

University of Wyoming

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Research and Economic Development  
Division

SI2025 Report

## SI2025 Report

### Executive Summary:

Science Initiative was initiated in 2014 by the Wyoming Governor to modernize research facilities and transform sciences at the University of Wyoming. The state invested over \$100 million in a new building and appropriated an annual budget of \$4.8 million for operating activities supported through the science initiative. In 2022, President Seidel charged a committee of administrators and faculty to develop a vision for an Institute that will leverage the state's investments in science initiatives to catalyze new science areas that will address Wyoming's needs and opportunities for Wyoming's future. The SI2025 Executive Committee and Faculty Advisory Committee met during the fall of 2022 and developed plans for an institute and space policy. Based on these inputs, the SI2025 Executive Committee is submitting this report to the President.

It is recommended that the investments in SI should now be managed by an interdisciplinary institute that catalyzes the convergence of disciplines for addressing Wyoming's needs.

### Background:

The Science Initiative was conceptualized in 2014 when Governor Mead charged the Science Initiative Task Force to devise a plan for invigorating the sciences at UW. Successful University of Wyoming alumni and employers in pertinent science fields were appointed to the Task Force. After several meetings with the UW Campus Science Initiative Leadership Team, the Task Force submitted a Report to the Governor on January 6th, 2015 outlining a detailed plan to raise the science programs at UW to top-quartile status. The committee report recommended state investments in science facilities (including a building), science engagement activities, and research support. With strong support from UW Trustees, the Governor, and the legislature, the state of Wyoming has invested over \$100 million in one-time support for buildings and \$4.8 million in annual support for programs and personnel.

Now the building is almost complete (the remaining shelled space is to be finished in 2024) and operations of the SI are funded in the UW's annual budget, it is time to transition the SI management to an institute during FY2023-24 to make it fully staffed and functional by 2025. This transition will reimagine SI to incorporate the interdisciplinary nature of modern science, the transformative impacts of digital technologies on STEM education and research, the increased importance of convergence as a path to innovation, and the realization that inclusion is a prerequisite to excellence.

## Vision:

The Institute will catalyze the convergence of physical, social, and biological sciences, engineering, humanities, and computing to address Wyoming's needs through transformative research, engagement, and experiential learning.

Options for the Institute name include:

- Science Institute (SI)
- Wyoming Institute for Stakeholder-Engaged Science (WISE-Science)
- Convergent Science Institute (CSI)
- Interdisciplinary Science Institute (iSI)
- Institute for Interdisciplinary Convergence (IIC)
- Institute for Interdisciplinary, Innovation-focused, Inclusive Convergence (I<sup>4</sup>C)

## Principles:

- Complex challenges today require **interdisciplinary** approaches to science (natural as well as social) and their interface with humanities.
- **Integration** of research, education, and public engagement is essential for success in any of these three functions.
- **Innovation**- transitioning science outcomes for societal use- is instrumental in ensuring the relevance and impact of science research.
- **Investment** strategy in the science initiative needs to be sustainable through recovery from extramural funding sources.
- **An inclusive** culture in the Institute will ensure transparent access to the Institute resources and is essential for diversity of thoughts, approaches, and disciplines for the convergence of sciences to solve societal problems.

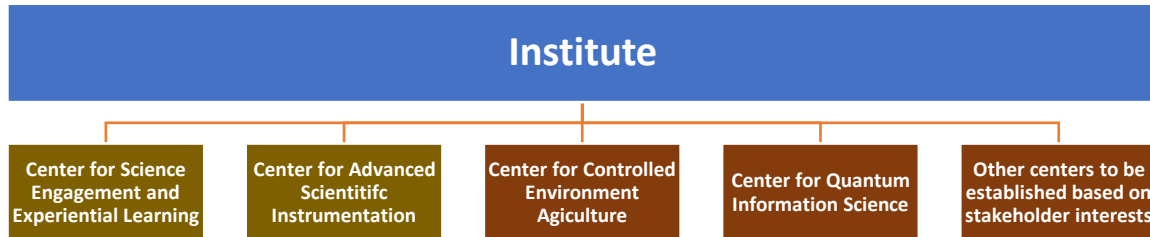
These principles will be at the forefront of every resource allocation (space, outreach programs, seed grants, or graduate student support).

## Overview of the Institute:

- The institute will bring together different disciplines and facilitate convergence by encouraging collaboration and the exchange of ideas. The goal of such an institute is to foster an environment where researchers can work together to address complex problems that require expertise from multiple fields.
- The institute would be designed to encourage interaction between different disciplines, with common spaces and events for researchers to meet, ideate, and work together.
- It would also provide funding and resources to support interdisciplinary research, public engagement, and experiential learning projects, and facilitate communication between researchers by hosting conferences, seminars, and workshops.
- The institute would have a strong leadership team with expertise in various fields to oversee and support research projects. The team would work with researchers to identify research opportunities that require a convergence of expertise and provide mentorship and support to ensure the success of the projects.
- The institute would be committed to solving real-world problems and would engage with industry partners, policymakers, and other stakeholders to ensure that research findings are translated into practical applications.
- The institute will generate resources through extramural funding from public and private sources for its research, science engagement, and experiential learning activities. Each center in the Institute will be expected to generate extramural funding.
- Availability of common-use facilities, seed funding, and student support will be the incentives for faculty to be affiliated with the institute. A certain number of graduate student assistantships will be made available to groups of faculty members with the expectation that they will attract training grants for interdisciplinary foci, potentially leading to interdisciplinary majors in graduate school.
- Although the SI Building will hold many institute-affiliated faculty, it is anticipated that faculty across the campus and colleges can affiliate themselves with the Institute. Some of the centers could be outside the SI Building, which was built to accommodate wet-bench research laboratories and innovative learning settings.
- Inclusion and diversity are essential prerequisites for achieving excellence in sciences and for reaching the top quartile among science programs across the country.

## Institute Organization:

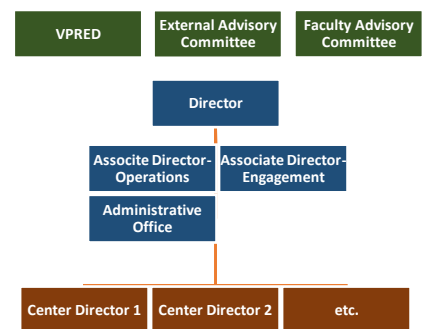
The proposed institute will have a core leadership team and a supporting administrative staff. The faculty affiliated with the Institute will be organized into centers focused on topics relevant to Wyoming’s needs. The proposed organization with initial centers is presented in Fig. 1. The remaining centers will be proposed by faculty, selected by the SI Executive Committee, and approved by the President in consultation with the Provost and VPRED.



## Long-term Science Director for the Institute:

The Institute will be led by a renowned scholar and skilled administrator, who will report to VPRED for the Institute's responsibilities. The Director is responsible for agile direction setting for various centers in the Institute. The Director will also be responsible for fundraising in collaboration with the UW Foundation and for developing corporate relationships in collaboration with the Office of Corporate Relations.

The Director will be hired through an open search by 2025. During the transition, an interim director will be appointed. The Director will be supported by an administrative core (business manager, accounting staff, building management staff, etc.). The Associate Director for Operations will oversee administrative functions. The associate director for engagement and experiential learning will be responsible for overseeing the institute-wide activities. The Director and Associate Directors will have no more than 50% administrative responsibilities and will be provided administrative stipends and/or summer salaries.



## Advisory Structures- internal and external:

The Science Institute will be guided by internal and external advisory groups.

**External Advisory Committee:** This diverse committee will be composed of at least eight nationally recognized members from different disciplines and sectors. Academic institutions, industry, and non-profit organizations will be represented on the committee. The committee's Chair will be an eminent scholar in an area relevant to the Institute's goals. The committee will meet annually to assess the progress and performance of the Institute and its centers and will provide advice about future directions.

**Faculty Advisory Committee:** The Director and Associate Directors are advised by the SI Faculty Advisory Group which consists of approximately 12 members representing relevant colleges recommended by department heads at the request of deans and appointed by the VPRED to serve staggered 3-year terms. Qualifications to serve on the advisory group should include a demonstrated track record and commitment to research, education, and outreach. The Faculty Advisory Committee will meet monthly, but at least once per semester. The Faculty Advisory Committee is chaired by the Director. The compelling reason for one oversight group is intended to foster integration between the current "Programs side" of the Science Initiative and the "Research side". Having two committees risks perpetuating schism among the engagement, experiential learning, and research activities.

## Project Proposals to be carried out by the Institute:

The institute will be organized into centers to undertake projects. Two of the centers are permanent and provide university-wide STEM engagement programs and instrumentation facilities.

### Permanent Centers

#### **Center for Outreach & Engagement, Experiential Learning, and Excellence in STEM Education (COEELESE – 'sounds like' coalesce, come together to form one whole):**

Under the new Science Institute, COEELESE will serve two primary functions:

COEELESE will physically host SCROLL (Student Collaborative Research, Outreach, and Learning Laboratory) on the 4<sup>th</sup> floor of the Science Initiative Building (SIB) to provide innovative spaces that will support and grow the already successful SI Education Programs. With the completion of SCROLL and additional program resources, each program might grow as suggested below.

- *The Learning Actively Mentoring Program (LAMP)* will continue to train faculty on adopting a transformative "evidence-based" approach to teaching and learning across STEM fields. The active classroom approach will continue to be supported and expanded to various areas of science through LAMP and will continue to expand its reach at all community colleges across Wyoming. Through the LAMP Educator Learning Community, faculty will continue to

design studies to determine if their altered teaching approaches are leading to greater student learning and success in their classes, thus contributing to the scholarship of teaching and learning at UW and the community colleges.

- **Integration of Computing.** The SI should undertake an initiative to promote digital literacy on campus, consistent with the UW pillars. This is best placed under LAMP's auspices, in collaboration with the School of Computing and the Ellbogen Center for Teaching & Learning. One potential track can be stipends that pay faculty to participate in training that helps them introduce digital elements to 1000- and 2000-level classes. This will look different across the disciplines but has the potential to impact every student on campus. Another thread can be requiring digital elements in classes to use the large active-learning classroom in the SIB. Partnerships with the ECTL and New Faculty Orientation are encouraged.
- The transformative undergraduate research opportunities provided to our students through the *Wyoming Research Scholars Program (WRSP)* will continue to be expanded to reach an even greater diversity of students as well as faculty mentors on campus. The positive outcomes of hands-on research will also be extended to hundreds of students each year through the continued development of Course-based Undergraduate Research Experiences (CUREs). Led by the WRSP staff, CURE courses will be encouraged across all STEM disciplines and will be supported by the innovative spaces in SCROLL. Extramural funding opportunities will be sought to expand these research programs across the state and to attract students from outside the state.
  - **Integration of Entrepreneurship, Innovation, and Business Development education for research students.** A small subset of students, including students who participate in the WRSP, exhibit an interest in entrepreneurship and seek ways to turn their research ideas into a business. However, many students do not know the possibilities of turning their research into creative business ideas. In collaboration with Impact 307, the College of Business, and CEI, the SI will embed educational opportunities about entrepreneurship, innovation, and business development into the WRSP and CURE programming to support both student groups. Our students will play a critical role in fundamentally shaping the future economic development landscape of our state, but only if we purposefully create these opportunities for them.
- The *SI K-Community Roadshow* will continue to serve a critical mission throughout the state by bringing engaging STEM learning opportunities to Wyoming's K-12 teachers, students, and community members. Expanding the reach of the Roadshow will lead to lasting positive changes in STEM education and communication throughout Wyoming and will serve as a powerful recruitment tool for UW and excite students about careers in STEM.
  - **Development of Collaborative Community-based Projects.** The SI Roadshow can lead in the development of Collaborative Community-based projects that focus on locally defined issues that have a STEM basis, engage a wide variety of the community, bring appropriate UW STEM expertise to the table to help address those local issues and engage K-12 students in learning about and helping solve that issue. This will benefit UW by proactively bringing our STEM researchers (Science Institute as well as all other STEM members on campus) into our communities in a productive

way, can help our Wyoming communities see that UW is engaged across the state, and can be an important tool to excite students about STEM and bring them to the UW campus.

**COEELESE** will serve as a nexus for STEM educational opportunities and activities across the UW campus and the state of Wyoming to increase collaborations amongst UW groups and to provide much more effective support for the various stakeholder/user groups at UW and around Wyoming.

- The Center will create and support an Office of Undergraduate STEM Research to be housed in SCROLL. This office will be central to all things undergraduate STEM research, serving as a one-stop shop for students. Students can get information about the various programs that offer research opportunities (SI, INBRE, EPSCoR, etc.) and can facilitate a common point of application for all programs. The Office can also help identify points of collaboration across research-offering entities (e.g., collaborate on seminar courses for student professional development).
- The Center can serve as a point of coordination, collaboration, and communication for all programs on campus that offer STEM-based outreach and engagement programs (e.g., SI Roadshow, NASA Science Kitchen, Engineering K-12 Outreach, UW Makerspace). Greater communication and collaboration across these groups will improve the collective offerings for our stakeholders and identify potential gaps in outreach and engagement opportunities. The Center will coordinate and broadly share all STEM outreach and engagement opportunities with our K-12 and community stakeholders across Wyoming.
- The Center can become an engine for scholarly work on STEM teaching & learning, pedagogy, and best practices. Through cross-campus and cross-institution (UW & community colleges) partnerships, UW can become a highly recognized institution that not only fosters and supports evidence-based teaching practices but is fundamentally contributing to and shaping that knowledge base. This is consistent with the vision of the Science Institute.
- Across these groups, the Center can foster the development of collaborative grants to expand the opportunities for outreach & engagement, student research, broader adoption of evidence-based teaching practices, and scholarship across all areas. These could be realized as 'stand-alone' grants (REU, RET, etc.). These could also be realized by connecting these already well-formed units (SI Roadshow, WRSP, NASA Science Kitchen, etc.) as partners on NSF and NIH grants to support the Broader Impacts requirements. Such a partnership would be a win-win by increasing the odds UW STEM faculty would secure a grant because of a strong Broader Impacts plan and would help grow the current programming offered by our already-staffed programs.



### **Center for Advanced Scientific Instrumentation:**

Shared-use facilities for physical and biological sciences contain instruments for spectroscopic and microscopic analyses. Most of these instruments are in the SI Building. The center contains many instrument rooms, some on vibration-free floors. The Director of the Center will be assisted by skilled technicians to provide fee-based service, training, and access to instruments. Operations costs of the facilities will be built in the service charge structure. The center will be guided by a user advisory committee, and the chair will serve on the Institute faculty advisory committee. The center will have three components- Microscopy services, Spectroscopy services, and digital services through a data hub.

- Microscopy services will provide equipment, training, and access to microscopes of all kinds such as confocal microscopes, electron microscopes, etc.
- Spectroscopy services will be based on X-ray diffraction, mass spectrometry, and other analytical techniques.
- The data hub will store the data from various facilities in CASI and beyond (e.g. plant phenotyping). It will also provide resources for computing experts that will use these data to provide tools for analysis and predictions.

Policies for the shared instrumentation use will be developed further after the hiring of the CASI Director. A group of current faculty advisors to existing facilities have been charged with developing recommendations for policies and best practices for shared instrumentation on the UW campus.

### Strategic Research Centers

Other centers in the Institute will focus on topics that require convergence of different disciplines. These centers are evaluated every five years to assess their continuation based on their success in generating extramural funding and the length of the problem to be solved. The Institute will encourage faculty in centers to apply for large external grants, starting from internally funded seed grants. Facilitation services and grant writing support will be provided. Considering the limitation of resources, no more than five issue-focused centers will exist at a time. The following criteria should be used to establish centers.

- Relevance of the topic to Wyoming's needs. These needs can be determined based on input from relevant agencies and government bodies, opportunities from corporate and other partnerships, and faculty interests
- Potential to generate additional extramural funding from Federal, Foundation, or corporate sources, particularly through centers or large grant programs
- Core existing faculty group that is committed to making the center successful
- Adherence to the principles listed earlier in this document (interdisciplinary sciences, innovation-focused, inclusive, integration of research with education and engagement, investment strategy for sustainability)

These centers will include the following components:

- **Center Director** (and other staff such as an associate director, if needed for center-specific instrumentation and data sources): The Director will hold a faculty appointment and will receive an administrative stipend.
- **Affiliated faculty:** They will have access to the center programs
- Seed-grant, graduate student, and post-doctoral programs will be accessible to the affiliated faculty
- Other activities- seminar program, regularly scheduled gatherings, fund-raising events, establishing and strengthening corporate and donor relationships.
- Holding one workshop per year to highlight the center's work.

Based on the current interests and funding levels, initially, the following two centers will be established.

#### **Center for Controlled Environment Agriculture:**

Requiring plant sciences, engineering, computing, and business/economics expertise and partnership with Plenty. Controlled Environment Agriculture (CEA) is an advanced and intensive form of agriculture where plants grow within a controlled, enclosed environment to optimize horticultural practices.

Nurturing a new type of controlled environment farming will create a resilient and robust supply chain for fresh produce to address nutrition security in remote areas. Controlled-environment agriculture, including vertical farming, greenhouses, and other setups, is a rapidly growing sector in fresh produce cultivation. It exemplifies a disruptive innovation for local facilities to produce nutritional fresh produce. Thus, it can alleviate needs in food deserts of urban and rural areas. With modern greenhouses using affordable ground-source heat pumps, large greenhouses are economically viable. Environmental realities (temperature, availability of sunshine, good soil) interface with economic and market infrastructure realities. The propagation of these technologies via a business incubation network with business support services would be great for empowering these technologies for community-tailored systems for producing nutritionally rich produce for rural communities. Computer modeling could help in generating decision tools for consumer-inspired production of fresh produce in controlled environment agriculture setups.

One of the largest vertical farming companies, Plenty, has its origins at the UW and still has its R&D in Laramie. Dr. Nate Storey, a graduate student in plant sciences at UW used UW's start-up challenge funds and Impact307 incubator to start a controlled environment agriculture business. After merging with a similar company, Plenty, from California, the resulting company still has its R&D in Laramie while large production plants operate in California, with another one in construction in Virginia. In 2022, Plenty was one of the largest investment opportunities in the ag sector, garnering over 900 million. Now the state of Wyoming is considering investments in expansion of Plenty's R&D facilities in Laramie. In collaboration with Plenty, UW will establish a Center for Controlled Environment Agriculture. Using WIP (Wyoming Innovation Partnership)

funding, instrumentation for high throughput phenotyping is being purchased coupled with the hiring of additional faculty positions. Operations in a controlled environment farm are complex, automated, and produce enormous data from sensors and digital imaging. AI-based decision tools are needed in this industry. The digital industry will be needed to support these transformations. In collaboration with Plenty, digital twinning will be used to model vertical farming data from the production facilities. This center will be a hub of interdisciplinary research for developing tools for the current corporations while creating new models for modular controlled environment farming chambers for providing fresh food for rural communities.

The center will build on sophisticated greenhouses and plant growth facilities in the SI building. It will be led by a director, who will provide scientific vision and will be assisted by an Associate Director for operations who will be responsible for the greenhouse and phenotyping facility management. Center faculty will be derived from across the campus from diverse disciplines such as plant sciences, computational sciences, engineering, economics, and business management. Cluster hire in this area will strengthen Wyoming's position as a destination for CEA research, workforce development, and industry. Some of the proposed activities in the center include:

- **CEA research:** interdisciplinary research that converges plant sciences, high throughput phenotyping, sensors and automation engineering, computing, and business analytics
- **CEA education:** Since CEA technologies are evolving rapidly, the CEA industry needs employees with expertise in many areas. Therefore, CEA exposure through a course, summer research experiences, and industry internships will allow UW and its partner organizations to provide a taste of CEA to a large number of students, interested in transforming our current food systems for resilience, sustainability, and reliability.
- **CEA facilities:** Through vertical and horizontal CEA facilities of different types (e.g. greenhouses, growth chambers, etc.) and high throughput phenotyping, sensing, and automation instrumentation, the CEA Center will provide services for researchers and students as well as conduct original research in construction and operation of CEA. The Center will have an associate director for operations who will be responsible for the CEA facilities and their use by faculty, non-UW users, and corporate partners.

**Center for Quantum Information Sciences and Technology:**

Requires and brings together expertise from physics, chemistry, chemical engineering, materials science, computer science, education, and electrical engineering. QIS is emerging as a major force for transforming computing power. It generally includes four areas of research and training-

- **Quantum computing:** While not a substitute for classical computers, quantum computers are believed to be extraordinarily powerful at solving certain problems and tackling some of the long-standing challenges in science that are beyond the capabilities of classical computing systems.

- **Quantum communication:** Quantum systems using entanglement or a transmission channel hold out the possibility of extremely secure encryption—a major attraction in an age of cybersecurity.
- **Quantum sensing:** Sensors based on quantum states to detect and measure physical properties could be exquisitely sensitive and could be applied in many cases from biological systems to the nature of dark matter.
- **Quantum foundational science:** Fundamental theoretical and experimental research augments the application of QIS to quantum computing, communications, and sensing.
- **Quantum Information Science Education & Training:** Graduate degree in Quantum Information Science addressing Quantum Computing, Communications, and foundational science as well as K-14 outreach about QIS.

The director of the Center will guide the programs and catalyze large new projects, including training in collaboration with community colleges. By becoming a member of the Quantum Collaborative and Quantum Economic Development Consortium, the Center will establish collaborations in basic and translational research, education, and innovation. A cluster hire in this area can strengthen the quantum computing, communication, and sensing areas; UW has many faculty members with expertise in quantum foundational science.

Additional centers will be formed by inviting center ideas from the faculty; the Executive Committee will recommend the centers to the President. Potential centers could be formed using the Ideas Lab concept through facilitation. Examples of ideas for potential additional centers include:

- Center for AI-enabled Discoveries
- Center for Ecosystem Services
- Center for biomolecular design and applications

A typical center will be led by a center director (with an administrative stipend for the center's responsibilities) and will have access to seed funds and graduate student support for catalyzing new interdisciplinary activities. If facilities are associated with the center, the staffing and operating costs for the facilities will be included in the center's budget.

## Policies for the space use:

SI2025 Executive Committee developed a space assignment policy for the SI Building (included in Appendix B). Principles used for this policy development include:

- Data-based (research productivity data) decisions
- Open and transparent process
- Competitive process with no more than 5 years of approval for space
- Annual assessment of space needs resulting in changes in the amount and the location of space

The campus-wide research space management will require detailed data analysis and planning. SI2025 Executive Committee recommends the formation of another committee to address this topic.

## Appendix 1. Charge to the SI2025 Committee from the President



April 15, 2022

**To:**

Diana Hulme, Interim Vice President, Office of Research and Economic Development,  
Chair Greg Brown, Science Initiative Facilities Executive Operations Director (*ex officio*)  
Mark Lyford, Science Initiative Programs Executive Director (*ex officio*)  
Cameron Wright, Dean, College of Engineering and Applied Science  
Barb Rasco, Dean, College of Agriculture and Natural Resources  
David Jones, Dean, College of Health Sciences  
Dr. Bryan Shader, Professor, Mathematics and Statistics, UW STEM representative  
Adrienne Freng (or designee), Faculty Senate Representative

**From:** Ed Seidel, President

**Re:** Science Initiative Executive Committee Charge

I am charging this seven-member committee with making all top-level decisions concerning UW Science Initiative facilities and programs. Decisions include faculty occupancy of the SI Building, space allocation to faculty in the SI Building, access to and use of research facilities by UW faculty not housed in the building (e.g., Greenhouses, walk-in growth chambers, Model Organism Research Facility), partnerships with outside business and industry partners and their use of SI facilities, and the SI programs.

In consultation with the Faculty Senate, the Committee will assemble a team of relevant UW faculty, staff, and administrators (a Faculty Leadership Committee) to develop a written plan to move the SI forward to Science Initiative 2025 (enclosed), given the backdrop of changes at UW and on the national landscape. *This plan can be comprehensive, but should specifically lay out a pathway to a new management structure of the new Science Building as a centerpiece which I refer to below as the "Institute", as well as related labs in other buildings that together form the broader science initiative.* In this new vision, faculty from different departments may move into the building, either part-time to cultivate a new project with other faculty, or fully, for a period of some years, leaving behind their existing office and lab space. The plan developed should include not only the Science Building itself, but also such related science labs and offices, their possible renovation, and policies for accommodating these more fluid arrangements.

The Faculty Leadership Committee shall provide preliminary recommendations, including any challenges and opportunities, to me, the Provost, and the SI Executive Committee by October 15, 2022, and a final report by December 15, 2022.

Enclosure: Top Tier Science Initiative 2025



Top Tier Science Initiative 2025 (SI25)

I ask that a group led by the Vice President for Research and Economic Development, under the auspices of the Science Initiative Executive Committee, consider the following concept for what I call “Top Tier Science Initiative 2025”, and develop a recommended plan to develop and operationalize it over the coming three years. I would ask that these recommendations be developed and brought to the President and Provost, with a preliminary report by October 15, 2022, and a final report by December 15, 2022.

**Backdrop:** The UW Science Initiative (SI) has the potential to elevate scientific research and science learning outcomes to new levels at both UW and across the state, as well as act as a catalyst for economic development. Quite significant work has gone into planning for this initiative, and with the recent opening of the new science building, a new era in science at UW is about to begin. It is an exciting time for science at UW!

At the same time, major changes have come to UW since the initial planning for the SI: a new science-savvy UW administration is in place, colleges involving science and engineering are being reorganized, a new School of Computing (SoC) has been launched, a Center for Entrepreneurship and Innovation (CEI) has been started, and the Wyoming Innovation Partnership (WIP) with the state’s community colleges is underway.

At the national level, recent trends in science and engineering are showing an acceleration in [transdisciplinary research](#) that requires deep integration of disciplines from life sciences and agriculture to engineering to computing, requiring ever-changing teams, rapid development of new methodologies, and an [open, shared approach to science and its practice](#). These developments are increasingly coupled with work in innovation and corporate partners. Federal agencies such as NSF, DOE, NIH, and others are responding by devoting increasing funding to transdisciplinary team approaches that deeply connect the science and engineering disciplines to computation/data and technology and commercialization, with NSF even creating a new “technology directorate”.

Hence, UW is well positioned to take advantage of its investments in science and to consider how best to move forward in a Top Tier Science Initiative 2025 (SI25), one that builds on current excellence and SI plans, that create an environment where *interdisciplinary teams*

*involving units from across UW and beyond can work together, where new ideas and new teams can be incubated and further supported through a competitive process where existing projects compete with new proposals, and where connections to entrepreneurship and corporate partnerships are valued and supported. This involves a fundamental culture change for science, not only at UW, but nationwide.* This document lays out initial thoughts on what SI25 might look like and suggests a process to develop a plan to go from our current configuration to one that can better respond to these new, rapidly changing developments.

While most of what I have written regards creating interdisciplinary research teams, no less important is the transformative “evidence-based” approach to teaching and learning science, which is already well-developed at UW. In my charge below, I ask that the active classroom approach continue to be supported and expanded to various areas of science through the Learning Actively Mentoring Program (LAMP), and in collaboration with our community colleges, where possible. Similarly, we must continue to support and grow the transformative undergraduate research opportunities we provide our undergraduate students through the Wyoming Research Scholars Program, who indeed will benefit greatly from changes driven by SI25, as well as look for ways to expand this program across the state. Finally, the SI serves a critical mission throughout the state by bringing engaging STEM learning opportunities to Wyoming’s K-12 teachers and students as well as community members. Expanding the reach of the SI K-Community Roadshow will lead to lasting positive changes in STEM education and communication throughout Wyoming, which will further enhance the vision of SI25. As such, while this document primarily outlines the future direction of SI research, the committee must be cognizant of these ongoing and successful SI programs which fall under the leadership of the Executive Director of the SI Programs.

**Future Vision:** I charge the Vice President of Research and Economic Development, through the SI Executive Committee, and in consultation with the Faculty Senate, to assemble a team of relevant UW faculty, staff, and administrators to develop a written plan to move the SI forward to SI25, given the above backdrop of changes at UW and on the national landscape. *This plan can be comprehensive, but should specifically lay out a pathway to a new management structure of the new Science Building as a centerpiece which I refer to below as the “Institute”, as well as related labs in other buildings that together form the broader science initiative.* In this new vision, faculty from different departments may move into the building, either part-time to cultivate a new project with other faculty, or fully, for a period of some years, leaving behind their existing office and lab space. The plan developed should include not only the Science Building itself, but also such related science labs and offices, their possible renovation, and policies for accommodating these more fluid arrangements.

This should be a three-year plan to move from where we currently stand to the SI25 vision described above, which should include consideration of the following:

- Appointment of a long-term science director (who will report to the VPRED), placed after a national search (who could be currently at UW or elsewhere), to lead activities in the institute. The Director should be a prominent researcher in a field relevant to the current

science activities in the science initiative, who actively sets the scientific direction of the institute. The director would work with a local faculty group and a national advisory group (see below) to:

- Set scientific directions for the institute, harnessing academic strengths from across the campus, building partnerships with other institutions, and raising the SI25 scientific profile;
- Build and manage interdisciplinary science research and education programs that can uniquely take place at the institute, extending or expanding on what can be done in individual departments or colleges;
- Determine criteria for which faculty groups are in the building, how they are to be selected and reviewed, how new teams are to be brought in, etc.;
- Manage additional programs at the institute, such as postdoc programs, faculty affiliates, graduate students, public engagement, and so on;
- Connect to activities at the Center for Entrepreneurship and Innovation, including corporate partners, entrepreneurship, etc.; and
- Raise extramural funds for the institute, from federal sources (e.g., NSF, DOE, etc), foundations (e.g., Gates, Moore, Sloane, etc), corporate partners (e.g., for sponsored research and/or philanthropic partners, and from private sources. The President will work with the team actively to raise funds with the UWF to build resources for the Director to build programs at the Institute.
- Creation of strong advisory structures, including
  - A local faculty steering group that will meet regularly to advise on local matters, programmatic activities, interdisciplinary connections, etc.
  - A national advisory committee that should meet annually, chaired by an outside expert of national renown<sup>1</sup>.
- Development of a set of criteria, and a process, for 3-5 year project proposals to be carried out in the Institute, that can be carried out in the Institute, that either
  - uniquely or especially draw on strengths of the UW faculty from any and all academic units across campus, including science, engineering, and social sciences, but also including faculty from business, law, arts, humanities, or
  - purposefully build strengths in directions that the Director's advisory groups deem important to the scientific future directions of UW.
- The plans should consider:
  - How the Institute, and more broadly SI25, speak to the developments of the "four pillars" at UW, namely, that UW becomes more digital, more interdisciplinary, more entrepreneurial, and more inclusive. Please respond to each of these in your report.
  - A process for selecting projects based on their scientific promise and impact, their potential for external funding, their impact on student education, and

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<sup>1</sup> Possible members could include people such as [Jim Collins at ASU](#) who led the Biological Sciences Directorate at NSF. I happened to have a chat with him recently and he offered his help if desired.



potentially their ability to impact the state of Wyoming, including their potential for partnerships with community colleges, companies, NWSC, national parks, etc.

- A process for assessing the progress of existing projects towards their goals, and if deemed appropriate, a process for sunseting them to make room for new projects that are completed as above. The expectation should be that projects may run for 5 years with no guarantee that they will be continued, although they may be renewed if they are found to be well-performing and/or better than competing proposals, in the spirit of an NSF STC program. It should be anticipated that some projects may lead to highly competitive proposals to NSF, NIH, DOE, Gates, or other agencies, such as STC and ERC programs at NSF.
- A process for incubating new projects to be considered for taking place in the Institute, for example through the activity of faculty affiliates, or through smaller projects that can be given short-term space in the building to catalyze new faculty collaborations to incubate new projects that may be competed against existing projects as above. Specific ideas to catalyze new projects to consider include:
  - Creating a cohort of Institute Faculty Fellows, who may be given seed funding (through a competitive process) to become affiliated with the Institute, and to carry out small projects with Institute members that have promise to grow into larger projects that may be housed there, or may be good candidates for external funding, forming a company, etc.
  - Another approach would be to build out space on the first floor of the Institute specifically for the incubation of new such projects, over a term to be determined. Again, proposals for such projects, with seed funding, could be competed with the winners given space in this area for the development of future full-scale Institute projects.
  - Development of appropriate policies for the use of office space, recognizing that teams in the Institute may need to maintain a presence in their home unit building during their projects, and may need to move their primary operations back to their home units when their projects are finished, while new teams may move into the Institute when their projects begin.
  - It may make sense for certain activities to be carried out for longer than the 3-5-year term as described below; the group should advise on what such criteria are.
  - Development of specific policies regarding shared instrumentation in the Institute. Scientific instruments in the Institute should be shared and open to others in the Institute, across campus, and with our community colleges and even corporate partners. This is clearly a culture change from historical, individual science. As instruments are typically digital, they should be able to provide data that are shared through the Data Hub. These activities will serve to enhance interdisciplinary and team science. Policies governing the use and management of Institute instrumentation to achieve these goals are needed.
- In addition to the above, the group should advise on any other aspects of the operations of the Institute, including, but not limited to:

- Budgets are needed to accommodate finalizing the completion of the building, its labs, computing equipment, etc. These should include, for example, what might be needed to build out the
  - new project incubation space,
  - space for possible corporate partners,
  - Instrumentation needed,
  - data services for instrumentation being deployed, building on the planned data hub.

Budgets for Institute Graduate Student and Postdoc Programs that could be used by the Director to enhance scientific research, attract faculty, and/or educate our students. This could include

- A competitive Institute Postdoc Program for a committee to select postdocs to come to enhance science outcomes, in, and possibly between different groups operating in the Institute or with other units on campus;
- A competitive Institute Graduate Student Fellow program, similar to the above

Specific recommendations on how to build collaborations with the new School of Computing, the ARCC, the NWSC, the CEI and its developing programs around corporate partners and entrepreneurship, The newly structured College of Engineering and Physical Sciences, the College of Agriculture and Life Sciences, the AMK Ranch, other academic units as appropriate

- Plans for use and potential renovations of related offices and labs, such as space where collaborators of the SI work, and renovation and use of offices and labs that may be vacated as projects develop in the SI building. In this way, a quite comprehensive view of the science on campus related to the SI should be taken into consideration. Are there other buildings, or offices, that require renovation that can be foreseen now? Additionally, as new projects develop, and faculty move to the SI, what plans are needed to address using and/or upgrading their current home offices while they are in the SI?
- The impact of the Institute on the WIP initiative, including specific programmatic that could be undertaken to enhance science research across the state
- New developments are also underway with the Tier 1 Engineering program, the Center for Entrepreneurship and Innovation, and the School of Computing. I ask that this team meet at least once with these other planning groups to discuss synergies across, and include in your report what connections have been planned.

Any other topics the group thinks are important to be considered!

## Appendix 2. Faculty Advisory Committee Report

### SI2025 Faculty Advisory Committee

#### From the Governor's Task Force cover letter charge, 2014:

1. The renovation and construction of science laboratories and instructional areas at UW, which shall be designed in cost and approach to lead the University toward a top-quartile academic and research institution in areas of science pertinent to the economies of Wyoming and the nation, and other elements related to Wyoming's quality of life. The plan shall include the science labs and instructional areas in the Biological Science and Physical Science Buildings, the facilities in the Aven Nelson Building, and consideration of a structure that would provide space for temporarily displaced programs due to the renovation and consideration of a new location for the programs in the Aven Nelson Building.
2. Improve the quality of instruction and research in the various fields of science that supports the goal of being a top-quartile science program that prepares students for successful careers in the sciences. Emphasis shall be placed on the retention and recruitment of high-performing faculty and graduate and undergraduate students, encouraging innovative research, and educational partnerships with employers of science graduates. The goals shall be improving the prestige and quality of teaching and research in the sciences, enhancing the employability of UW's graduates in the sciences, fostering opportunities for the creation of sustainable jobs in Wyoming, and furthering economic development.

### Outline of Charge

Transform sciences at UW to be consistent with national trends: **interdisciplinary**, integrative, innovative, collaborative, and data-driven. The faculty advisory committee will provide advice to the Executive Committee in planning the future of the Science Initiative to be achieved by 2025. Components of the Plan include:

- Vision
- Long-term Science Director for the Institute
- Advisory Structures- internal and external
- Project Proposals to be carried out by the Institute
- Policies for space use
- Policies for shared instrumentation use

Principles: **Integration** of research, education, and public engagement. **Innovation**: transition science outcomes for societal use, **Investment strategy** to become sustainable through cost recovery.

### Recommendations of the SI2025 Faculty Advisory Committee

## Executive Summary:

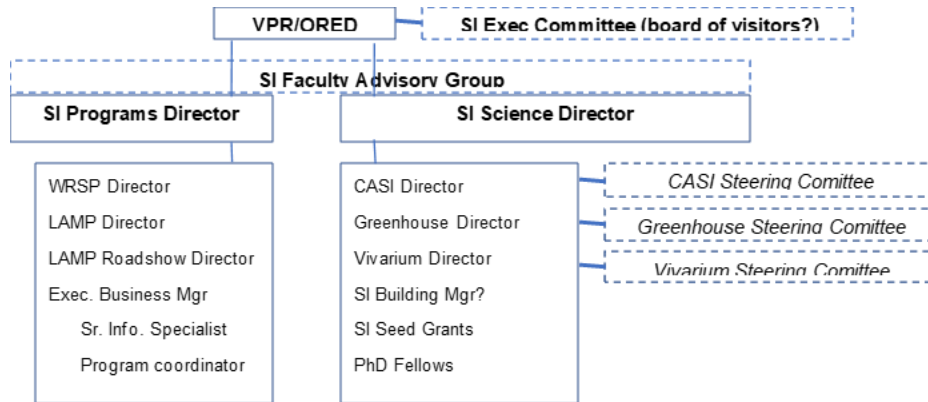
The first phase of the Governor's UW Top-Tier Science Programs and Facilities initiative has produced a highly successful suite of outreach/education programs and completed a state-of-the-art science building that is in the early stages of fostering interdisciplinary research in the life sciences. Consistent leadership—shared across programmatic and research elements—and sustained investment in the nascent SI laboratories are crucial to their maturation as core facilities having a broad campus impact on research capability and productivity across the life, health, and physical sciences. Opportunities abound for creating synergies with State and corporate partners that leverage recent investments while promoting UW's entrepreneurial and digital literacy aspirations. A policy for SI building occupancy must navigate the tension between novel interdisciplinary models that prescribe mixing faculty from many departments (senior faculty are typically more comfortable with this) and traditional academic models that retain the sanctity of the departmental unit (junior faculty strongly advocate proximity to peers). While dynamic lab occupancy optimizes space and may stimulate innovative research streams, faculty relocation entails non-trivial expense and may have a deleterious effect on productivity and morale; moves should be infrequent. Reserving a small fraction of the SIB office space (~10%) for a cohort of rotating visiting faculty could serve to spark interdisciplinary collaboration. Recommendations for SI building operations, occupancy, core laboratories operation, leadership structure, and campus science space renovations are included.

### SI Leadership and Advisory Structures:

1. The Science Initiative should be housed under the UW Vice President for Research and led by 1) an SI Science Director who will oversee core facilities, research programs, and science budget and 2) a program director who will oversee the SI educational and outreach programs.
2. The SI Science Director and SI Program Director are advised by the SI Faculty Advisory Group which consists of approximately 12 members proportionally representing the three colleges of CEPS, ALSNR, and CHS recommended by department heads at the request of deans and appointed by the VPR to serve 3-year terms. Qualifications to serve on the advisory group should include a demonstrated track record and commitment to both research and education/outreach. The Faculty Advisory Group should meet approximately monthly, but at least once per semester. The SI Faculty Advisory Group is chaired by the SI Science Director/SI Program Director in alternating academic years starting in even/odd calendar years. The compelling reason for one oversight group rather than two is intended to foster integration between the "Programs side" of the Science Initiative and the "Research side". Having separate oversight committees risks perpetuating schism between the programs and the research activities.
3. The SI Science Director oversees the directors of each core facility, the seed grant program, and the Ph.D. The fellowship program and future science efforts are yet to be developed. The SI Science director is recommended by the SI Faculty Advisory Group and appointed by the VPR for a term of 4 years.

4. The SI Program Director oversees the program staff and the budgets for WRSP, LAMP, and SI publications and outreach to UW and schools/community colleges/public throughout the State of Wyoming. The SI Program Director serves terms of 4 years and is recommended by the SI Advisory Group and appointed by the VPR.

5. **Leadership Chart:**



6. **SIB as an Institute:** The committee was unable to coalesce around a single vision for the SI or the Si building functioning as a science “Institute” with one unifying vision. Normally an institute has a specific (generous) funding stream and mission such as “cure cancer”. The committee feels it has neither the breadth nor representation to craft that vision for the campus. Nevertheless, here are some possibilities.

- The Science Institute conducts research on issues relevant to Wyoming Agriculture and Industry, such as invasive species, water use, environment-controlled agriculture, non-destructive testing, composition analysis, and more. A possible theme could be “The Wyoming Institute for Stakeholder-Engaged Science (WISE-Science)”, however, science should be driven by faculty as well as by external problems. The Institute operates a suite of scientific instruments for internal and external users. instruments include light microscopes, electron microscopes, rapid phenotyping, isotope analysis, and more. The institute fosters interdisciplinary collaborations that work to solve cross-cutting problems on scales from the atomic to cellular and organismal. The Institute provides training to UW students in state-of-the-art techniques and instrumentation.
- SI could work with applied science groups, e.g. CEI, SER, ENR, et al when it is appropriate and advantageous to both groups and does not conflict with the broader vision of either.
- Research groups form and dissipate on the timescale of ~5 years based on funding and the length of the problem to be solved.
- The Institute can encourage groups to form and apply for large external grants, starting from internally funded SI seed grants.
- The SI Director should tell stories of success in forming groups in close proximity around common problems, as well as, reach out for stakeholder input from the state

- The SI Director should travel the state to learn what issues are on the minds of stakeholders while promoting the capabilities of the Institute, possibly working with UW extension to reach local communities.
  - The Stable Isotope Facility can be used as an example of a self-supporting laboratory that serves UW and the state.
  - The Institute could sponsor interdisciplinary science courses at UW, promoting very different interdisciplinary projects, e.g., music and science, along the way training science journalists and educators.
  - The UW Grand Challenges initiative should be revisited as an example of cross-cutting programs suitable for forming the nucleus of interdisciplinary research groups.
  - The committee discussed the idea of an “Institute Director” who sets science goals. Unless the Director has a significant budget, similar to the director of the School of Energy Resources, we are not able to envision a model where such a person functions as a leader who sets science direction (like the German Max Planck directors), except as enabled by the strategic distribution of seed grants and PhD fellowships overseen by the director that can serve to incubate cross-cutting projects.
  - An 80-20 model for space allocation might be optimal, wherein 80% of the faculty are essentially permanent in the building and 20% of the faculty serve 5-year rotating positions. There can be great cross-fertilization with a small fraction of faculty rotating in and out—faculty who retain their office space elsewhere on campus for that 3-5 year duration. The overhead of just extra office space is small compared to the potential payoffs.
  - SIB space should be used as a recruiting tool for new faculty, provided they are a good fit for the department.
7. Given the numerous departments placing faculty in the SIB, the traditional departmental funding model is problematic. Common costs such as copiers and printers should either be prorated by department representation (impractically cumbersome) or borne by the ORED.
  8. Partnership with private and government science institutes and enterprises and entities (e.g. NIH Institutes, EPA Research Centers, National labs, private institutes, and firms, e.g. Plenty) ...to be discussed...

## Facilities

## Core Laboratories under SI Phase:

1. Staffing for the SI core lab facilities is a critical need. Completion of SI core science facilities is essential to increase science efficiency and move UW toward R1 status across the scientific disciplines. Only a small fraction of the science support personnel envisioned for the Science Initiative by the 2014 Governor's Task Force has currently been achieved. Consistent staffing is essential to the successful operation of core facilities. Each of the three SI cores (CASI, Greenhouse/Growth Facility, Vivarium) requires a director who will oversee the staff, operations, and training of users of each core. The CASI and Vivarium will require an additional 1-2 staff positions in order to span the expertise necessary for effective support of instrumentation (e.g., light microscopy versus electron microscopy), PI-led science programs, student training, and equipment maintenance.
2. **Vivarium/MORF:**
  - a. The vivarium advisory structure should be led by the Attending Veterinarian who serves as the director of that facility. The staff should also include a full-time attending vet.
  - b. Shelled space in the SI building should be finished to allow the expansion of a core vivarium facility. The space in the SI Building is not sufficient for an all-campus vivarium, so another/additional space should be identified and prepared to house a vivarium for campus users at a per diem cost that is affordable and set in consultation with the Vivarium Steering Committee. At other institutions labs and animal housing spaces are often separate, so the proximity of research labs to vivarium space is or is not an issue. There should be additional shared procedure rooms near/within the vivarium to ensure animal and investigator security. AALAC accreditation is desirable. The need for a core aquatics (e.g., frogs, zebrafish, etc.) facility based on use at peer institutions is 1500 sq ft. The approximate square footage needed to house the current UW animal researchers in a single-core vivarium is 40,000 s.f. based on the number of active researchers at UW, significantly beyond the shelled space available in the SIB. Detailed facility design should include a panel of representative animal researchers.
  - c. A Vivarium Steering committee should be established to advise the Director. It should be composed of 5 members, one each from Zoology & Physiology, Animal Science, Molecular Biology, Pharmacy, Kinesiology, and Bio-engineering, each appointed by the respective department head.
3. **Greenhouse & Plant Growth:**
  - a. A plant growth facility steering committee should be established to advise the Director. It should be composed of 5 persons from the departments of Botany, Plant Sciences, Ecosystem Science & Management, and Molecular Biology, appointed by Department heads; one representative from the Wyoming Agricultural Experiment Station appointed by the WAES Director; and one at-large position appointed by the SI Science Director. It should be chaired by the greenhouse director.

- b. The steering committee sets policy for greenhouse and plant growth facility use. It also advises the Director on rental/usage fees, research and teaching equipment needs, and other matters relevant to the plant growth facilities. The plant growth steering committee should communicate with other relevant core facilities (such as CASI) regarding needs that fall outside the scope of the plant growth facilities but would enhance research and teaching capacity.
- c. The relationship between the greenhouse run by the Agricultural Experiment Station (30<sup>th</sup> & Harney) and the SI greenhouse should be considered. Our initial recommendation is that they remain under separate management structures, with coordination encouraged to maintain consistency in policies.

4. **CASI:**

- a. After the completion of the director hire this year, plans for two more CASI staff positions should be pursued in the next year, especially as CASI is envisioned as a distributed facility with locations around campus. CASI will need a business/billing manager as well.
- b. The relationship of the Jenkins microscopy facility to the should be examined by the SI Exec Committee with regard to avoiding duplication of capabilities at UW.
- c. There is strong interest across campus for a clean room (size and class??) that was not included in the SI Building nor the EERB. Space should be identified and funding pursued for this core facility to be operated as part of CASI to support Chemistry/Physics/Engineering faculty. Seven faculty from 4 departments had committed to providing a wide array of community-use instrumentation and equipment for the clean room. The original cost estimate for one in EERB was \$9M.
- d. CASI needs additional instrumentation to move beyond its initial complement of instruments, most of which were purchased with INBRE or grant monies. Items on the equipment list generated in 2020 by the former incarnation of the CASI Steering Committee should be ranked by a new Steering Committee and purchased.
- e. The 2014 Task Force report called for an operating budget for CASI to be used for equipment purchase, maintenance and repair, under the control of the CASI Director. Funding in the amount of \$400-\$600k annually should be requested from the Legislature.
- f. A CASI Steering committee should be established to advise the Director. It should be composed of ~9 people including a representative from Chemistry, Physics, Geology, Molecular Biology, Botany, Zoology, Plant Sciences, Health Sciences, and Engineering appointed by department heads and one from Faculty Senate. This list is not meant to be complete or exclusive but to cover the vast range of instrumentation methodologies and capabilities. It should be chaired by the CASI Director. The CASI Science Director serves ex officio. This steering committee will advise the director on setting rates for instrument use, scheduling, training, and instrument selection/retirement.

## Other SI Facilities and Renovations:



**1. QuaMSI - A New Quantum Materials Science Center in Physical Sciences:**

- a. Quantum technology is the future of the 21<sup>st</sup> century, and it paves the way for smaller, faster, and more flexible electronics. The global quantum computing market accounted for \$507.1 million in 2019, growing at a compound annual growth rate of 56.0% during the forecast period of 2020 to 2030. Quantum technology is coming of age and becoming a pervasive technology in which UW scientists are playing a growing part. To identify and support emerging opportunities for U.S. leadership in quantum technology, the quantum leap was identified as one of the National Science Foundation's (NSF's) 10 BIG Ideas in 2017. Just one year later, quantum information science (QIS) was included in one of the six initiatives of special priority for the Department of Energy (DOE) Office of Science. Particularly, the CHIPS and Science Act of 2022 authorizes \$20 billion for NSF's Directorate for Technology, Innovation, and Partnerships (TIP), which will accelerate domestic development of national and economic-security critical technologies such as artificial intelligence, quantum computing, advanced manufacturing, 6G communications, energy, and material science, that will encourage transformative and fundamental scientific discoveries. Top-tier institutions all have established quantum materials research centers.
- b. The ongoing Science Initiative should establish an interdisciplinary quantum materials science center that will bring together UW physical scientists from physics, chemistry, and electrical engineering in a common center to 1) design novel quantum materials, 2) fabricate and test quantum devices, 3) apply new discoveries in applications including quantum information technology, quantum computation, spintronics, and quantum sensing. Such a center advances UW's priorities to become more digital and leverage national initiatives in quantum materials. The creation of such a center would help the Science Initiative better balance investment in the life/physical sciences areas.

**2. Renovation of Aven Nelson/BS/PS library annex:**

- a. A request is being made for the renovation of the Library Annex Space to house the Rocky Mountain Herbarium and additional Geology exhibits to form a public outreach center near the UW planetarium in the basement of BS/PS.

**3. Renovation of Aven Nelson**

**4. Renovation of Biological Sciences**

**5. Renovation of Animal Sciences**

**6. Renovation of Ag C**

**7. Replacing the Wyoming Infrared Observatory 2.3 m telescope:**

- a. World-class laboratories produce world-class scholars equipped to solve regional and national problems. A new 6.5-meter Wyoming Astronomical Observatory (WAO) telescope will replace the mid-1970s 2.3-meter diameter telescope that has served as the centerpiece of the Physics & Astronomy research and education program. It will build upon 45 years of UW expertise in astrophysics, imaging science, data processing, and instrumentation technology as the marquee facility in a top-tier big-

data STEM program at Wyoming. The construction of a modern telescope at UW will spark instant international recognition as it beckons students, faculty, collaborators, and visitors from around the globe. WAO will undertake cutting-edge astrophysical research programs achievable at no other facility in the world, propelled by federal and private support, while inspiring and training tomorrow's scientists. Mount Jelm's dark skies, high altitude, and dry climate make it a precious regional resource for digital imaging science. Proximity to the UW campus permits economical operation with abundant access for Wyoming's students and citizens. WAO will measure and map, explore, and explain, to advance humanity's oldest quest to know what exists in the universe, how it works, and how it may affect life on Earth. The recent confluence of modern astronomical surveys with big-data computational science initiatives makes this a propitious moment to revitalize the telescope infrastructure at Wyoming. WAO will complete UW's Science Initiative upgrades to core scientific laboratories, as described in the 2014 Governor's Task Force Report on Top-Tier Science Facilities.

## SI Building, General Operation, and Occupancy:

1. The SIB, which encompasses the Center for Integrative Biological Research (CIBR), shall be maintained as a premier laboratory and collaborative space for faculty and students who are active researchers in the life sciences or close collaborators requiring modern lab space.
  - Space in SIB should be flexible, but the model here is different than the space normally assigned to department heads. Can new faculty establish a program if space depends on funding?
  - Faculty turnover rates are concerning; we don't want to look for reasons to aggravate high-performing faculty with threats of space reduction or movement
  - What motivates faculty to move into the SI building? Proximity to laboratories there (Greenhouse, Vivarium, CASI) or colleagues top the list. These criteria should drive decisions.
  - Decision makers should consider the "delta" to productivity made possible by the moves in or out of SIB.
  - Department unity and proximity to peers is highly valued by most faculty
  - The application and selection process for SIB occupancy should be university-wide and transparent.
2. The remaining shelled space in SIB should be fitted for research space rather than office space.
3. Applications from faculty to fill the open lab and office space should be considered by the SI Faculty Advisory Group in the near-term 1-year timeframe. VPR should put out a call for building occupancy each year if space is available so that this space is filled sooner rather than later, demonstrating good use of the State's investment. A minimal amount of free office space should be maintained to aid in the recruitment of new faculty.

4. Faculty moves into or out of the Institute should be infrequent, as moves are disruptive to research and forced moves have a deleterious effect on morale. Consideration should also be given to the effects of separating faculty from colleagues & collaborators if forced relocations are being discussed. Physical separation of faculty working in common disciplines conveys additional administrative expenses. Some faculty feel physical separation from departmental colleagues is acceptable if driven by research facility needs; other faculty feel that physical proximity to colleagues is essential, especially for junior faculty who desire close collaboration.
5. There needs to be assured space (renovated space in Aven Nelson/PS/BS/Animal Science?) for faculty to move back to if they move out of the Institute.
6. Faculty should be allowed to retain Institute office space and lab space essential for their funded research as long as faculty maintain a “research active” or above rating by their academic unit head. Faculty may stay in the SIB as long as they are research active with continuous funding and publications, as averaged over 3 years. A lapse of funding for two years or more may constitute a justification for the loss of lab or office space in the SIB. Decisions should be made by the SI Exec committee (SI Science Director and VPR and evaluated every 5 years). Assistant professors should not be removed from the SI building.
7. In recognition of the fact that some faculty only require lab space for a short duration, a portion of the SIB lab space should be reserved for generalized core use and scheduled through CASI as a shared resource.

## Programs:

1. **LAMP:**
  - a. LAMP should continue its mission to train faculty and graduate students in best-practices active-learning methodologies. LAMP [has an impressive track record](#) of preparing college teachers and students to be teachers.
  - b. **Integration of Computing.** SI should undertake an initiative to promote digital literacy on campus, consistent with UW pillars. This is best placed under the auspices of LAMP, in collaboration with the School of Computing and the Ellbogen Center for Teaching and Learning. One track can be stipends that pay faculty to participate in training that helps them introduce digital elements to 1000- and 2000-level classes. This will look different across the disciplines. It has the potential to impact every student on campus. Another thread can be requiring digital elements in classes in order to use the large active-learning classroom in SIB. Partnerships with ECTL and New Faculty Orientation are encouraged.
2. The LAMP Roadshow [has served a broad swath](#) of the State, providing educational classroom visits in support of K-12 teachers and students.
3. **WRSP:**
  - a. The WRSP program has been a great success since the early days of the Science Initiative, [serving departments beyond just the core sciences](#) by providing undergrad research experiences. Funding should be maintained and incremented as additional mentees/mentors are available.

- b. The ORED could help increase the visibility of WRSP to faculty through the inclusion of solicitations in ORED mailings to faculty. A research “match day” each fall publicized through new faculty orientation, ORED listserv, and faculty listserv would help new faculty and students be aware of the opportunities for research with faculty.
  - c. WRSP/LAMP should consider running a session on how to be an undergraduate mentor, aimed at new faculty or faculty newly interested in working with undergraduates.
4. **Seed Grants:**
- a. Implementation of an SI seed grant program is a high priority to spur interdisciplinary research and generate additional extramural grant proposals as a demonstration of the SI research success.
  - b. The SI Director and Faculty Advisory Group should create a seed grant program that borrows best practices from INBRE and COBRE programs, specifically requiring a commitment to submit external proposals. Seed grants would be nominally \$75k/yr for 2-3 years with an obligation to submit a federal proposal within 2 years. It is up to the PI to establish the case for interdisciplinarity so that the criteria are not solely defined by departmental boundaries. Proposals would be reviewed by the SI Director with the help of a review (external???) panel similar to the EPSCOR or MRI internal competitions.
5. **Inreach:** Does the campus know what SI is about and where it is going? Relevant documents include the list of all [people trained in active learning as part of the LAMP Program](#) and the [list of all Wyoming Research Scholars](#) from a wide range of disciplines. A better awareness of SI activities is needed on campus.
6. **Outreach:**
- a. The Science Initiative should conduct regular outreach to the State regarding the programs and research activities and facilities it manages. Examples of outlets for regular news include Western Confluence, (Ruckelshaus Institute of Environment and Natural Resources) as it goes to legislators, state agencies, and industries.... <https://westernconfluence.org/> Other outlets include Reflections, (College of Agriculture, Life Sciences, and Natural Resources) <https://www.uwyo.edu/uwexpstn/publications/reflections/>
  - b. Training and recognition of science journalism in the State and Rocky Mountain region, the way that AAAS does with its fellows programs <https://www.aaas.org/programs/public-engagement/> and AAAS Ambassadors and Fellows Program <https://www.aaas.org/page/ambassador-fellow-programs/>
    - Mass Media Science & Engineering Fellowship
    - Diverse Voices in Science
    - Science Journalism Internship in partnership with the EPSCOR program
  - c. Efforts will be encouraged to get research programs presented in communities around the state through organizations such as Rotary, presentations at Community Colleges, and even to some extent K-12 schools. This can be done by faculty or presentations or poster sessions to the public.

**7. PhD Fellowships:**

- a. The planned SI PhD fellowship program would boost graduate enrollment and degree completion in the sciences by providing stability of funding (I.e., students don't have to move back and forth between teaching and research support). Fellowships could include a teaching component, in keeping with SI's broad mission for outreach and education at all levels. The SI Director could choose to target fellowships in areas of strategic importance to the State or University. These could also be used as a means to increase diversity on campus.

**8. Startup Augmentation:**

- a. UW start-ups are a factor of 2-3x smaller than the going rate at R1 universities. SI research support always envisioned resources to help with startup costs. Startup resources can also be in the form of time in core facilities. This is a place to work with the Foundation on Private Fundraising in targeted areas.

9. Plenty, of internships...controlled environment growth engineering...WIP partnership

**10. Metrics of Success – TBD:**

- i. Competitive funding from SI faculty.
- ii. Major equipment and instrumentation use
- iii. Graduate students and assistantships filled.
- iv. Undergraduate WRSP participation
- v. Publication counts
- vi. Interdisciplinary efforts

Table of Science Initiative Funding relative to target goals

Budget Segment	2014 Task Force Target	FY 20/21	Funded %
Active learning training (LAMP)	\$398,000	\$308,000	77%
Undergrad research scholars (WRSP)	\$900,000	\$339,000	38%
Administrative staffing and expenses	\$506,000	\$326,000	64%
Outreach and Engagement	\$200,000	\$39,000	20%
Research Support	\$817,000	\$124,000	15%
Core Instrumentation Facility (CASI)	\$510,000	\$14,000	3%
Specialized Building Staffing	\$160,000	\$0	0%
Seed Grant Program	\$600,000	\$0	0%
PhD Scholars Program	\$920,000	\$0	0%

## Appendix 2: Space Policy for the SI Building

University of Wyoming Regulation 6-7 on Space Assignment and Management states that all University facilities belong to the University and are an allocable resource to be used in the best interests of the institution. Accordingly, the proprietary interests of individual organizational units shall not exclusively define the allocation and use of campus space, especially when larger institutional interests are thereby sacrificed. Space is a critical University-owned resource and is subject to allocation, evaluation, and reallocation to meet the overall needs and priorities of the University.

The Science Initiative building (SIB) exists to support interdisciplinary science programs focused on student and faculty success and includes large open lab spaces for wet-bench research, many research support rooms, and new major instrument core facilities (Center for Advanced Scientific Instrumentation; CASI) designed to be shared by faculty research-groups engaged in externally funded interdisciplinary research consistent with the primary goal of helping UW propel into Carnegie R1 status. Attaining and maintaining the Carnegie R1 status for UW means that faculty lab group occupancy in the SIB is dependent upon the ongoing research productivity and interdisciplinarity of an individual faculty member's research group, or that faculty members with a role in a large externally funded interdisciplinary grant with other UW faculty collaborators that requires the type of open wet-bench shared laboratory spaces that the SIB provides. Computing, engineering, and data science faculty that collaborate with the wet-bench scientists in the SI building are also appropriate for occupancy in this building.

### Space Decisions:

The Science Initiative Executive Committee will be responsible for space allocations and reallocations for the existing UW faculty research groups in the SIB as well as for the UW faculty interested in moving their research groups, completely or partially to the SIB. The space needs of all faculty in SIB will be evaluated annually. The faculty will have a space contract no longer than 5 years, which will be renewed annually for the requested time. The Executive Committee will decide on occupancy, as well as the amount of lab space in the Science Initiative building based on the criteria in the next section.

### Criteria:

#### **Appropriateness of research for the building:**

SIB's research wing is designed to support wet lab research, primarily for supporting research using biochemical, chemical, microbiological, and molecular techniques. There are also highly sophisticated BSL2 laboratories. The space must be used for research requiring these available resources. Research projects that do not need wet lab space or need wet lab space only for a brief period could be served better in other research spaces on campus.

Criteria

- Type of wet-bench research performed
- % of research that requires wet bench lab space
- If the need is seasonal, the number of weeks for which the wet lab space will be needed.

**Research productivity and potential:**

This can be demonstrated by the annual funding level for the faculty member.

- Ongoing funding from externally funded research grants, including pending proposals, awarded to the faculty member. When providing \$ amounts, both indirect and direct costs in the projects should be included.
  - Annual individual grant support (\$) for the next two years (In a separate sheet, include agency, start date, duration, and amount.)
  - Annual Institutional grant support in \$ for the next two years (e.g. capacity funds, EPSCoR grant, INBRE, etc.). In a separate sheet, include agency, start date, duration, and amount.
    - For new faculty members, the projected research support (based on start-up funds, etc.) in \$ will be considered. In a separate sheet, include anticipated plans for the proposal submission agency, start date, duration, and amount, if available.
- Annual research expenditures in the previous two years as reported to NSF. (This information will be collected by VPRED from OSP).

**In addition, the following information will also be considered as indicators of research productivity:**

- Number of PhD students and post-doctoral fellows in the faculty principal investigator's group.
- Numbers of master's and undergraduate research students mentored by the faculty principal investigator.
- Number of peer-reviewed scholarly publications that have resulted from funded research produced by the faculty principal investigator's lab group in the last five years.
- Any tangible intellectual property (e.g., patents) related to work done in the faculty principal investigator's lab in the last five years.

**Research Synergy:**

One way to increase the research productivity of researchers in the SIB is to bring together a set of researchers with common interests to build multi-investigator teams for large extramural grants.

- Documentation of the faculty principal investigator's key role in ongoing Science initiative-building-centered research and interdisciplinary, team science projects.
- Documentation of efforts to build interdisciplinary collaborations among SI occupants.

It is important for Science Initiative building occupants, as well as future building occupants, to realize that their occupancy and the amount of research lab space allocated to them are subject to change annually based on their overall research productivity as measured by the research output indicators above.

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**Research Space Metrics (Effort costs):**

Will be calculated by VPRED and VP Operations staff

There is a need to apply objective criteria to determine research space allocations to investigators. To that end, the following metrics will be used to analyze faculty research productivity:

- Total Award (TA): the sum of direct costs and indirect costs. Projects on no-cost extensions should not be included in the total. Awards without indirect costs are not included.
- Net Assignable Square Feet (NASF): wet-lab laboratory space. Does not include office space or common facilities.
- The Research Space Productivity Index (RSPI): the TA of a funded investigator divided by the number of NASF of laboratory space occupied.
- Each fiscal year, the Research Space Productivity Index (RSPI) will be calculated for the benchmark value by the VPRED office

**Management Guidelines for Decisions**

**Researchers become eligible to lose space when their:**

- Research does not use the available research space RSPIs are lower than 0.33 (33%) of the benchmark RSPI for the SI;
- They have had no external funding for 2 years or
- They have a 2-year average of annual external funding less than 0.33 of the mean Total Award (TA) for the SI.

Investigators without external funding for 1 year may be notified of the above provisions in the policy.

- o Researchers without funding for 2 years will lose space in the SI.
- o Researchers without IDC as a component of their TA will lose space in the SI.

Renting, or leasing space from non-university landowners/lessors will be accepted on a case-by-case basis at the discretion of the Committee, in accordance with the Real Estate Lease agreements.

Benchmark RSPI will be determined based on the funding levels for the faculty interested in moving to the SI Building