

USC ROADMAP FOR AI APPLICATION IN RESEARCH AND CREATIVE SCHOLARSHIP

Presented by:

Julius Fridriksson, Vice President for Research

Brice Bible, Vice President for Information Technology and Chief Information Officer

SUMMARY

This roadmap (AI Roadmap) addresses the need to enhance AI application in research and scholarship at USC. The plan prioritizes select AI-related initiatives to help us accomplish key goals like establishing centralized research databases, pursuing federal grants, fostering interdisciplinary collaborations, driving innovation, and translating research into real-world solutions.

Several existing university initiatives are already leveraging AI to support the university's research goals. The Carolina Grant Innovation Hub (CGI Hub) relies on state-of-the-art AI applications to enhance faculty grant-writing capabilities and improve grant-administration efficiency, with the goal of significantly boosting the competitiveness of grant submissions to federal agencies. The AI Institute will also be instrumental in fostering a collaborative research environment through events like AI Roundtable Discussions, AI-ification, and AI-athon. Additionally, the university is exploring the use of Microsoft Copilot to enhance productivity, creativity, and collaboration among faculty and administrators. Ultimately, efforts laid out in the AI Roadmap will transform the university into a recognized leader in AI application, fostering research excellence and technological advancement.

INTRODUCTION

The AI Roadmap leverages current and emerging AI-related initiatives on our campus to spur growth in research and other types of creative scholarship. In some academic fields, AI is already a mainstay tool in the research arsenal, but it is rapidly infiltrating almost all fields of inquiry. Although there are ample reasons to be cautious and skeptical about this development, there are even more reasons to feel optimistic about the transformative power of AI in academia. As we move forward together, it is imperative that we provide our faculty and students with AI tools, infrastructure, and training opportunities that will help them grow and maximize their potential. Although we celebrate advances in the core development of AI methods, USC aims to make our impact by applying AI to solve scientific and societal problems. That is why the AI Roadmap emphasizes groundbreaking research that addresses the critical challenges faced by South Carolina and the nation.

To amplify the impact of our AI research efforts, USC will actively pursue federal grants that align with state and national priorities, and support applied AI research. We will leverage existing USC AI initiatives to enhance competitiveness for these sponsored awards:



- **The CGI Hub will provide** personalized assistance to faculty members in grant writing, from inception to submission, leveraging AI to enhance the quality and increase the quantity of grant applications. The CGI Hub's AI-powered tools will offer tailored recommendations, optimize proposal structures, and ensure compliance with funding agency guidelines, thereby significantly improving the likelihood of securing competitive grants.
- **The AI Institute will further support** these efforts by organizing a series of innovative events designed to foster interdisciplinary collaborations and partnerships, including AI Roundtable Discussions which focus on AI-related topics suggested and selected by the USC community, AI-ification sessions that will allow researchers to share their work and receive expert recommendations on how AI can enhance it, and AI-athons where participants, guided by AI experts, implement machine learning models to solve research problems.
- **Implementation of Microsoft Copilot has the potential to strengthen** productivity and collaboration in research and administrative tasks, integrating with Microsoft 365 applications to automate routine tasks, streamline document creation, facilitate data analysis, and improve communication within research teams. By leveraging AI through Microsoft Copilot, USC aims to understand whether it can make workflows more efficient, allowing researchers and staff to focus more on innovation and impactful research output.

These combined efforts will position USC as a leader in AI research, driving technological advancements, securing significant funding, and fostering a collaborative and innovative research environment.

As USC embarks on the transformative journey laid out in the AI Roadmap, it is poised to become a leading AI research and application institution. By harnessing the power of AI and big data, enhancing research capabilities, fostering collaborations, pursuing federal grants and implementing a robust governance framework, USC can drive innovation, create new opportunities for faculty and students and contribute to the advancement of AI for the betterment of society. Ultimately, the execution of the AI Roadmap will transform the university into a recognized authority in AI research application, driving economic growth, improving the quality of life in South Carolina, and spurring technological innovation in the region and beyond.

IMPLEMENTATION PLAN

1. Identify and prioritize USC's existing AI and big data-related work

- **Conduct a Comprehensive Inventory:** Perform an audit of all AI-related research projects, labs, faculty programs and initiatives currently active at USC, covering a broad range of disciplines. This includes interdisciplinary projects such as those in the AI Institute, the Big Data Health Science Center, Propel AI and collaborations across various units.
- **Identify and Prioritize Research Directions:** Focus on the most promising AI and big data research areas based on potential impact and alignment with USC's strengths. Establish clear objectives and deliverables for each prioritized project. The lowest



hanging fruit may be in energy research (via SC Nexus), broadly across the medical and health sciences (e.g., Big Data Health Science Center) and several highly funded groups in neuroimaging or neurodevelopmental disorders or other emerging areas.

- **Map Existing Expertise:** Create a database of faculty applying AI and big data in their work, including specific projects, publications, and areas of expertise across all fields of study. The database should be searchable and highly visible inside and outside USC.
- **Launch an AI Research Website:** Develop a comprehensive USC AI Research website to be integrated into the sc.edu/vpresearch platform. The site will showcase USC's AI research landscape to internal and external stakeholders, featuring an extensive inventory of research, a map of expertise, and prioritized research directions. This work is already underway, and we expect to have a website dedicated to this effort go online shortly.
- **Develop Comprehensive Datasets:** Work with health care providers, state agencies, businesses (e.g., health insurance providers), and other stakeholders to create secure, centralized databases of anonymized data that can be leveraged for research that relies on AI applications. This could include data related to health care, public health, business analytics, social sciences, and more. The Office of the Vice President for Research (VPR) is starting a new research core called the Health Evaluation Systems and Technological Informatics Archive (HESTIA), launching in fall 2024, that will help acquire, curate, and disseminate large datasets related to health sciences.
- **Integrate Internal Databases:** Establish a database integrating data from academic and administrative units to support AI-based decision-making and resource allocation. Ensure all databases comply with data governance and security protocols like HIPAA and FERPA. The university's Chief Information Officer, Brice Bible, is leading this work.
- **Deliver Comprehensive Training and Support:** Provide training for researchers and staff on using AI tools and new databases effectively for research, creative scholarship and key university functions. This effort is supported by the CGI Hub (see details on the CGI Hub in goal 3 below).

2. Foster interdisciplinary collaborations and industry partnerships

- **Offer Seed Funding:** Allocate seed funding over the next two years to support interdisciplinary AI research pilot projects, prioritizing those with strong potential for external funding and significant impact on South Carolina. This funding opportunity will be open to all USC faculty, with a strong emphasis on projects that involve interdisciplinary collaboration across various fields.
- **Form Community Partnerships:** Develop a strategy to actively engage with South Carolina's community leaders and stakeholders who are at the forefront of AI applications, ensuring the maximization of potential opportunities. Establish a Stakeholder Advisory Board composed of representatives from top AI-driven companies in the state to foster interdisciplinary collaborations and provide strategic input on curriculum development and research priorities.



3. Integrate AI into CGI Hub services and training programs

The Carolina Grant Innovation Hub (CGI Hub) at the University of South Carolina is designed to enhance faculty grant-writing capabilities, streamline the proposal process, improve grant-administration efficiency, and significantly boost the competitiveness of submissions to federal agencies. Leveraging AI, the CGI Hub will provide personalized assistance to every faculty member involved in grant writing from inception to submission.

- **Propel Research Mentorship Program:** Propel is year-long mentoring program for early-career faculty writing grants for specific federal agencies and foundations. AI will be incorporated into the program to match early-career faculty with mentors based on research interests and career goals, monitor participant progress, and provide personalized feedback.
- **NSF CAREER Proposal Development Program:** This program, available to all eligible assistant professors, aims to increase the competitiveness of NSF CAREER Award proposals through AI-enhanced review processes and proposal editing tools.
- **Grantasaurus Rex (GrRx):** This initiative will create a small language model – GrRx – to evaluate and refine new grant proposals based on previous grant applications. GrRx was created by fine-tuning a pre-existing large language model, leveraging more than 24,000 grant applications submitted by USC faculty over the past 12 years. The adapted model is specifically tailored to evaluate the readability and competitiveness of grant proposals within the context of USC's research environment and funding history. This data-driven approach aims to provide faculty with valuable insights and feedback, potentially increasing the success rate of federal research grant applications. GrRx represents a novel application of AI in research administration, potentially setting a new standard for proposal development support in higher education.
- **The PI Academy:** Provides on-demand training to acclimate new and early-career faculty to USC systems and processes for writing, submitting, receiving, and managing sponsored awards. AI will be available 24/7 to provide personalized answers to grant-administration questions.
- **CGI Hub Workshops:** The CGI Hub offers workshops on emerging topics related to pre-award and post-award processes. AI will tailor workshop content to participant needs, helping to keep USC faculty and research administrators well informed about process changes and other timely updates.
- **STRIVE Program:** This training program for research administration professionals across the lifecycle of sponsored funding will supplement its curriculum with AI tools to support research management and administration by providing a chatbot to answer questions on sponsored funding regulations and USC policies and procedures.
- **DataCamp Training and Certification:** The USC VPR Office, in conjunction with the Provost's Office will provide access for USC faculty to DataCamp hands-on learning and certification programs on AI fundamentals and other relevant topics. With DataCamp, USC faculty can complete DataCamp modules independently on their schedule, and learn how to apply AI through interactive exercises, short videos and other proven methods for acquiring new skills. Faculty can opt to complete modules of interest or the full "AI Fundamentals" course to receive an industry-recognized certification in essential AI skills like machine learning, generative AI, ethical considerations, and more.



4. Help faculty leverage AI research and collaboration through Propel AI

The Propel AI program, offered by the CGI Hub, is designed to train faculty in the application of AI across various research domains. Building on the robust foundation of USC's existing Propel program, Propel AI aims to integrate AI into faculty's scholarly and research activities across diverse disciplines, including arts, humanities, law, education, social sciences, business, STEM and health sciences.

- **Workshops:** Conduct a series of one-day workshops throughout the academic year, covering topics such as machine learning algorithms, natural language processing, and computer vision. These workshops will not only provide instructional content but also encourage interdepartmental dialogue and collaboration.
- **Exchange Network:** Establish a network connecting faculty with eminent AI researchers and thought leaders to foster partnerships and interdisciplinary research ventures.
- **AI Resources:** Provide access to AI resources, including software, data collections, and high-performance computational infrastructure. Interactive lab experiences will supplement these tools, allowing faculty to practice applying AI methods to their research questions.
- **Professional Development:** Offer ongoing seminars, workshops, and e-learning opportunities to ensure faculty remain at the forefront of AI application and theory.

5. Encourage participation in AI Institute initiatives

The AI Institute at the University of South Carolina is inaugurating a new series of AI education activities as part of its second phase of operation. The USC community is encouraged to learn more via the [AI Institute Events page](#) and attend sessions of interest.

- **AI Roundtable Discussion:** A two-hour meeting where an AI-related topic suggested by the USC community is presented by a panel of experts during the first hour and discussed by the broader community of participants and experts during the second hour. Topics will be suggested by participants and selected based on popularity.
- **AI-ification:** Researchers present work that could benefit from modern AI approaches to a panel of knowledgeable AI practitioners during the first hour. In the second hour, the panel will brainstorm and recommend ways to integrate modern AI techniques into the existing research, forming new collaborations and partnerships.
- **AI-athon:** A one-day hands-on workshop where participants bring their data, research problem, and a potential machine learning (ML) approach for full implementation. The AI Institute will provide space and expertise to guide participants through installation, coding, and development of an ML engine. A low participant-to-instructor ratio will be maintained to ensure effectiveness. By the end of the workshop, participants will have a functional ML engine, along with knowledge on how to improve it and apply it to collaborative research.



6. Implement Microsoft Copilot for faculty and administrators

USC has already initiated a pilot program with faculty and staff to understand the potential of Microsoft Copilot to enhance productivity, creativity, and collaboration in research and scholarship. Microsoft Copilot integrates seamlessly with Microsoft 365 applications like Word, Excel, PowerPoint, Outlook, Teams, and more, offering advanced AI capabilities to streamline workflows and enhance research output.

- **Conduct Training to Support Adoption:** Conduct training sessions to help faculty and administrators understand and adopt Microsoft Copilot. These sessions will cover Copilot's integration with Microsoft 365 applications and demonstrate its capabilities in automating routine tasks, enhancing document creation, and facilitating data analysis.
- **Create Content:** Utilize Copilot in Word to assist in drafting research papers, grant proposals, and other scholarly documents. Copilot can provide initial drafts, suggest edits, and help with formatting, saving significant time and effort.
- **Enhance Data Analysis and Visualization:** Leverage Copilot in Excel for advanced data analysis and visualization. Faculty can use natural language prompts to analyze research data, generate insights, and create professional charts and graphs efficiently.
- **Support Collaborative Research:** Use Copilot in Teams and Outlook to enhance communication and collaboration among research teams. Copilot can summarize meetings, track action items, and facilitate follow-up communications, ensuring that research projects stay on track.
- **Automate Administrative Tasks:** Employ Copilot to automate administrative tasks such as scheduling meetings, managing emails and preparing presentations. This will allow faculty and administrators to focus more on their core research activities.
- **Pilot a Research User Group:** A user group consisting of faculty participants from Propel AI and VPR Leadership will do an initial evaluation of the CoPilot platform. This group will provide feedback on the AI tool to determine the path forward for using CoPilot and the future of the contract.

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