What is a Stakeholder Interest Map?

• This is a way to see the organizational landscape in cases where there are many stakeholders, not one organization is in charge, and collaboration is needed.

• Ensuring an effective and sustainable set of research computing and data resources for minority serving institutions (MSIs) is an example where progress together will far exceed what each organization could do on its own – which prompted the stakeholder interest survey.

• These materials begin with the introductory language from that stakeholder survey that was sent out to MSI institutions, then include profile information on the respondents, and, finally, feature a mix of qualitative and quantitative data that is designed to inform collaborative dialogue, planning and action.
Stakeholder Survey Invitation:

You are invited to participate in a baseline survey focusing on strategic partnerships advancing research computing and data services among minority service institutions (MSIs). MSIs include:

- Historically Black Colleges and Universities (HBCUs)
- Hispanic Serving Institutions (HSIs)
- Tribal Colleges and Universities (TCUs)
- additional minority serving institutions

In this survey, we use the term “cyberinfrastructure” (CI) to refer to the full range of computation and data resources needed for research and education in a globally connected science community. The National Science Foundation (NSF) uses this combination of “cyber” and “infrastructure” as central to supporting NSF-funded campus researchers and programs. Cyberinfrastructure includes the network, data, software and hardware resources, special instruments, and facilitation with researchers to best utilize available research computing resources.

The overall aim with the survey is to help a combination of MSI institutions to advance cyberinfrastructure resources together in ways that exceed what they can do separately.

Research computing and data services are of increasing importance to MSI faculty in the sciences, engineering, social sciences, humanities, and professional domains. Work in this domain is of increasing importance to students attending MSI institutions.

Respondent Profile (n=49)

Minority Serving Institutions with one or more respondents:

- Alabama A&M University
- Benedict College
- Bethune-Cookman University
- Claflin University
- Clark Atlanta University
- Dillard University
- Fisk University
- Francis Marion University
- Hampton University
- Jackson State University
- Johnson C. Smith University
- Lambuth University
- Lane College
- Mississippi Valley State University
- Mississippi State University
- Morehouse College
- Morgan State University
- Norfolk State University
- North Carolina A&T State University
- North Carolina Central University
- Prairie View A&M University
- Regis University
- South Carolina State University
- Xavier University of Louisiana
Respondent Profile (n=49) (cont.)

Roles
- Campus Executive Leadership (n=7)
- Campus Academic Leadership (n=12)
- Campus IT Services (n=5)
- Campus Research Computing & Data Facilitators (n=8)
- PI and Research Team Members (n=33)
- Non-MSI Respondents (n=4)

Experience
- Under 5 years
- 5-10 years
- 11-20 years
- 21-30 years
- Over 30 years

Respondent Profile (n=49) (cont.)

Gender
- Female
- Male
- Prefer not to say

Education
- Bachelor Degree
- Graduate degree (non-doctoral)
- Doctoral degree
If a potential cyberinfrastructure consortium of Minority Serving Institutions could deliver one thing to you, "a must have," what would it be? (Something that you personally value or that is professionally useful to you. It would motivate you to want this to move forward.) (sample responses)

<table>
<thead>
<tr>
<th>Support: services and resources (n=15)</th>
<th>Collaboration (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research computing specialists to manage software needs.</td>
<td>Potential collaborators with expertise in big data science and high performance computing.</td>
</tr>
<tr>
<td>Ability to collect, store, share all forms of scientific data and communication in a manner that students and faculty have FULL input and access.</td>
<td>Grant/contract partnerships.</td>
</tr>
<tr>
<td>Access to supercomputing infrastructure.</td>
<td>Interconnectedness of computers to share experiences across universities in real-time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Training and education/capacity building (n=12)</th>
<th>Compute power and storage (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training for new and emerging researchers.</td>
<td>Distributed and parallel supercomputing capabilities.</td>
</tr>
<tr>
<td>Distance learning studio.</td>
<td>Huge data storage center.</td>
</tr>
<tr>
<td></td>
<td>Large data processing facility linked to a pipeline which can permit ready access.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific research and development topics (n=5)</th>
<th>Security (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A testbed for &quot;pie in the sky&quot; ideas in climate modeling.</td>
<td>Collaboration in protecting the interests of our collective institutions through enterprise type and level security posture.</td>
</tr>
<tr>
<td>Quality of Life Surveys for the surrounding area.</td>
<td>Disaster Recovery Policy.</td>
</tr>
<tr>
<td>Applications of cybersecurity to the energy grid.</td>
<td></td>
</tr>
<tr>
<td>A testbed for ethical hacking.</td>
<td></td>
</tr>
</tbody>
</table>
What is the biggest barrier preventing or limiting your “must have?” (sample responses)

<table>
<thead>
<tr>
<th>Money (n=19)</th>
<th>Institutional Considerations (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cost.</td>
<td>• Buy-in from the various institutions.</td>
</tr>
<tr>
<td>• Time, budget.</td>
<td>• Developing trusting relationships.</td>
</tr>
<tr>
<td>• Resources.</td>
<td>• University willpower and large data carrying optical cable for this purpose.</td>
</tr>
<tr>
<td>• Funding to support faculty and students in this developing field.</td>
<td>• No support for research computing infrastructure in campus.</td>
</tr>
<tr>
<td>People (n=8)</td>
<td>• An institution to lead the effort that is impartial to each MSI.</td>
</tr>
<tr>
<td>• Lack of personnel with time to work with faculty.</td>
<td>• Computing hardware resources and organization of MSI consortium.</td>
</tr>
<tr>
<td>• Capacity.</td>
<td></td>
</tr>
<tr>
<td>• Systems support personnel.</td>
<td></td>
</tr>
</tbody>
</table>

Mixed: Time, Money, People (n=11)

• Funding and skilled resources.
• Computing hardware resources and organization of MSI consortium.

Indicator Issues, in order by size of gap

Note: The mean for “importance” – the mean for “difficulty” = gap
It is all on a scale from 1.0 to 0 so the first issue is a mean of .88 - 0.19 = .69

1. Implementing leading practices for regulatory compliance in mixed funding environments (government costing, appropriate use of funds, etc.) at your MSI institution. 0.88 - 0.19 = .69
2. Collaboration on research cyberinfrastructure between MSI institutions and majority-serving institutions (PWIs). 0.87 - 0.20 = .67
3. Collaboration on research cyberinfrastructure across multiple MSI institutions. 0.85 - 0.20 = .65
4. Implementing leading practices for balancing resource allocation for campus IT functions and campus cyberinfrastructure research support at your MSI institution. 0.84 - 0.19 = .65
5. Effective models for demonstrating return on investment (ROI) in research computing resources at your MSI institution. 0.79 - 0.17 = .62
6. Collaboration on research cyberinfrastructure between MSI institutions and private sector industry. 0.81 - 0.20 = .61
### Indicator Issues, in order by size of gap (cont.)

*(importance – difficulty = gap on a scale from 1.0 to 0)*

7. Innovating in the **design and operation of campus research cyberinfrastructure** at your MSI institution.
   
   0.82 - 0.23 = .59

8. **Career development** for cyberinfrastructure administrators and staff at your MSI institution.
   
   0.83 - 0.25 = .58

9. Connecting research cyberinfrastructure support with teaching about cyberinfrastructure (**future CI workforce development**).
   
   0.88 - 0.31 = .57

10. Constructing a campus **cyberinfrastructure strategic plan** at your MSI institution.
    
    0.83 - 0.27 = .56

11. Implementing leading practices for **cyber security** your MSI institution.
    
    0.84 - 0.28 = .56

12. Helping students at your MSI to pursue **careers in the cyberinfrastructure domain**.
    
    0.88 - 0.27 = .51

13. Influencing **state and federal policies** impacting research cyberinfrastructure at MSI institutions.
    
    0.75 - 0.24 = .51

### Reading a z-flower™

- **A color coded hexagon for every stakeholder**
- **Key:**
  - Shades of green: Positive
  - Shades of yellow: Neutral
  - Shades of red: Negative
  - Blank: Don’t know/Not applicable/No response

- **Central tendency**
- **Outliers**

- **Importance:** Constructing a campus cyberinfrastructure strategic plan at your MSI institution.
  
  ave: 0.83 std: 0.22

1. Implementing leading practices for *regulatory compliance* in mixed funding environments (government costing, appropriate use of funds, etc.) at your MSI institution.

**Gap:** 0.88 - 0.19 = 0.69


1. Implementing leading practices for *regulatory compliance* in mixed funding environments (government costing, appropriate use of funds, etc.) at your MSI institution. (cont.)

<table>
<thead>
<tr>
<th>How Important</th>
<th>How Challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive Leadership (n=7)</td>
<td>9.8</td>
</tr>
<tr>
<td>Campus Academic Leadership (n=12)</td>
<td>9.0</td>
</tr>
<tr>
<td>Campus IT Services (n=5)</td>
<td>9.2</td>
</tr>
<tr>
<td>Campus Research Computing &amp; Data Facilitators (n=8)</td>
<td>9.2</td>
</tr>
<tr>
<td>PI and Research Team Members (n=33)</td>
<td>8.3</td>
</tr>
<tr>
<td>Non-MSI Respondents (n=4)</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Legend: \[\text{How Important} \quad \text{How Challenging}\]
2. Collaboration on research cyberinfrastructure between MSI institutions and majority-serving institutions (predominantly white institutions (PWIs)).

**Importance**: Collaboration on research cyberinfrastructure between MSI institutions and majority-serving institutions

ave: 0.87 std: 0.13

**Ease**: Collaboration on research cyberinfrastructure between MSI institutions and majority-serving institutions

ave: 0.20 std: 0.20

**Gap**: 0.87 - 0.20 = 0.67


2. Collaboration on research cyberinfrastructure between MSI institutions and majority-serving institutions (predominantly white institutions (PWIs)). (cont.)

![Bar chart showing importance and challenge of collaboration](chart.png)
3. Collaboration on research cyberinfrastructure **across multiple MSI institutions**.

**Importance:** Collaboration on research cyberinfrastructure across multiple MSI institutions.

**Ease:** Collaboration on research cyberinfrastructure across multiple MSI institutions.

**Gap:** 0.85 - 0.20 = .65


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3. Collaboration on research cyberinfrastructure **across multiple MSI institutions**. (cont.)

![Bar chart showing importance and challenge of collaboration across multiple MSI institutions for different groups.](chart)
4. Implementing leading practices for balancing resource allocation for campus IT functions and campus cyberinfrastructure research support at your MSI institution.

Gap: 0.84 - 0.19 = .65


4. Implementing leading practices for balancing resource allocation for campus IT functions and campus cyberinfrastructure research support at your MSI institution. (cont.)

<table>
<thead>
<tr>
<th>Role</th>
<th>Importance</th>
<th>Challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive Leadership</td>
<td>9.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Campus Academic Leadership</td>
<td>9.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Campus IT Services</td>
<td>9.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Campus Research Computing &amp; Data Facilitators</td>
<td>9.0</td>
<td>2.9</td>
</tr>
<tr>
<td>PI and Research Team Members</td>
<td>8.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Non-MSI Respondents</td>
<td>8.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>
5. Effective models for demonstrating **return on investment (ROI)** in research computing resources at your MSI institution.

**Importance**: Effective models for demonstrating return on investment (ROI) in research computing resources at your MSI

**Ease**: Effective models for demonstrating return on investment (ROI) in research computing resources at your MSI institution.

Gap: 0.79 - 0.17 = .62


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5. Effective models for demonstrating **return on investment (ROI)** in research computing resources at your MSI institution. (cont.)

<table>
<thead>
<tr>
<th></th>
<th>How Important</th>
<th>How Challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive</td>
<td>7.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Leadership (n=7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campus Academic</td>
<td>8.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Leadership (n=12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campus IT Services</td>
<td>8.8</td>
<td>3.0</td>
</tr>
<tr>
<td>(n=5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campus Research</td>
<td>8.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Computing &amp; Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitators (n=8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI and Research</td>
<td>7.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Team Members (n=33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-MSI Respondents</td>
<td>8.0</td>
<td>2.8</td>
</tr>
<tr>
<td>(n=4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Collaboration on research cyberinfrastructure between MSI institutions and private sector industry.

**Importance:** Collaboration on research cyberinfrastructure between MSI institutions and private sector industry.

*ave: 0.81 std: 0.17*

**Ease:** Collaboration on research cyberinfrastructure between MSI institutions and private sector industry.

*ave: 0.20 std: 0.15*

Gap: $0.81 - 0.20 = 0.61$


6. Collaboration on research cyberinfrastructure between MSI institutions and private sector industry. (cont.)

<table>
<thead>
<tr>
<th>Role</th>
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<tbody>
<tr>
<td>Campus Executive Leadership</td>
<td>7.6</td>
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<td>8.9</td>
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<tr>
<td>Non-MSI Respondents</td>
<td>8.7</td>
<td>3.0</td>
</tr>
</tbody>
</table>
7. Innovating in the design and operation of campus research cyberinfrastructure at your MSI institution.

**Importance:** Innovating in the design and operation of campus research cyberinfrastructure at your MSI institution.

*ave: 0.82 std: 0.17*

**Ease:** Innovating in the design and operation of campus research cyberinfrastructure at your MSI institution.

*ave: 0.23 std: 0.16*

**Gap:** \(0.82 - 0.23 = 0.59\)


7. Innovating in the design and operation of campus research cyberinfrastructure at your MSI institution. (cont.)

![Bar chart showing the importance and challenge scores for different groups.](chart-url)
8. **Career development** for cyberinfrastructure administrators and staff at your MSI institution.

**Importance:** Career development for cyberinfrastructure administrators and staff at your MSI institution.

ave: 0.83 std: 0.20

**Ease:** Career development for cyberinfrastructure administrators and staff at your MSI institution.

ave: 0.25 std: 0.19

Gap: 0.83 - 0.25 = .58


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8. **Career development** for cyberinfrastructure administrators and staff at your MSI institution. (cont.)

![Bar chart showing importance and challenge levels of career development across different groups of respondents.](chart.png)
9. Connecting research cyberinfrastructure support with teaching about cyberinfrastructure (future CI workforce development).

Gap: \(0.88 - 0.31 = 0.57\)


**9. Connecting research cyberinfrastructure support with teaching about cyberinfrastructure (future CI workforce development). (cont.)**

<table>
<thead>
<tr>
<th>How Important</th>
<th>How Challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive Leadership (n=7)</td>
<td>8.4</td>
</tr>
<tr>
<td>Campus Academic Leadership (n=12)</td>
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<tr>
<td>Non-MSI Respondents (n=4)</td>
<td>8.5</td>
</tr>
</tbody>
</table>
10. Constructing a campus **cyberinfrastructure strategic plan** at your MSI institution.

**Importance:** Constructing a campus cyberinfrastructure strategic plan at your MSI institution.

ave: 0.83 std: 0.22

**Ease:** Constructing a campus cyberinfrastructure strategic plan at your MSI institution.

ave: 0.27 std: 0.18

**Gap:** 0.83 - 0.27 = .56


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10. Constructing a campus **cyberinfrastructure strategic plan** at your MSI institution.

(cont.)

<table>
<thead>
<tr>
<th>Group</th>
<th>Importance</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive Leadership (n=7)</td>
<td>9.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Campus Academic Leadership (n=12)</td>
<td>8.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Campus IT Services (n=5)</td>
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<td>3.5</td>
</tr>
<tr>
<td>Non-MSI Respondents (n=4)</td>
<td>8.3</td>
<td>4.0</td>
</tr>
</tbody>
</table>

How Important vs How Challenging
11. Implementing leading practices for **cyber security** your MSI institution.

**Importance:** Implementing leading practices for cyber security your MSI institution.

**Ease:** Implementing leading practices for cyber security your MSI institution.

Gap: 0.84 - 0.28 = .56


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11. Implementing leading practices for **cyber security** your MSI institution. (cont.)

<table>
<thead>
<tr>
<th>Role</th>
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<tbody>
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<tr>
<td>Non-MSI Respondents (n=4)</td>
<td>9.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>
12. Helping students at your MSI to pursue careers in the cyberinfrastructure domain.

**Importance:** Helping students at your MSI to pursue careers in the cyberinfrastructure domain.

**Ease:** Helping students at your MSI to pursue careers in the cyberinfrastructure domain.

Gap: $0.88 - 0.27 = .51$


12. Helping students at your MSI to pursue careers in the cyberinfrastructure domain. (cont.)

[Bar chart showing importance and challenge ratings for different groups]
13. Influencing **state and federal policies** impacting research cyberinfrastructure at MSI institutions.

**Importance:** Influencing state and federal policies impacting research cyberinfrastructure at MSI institutions.

ave: 0.75 std: 0.27

**Ease:** Influencing state and federal policies impacting research cyberinfrastructure at MSI institutions.

ave: 0.24 std: 0.19

Gap: 0.75 - 0.24 = .51


13. Influencing **state and federal policies** impacting research cyberinfrastructure at MSI institutions. (cont.)

![Bar Chart](chart.png)

<table>
<thead>
<tr>
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<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Executive Leadership (n=7)</td>
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<td>3.6</td>
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<td>Non-MSI Respondents (n=4)</td>
<td>9.0</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Legend:
- How Important
- How Challenging
Select the top three high-level challenges that you believe are most worrisome, needing immediate attention for a potential cyberinfrastructure consortium of Minority Serving Institutions. (Categories: Strategy, Process, Structure, Culture, Technology)

#3 – 30.4% Building a shared vision
- Sharing a sense of urgency
- Creating value
- Mitigating harm

#2 – 34.8% Ensuring effective leadership
- Supporting problem-solving in decisions
- Fostering inclusivity in decision making
- Ensuring effective conflict resolution
- Providing timely feedback
- Ensuring effective communication

#4 – 21.7% Specifying roles/responsibilities
- Making metrics visible
- Providing effective incentives
- Ensuring transparent information

#1 - 41.3% Maintaining dependable funding
- Reinforcing shared values
- Transforming underlying assumptions
- Ensuring effective cooperation
- Ensuring constructive competition
- Sustaining trust
- Being open to change
- Appreciating shared and separate interests
- Addressing disruptive technology changes
- Addressing incremental technology changes
- Using shared technology standards
- Developing an effective technology architecture

If you could use one phrase or metaphor to summarize your current view of a potential cyberinfrastructure consortium of Minority Serving Institutions what would it be?
If you could use one phrase or metaphor to summarize your current view of a potential cyberinfrastructure consortium of Minority Serving Institutions what would it be?

- Empowering.
- Imperative.
- Resilient MSI Cybergrid.
- Lack of critical mass.
- Impactful and exciting.
- Long overdue.
- Consortium of MSI that will share resources and experts.
- Expanding opportunities for transforming student career preparation in a data-driven world.
- HTCondor like system among all the MSIs.
- Wakanda Forever. I'm not kidding. I'd love to see a cyberinfrastructure consortium that somehow united MSIs to focus computing on an anti-colonialist, liberationist vision.

Please use one sentence to summarize your vision of success for a potential cyberinfrastructure consortium of Minority Serving Institutions.
Please use one sentence to summarize your vision of success for a potential cyberinfrastructure consortium of Minority Serving Institutions

**Within an institution (n=5)**
- An infrastructure that enables computational research capacity for all disciplines.
- A faculty or student has relative ease in linking to super-computation site from one or more nodes on campus with technical support.
- To infuse computational technologies into the research and creative activities of all academic disciplines.
- Provides cyberinfrastructure tools and technologies that can be infused to coursework at multiple levels.

**Across MSIs (n=22)**
- Building on the strengths of each institution to contribute to a stronger whole.
- MSIs actually work together and get it done.
- A mixture of public and private entity to educate the community with use of technology for our future growth.
- A distributed and parallel supercomputing and data storage system that connects all the MSIs.
- A classroom and lab without walls that extends across state lines and ivy covered buildings.

**Society at large (n=5)**
- Solving the important problems and serving community.
- Research nexus and centers of excellence at MSIs to attract top talent and be an enhanced pipeline for industry/federal government.
- Support multiple heterogeneous research testbeds for education and research communities; it will be governed by, and advocate for, its communities.
- Open to change; the beginning of trusted relationships.

**Additional Comments**
- I would like people to talk about cyberinfrastructure like they talk about our sports teams.
- Any initiative to support or promote MSI cyberinfrastructure is welcome as students will be connected to knowledge beyond their individual institution.
- I think this is a great idea but the management of the consortia in terms of distributing access and equipment maintenance will be a greater challenge...
- God bless and Godspeed!