for STEM educators, e.g., NAPE’s “Micromessaging to Reach and Teach Every Student”™
- Providing additional supports to underrepresented students
  - Regular programs
  - Mentors and role models

# Project Lead the Way Examples

- New PLTW Program at Mansfield Senior High School
  - New *Gateway to Technologies* (GTT) course for all 8th graders with female engineer teacher
  - Hands-on activities throughout the year
  - Education for students and parents on opportunities in STEM
  - Enrollment in first freshman PLTW program
    - 41 students have signed up for the 9th-grade class (18.6% of students who took GTT): 9 females (4% of total population, 22% of GTT); 15 African-American students (over 30%, males and females); 6.8% of total population (37% of GTT—very high). Parity with demographic for race/ethnicity

# Project Lead the Way

- Low enrollment of female students in 9th grade at Whitmer Career & Technology Center, Toledo, Ohio
  - New summer camp “GEMS” (Girls Exploring Math & Science) for summer before 8th grade
  - Quarterly hands-on activities in 8th grade
  - Winter of 8th grade – “Camp” with academic and career planning emphasis
    - Includes older students as mentors and role models

# Significant Increase in Nontraditional Student Enrollment

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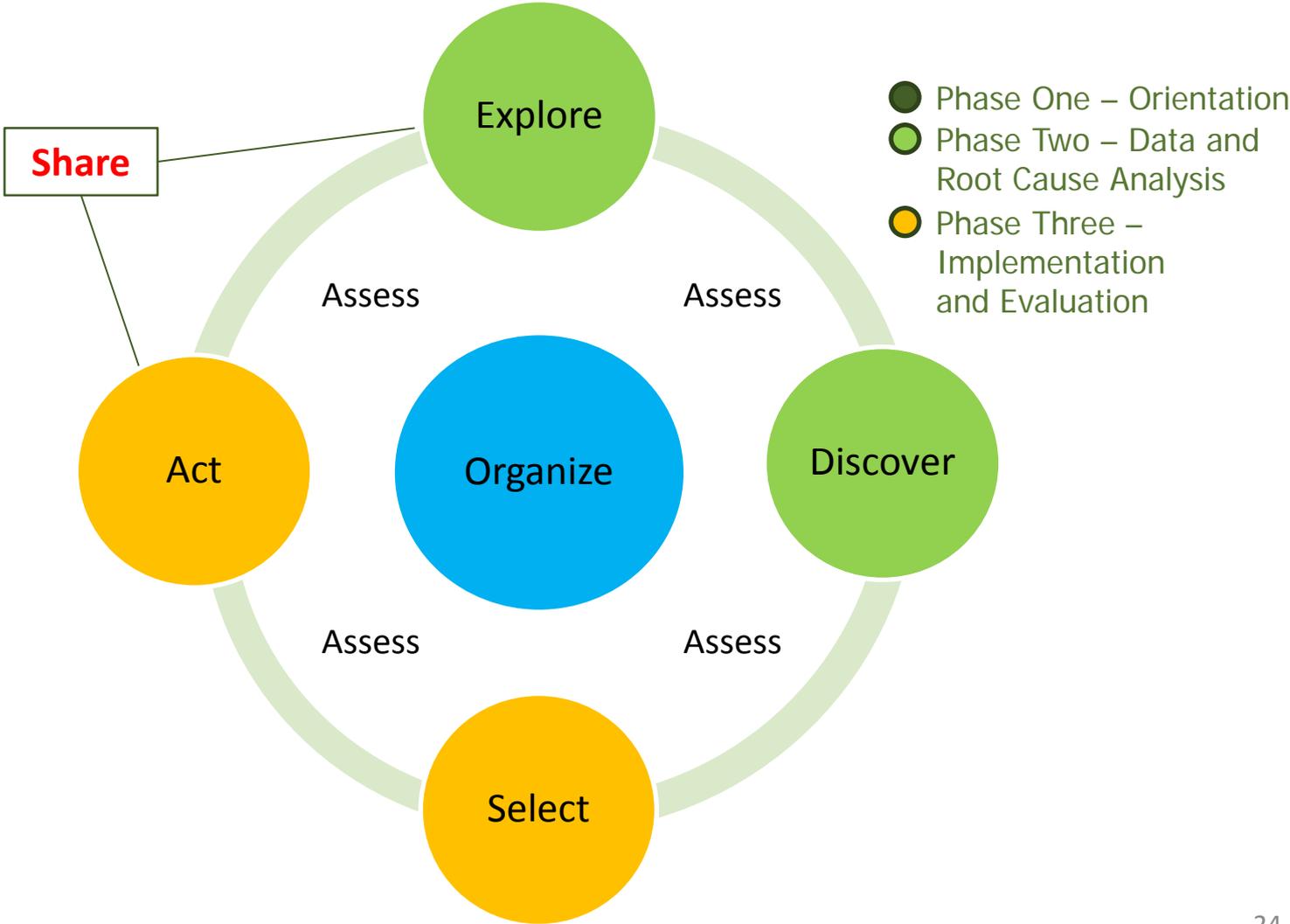
- More than doubled female enrollment in targeted programs at Maplewood Career Center (IT, CAD, and Electronics)
- Enrollment in the Welding Program for Fall 2013 includes five female students (out of 25 in the class), which represents 20% of the class
  - Previous years have had one to two females per year
- Attributed to better promotion of nontraditional careers by counselors (meeting with counselors in fall 2012)

# Strengths of PIPE-STEM™

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- Data driven (national and local)
- Collaborative across the pipeline
- Assessment, Assessment, Assessment
- Continuous improvement and learning
- Evidence that it has made a difference
- A national model
- NSF-supported...twice
- Review PIPE-STEM™ Plan Example

# Program Improvement Process for Equity™



# PIPE-STEM™ Sample Outcomes

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- After conducting a targeted personal outreach event, enrollment in high school freshman PLTW increased from 32 to 87—with 15 girls
- After hiring a female teacher's aide in a community college auto technology program, enrollment of women increased from 4 to 15 in one semester
- Community college nuclear engineering program graduated its first class with 6 (25%) women, and 7 (30%) women enrolled for the fall

# PIPE-STEM™ Sample Outcomes

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- After implementing targeted recruitment to women, a community college aviation program increased enrollment from 0 women to 7
- High school female enrollment increased after implementing their PIPE-STEM Plan:
  - AP Physics: 18% ➡ 28%
  - AP Chemistry: 35% ➡ 53%
  - IED: 10% ➡ 16%
  - CEA: 4% ➡ 18%
  - POE: 3% ➡ 7%
- High school PLTW female enrollment before PIPE-STEM = 87 girls; two years later = 126 girls

# Questions?

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## Thank You

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