

# Democratized Data Driving Discovery

*RENCI Strategic Plan*

2017



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## RENCI Strategic Plan 2017

### Executive Summary

Data science has emerged as an essential element of research and a pillar of the American economy. Defined as the systematic study of digital data using scientific techniques of observation, theory development, systematic analysis, hypothesis testing, and rigorous validation, data science has been described as the third great technological wave (the first being the advent of personal computing and the second being the invention of the Internet). Today data science underpins research activity across nearly all major scientific domains and fuels business innovation worldwide. The ability to effectively apply data is also an increasingly critical factor in ensuring the efficient administration of the modern research university itself.

For the past 10 years, the Renaissance Computing Institute (RENCI) at the University of North Carolina, Chapel Hill (UNC) has served as a living laboratory that has fostered data science expertise, advanced software development tools and techniques in domain sciences, developed effective cross-disciplinary and cross-sector engagement strategies, and established sustainable business models for software and services. In these areas, RENCI's work has formed the nucleus for broader data science efforts across the UNC system.

In order to fully capitalize on the promise that data science offers to society, we seek to stimulate a significant long term investment in cross-cutting organizational structures that will help to position North Carolina as a major force in bridging the gaps between data science research, education, and public good. We believe these investments are warranted to leverage RENCI's data science achievements and expertise, further expand our capabilities, and increase our impact for the university, the state, and the country.

RENCI has built a reputation as a leader in data science cyberinfrastructure. Our success stems from a strong staff and strong programs, and we have the potential to grow further. The strategies outlined here will enable us to organize, prioritize, and focus our efforts; diversify our talent pool; strengthen our operations; and enhance our communications in order to capitalize on new opportunities and apply our expertise for the benefit of researchers, educators, technology practitioners, decision makers, and the general public.

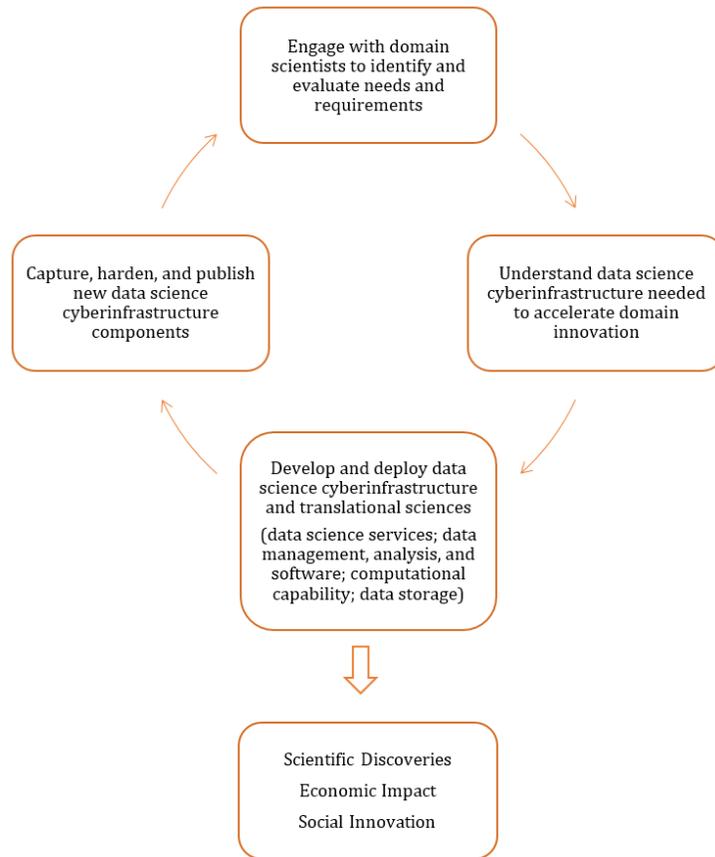
### Mission

RENCI develops and deploys data science cyberinfrastructure that helps researchers in academia, government, and business use data to drive discoveries, innovate, make informed decisions, and spur economic development.

- We build communities of domain scientists, data scientists, technology practitioners, and end users who apply data to catalyze innovation and knowledge discovery;
- We relentlessly improve our competencies in data science and cyberinfrastructure development and deployment, including the entire stack of resources and cloud services known as research cyberinfrastructure;
- We develop models of collaboration that translate our work into scientific, social, and economic innovations; and

- We document and share our findings in scholarly publications and educational materials for the benefit of others.

*Figure 1. Workflow illustrating RENCI's role in supporting the use of data to drive discovery and innovation.*



## Tenets

1. We are primarily technologists, tool builders, and architects, who work collaboratively with colleagues in other disciplines to innovate and thus accelerate discoveries.
2. Our tools and platforms are also social objects that nucleate communities of scientists and scholars, which in turn promote and foster social innovation.
3. We operate as a team, and we value teamwork.
4. We embody open team science.
5. We develop useful tools and the learning process and community-building involved in developing those tools.
6. We anticipate and accept challenges but expect and accept stumbles.
7. When we stumble, we admit it and learn from it.
8. By continuously improving we sustain our team and enrich our institutions.
9. Though we are guided by our vision for the future, we are patient and persistent as we work toward that future.

## Vision

RENCI is a leader in data science and an essential catalyst for data-driven discoveries leading to better health, a safer environment, and improved economic & business successes.

## Values

- We are committed to **excellence** and **continuous improvement**.
- We seek **collaborations across disciplinary boundaries**.
- We foster **inclusivity**, promote **diversity**, and embrace the unique skills and qualities of our team.
- We create and maintain a culture that fosters **innovation, creative thinking, and scholarly works**.
- We emphasize **openness** and **transparency** in every team member.
- We use **sustainable practices** that translate to a **sustainable organization**.

## Goals

To achieve RENCi's mission, we will pursue the following goals:

### Goal A: National Preeminence in Data Science Cyberinfrastructure

By demonstrating our values through excellence in all that we do, we will continue to grow our reputation and expand the impact of our work in data science cyberinfrastructure at the university, the regional, and national levels.

- **UNC research preeminence is our preeminence - and vice versa:** RENCi's success is linked with the success of UNC as a whole. We will provide UNC researchers in the fields of health, environment, and social sciences with sophisticated cyberinfrastructure solutions that will accelerate research advances and help to bridge the gap between academic research and real world solutions.
- **Triangle CI research preeminence is essential:** Collaborations with our board members, NCSU and Duke, as well as other Triangle institutions increase our capacity and impact. We strive to be viewed as a first-choice collaborator, with easy access to our resources and low barriers for cross-institutional science. The Data Science collaborations will include joint appointments, exchange of staff, common programs, and purposeful exchange of information that enable us to seamlessly project our joint capabilities.
- **North Carolina as a driver of cyberinfrastructure innovation.** We will work with NC researchers and businesses statewide to push the boundaries of technology and enable innovative research with tangible benefits for the state, the nation, and the world.

### Goal B: Competitive National Funding Portfolio

Robust funding enhances our capacity to foster expertise, create solutions, and increase the impact of data science. Funded work will include both RENCi-led projects and work conducted in partnership with others. We strive to leverage RENCi's unique strengths to enable the work of UNC-CH and our other partners.

### Goal C: Sustainable Institutional Business Models

Sustainable funding and operational models enable continuity of expertise and allow us to fulfill our overall vision. RENCi's sustainability will stem from a combination of:

- Strategic planning to optimize investments;
- Alignment with the budget models of our stakeholders; and
- Programmatic initiatives and consortia that generate positive funding.

### **Goal D: Greater Internal Efficiency**

Efficient operation enables us to leverage our funding and staff to achieve maximum impact. We will increase internal efficiency by:

- Clearly defining roles, responsibilities, and authority within the organization and within projects and initiatives;
- Clearly differentiating management and leadership responsibilities; and
- Fostering a shared mindset that allows us to think and act in close coordination.

### **Goal E: Open, Inclusive, Accountable, and Transparent Culture**

RENCI recognizes the need for constant cultural evolution in order to foster diversity, inclusivity, transparency, and innovation. Through constant improvement we build stronger teams, produce happier employees, and increase productivity. Accountability and transparency improve the functioning of project teams and bolster the ability to learn from our experiences. These values are also important in closing perception gaps between leadership and staff to achieve clarity on our goals, refine our processes, and promote a positive professional culture. The following elements and attitudes will help to generate and sustain positive change for our institutional culture:

- We are accountable and transparent in leading our projects.
- We seek transparency laterally across UNC departments, NCSU, Duke, and other collaborating institutions.
- We encourage guidance from UNC senior leadership to help shape RENCI.
- We work to help staff achieve their professional goals and bring value to all of their organizational commitments.
- We actively seek to promote the participation and hiring of women and underrepresented minorities at RENCI, especially in leadership roles.
- We actively seek constructive feedback in our work relationships and projects.
- We aim for accountability and transparency in our hiring process; in major programmatic planning, reviews, commitments, and investments; and in sharing information laterally and vertically within and beyond RENCI.

## **Strategies**

The following broad strategies will be employed to advance RENCI's goals. Implementation plans for these strategies will be addressed in a separate document.

### **Strategy 1\*: Be a key contributor and partner to data science initiatives across UNC and North Carolina.**

*Addresses goals A, C*

- Position RENCI as a domain-, college-, and department-independent organization that can bridge different communities and foster truly interdisciplinary work.
- Play a leadership role in a campus-, system-, region-, and nation-wide data science initiatives.
- Find opportunities to bring RENCI's competitive advantages to bear on advancing UNC's strategic needs.
- Bridge the gap between academic domain science research and real-world decisions and applications.
- Lead campus data science cyberinfrastructure by advancing data science software development in the domain sciences, in particular serving the needs of a core group of data-intensive fields such as earth sciences and personalized medicine.

**Strategy 2: Create a common technological platform for data science cyberinfrastructure.**

*Addresses goals A, C, D*

- Create a unified technological platform that spans and supports applicable RENCi data-science cyberinfrastructure development efforts.
- Create and build upon a federated cloud, normalized API, and unified suite of tools.
- Leverage this common platform in pursuing sponsored research funding.

**Strategy 3\*: Develop robust cyberinfrastructure that is national and interoperable.**

*Addresses goals A, B, C*

- Actively participate in creating, guiding, and collaborating on national data science and cloud initiatives.
- Ensure RENCi-developed data science cyberinfrastructure solutions are technically interoperable with those of key national initiatives.

**Strategy 4: Use our data science analytics expertise to provide integrated solutions.**

*Addresses goals A, D*

- Complete RENCi's data science stack by increasing our expertise and experience in data science analytics.

**Strategy 5: Promote and communicate working solutions for data science cyberinfrastructure.**

*Addresses goals A, B, C, D*

- Promote, harden, and communicate RENCi's data science products and solutions that are ready to be translated to stakeholders and customers thus exemplifying RENCi's role as an enabler of new science.
- Publish our contributions through scholarly works to advance the reputation of RENCi in the data science community.
- Publish and contribute open source software products that advance the data science community.

**Strategy 6: Undertake state-of-the-art data science research that has the potential for significant new advances.**

*Addresses goals A, B*

- Guided and inspired by RENCi's data science goals and strategies, invest in exploratory research for data science challenges that are not yet well defined or funded.
- Build expertise in cloud development and the use of cloud services for research applications, including those involving sensitive data, and provide training and guidance to facilitate the use of cloud resources by our campus partners.

**Strategy 7: Stimulate community adoption of our solutions through strategic engagement and exploring commercialization.**

*Addresses goals A, B, C*

- Build connections with industry and provide a path and process for commercialization, licensing and technology transfer, collaborations, innovation spin-offs, and entrepreneurship.
- Continually translate, expose, and publish key product and service offerings to stimulate community uptake and broader impact.
- Accelerate the impact of research in the domain sciences through translational activities.
- Where appropriate, seek monetization and/or commercialization of promising product and service offerings that have compelling scientific or engagement outcomes.

### **Strategy 8: Broaden our funding portfolio.**

*Addresses goal B, C*

- Deliberately and systematically engage outside partners and connect them with researchers at RENCI, and our partners across the region.
- Diversify RENCI's relationships with industry, foundations, and government agencies.
- Build upon existing consortia.

### **Strategy 9: Systematically engage new partners.**

*Addresses goal A, C*

- Underpin RENCI's mission by identifying and cultivating potential partners who can help RENCI programs through use cases, data sharing, research funding, problem definition, and research collaboration.
- Deliberately and systematically engage these potential collaborators and connect them with researchers at RENCI and other partners.
- Create a more proactive and responsive process for prioritizing and following through on leads.
- Strengthen RENCI's network with industry and a wider variety of federal agencies.

### **Strategy 10: Bolster the participation and leadership of women and underrepresented minorities at RENCI.**

*Addresses goals C, D, E*

- Develop strategies to attract women and minority groups to the field of computer science.
- Improve diversity in RENCI's workforce, especially with regard to women and underrepresented groups in leadership roles.
- Establish RENCI as a leader in creating diverse and inclusive work environments.
- Demonstrate the value of diverse and inclusive organizations in terms of creativity, expertise, innovation, and employee effectiveness.

### **Strategy 11: Increase internal organizational transparency.**

*Addresses goals C, D, E*

- In projects and RENCI's culture as a whole, increase the quantity and quality of intentionally shared information.
- Establish new channels of information flow vertically and horizontally within the organization.
- Define the role of managers in actively communicating information to employees, with particular attention to communicating the origins of and reasoning behind management decisions and actions that affect staff.
- Establish new mechanisms for sharing and disseminating skills, knowledge, and ideas.
- Foster open conversations and encourage asking questions to create mutual understanding.
- Remove barriers that hinder people from accessing information that could help them improve their job performance.

### **Strategy 12: Attract, empower, and retain exceptional staff.**

*Addresses goals A, B, C, E*

- Attract top talent by using appropriate and targeted language in job and project descriptions.
- Empower employees to perform well in their jobs and grow professionally while helping RENCI achieve its goals.
- Create and communicate clear career paths, particularly for long career paths that have not previously been well described, such as that of research software engineers.

- Encourage employee retention by providing and emphasizing benefits beyond monetary incentives, such as:
  - A sense of prestige; awareness that our work has impacts at the national scale.
  - Public recognition for valued contributions.
  - A sense of community involvement, such as the ability to work collaboratively with a community of users.
  - Recognition of the greater freedom and creativity available in academia compared to most industry jobs.
  - A sense of service, emphasizing the benefits of our work for the broader community, nation, and world.

**Strategy 13: Train working professionals and students in data science to meet the national workforce needs.**

*Addresses goal C, E*

- Develop and formalize RENCI's engagement with post-docs, graduate students, and undergraduate students to tap a broader talent pool and support sustainable, efficient operations.

*\*These strategies will require the development of novel capabilities that require additional resources.*

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