Workshop Report

August 18, 2024

Inaugural Future of BSE Days

The Future of Work and Learning

May 2-3, 2024

UNL East Campus Union, Arbor Suite

BIOLOGICAL SYSTEMS ENGINEERING

University of Nebraska-Lincoln

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Executive Summary

The inaugural **Future of BSE Days (FBD)** event, held on May 2-3, 2024, brought together the Biological Systems Engineering (BSE) community to discuss and shape the future of work and learning within the field. The event was designed to foster collaboration between faculty, students, industry leaders, and alumni, with the goal of reimagining the department's educational approach, enhancing industry partnerships, and preparing students for the challenges of tomorrow. Over the course of two days, participants engaged in insightful discussions, workshops, and presentations that highlighted both the strengths of the department and opportunities for growth.

The workshop resulted in several key outcomes, including a strong consensus on the need for curriculum innovation, particularly in integrating emerging technologies and systems thinking. The importance of experiential learning and industry collaboration was also emphasized, with participants advocating for deeper partnerships that provide students with real-world problem-solving experiences. Feedback from the event was overwhelmingly positive, with attendees expressing enthusiasm for the collaborative atmosphere and the focus on meaningful, impactful education.

Key Takeaways:

1. **Curriculum Innovation:** There is a clear need to reimagine the undergraduate curriculum to incorporate emerging technologies, sustainability, and systems thinking, ensuring that it remains relevant and responsive to industry needs.
2. **Industry Collaboration:** Strengthening partnerships with industry is essential, particularly in creating more experiential learning opportunities such as internships, co-op programs, and industry-sponsored projects.
3. **Focus on Durable (Soft) Skills:** Integrating durable skills like communication, leadership, and emotional intelligence into the curriculum is critical for preparing students to succeed in fast-paced, multidisciplinary environments.
4. **Event Success and Feedback:** The workshop was well-received, with participants praising the collaborative environment and the valuable content. Suggestions for improvement focused on logistical aspects and the desire for more industry-driven, thought-provoking content.

Next Steps:

1. **Reimagine the Undergraduate Curriculum:** The BSE Undergraduate Programs Committee should continue to evaluate and redesign the BSE curriculum, focusing on integrating emerging technologies, systems thinking, and experiential learning.
2. **Explore Industry-University Collaborations:** Develop new models of collaboration with industry, including collaboration with the BSE Advisory Board and pilot initiatives for industry-sponsored projects and internships.
3. **Coordinate Future Collaborative Events:** Organize regular workshops, focus groups, and networking events, and establish communication platforms to maintain ongoing dialogue and collaboration within the BSE community.
4. **Plan the Next Future of BSE Days in Spring 2025:** Begin planning for the next event, incorporating participant feedback to enhance the event's structure, content, and impact.

Introduction

The **Future of BSE Days (FBD)**, held on May 2-3, 2024, at the UNL East Campus Union, gathered faculty, students, and industry leaders to explore the future direction of Biological Systems Engineering (BSE). The workshop was designed to address the critical challenges and opportunities facing the BSE field, focusing on the integration of emerging technologies, the development of essential soft skills, and the promotion of interdisciplinary and experiential learning. Over two days, participants engaged in a series of discussions, panel sessions, and student showcases, all aimed at shaping a responsive and future-ready curriculum that meets the evolving needs of the industry. The event highlighted the importance of preparing students not only with technical expertise but also with the adaptability and emotional intelligence required in a rapidly changing workforce. This report summarizes the key outcomes of the workshop and outlines the recommended next steps for advancing the BSE department's mission.

The FBD agenda was designed to explore key themes within the department through a mix of industry collaboration and student-focused activities. Spanning two days, the event commenced with an emphasis on industry perspectives, highlighted by an enlightening keynote speech from Dr. Erica Barreiro, followed by a dynamic industry panel. The afternoon sessions of Day 1 delved into focused breakout sessions centered around the department's core program areas. Day 2 shifted the focus to student success, beginning with an engaging career pathways panel that featured alumni with diverse career trajectories. The afternoon celebrated student achievements through graduate student lightning talks, senior capstone poster sessions, and concluded with the recognition and celebration of our outstanding student awardees. The following sections of this report provide a detailed overview of these activities and the key outcomes derived from each. The full agenda can be found in Appendix A.

Opening Keynote: Dr. Erica Barreiro

Dr. Erica Barreiro, a respected future of work strategist, delivered an inspiring and enlightening keynote address where she shared her expertise on navigating the rapidly evolving landscape of work and learning. With a focus on leveraging emerging trends in talent, technology, and workplace practices, Dr. Barreiro emphasized the importance of designing agile and sustainable ways of working that can adapt to future challenges. Her deep understanding of human motivation and learning, coupled with her passion for fostering inclusive and engaging environments, provided participants with valuable insights into the future of our field. Dr. Barreiro's presentation underscored the critical role of emotional intelligence, continuous learning, and the integration of new technologies in preparing students and professionals for the complexities of modern leadership and workplace dynamics.

Key Takeaways:

- **Adapting to Change:** Dr. Barreiro emphasized the need for continuous adaptation in both education and the workplace, driven by rapid technological advancements and shifting workforce dynamics.

- **Shortened Half-life of Skills:** The fast pace of technological change has reduced the longevity of technical skills, making continuous learning and upskilling essential for career success.
- **Importance of Soft Skills:** Alongside technical knowledge, emotional intelligence, communication, and teamwork are increasingly critical for thriving in modern work environments.
- **Generational Dynamics:** Dr. Barreiro discussed the values of Gen Z and Gen Alpha, highlighting their focus on diversity, authenticity, and environmental sustainability, which are reshaping workplace expectations.
- **Integration of Technology in Education:** The keynote stressed the importance of incorporating emerging technologies like AI and big data into the BSE curriculum to prepare students for future industry demands.
- **Flexible Learning Models:** Innovative educational approaches, such as competency-based learning and stackable credentials, were presented as ways to better align education with industry needs.
- **Purpose and Culture:** Dr. Barreiro underscored the significance of aligning educational programs with a clear mission and values that resonate with students and industry partners alike.

These takeaways provide a strategic framework for the BSE department to evolve its curriculum and partnerships, ensuring that graduates are well-equipped to navigate and lead in the future workforce.

Industry Panel: Challenges and Opportunities in Workforce Training

An industry panel was convened to discuss the challenges and opportunities in workforce training, particularly in the context of BSE. Moderated by Bobby Brauer from Bayer Crop Science, the panel featured experts from various sectors who provided insights into the evolving needs of the industry and the implications for BSE education. The discussion highlighted the importance of aligning academic programs with industry demands, fostering soft skills, and promoting hands-on learning experiences.

Panelists:

- **Bobby Brauer (Moderator), Bayer Crop Science:** Bobby leads a team at Bayer that focuses on automating field data collection and analysis using advanced technologies such as imaging, sensing, and cloud computing. He has extensive experience in crop yield simulation and geospatial platforms, and he plays a key role in Bayer's Data Science Center of Excellence.
- **Tony Kaufman, Solventum:** Tony is the New Business Ventures Lead for Solventum's Medical Technologies OEM Business. With over 26 years of experience in medical device design and development, he focuses on bringing innovative healthcare technologies to market. He holds a Lean Six Sigma Black Belt and a degree in Biological Systems Engineering from UNL.
- **Dr. Ali Ajaz, Lindsay Corporation:** Ali has 15 years of experience in the irrigation sector, specializing in scientific irrigation scheduling, spatial crop modeling, and drought risk assessment. He leads an international team at Lindsay Corporation

and is responsible for the company's irrigation design software and mechanized irrigation research.

- **Carter Hubbard, Olsson:** Carter has more than 25 years of experience in water resources engineering, with expertise in hydrologic and hydraulic modeling. He has worked on flood control and stormwater projects across the United States and has served as an adjunct lecturer at UNL. He holds a BS degree in BSE from UNL and a MS degree in environmental engineering.
- **Katie Campbell, Lindsay Corporation:** Katie is the Senior HR Business Partner at Lindsay Corporation, where she supports the Infrastructure and Irrigation Business units. With a background in Speech Communication, she is dedicated to fostering a positive work environment and developing employee potential.
- **Steve Tippery, RealmFive:** Steve is the CEO of RealmFive, an Ag Tech company that provides wireless connectivity solutions for agriculture. He has 17 years of experience in the agricultural machinery industry, with expertise in design engineering, project management, and product development. Steve holds a BS in Agricultural Engineering from the BSE department and an MBA, both from UNL.

These industry leaders provided valuable perspectives on the importance of experiential learning, the need for continuous curriculum updates, and the integration of soft skills training within BSE programs. Their insights will guide the department's efforts to better prepare students for the evolving demands of the workforce.

Key Takeaways:

1. **Experiential Learning is Critical:** Panelists emphasized the importance of hands-on learning experiences, such as internships and co-op programs, to bridge the gap between academic preparation and industry needs. These programs help students apply theoretical knowledge in real-world settings, enhancing their readiness for the workforce.
2. **Continuous Curriculum Updates:** The need for ongoing updates to the BSE curriculum was highlighted, ensuring that it stays aligned with current industry practices and emerging technologies. This includes integrating topics like AI, big data, and precision agriculture to keep students competitive in the job market.
3. **Integration of Soft Skills:** Beyond technical expertise, the panel underscored the importance of developing soft skills such as communication, leadership, teamwork, and emotional intelligence. These skills are increasingly valued by employers and are essential for navigating complex workplace dynamics.
4. **Strong Industry Collaboration:** Building and maintaining robust partnerships with industry is vital. Panelists advocated for more collaborative projects, industry-sponsored research, and advisory boards to provide feedback on curriculum development and ensure that academic programs meet industry standards.
5. **Flexibility in Learning Models:** There was a consensus on the need for flexible learning options that cater to different types of students, including non-traditional learners and working professionals. This could involve modular courses, micro-credentials, and evening or online classes.

6. **Emphasis on Real-World Problem Solving:** The panel highlighted the value of incorporating real-world challenges into academic projects. This approach not only enhances learning but also provides students with practical experience that is directly applicable in their careers.
7. **Addressing Intellectual Property (IP) Concerns:** Managing IP issues was identified as a significant barrier to effective industry-academic collaborations. Panelists called for clearer and more flexible IP policies to facilitate joint research and development efforts.
8. **Adapting to Future Generations:** Panelists noted the importance of understanding and adapting to the values and expectations of younger generations, such as Gen Z and Gen Alpha, who prioritize diversity, authenticity, and sustainability in their careers.

These key takeaways provide a strategic framework for enhancing the BSE department's curriculum and partnerships, ensuring that students are well-prepared to meet the challenges and opportunities of the future workforce.

Overview of the BSE Department

Over the lunch hour, Mark Stone, Deepak Keshwani, Derek Heeren, and John Hay provided an update on the status of the department. The update highlighted the department's strengths, recent initiatives, and ongoing efforts to enhance academic programs, research, and community engagement. The following is a short summary of some of the main points shared.

Faculty and Students: The BSE Department comprises 38 faculty members, 25 staff and post-docs, 250 undergraduate students, and 66 graduate students, reflecting a diverse and active academic community.

Academic Programs: The department offers undergraduate degrees in Agricultural Systems Technology, Agricultural Engineering, and Biological Systems Engineering. Graduate programs include an MS in Mechanized Systems Management, MS in Agricultural and Biological Engineering, and a PhD in Biological Engineering, with several interdisciplinary options.

Focus Areas: The department focuses on four “pillars of excellence”:

- **Biomedical Engineering, Health, and Safety Systems**
- **Precision Irrigation Systems**
- **Smart & Autonomous Biological Systems**
- **Sustainable Engineering Systems**

Recent Initiatives:

- Introduction of the Smart & Autonomous Systems (SAS) emphasis in Agricultural Engineering (Fall 2024)
- Launch of the Ecological Engineering Minor (Fall 2024)

Upcoming Initiatives:

- Accelerated MS program
- Undergraduate certificates in Irrigation and Agricultural Water Management

Research Highlights: The department is engaged in cutting-edge research across various domains, including nanotechnology and gene delivery in Biomedical Engineering, nitrate

transport in watersheds, and the Heartland Robotics Cluster in Smart & Autonomous Systems.

Extension Programs: The department's extension affiliates are actively involved in critical areas such as food safety, irrigated cropping systems, and animal manure management, providing valuable resources and expertise to the community.

Student Success: The department is committed to fostering student success through a holistic approach, integrating academic excellence, experiential learning opportunities, and support services.

Emeriti Scholarship Campaign: An ongoing campaign honors the legacy of former professors by supporting scholarships and experiential learning, ensuring continued support for student development.

The overview underscored the department's commitment to innovation, academic excellence, and community engagement, positioning it as a leader in addressing the complex challenges in BSE.

Workshops: Exploring the BSE Pillars of Excellence

In the afternoon of Day 1, participants engaged in four focused workshops, each aligned with the department's pillars of excellence. These workshops provided an in-depth exploration of key areas within Biological Systems Engineering, offering a platform for collaborative discussions, knowledge sharing, and the generation of innovative ideas. The workshops covered critical topics in: (1) Biomedical Engineering, Health, and Safety Systems; (2) Precision Irrigation Systems; (3) Smart & Autonomous Biological Systems; and (4) Sustainable Engineering Systems. Participants, including faculty, industry leaders, and students, worked together to identify current challenges, opportunities for advancement, and actionable steps to enhance educational programs and research initiatives within each pillar. These sessions provided valuable insights for shaping the strategic direction of the department and reinforcing its commitment to addressing complex, real-world problems through interdisciplinary collaboration and cutting-edge technology.

Biomedical Engineering, Health, and Safety Systems Workshop

This workshop focused on identifying the critical skills and experiences necessary for students to succeed in the biomedical engineering workforce. Industry representatives from companies like Pfizer, BD, Solventum, and AbbVie emphasized the importance of internships and research experiences in developing practical knowledge, leadership, and problem-solving skills. Discussions also highlighted the need for curriculum enhancements, such as cross-disciplinary senior design projects and the integration of FDA/regulatory knowledge.

Key Takeaways:

- **Emphasis on Internships:** Internships are essential for students to gain diverse, marketable skills and real-world experience.
- **Curriculum Enhancements:** Incorporating cross-disciplinary projects, software development, and clinical immersion into the curriculum is crucial.

- **Industry Collaboration:** Strengthening partnerships with industry through sponsored projects and micro-credentialing can improve student placement rates.
- **Integration of Soft Skills:** Teaching students to translate their research into practical, marketable skills is vital for their success in the workforce.

Precision Irrigation Systems Workshop

This workshop addressed the educational needs and industry collaborations necessary to prepare students for careers in irrigation systems. Participants discussed the importance of job opportunities after graduation and proposed ways to enhance the curriculum to include problem-solving and sales skills. The workshop also explored methods to strengthen industry partnerships, such as regular focus groups and mentorship programs.

Key Takeaways:

- **Job Readiness:** Ensuring that students are well-prepared for post-graduation job opportunities through enhanced training in problem-solving and prioritization.
- **Industry Collaboration:** Developing stronger ties with industry through focus groups, field days, and mentorship programs.
- **Practical Learning:** Incorporating short internships and real-world problem-solving experiences early in the academic program.

Smart & Autonomous Biological Systems Workshop

This session focused on balancing theoretical knowledge with practical experience in the curriculum. Participants highlighted the need for more experiential learning opportunities, flexible internship options, and potential certificate programs in Smart & Autonomous Systems (SAS). The workshop also discussed the importance of preparing students for the fast-paced and demanding nature of the industry by building emotionally robust graduates.

Key Takeaways:

- **Experiential Learning:** Expanding experiential learning opportunities through co-designed classes with industry and leveraging university resources like farms.
- **Flexible Internships:** Developing longer, more flexible internships that allow students to gain deeper industry experience.
- **Certificate Programs:** Exploring certificate programs in SAS for both traditional students and industry professionals.
- **Soft Skills Development:** Focusing on building graduates who are mentally and emotionally prepared for industry challenges.

Sustainable Engineering Systems Workshop

Originally referred to as the Resilient Food-Energy-Water Systems workshop, participants in this workshop expressed enthusiasm for integrating systems thinking and sustainability into the BSE curriculum. Hence, the name was adjusted to Sustainable Engineering Systems (SES). The discussion emphasized the need for innovative educational approaches and the development of essential skills like critical thinking,

collaboration, and resilience. The workshop also explored the potential for establishing BSE as a leader in sustainable systems engineering through curriculum innovation and industry partnerships.

Key Takeaways:

- **Systems Thinking:** Incorporating systems thinking and sustainability as core components of the curriculum to address complex global challenges.
- **Innovative Education:** Developing new methods of delivering education that focus on experiential and lifelong learning.
- **Professional Skills Development:** Emphasizing the importance of critical thinking, creativity, and collaboration in preparing students for the future.
- **Strategic Vision:** Positioning BSE as a leader in sustainable systems engineering by pursuing problem-driven curricula, securing funding, and building strong industry connections.

Overarching Key Takeaways:

Several key themes emerged across all four workshops that can inform the department's strategic direction including: experiential learning and industry collaboration, curriculum Innovation, development of soft skills, focus on systems thinking and sustainability, and flexibility and lifelong learning. These salient points collectively reflect a forward-thinking approach to BSE education, aimed at equipping students with the technical expertise, practical experience, and adaptive skills needed to thrive in the future.

Career Pathways Panel: Exploring Diverse Career Journeys

The **Career Pathways Panel** on Day 2 provided attendees with insights into the diverse and often unpredictable career trajectories of departmental alumni. Moderated by Andy Sauer, the panel included professionals from a wide range of industries who shared their experiences and emphasized the importance of lifelong learning. The panelists highlighted how their broad training in BSE enabled them to adapt to new opportunities, many of which involved technologies and practices that were not prevalent during their time as students. Their stories underscored the value of flexibility, adaptability, and the continuous pursuit of knowledge in navigating successful careers.

Panelist Bios:

- **Andy Sauer (Moderator), Burns & McDonnell:** Andy is the Green Infrastructure & Stormwater Manager for Burns & McDonnell Water Global Practice, with over 23 years of experience in water resources and stormwater management. He holds both a B.S. and M.S. in Agricultural and Biological Systems Engineering from UNL and is a registered professional engineer with a strong commitment to sustainable stormwater solutions.
- **Deb Ohlinger, Olsson:** Deb leads the Colorado water resources group at Olsson, focusing on stormwater management. A UNL alumna with degrees in Biological Systems Engineering and Civil Engineering, Deb has over 20 years of experience in environmental engineering and enjoys outdoor activities in Colorado.
- **Deidre Rauch, Cargill:** Deidre works on the North America Process Safety Risk Management team at Cargill, where she supports the management of process

safety systems involving hazardous chemicals. A 2017 BSE graduate with a focus on food and bioprocessing, she has held various engineering roles in edible oil refineries and has a passion for process safety.

- **Jackson Stansell, Sentinel Fertigation:** Jackson is the Founder & CEO of Sentinel Fertigation, a company that specializes in fertigation scheduling software. After earning his master's degree in Agricultural Engineering from UNL, Jackson developed Sentinel's flagship product, N-Time, and has grown the company to serve customers across the U.S.
- **Madison Spence, Catheter Precision:** Madison has worked in the Medtech industry for five years, starting with Johnson & Johnson and later moving into clinical research. She is currently involved in developing pre-procedural planning tools for cardiologists and overseeing first-in-human trials for a deep brain stimulation device aimed at treating mental health conditions.
- **Christina O'Keefe, Kerry:** Christina is the Director of Sustainability for North America at Kerry, where she leads efforts to create sustainable food and beverage solutions. With over a decade of experience in sustainability strategy, Christina holds a B.S. in Agricultural Engineering from UNL and an MBA from the University of Nebraska at Omaha.
- **Bethany Lowndes, UNMC:** Dr. Lowndes is an Assistant Professor at UNMC and a Certified Professional Ergonomist, specializing in human factors engineering. With a PhD in Biomedical Engineering and a master's in public health, she focuses on improving healthcare delivery through user-centered design and ergonomic research.

Key Takeaways:

- **Career Trajectories:** The panelists emphasized that career trajectories are often unpredictable and that success frequently comes from being open to new opportunities and challenges that arise unexpectedly.
- **Value of Broad Training:** The diverse and comprehensive education provided by the BSE department was highlighted as a key factor in enabling panelists to adapt to various roles and industries, even as the landscape of technology and industry practices evolved.
- **Lifelong Learning:** Lifelong learning emerged as a crucial theme, with panelists noting that many of the tools and technologies they use today, such as AI and machine learning, were not part of their formal education, underscoring the need to continually update skills and knowledge.
- **Adaptability and Flexibility:** The ability to adapt to change and remain flexible in the face of new challenges was identified as essential for career success, particularly in fields where technological advancements occur rapidly.

Graduate Student Lightning Talks

The **Lightning Talks** session provided a dynamic platform for twelve graduate students to present their cutting-edge research in a concise and engaging format. Designed to be accessible to a broad audience, this competition emphasized the

innovative nature and societal impact of the students' work. Each participant demonstrated exceptional clarity and passion as they highlighted the significance of their research, covering a diverse range of topics that are crucial to advancing the field of Biological Systems Engineering. The impressive performance of these students not only showcased their deep knowledge and creativity but also underscored the department's commitment to fostering research that makes a meaningful difference in society. Participating students included Mahsa Mohammadi, Amlan Blabantaray, Prajwol Thapa, Trisam Sapkota, Zhaocheng Xiang, Akeem Adeniran, Portia Plange, Gustavo Castro Garcia, Kevin Steele, Muili Lawal, Sanjog Kharel and Shaswati Behera.

The audience was exceptionally impressed by the presentations by all of the students. The students claiming top prizes where Kevin Steele, Amlan Blabantaray, and Portia Plange. Thank you to Sarah Plautz, Hyun-Seob Song, Julie Obermeyer, and Wei-Zhen Liang for serving as judges.

Celebrating Student Excellence: Poster Presentations and Awards

The final events of Day 2 were dedicated to celebrating the hard work and achievements of our students. The afternoon began with poster presentations by our senior capstone classes, where students showcased their innovative projects, highlighting the practical applications of their studies in Biological Systems Engineering. These presentations provided a glimpse into the future of the field, as students demonstrated their ability to tackle real-world challenges with creativity and technical expertise.
The day concluded with a special recognition ceremony, honoring the outstanding accomplishments of both undergraduate and graduate students. Awards were presented to those who have excelled in academics, research, and service, reflecting the department's commitment to fostering excellence in all aspects of student life. This celebration not only recognized individual achievements but also underscored the collective strength of our student community. As we look forward to the future, these moments of recognition serve as a reminder of the bright potential that lies ahead for each of our students.

Post-Event Survey

We conducted a post-event survey, which provided valuable insights into participants' experiences and highlighted several areas of success and opportunities for improvement. Overall, respondents expressed strong appreciation for the content and presentations, particularly those by students, as well as the collaborative environment fostered during the workshop. Key themes emerged around the importance of industry collaboration, experiential learning, and ensuring that the event's mission aligns with participants' goals. However, there were also suggestions for logistical improvements, such as better room setup (larger space), as well as the desire for additional thought-provoking content from industry leaders in future events.

Key Takeaways:

1. **Valued Content and Collaboration:** Participants greatly valued the student presentations and the collaborative atmosphere, especially the opportunities to engage with the department.
2. **Importance of Industry Collaboration and Experiential Learning:** A strong emphasis was placed on the need for the BSE department to embrace closer collaboration with industry and to enhance experiential learning opportunities for students.
3. **Opportunities for Logistical Improvements:** Feedback included the need for larger spaces, better temperature control, and more thoughtful room setups to improve the overall event experience.
4. **Desire for Thought-Provoking Content:** Participants suggested including industry thought leaders and best practices from other institutions in future events to increase the relevance and impact of discussions.
5. **Positive Support for the Initiative:** There was positive feedback supporting the launch of the "Future of BSE Days," with participants expressing enthusiasm for continuing the initiative and further exploring industry collaborations.

These insights will be instrumental in planning future events, ensuring they continue to meet the needs and expectations of all stakeholders involved.

Key Outcomes and Next Steps

The **Future of BSE Days** successfully brought together faculty, students, industry leaders, and alumni to engage in meaningful discussions about the future of the department. Through panels, workshops, and presentations, FBD participants identified several critical outcomes and actionable next steps to guide the department's strategic direction in the coming years.

Key Outcomes

1. **Strengthened Industry Partnerships:** The workshop reinforced the importance of deepening collaborations with industry to ensure that BSE education remains relevant and responsive to evolving workforce needs. Stronger ties with industry will enable more practical, hands-on learning opportunities, such as internships and co-op programs, which are critical for student success.
2. **Curriculum Enhancement and Flexibility:** Participants across sessions emphasized the need for continuous curriculum updates to incorporate emerging technologies, systems thinking, and sustainability principles. The importance of flexibility in learning models, including modular courses and micro-credentials, was highlighted to cater to diverse student needs and support lifelong learning.
3. **Focus on Soft Skills Development:** The workshop underscored the need to integrate soft skills—such as communication, leadership, teamwork, and emotional intelligence—into the curriculum. These skills are essential for students to thrive in fast-paced, multidisciplinary environments and to effectively navigate the complexities of modern engineering challenges.

4. **Commitment to Sustainability and Systems Thinking:** A strong consensus emerged around the importance of embedding sustainability and systems thinking into all aspects of the BSE curriculum. These approaches are vital for addressing global challenges, such as food security and environmental impact, and for preparing students to become leaders in sustainable engineering.
5. **Recognition of Student Achievement:** The workshop highlighted the remarkable talent and potential of BSE students through events like the Lightning Talks and Poster Presentations. These activities demonstrated the department's commitment to fostering student excellence and innovation, which will continue to be a focal point in future initiatives.

Next Steps

Based on the insights and discussions from the FBD and the follow-up survey, the following next steps were identified to guide the department's efforts in advancing our strategic priorities:

1. **Reimagine the Undergraduate Curriculum:**

- **Objective:** To ensure that the BSE curriculum remains at the forefront of innovation and relevance, the department will prioritize the reimagining and redesigning of its undergraduate programs.
- **Action Items:** The BSE Undergraduate Programs Committee will continue to advance efforts to critically evaluate and redesign the undergraduate curriculum, focusing on integrating emerging technologies, experiential learning, systems thinking, industry collaborations, and sustainability into the core coursework. This will include the pursuit of funding and partnerships to support the development and implementation of these curricular changes.

2. **Explore Novel Industry-University Collaborations:**

- **Objective:** To strengthen the connection between academia and industry, the department will explore new models of collaboration that benefit both students and industry partners.
- **Action Items:** Launch pilot initiatives for industry-sponsored senior design projects, internships, and co-op programs that offer students real-world problem-solving experiences. Also, identify and pursue collaborative research opportunities that align with industry needs and leverage the department's expertise.

3. **Coordinate Future Collaborative Events and Communication Platforms:**

- **Objective:** To foster ongoing collaboration and communication within the BSE community, the department will coordinate future events and establish new communication platforms.
- **Action Items:** Organize regular workshops, focus groups, and networking events that bring together students, faculty, industry partners, and alumni to share insights and explore new opportunities. Also, develop and maintain platforms, such as a department newsletter or an online forum, to facilitate continuous dialogue and information sharing among stakeholders.

4. **Plan for the Next Future of BSE Days Event in Spring 2025:**

- **Objective:** To build on the success of this year's workshop and maintain momentum, the department will plan a follow-up event for Spring 2025.
- **Action Items:** Begin early planning for the 2025 Future of BSE Days, incorporating feedback from this year's participants to improve the event's structure and content. Identify key themes and topics for the 2025 event, ensuring they align with the department's evolving priorities and the latest trends in BSE. Engage with a broad range of stakeholders, including industry partners, alumni, and students, to ensure the event reflects the needs and interests of the entire BSE community.

By following these next steps, the BSE department will continue to innovate in education, strengthen its industry connections, and foster a vibrant, collaborative community that is well-prepared to meet the challenges and opportunities of the future.

Conclusion

The inaugural FBD marked a significant moment for the BSE department, serving as a catalyst for innovation, collaboration, and strategic planning. Over the course of two days, faculty, students, industry leaders, and alumni came together to explore the future of work and learning within the field of BSE. FBD not only highlighted the department's existing strengths but also illuminated the path forward, focusing on curriculum innovation, industry partnerships, and the integration of sustainability and systems thinking.

Key outcomes from the event included a strong consensus on the need to reimagine the undergraduate curriculum to better align with industry demands and emerging technologies. The workshop also underscored the importance of experiential learning and industry collaboration, with participants advocating for more hands-on, real-world experiences that prepare students for the challenges of tomorrow. The feedback gathered through post-event surveys reaffirmed these priorities, while also offering constructive insights on logistical improvements and future content focus.

As the BSE department moves forward, the insights and actions generated during FBD will guide its efforts to remain at the forefront of engineering education. The department is committed to implementing the next steps identified during the workshop, including the reimagining of its curriculum, the exploration of novel industry-university collaborations, and the organization of future collaborative events. These initiatives will ensure that the BSE department not only meets the evolving needs of its students and industry partners but also continues to lead in the development of innovative solutions to global challenges.

In conclusion, the FBD was a resounding success, laying a strong foundation for the department's future endeavors. By embracing the feedback and ideas generated during the event, the BSE department is well-positioned to advance its mission, foster excellence in education and research, and prepare the next generation of engineers to make a meaningful impact on the world. The department looks forward to continuing this journey, with plans already underway for the next FBD event in Spring 2025, where progress on these initiatives will be shared and new goals will be set.

Appendix A: Full Agenda

Inaugural Future of BSE Days

The Future of Work and Learning

May 2-3, 2024

UNL East Campus Union, Arbor Suite

May 2nd – Innovation and Industry Day: The Future of Work and Learning

Session 1: The Future of Work	
8:30 - 9:00 am	Registration, Networking, and Coffee
9:00 - 9:05 am	Welcoming Remarks, Dr. Mike Boehm, Vice Chancellor, UNL Institute of Agriculture and Natural Resources
9:05 - 9:45 am	Opening Keynote Speaker: Dr. Erica Barreiro, Be Courageous Leadership, From Learning to Work to Working to Learn
9:45 - 10:45 am	Tabletop Discussions on the Future of Work
10:45 – 11:00 am	Coffee and Networking Break
11:00 – 12:00 pm	Industry Panel on Challenges and Opportunities in Workforce Training
	Moderator: Bobby Brauer, Bayer
	Steve Tippery, RealmFive
	Ali Ajaz, Lindsay Corporation
	Carter Hubbard, Olsson
	Tony Kaufman, Solventum
	Katie Campbell, Lindsay Corporation
12:00 – 1:00 pm	Lunch and BSE Department Overview

Session 2: The Future of Learning	
1:00 - 3:45 pm	Concurrent Workshop Sessions
	Workshop 1: Biomedical Engineering, Health, and Safety Systems
	Workshop 2: Precision Irrigation Systems
	Workshop 3: Smart & Autonomous Biological Systems
	Workshop 4: Resilient Food-Energy-Water Systems

3:45 - 4:00 pm	Coffee and Networking Break
4:00 - 4:30 pm	Workshop Reports, Lessons Learned, and Next Steps

May 3rd – Student Showcase Day: Celebrating our Learners

12:00 - 1:00 pm	Lunch and Career Pathways Panel
	Moderator: Andy Sauer, Burns & McDonnell
	Deb Ohlinger, Olsson
	Deidre Rauch, Cargill
	Jackson Stansel, Sentinel Fertigation
	Madison Spence, Catheter Precision
	Christina OKeefe, Kerry
	Bethany Lowndes, UNMC

Session 1: Research Showcase

1:00 - 1:05 pm	Welcome and Opening Remarks
1:05 - 2:00 pm	Lightning Talk Competition & Student Research Poster Showcase

Session 2: Senior Capstone Showcase

2:00 - 2:50 pm	Capstone Poster Group 1 & Networking Event
3:00 - 3:50 pm	Capstone Poster Group 2 & Networking Event

Session 3: Student Recognition

4:00 - 5:00 pm	Student Celebration and Awards Ceremony
5:00 - 7:00 pm	Alumni Social Mixer, Great Plains Room, East Campus Union