Technology Strategic Planning Priorities

The rapid pace of technological change creates a strategic opportunity for the University of Virginia. In the next decade, we will make countless decisions—large and small—about how we use technology to promote excellence in research, learning and healthcare. Our challenge is to choose initiatives that play to our strengths and that reinforce the deeply held values of this unique institution. At the same time, we have no choice but to develop constructive responses to trends and influences that may sometimes disrupt our assumptions and practices. In an effort to meet this challenge and define a path for the University to lead in this area, the Technology Task Force has identified three broad areas where we believe the greatest opportunities lie:

- Big Data (networks, storage, computation, and simulation)
- Defining and Supporting Scholarship in the Digital Era
- Reimagining the Academical Village

Big Data

Exponential growth in data presents unprecedented opportunities and challenges. Over the next decade, the leading institutions will be the ones that harness the tools of computation, simulation, analytics, and visualization. To compete in this space we will need to invest in our networks to bring them up to the emerging 100-gigabit-per-second standard, in our storage facilities to provide robust, abundant, and secure data repositories, and in new visualization facilities. More importantly, we will need to invest in the human capital that it will take to support simulation, visualization, and data management. These are all areas where the pace of change is rapid and where we need to be able to supplement and enhance the skills of our faculty and staff.

Defining and Supporting Scholarship in the Digital Era

At its core, scholarship boils down to an enduring public conversation among scholars. The particular form of the conversation, whether it is based in data, rhetoric, or creative expression, matters less than the fact that it is both public and enduring. In the analogue world we know how to make this happen. Faculty members and their students publish, libraries collect and preserve, and the works are thereby made accessible to current and future generations. The workflows that sustain this process have evolved over the last six centuries and are deeply understood and well-practiced.

The transition from analogue objects to digital objects puts much of that up for grabs and creates enormous opportunity. We are an institution that is known for
our early leadership in the quest for new methods of understanding and discovery. The Robertson Media Center, the Institute for Advanced Technology in the Humanities (IATH), the Scholars’ Lab, and the Sciences, Humanities and Arts Network of Technological Initiatives (SHANTI) provide a strategic asset base from which UVA can reassert its leadership role. Fully realizing this advantage, however, will require sustained attention and resource allocation. Over the last several years, the efforts to support digital scholarship have tended to be too isolated and insufficiently aligned with the priorities of the schools.

Reimagining the Academical Village

One of the things lost with the emergence of the industrial revolution was the ability of individuals to make the things they needed and used. A culture of growing and making was replaced by a culture of mass production and consumption. That is changing. Today’s technology brings with it an enormous capacity for individuals and small collaborative groups to innovate and build. Whether it is by creating websites, digital books, apps, or fabrications from 3D printers, today’s citizens have the ability to participate in a vibrant “maker” culture and to learn increasingly by doing.

This transition gives us an opportunity to reimagine Jefferson’s Academical Village. Just as Jefferson redefined higher education early in the 19th century by placing the library at the center of the University and creating an architecture designed to promote interaction between faculty and students, the University of Virginia has the opportunity to redefine place-based learning for the 21st century by leveraging technology fully in the service of innovation, creation, and discovery. Relatively passive industrial models of education give way to active team-oriented approaches that engage students in discovery from their first day on the Grounds. The same technologies that allow isolated laboratories to evolve into global collaborative teams allow us to blur the boundaries between classrooms, libraries, laboratories, studios, and residence halls and to create an extended environment where faculty members, graduate students, and undergraduates collaborate in multi-disciplinary teams to generate discoveries and find creative solutions to problems related to human well-being.

To accomplish this transformation, we will need to:

- Embrace the fact that face-to-face learning takes place in the context of connection;
- Leverage the innovation and associated rapid change cycles that characterize the consumer technology space;
- Make technology, especially near bleeding-edge technology, ubiquitously available to our community;
• Use our academic strengths and commitment to student self-governance to stake out a defining position on the emerging questions of ethics and literacy in an era of big data, constant connection, and diminishing privacy.

**Embrace Connected Learning**

Technology is changing the way teachers teach and students learn—both online and face-to-face. Our students arrive on the Grounds fully connected—through smartphones, tablets, and social networks. Their communities are as likely to be virtual as they are to be physical. They swim in a world of rich media where information comes in many forms (e.g., text, images, and sound) and where meaning is achieved through manipulation and interaction. How UVA responds to the digital forces that are shaping our students and broader society will play out across the schools as we use technology to enhance and transform the residential experience and as we extend the UVA experience beyond the Grounds.

From an infrastructure standpoint, the investments that we make in networks, combined with strategic approaches to scaling and consumerization, should position us to deliver the classes and activities that come out of the academic programs. Where it will create additional demand is in the academic units as they invest in flipping classrooms, moving toward a more discovery and problem-based curriculum, and as they create online opportunities for non-traditional students. This is also a space where there are likely opportunities for revenue growth as the University uses technology to look beyond its traditional instructional boundaries.

**Leverage Consumer Technology**

In today's chaotic and fully consumerized world, institutional control is up for grabs. Need an email account? Go to Google. Want more storage? Go to Amazon. Think some online collaboration tools will be useful? Go to Webex, GoogleDocs, Microsoft365, or any of a dozen companies that you almost certainly haven't heard of before. Faculty, students, and staff now have the ability to provision many of their technology needs directly and to do that on devices that they already own. Whether they should be doing any of this is, of course, a question of high interest to the University. The University remains accountable for the security, legality, and stewardship of its data, services, and intellectual property. What has changed, fundamentally, is that we can no longer depend upon the University's exclusive ability to provision technology to act as an effective control. In a world where there are 300,000 apps for a single smartphone, control is devolving to the individual and that fact should have enormous impact on the way we think about managing services, data, and risk. But beyond this fairly obvious challenge, the working group believes that there is tremendous opportunity in becoming an institution that embraces interoperability and the "demand pull"
environment of the consumer IT space. Faculty and students increasingly want to construct their own learning/discovery environments. Making that easier rather than harder will allow our faculty and students to take full advantage of the rapid innovation that is occurring in the consumer space.

**Foster a Culture of Immersion**

In addition to taking advantage of the consumer space, U. Va. should be a place where faculty and students can be immersed in emerging technologies. 3D printers, advance visualization, high performance clusters, and a host of other “near bleeding edge” technologies will rapidly make their way to the mainstream. Our faculty and students must have access to them if they are to continue to lead and to thrive.

**Stake Claims for Ethics and Literacy in the 21st Century**

Perhaps no topic attracted as much discussion among the working group members as did our discussion of the ethical challenges that technology poses (e.g., healthcare, insurance, and genetic information; privacy and big data; social interaction and social media; etc.) and the question of what it means to be “literate” in a century that will be shaped by big data, simulation, and social media. The working group believes that the University's history of student self-governance combined with academic strengths in the humanities, leadership, ethics, and health policy provide an opportunity for the University of Virginia to become the preeminent place to examine these questions.

**Other Considerations**

In addition to discussing the three focal areas for strategic investment, the task force also spent a good bit of time discussing technology trends that cut across all three areas. Two, in particular, are trends that we ignore at our peril: 1) cloud computing and the economics of aggregation; and 2) the challenge of providing support for emerging technologies.

**Cloud Computing and the Economics of Aggregation** - Although the hype around cloud computing is often more medicine show than substance, what has clearly changed about computing in an era of advanced networks is that scale matters--a lot. Where our needs are mundane (e.g., email, storage, compute cycles), we should look to the consumer market and pursue terms with commercial providers that protect the interests of the University while allowing us to take advantage of the favorable costs associated with their global scales. Where there is a shared need for services tailored to the academy (e.g., data preservation archives, research administration and compliance systems, and advanced networks), we should look first to multi-institutional collaborations like Internet2 (advanced research and education network owned by and for the academy) or Kuali (a community source
software consortium that builds open source software by and for higher education) where we can share the costs and risks associated with capitalizing the infrastructure while maintaining control over its design and implementation. The places where we should deploy emerging and customized technology are the places where the needs of the University or an academic program are truly unique and where we see the opportunity to use that technology to gain competitive advantage (e.g., a new instrument that allows researchers to observe the metabolism of cancer cells at an earlier stage, an enhanced web presence that distinguishes our academic programs from others, a customized database that allows historians, political scientists, and biologists to visualize systemic interactions).

The Challenge of Supporting Emerging Technologies - Finally, the University must find ways to provide better and more value-added technical support. In the team-based model of research and scholarship that is becoming dominant, faculty and students need access to tools and expertise that provide competitive advantage. Concretely, that means that we need to find ways to provide generic desktop support at scale and at reduced costs while providing value-added advanced discipline specific support to research teams and scholars. While it is relatively easy to identify technology investments, it is also easy to underestimate the impact that implementing those technologies will have across the University. In the open forum we heard loudly and clearly the need to take into account the human capital that is needed to support technology innovation. Investments in technology must be accompanied by investments in support.