
To the University Community:

The following plan is the result of a year-long effort to articulate the aspirations of the School of Arts and Sciences. The planning process was a highly consultative one, involving extensive discussion among SAS faculty, students, staff, alumni, and overseers, as well as with colleagues from other Penn schools and the University administration. Because of the plan's emphasis on the central academic role of Arts and Sciences within Penn, we are eager to share our goals with the entire campus community and look forward to either continuing or launching the many cross-University academic partnerships described therein. We are excited about using this plan as a blueprint for achieving our highest priorities in the years ahead.

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Our Foundations and Frontiers: A Strategic Plan for Penn Arts and Sciences

Preamble

Throughout its history, the University of Pennsylvania School of Arts and Sciences has been one of the world's great homes for the study of the humanities, social sciences, and natural sciences. Its distinctive academic excellence—at once rooted in tradition, forward-thinking, and outwardly engaged—was established by Penn's forerunner, the College of Philadelphia, the first institution to pursue an arts and sciences curriculum emphasizing both the classical and the contemporary. Today's Arts and Sciences faculty are at the forefront of their respective fields, creating transformative new understandings about the world around us, from ancient philosophy to astrophysics to political elections. Fueled by their discoveries, these faculty instill in our outstanding undergraduate and graduate students insatiable curiosity, boundless creativity, and a passion for life-long learning that are preparation for impactful lives.

Just as the arts and sciences were at the heart of Penn's beginnings, so does the School of Arts and Sciences sit at the intellectual epicenter of the renowned research-intensive university that Penn is today. Its combined mission of advancing the depth and breadth of liberal arts education, and the innovative pursuit of fundamental and applied knowledge, informs and enables all of the scholarly endeavors of the 11 other schools that make up Penn's compact campus. At the same time, this physical proximity immerses SAS faculty, students, and staff in a vibrant academic community that fosters synergies across disciplines, greatly enriching education, research, and engagement. Penn's urban campus in a global city offers limitless opportunities for Arts and Sciences faculty and students to translate theory into practice and address the world's most pressing challenges.

As we embark on this new strategic plan, the School is well-positioned for the continued pursuit of excellence in all that we do. The accomplishments that flowed from the School's 2006 strategic plan provide a strong foundation upon which to construct our vision for the future. That plan included an ambitious agenda to build further excellence in the School's research and teaching missions and was developed in concert with the goals of the Penn Compact: increased access, integrating knowledge, and local and global engagement. The 2006 plan emphasized several evergreen pri-

orities such as faculty support, facilities development, research infrastructure, and new initiatives in education. In addition, it featured strategic multi-year investments in several multidisciplinary priorities: Genes to Brain to Behavior; Nanoscience; Cross-Cultural Contacts; Democracy and Constitutionalism; and Social Dimensions of Health. By almost any measure, the plan was a major success despite the unanticipated economic downturn that necessitated some mid-course adjustments.

There are several broader contexts in which the School undertakes this new plan. One is the University's recently-renewed strategic vision, Penn Compact 2020. It underscores the institution's commitment to access and inclusion with an emphasis on diversity and a need-blind, no-loan undergraduate admissions policy to ensure that a Penn education is open to all deserving students. It also continues to stress the integration of knowledge through investments in Penn Integrates Knowledge (PIK) professors, interdisciplinary centers, and integrative teaching programs. New aspirations of the Compact 2020 focus on innovation and impact: Penn is committed to creating a culture that facilitates and empowers pathbreaking thinking and action, and is pursuing new ways to bridge the translational gap between academic research and societal change.

The shifting landscape of higher education offers both opportunities and challenges. Scholarship and teaching are being transformed by the great promise of new interdisciplinary and collaborative approaches. The unprecedented impact of technology continues at a rapid pace. Higher education itself is under increasing public scrutiny, and the value of the arts and sciences is often a focus of this discourse. The School has a significant role to play not only in continuing to generate its impactful research, but in helping to shape public understanding of why that research is important. The same applies to the skepticism that often surrounds liberal arts education, where our graduates demonstrate every day that precisely because of the rapid pace of change and the unanticipated nature of progress, the skills and depth of understanding that they acquire in the College are timeless training for a variety of careers and responsible citizenship.

The year-long process for creating this strategic plan was a highly con-

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sultative one designed to promote engagement and facilitate innovative and aspirational thinking among its participants. The plan was used as a means for identifying our distinguishing strengths and for imagining unique opportunities to build on that foundation, enabling Penn Arts and Sciences to achieve further distinction. The process began with a preliminary effort among the Dean's office, the SAS Planning and Priorities Committee, department chairs, and center directors to develop a conceptual framework. The School then formed 15 working groups involving about 150 standing faculty of all ranks from the humanities, social sciences, and natural sciences to consider trends in knowledge and education and how to advance SAS in these areas. In the final stages of the process, and with plan's contours well established, the School sought input from the entire faculty through discussions at department meetings, as well as from students, staff, alumni, overseers, and Penn deans.

Underlying the planning process and the plan itself are several fundamental values that are at the core of SAS:

- The School pursues the highest academic excellence in all of its endeavors.
- The arts and sciences are the enduring source of pathbreaking knowledge and ideas; a foundation on which many other areas of study are built; and the basis of an education that emphasizes creativity, critical thinking, and problem-solving.
- SAS must embrace the opportunities and challenges of education at research-intensive universities in the 21st century.
- Interdisciplinary research and teaching involving the methodologies and perspectives of several fields are critical in addressing complex questions and problems. Such interdisciplinary activities must be grounded in strong disciplines.
- Faculty and student diversity is essential to achieving excellence.
- SAS must foster innovative and impactful scholarship and teach-

ing, making room for new approaches alongside traditional ones as additional means of discovery and learning.

The plan is organized into three main sections. The first, "Foundations," discusses new efforts and investments designed to strengthen our foundational core of faculty and students. The second part, "Emerging Academic Opportunities," focuses on opportunities to strengthen the School's current intellectual activities and initiate new ones to advance the integration of knowledge. Several of these activities involve strategic investments in faculty, education programs, facilities, and research activities. The final section, "Achieving Our Aspirations," articulates how our ambitious goals will be implemented, what resources will be required to do so, and what metrics we will use to assess the plan's progress and outcomes.

The School's solid financial position as it undertakes these new goals is the result of many years of careful choices and the efficient use of assets that have allowed us to compete with better-resourced peers. Likewise, the priorities of this new plan are intended to guide the use of our existing resources and the attainment of new ones in a way that will have the strongest and widest-reaching academic impact. With ongoing pressure on our revenue resources and the downward trend in federal research funding, SAS must redouble its efforts to attract new resources, and the plan will serve as a roadmap for our fundraising efforts and new program development.

Penn Arts and Sciences has a very strong foundation built over centuries of prudent planning toward the pursuit of excellence and eminence. Collectively, the goals and priorities identified in this plan represent an opportunity to build on that foundation and pursue pioneering frontiers of knowledge, catalyzing the scholarly activities of our transformative faculty and enterprising students. The new Strategic Plan for the School of Arts and Sciences will continue that timeless tradition, further enhance our stature in the academy, and strengthen our impact on the world.

Foundations

Faculty

The School's research and teaching missions must be underpinned by a faculty of the highest distinction. In an extremely competitive climate of faculty recruitment and retention, SAS must provide the necessary resources to enable its faculty to flourish, including competitive salaries. Such resources must recognize and support faculty in their individual scholarly pursuits in their respective fields, while promoting a dynamic environment in which ideas are shared and knowledge boundaries are crossed among faculty and students here at Penn. The School takes pride in its tradition of faculty loyalty, derived from both its custom of bringing the best junior faculty up through the ranks and of providing an attractive home for recruiting top senior faculty. We must continue to foster this vibrant sense of academic community.

Composition

Disciplinary and Interdisciplinary Expertise: The School's standing faculty must sustain the bedrock of core arts and sciences disciplines on which every great research university is built. While those disciplines are the source of pioneering discoveries in their own right, they are also the launching point for interdisciplinary research and teaching that yield further vital insights. With a faculty of limited size, where every position is precious, the School will sustain its philosophy of making appointments that support the disciplines but also serve needs beyond their confines in research and education. SAS will continue to promote joint appointments such as Penn Integrates Knowledge professors in partnership with other schools and cross-departmental appointments within SAS. It will also promote joint planning efforts among departments such as cluster hiring that build School-wide expertise around a common theme.

Diversity: In a school that values the breadth and depth of its research and teaching, the diversity of the SAS faculty is paramount to its academic success. In its 2012 Plan for Faculty Diversity and Excellence, the School articulated a dual strategy for achieving greater representation of

minorities and women on the faculty. One goal focuses on enhancing and supporting the diversity of the current SAS faculty. At the heart of that objective is a strengthened standing faculty hiring process that seeks to build broad candidate pools for every open position. The School will also be aggressive in pursuing "targets of opportunity" when such candidates become available. SAS will create a new visiting professorship mechanism that will further expand our networks for recruitment. To promote faculty recruitment and retention, the School must create a nurturing and inclusive environment in which all faculty thrive at all stages of their careers. The second part of the SAS diversity plan calls for building pipelines to attract a more diverse group of scholars to the Penn faculty and the broader professoriate of tomorrow. The School will continue to do so by proactively and strategically reaching out to students at all levels, from high school through the post-doctoral level, as described in the Education section of this plan.

Use of Non-Standing Faculty Tracks: The School's research and teaching missions assume the primacy of the standing faculty, but there are occasional gaps in these missions that the standing faculty are not qualified to serve. SAS will explore the judicious creation of non-standing faculty tracks where it would not only benefit targeted programs academically but also provide well-supported professional paths for the individuals in these roles. In undergraduate education, where the School has longstanding and successful lecturer tracks for its large cohort of full-time foreign language instructors, a similar model is needed for its teachers of critical and creative writing. In the School's expanding suite of master's degrees, which are firmly rooted in the arts and sciences but have an added dimension of professional practice, there is a growing need for a track for distinguished practitioners to complement the teaching of the standing faculty. By permitting centers, not just departments, to make appointments to the existing Research Faculty track where sponsored funds are available, there is an opportunity to recruit individuals with unique expertise to the School's cross-disciplinary research endeavors.

Performance Standards

Assessment: The careful assessment of faculty scholarship, teaching, and service at the time of appointment and promotion is essential to building and maintaining a world-class faculty. As the nature of scholarship and teaching evolve and the range of faculty activity expands, SAS must ensure that this assessment continues to capture and properly evaluate the entire spectrum of faculty achievements. Innovative new types of research raise important questions about how to evaluate such scholarship, whether it is interdisciplinary inquiry, collaborative work in fields where research has traditionally been done independently, or scholarship carried out in new media. Questions must also be asked about the evaluation of new forms of pedagogy. Changes in academic publishing and the external funding climate raise questions about the traditional benchmarks for scholarly production. While research and teaching remain the cornerstones of faculty reviews, assessment must also ensure appropriate consideration of other activities, including involvement with interdisciplinary programs, administrative service, curatorial work, mentorship, and academically-based community engagement. Accordingly, the School will appoint a task force that will be charged with involving the entire standing faculty in an extended discussion about, and making recommendations regarding, these complex but important issues.

Mentoring: The School's investment in the success of its faculty at all stages of their careers must include the personal support of a community of experienced colleagues that offer regular guidance and advice. For junior faculty, the School will strengthen its existing mentorship program that monitors progress on scholarship, teaching, and overall career development as they progress toward the tenure review. After promotion to associate professor, faculty require a new kind of mentoring: they are often balancing new commitments such as administrative service while continuing to advance their research and teaching toward timely promotion to full professor. The School will develop a more comprehensive mentoring program that addresses the more nuanced needs of faculty at all ranks and stages of their career.

Supporting Research

Faculty at a major research university like Penn must have the tools that allow them to achieve their fullest potential in the pursuit of new knowledge. Two core forms of SAS-based research support—research funding and leaves—are discussed below, while two other key types—facilities and information technology—are relevant to several domains of the School and therefore are addressed in the final section of this plan. The University Libraries will remain an essential partner to the School in providing critical research resources and services. SAS and Penn must also continue to offer high-quality support in research administration, and we are committed to enhancing our regional support services within departments and centers.

Research Funds: Access to financial resources is fundamental to the ability to carry out research, whether to run a laboratory, travel to a distant archive, or share findings at a conference. In recent years SAS has expanded the variety and amount of research funding for faculty, through start-up packages, funds awarded on promotion, and the Research Opportunity Grant and Conference Fund programs. We will explore ways to increase further the SAS-based funds available to allow faculty to continue their pace of discovery and for Arts and Sciences to remain competitive in recruitment and retention. These efforts will include raising the award amounts granted through existing programs, securing gifts to create more endowed chairs (which come with research funds), developing a formal framework for offering matching funds for monies received outside of SAS, establishing a Dean's Innovation Fund, and creating incentives for interdisciplinary and collaborative group research projects. The School will also continue to promote the pooling of individual faculty funds to support group projects or collective departmental research needs. While some major federal funding sources are on the decline, SAS faculty remain competitive in achieving government grants. The School as a whole will continue to pursue a strategy of diversifying its portfolio of sponsored funds to safeguard against anticipated future federal cuts. There remains

a wide range of external sources of support from government, foundation, and industry sources, and it is incumbent upon SAS to help monitor and communicate them to faculty and to expand related resources such as grant-writing workshops.

Research Time: With the many responsibilities that standing faculty must undertake, it is important for them to have extended periods of protected time in which to focus purely on research. In addition to the University's sabbatical program, teaching relief awarded for administrative service, and time away achieved through external fellowships, the School has established a program of one-semester Dean's Leaves for faculty who do not have access to further time off between sabbatical leaves. Even with all of these alternatives, SAS recognizes that its leave practices vary among the School's faculty and are not competitive with those of some peer universities, and that it must take further steps to address this situation.

Departments, Programs, and Centers

The organization of the faculty into academic departments, undergraduate and graduate programs, and research centers serves as a series of building blocks on which all of the School's academic activities—disciplinary and interdisciplinary—are based. The long-term vitality of these units remains closely tied with the long-term academic vitality of the School.

Long-Range Planning: Just as this strategic plan allows the School to align its academic priorities with its resources, so too will SAS ask all departments, programs, and centers to articulate their long-range aspirations, make choices about priorities, and use them as the basis for all budgeting and resource requests. At the department level, SAS will respond to these efforts by making multi-year commitments for faculty appointments against known attrition; it will also support departments who identify common priorities with other units in support of Penn Integrates Knowledge professors, cluster hires, and other forms of shared appointments. Continued attention to long-range curricular planning by departments and programs will ensure the effective coordination of faculty teaching time against programmatic needs. The School will continue its process of regular reviews of departments and programs and will introduce a more regular review process for research centers to ensure their long-term academic rigor, faculty engagement, and funding base.

Faculty Leadership and Citizenship: Faculty governance depends on the service of professors in academic leadership roles, and an engaged and creative cohort of chairs and directors across SAS programs is essential to the School's overall success. SAS will continue to cultivate a strong culture of leadership and citizenship in which administrative roles offer a special opportunity to shape programs and their academic directions. The School must offer appropriate incentives for this service, including rewards for long-term planning and appropriate administrative support. The School also must provide the proper training for these roles and encourage the creation of stronger pipelines within units to plan for long-term succession. Because SAS administrative entities vary widely in size, SAS will promote more flexible governance structures that create the most efficient means of carrying out a unit's collective duties.

Education

As home to approximately half of Penn's student body, and with the responsibility to offer liberal arts courses to all Penn undergraduates, the School seeks to provide world-class undergraduate, graduate, and lifelong education in fields across the arts and sciences. SAS is deeply committed to instilling in all of its students the values and principles of the liberal arts. The School is dedicated to providing outstanding educational programs in its core disciplines at all levels, and we are proud of the unique interdisciplinary educational opportunities made possible by our own faculty as well as our proximity to Penn's professional schools. Consonant with this intellectual diversity, the School seeks students of the highest caliber from around the world who are diverse in race, gender, and socio-economic background. Consequently, raising funds for financial aid—for undergraduate scholarships and graduate fellowship packages—remains a top priority for SAS to ensure that qualified students can matriculate regardless of their ability to pay.

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Undergraduate Education

Our goal in the School of Arts and Sciences is to offer our undergraduates the best liberal arts education available at any research university in the world. Our undergraduate programs in the College of Arts and Sciences (“the College”) and the College of Liberal and Professional Studies (LPS) have the distinct challenge and opportunity to define and frame the core mission and value of liberal arts education in the 21st century, both for our own students and for those of the pre-professional schools that surround us.

While the specific content of the liberal arts has evolved over the centuries and will continue to do so, our fundamental approach will remain consistent: deep, sustained, and active engagement with the most profound ideas of a specific area of study, complemented by a breadth of experience and encounter across ways of thinking. Working from these foundations, our students should then join the process of creating new knowledge and of active, impactful participation in solving problems at the local, national and global level. In the coming decades, our students will see opportunities and challenges of increasing complexity in their lives and their professions. As the pace of change increases, the liberal arts will become increasingly valuable for what they have always done particularly well: instill an ability to adapt to change, or even to catalyze it. By focusing on innovative thinking, deepened empathy, clarity of expression, and fundamental critical thinking, the liberal arts make minds nimble and actions impactful.

Curriculum, Advising, and Assessment

The College’s current curriculum, comprising the General Education Requirements in effect since 2006 and the major, continues to serve our students well. The curriculum introduces students to the intellectual perspectives and traditions of the humanities, social sciences, and natural sciences and examines how they interact to facilitate understanding of complex phenomena and improve the human condition. Its foundational approaches provide and strengthen core communication, analytical, and cultural competencies our students will need to thrive in the contemporary global landscape. But as the liberal arts evolve for the 21st century, the curriculum of the College will adapt to our students’ changing needs. We will develop courses as well as research and internship opportunities for College students to gain computer programming skills and experience. We will also develop targeted courses and opportunities for students to learn and practice appropriate data and statistical analysis methods. A primary goal of these efforts will be to enable our undergraduates to participate more fully in the academic opportunities described in the next part of this strategic plan, such as digital humanities, policy, or scientific programming in support of the Energy, Sustainability, and Environment and Mapping the Mind initiatives.

Invested with a strong foundation in the liberal arts and the deeper study of their major field, many of our students seek to explore the applications of what they have learned and how it pertains to specific vocations. We will continue to develop structured opportunities and programs to enable students to take advantage of the professional schools that surround the College (and the School’s own professional master’s programs), through minors, sub-matriculation, and other kinds of structures. While doing so, we will work to overcome administrative and financial practices that unnecessarily obstruct the vigorous development and implementation of such programs.

Building on the model of the Integrated Studies Program for freshmen, we will encourage our faculty to develop courses and programs that enable our students to marshal multi-disciplinary perspectives to solve theoretical and practical problems. These efforts can reach across disciplines within the Arts and Sciences, or beyond into Penn’s other schools. They can also occur at many stages during a student’s career, from new offerings in our freshman seminar program taught by SAS faculty or faculty from other schools to integrative capstone experiences that culminate in research, community action, or policy projects.

Undergraduates in the College and LPS are expected to make informed decisions about their education, assume responsibility for those decisions,

and recognize that their choices must resonate with the faculty’s vision for their education as articulated in the curriculum. Our academic advising systems are organized with this expectation in mind. The academic advising team—composed of the College and LPS advising staffs, SAS faculty, and University partners such as College Houses and Academic Services, Career Services, Learning Resources, and Counseling and Psychological Services—provides support and challenge to students as they craft their Penn education and supports faculty in their educational and advising responsibilities. We will continue to ensure that our advising is informed by the best practices in the field, ongoing evaluations of performance, and a deep understanding of the changing demographic characteristics of our student population. We will pay particular attention to the advising and support students receive after they have declared their majors.

Our work in support of our students’ success begins even before they arrive on campus. Indeed, it begins with the process of admitting each year’s class. The School remains deeply committed to working with the Office of Undergraduate Admissions to increase the diversity of our applicant pool and admitted classes in every dimension, because our community is stronger when it can celebrate its diversity in terms of race, gender, nationality, and socioeconomic status. In this context, it is ever more imperative to ensure that a Penn education is fully accessible to and supportive of the most promising students, regardless of their background or ability to pay tuition. We must also build stronger networks of faculty, alumni, and campus groups, and our partners in University Life to provide mentoring and other support for these students where appropriate. Beyond tuition, we must provide the means for students to take full advantage of the richness of the educational environment, including opportunities to take non- or low-paying internships, to do research, and to study abroad. In addition, the changing demographics of higher education have brought a national audience to the LPS B.A. Maintaining opportunities for talented students who pursue a different path to their B.A. without compromising academic excellence is an important dimension of the School’s inclusion strategy.

In recent years the College and its programs have made explicit the learning goals and outcomes of majors as well as those of the general education curriculum. We have also made great progress in assessing the effectiveness of our programs in achieving these goals, and we have begun to use the results of assessment to make improvements. The College will maintain and enhance its assessment activities, helping departments sustain these efforts and realize the benefits of longer-term assessment and evidence-based improvement.

Teaching

In the classroom students come face to face with things that are complex and real, as they are placed in direct contact with a variety of people, texts, phenomena, artifacts, and places. We should cultivate the intimacy, presence, and materiality of the classroom as a distinctive contribution of undergraduate teaching at Penn that is both profound and irreplaceable. At the same time, we will continue to develop our expertise at using the Internet to bring ourselves to the world and the world into our classrooms, and to take advantage of our experiences with online teaching to enhance the experience of students in College classes, both through the for-credit courses offered through LPS as well as in massive open online courses (MOOCs).

The College is justifiably proud of the care and attention that its faculty pays to the teaching mission and will support efforts to improve the classroom experience as follows:

1. The College will maintain and strengthen its collaboration with the Center for Teaching and Learning in offering programs and resources to all faculty for the improvement of classroom instruction, including additional outreach to new junior faculty.

2. The College will support departments and individual faculty in ongoing experimentation with teaching methods and course designs that engage students more actively in learning. We will continue our investment of resources and faculty effort to exploit the educational benefits of online teaching and instructional technology more generally: blended courses, flipped classrooms, engaging non-resident com-

munities of learners, and other approaches we have not imagined yet. We will continue to support and expand the Structured Active In-class Learning efforts of the natural science departments and the expansion of these efforts to other interested departments such as Economics and Political Science. Many of the new approaches to teaching require classrooms that are configured differently from the traditional lecture halls and seminar rooms we have now.

3. The College will support faculty in developing flexible approaches to teaching that enable students with varying preferred modes of learning to succeed. Anticipating the demographic shift implied by more inclusive admissions policies, we will support faculty efforts in teaching introductory courses using methodologies that encourage success and persistence for students from groups underrepresented in specific disciplines.

Research and Engagement

Opportunities to participate in advanced research in SAS or in Penn's professional schools make a liberal arts education in the College distinctive. Involvement in this work, whether in humanistic scholarship, creative expression, social science analysis, public policy, or scientific investigation, should be a hallmark of every student's education in the College. To the extent possible, no student should graduate from the College without having experienced at least some aspect of the process of creating and disseminating new knowledge or independent creative work, whether on their own, in a course, or in an "apprenticeship" relationship or contribution to a mentor's research, writing, civic, or curatorial project. We intend to support this goal by taking the following steps:

1. Students should begin to develop their capability to do research as soon as possible in their Penn careers. Where they do not already have them, departments and programs will be encouraged and supported to develop courses or workshops on research methods for undergraduates.

2. The College will provide support for undergraduate research, particularly connected with the emerging academic opportunities described elsewhere in this plan. Additionally, building on the model of programs such as the Humanities Internships and Community Service grants, as well as science research programs, we will seek to provide funding to enable students to work with mentors in schools and organizations both at and outside of Penn, for example, through Penn in Washington and in New York through the Program in Opinion Research and Election Studies (PORES).

3. We will take greater advantage of the opportunities that are presented by the laboratories of SAS natural sciences departments and Penn's health schools; local schools, organizations, and government institutions; the University's and Philadelphia's extensive libraries and cultural institutions; and the other graduate and professional schools at Penn as sites where undergraduates can acquire research experience.

4. We will increase resources for mentors, both at Penn and in the surrounding community, who supervise undergraduate research projects.

Additionally, we will work to create a structure for recognizing students' efforts to put theory into practice through a new kind of credit on the transcript, distinct from academic credit. These efforts include research, work/internship experience, or community engagement. The College will explore instituting a requirement that students amass several such credits for graduation.

Graduate Education

Advanced education in SAS takes place in several forms: in an array of over 30 eminent Ph.D. programs; in post-doctoral training; and in a growing suite of professional master's degrees. These programs seek to offer a rigorous education that promotes cutting-edge research and professional abilities that prepare students for careers in academia or a variety of other domains. The School must regularly assess these programs and innovate where appropriate to ensure the alignment of its graduate programs and curricula with trends in knowledge and societal needs.

Doctoral Education

The students in the School's Ph.D. programs represent the next generation of scholars who will further knowledge and apply their advanced training in any number of important careers. Their presence adds fresh

intellectual stimulation to our academic community and is a significant attraction for top faculty to be at Penn. As many of them train to become teachers themselves, graduate students play a crucial role, as teaching assistants and instructors, in undergraduate education in SAS.

The School's strong commitment to doctoral education extends to our recognition of the changing landscape of academia, particularly shifts in the job market for academic positions and the reduction in federal funding. Our commitment means that we will continue to educate the best doctoral candidates in the world, but always with an eye to the realities that confront recent Ph.Ds. Departments train doctoral candidates primarily for academic jobs, but career opportunities are growing in other fields and industries. As part of an elite research university, SAS must preserve its extremely valuable and intellectually rich graduate programs by maintaining our high standards of admission, mentorship, and research, but we must also renovate them by pooling our resources carefully and with sensitivity to the altering opportunities available for our graduates.

Recruitment

Funding: It is imperative for SAS to maintain the competitive funding packages needed to attract the best graduate students to Penn, while also recognizing that it must reconcile the impact of the current external funding climate with program size. We will strengthen the process of assessing outcomes such as time to degree, job placement, and diversity and continue to use them to calibrate cohort numbers as well. The School must be aggressive and creative in seeking support from new sources and will develop new strategies for fundraising for graduate fellowships, including the pursuit of funding from third-party partners.

Diversity: Graduate education in the School is further strengthened by our commitment to multi-racial and multi-cultural cohorts of students across programs. We strive to be leaders in this effort, not only for the benefit of today's SAS community but also to foster the diversity of future faculty and professional populations. The School must develop more proactive strategies for the recruitment of underrepresented minority graduate students, and for mentoring them during their time at Penn. SAS will work with the University to broaden and strengthen mechanisms such as the Fontaine Fellowships to support recruitment and will seek additional funding sources. We will be active participants in the Provost's program of Predoctoral Fellowships for Excellence Through Diversity. We will also build on the success of bridge programs like the Leadership Alliance to attract talented underrepresented minority undergraduate students to doctoral education. And we will continue to build community for these students through consistent mentoring and networking across programs.

Curriculum and Research

Curricular Assessment and Innovation: Individual graduate groups must take into account current directions in their field, as well as in the national landscape of funding and jobs, to review and as needed tailor the scope of graduate training to best fulfill student needs. Options like certificates present flexible opportunities to gain additional credentials, such as those in digital humanities and public humanities, proposed in the second half of this plan, or the new certificate in Social, Cognitive, and Affective Neuroscience. Some programs have lent themselves easily to cross-departmental training, such as Africana Studies and History, Anthropology and Religious Studies, or Political Science and Criminology, but additional such opportunities will be pursued. The School will also facilitate students' ability to combine an SAS Ph.D. with a degree from another Penn school, such as with a J.D. from the Law School, in keeping with a long tradition of successful joint programs such as the Ph.D.-M.D.

Research and Mentoring: Graduate students are admitted largely on the basis of their potential to conduct independent research. Graduate groups must support this work with an eye toward accelerating students' immersion into the research enterprise, including with such tools as regular dissertation and grant-writing workshops and other forums about professionalization. Faculty mentoring and training must be strengthened, particularly in the early years of programs, to ensure the timely advice to students about progress in their program and field-specific planning for entering the job market. Graduate group and Graduate Division policies

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and guidelines need to be more consistently documented and publicized, to help assure that all students and mentors are fully informed about expectations and outcomes.

Student Assessment: It is incumbent upon each graduate group to provide assessments of their students' progress and their group's needs. The Graduate Division is committed to broadening its assessment of graduate groups to the level of each individual student in terms of time to degree, mentoring, language acquisition (when necessary), and diversity. Improved communication and access are needed to provide graduate students better means to assess their programs.

Post-Doctoral Fellows

Traditionally part of the path of academic training only in the natural sciences, post-doctoral fellowships have become more commonplace in the social sciences and humanities. They provide time for continued training in research, under the guidance of a mentor or mentors, and sometimes opportunities for teaching. The School will continue to welcome the appointment of post-doctoral fellows where funds are available, are consistent with faculty interests, and promote professional development. SAS will also continue to supplement the University's allotment of Post-Doctoral Fellows for Academic Diversity as another means of promoting diversity in the broader professoriate.

Professional Master's Programs

A growing audience of post-baccalaureate professionals is seeking the advanced expertise available in the School's professional master's programs. These programs represent an opportunity to extend the reach and impact of SAS faculty research by translating it to application or practice in fields with great potential to benefit society, such as public administration and environmental studies. Such degrees drive innovation within SAS by exposing faculty to new and complex issues from the world of professional practice and by engaging faculty in classroom interaction with adults from a wide variety of experiences and backgrounds and with colleagues from the professional realm. The multifaceted issues that these programs strive to address are inherently interdisciplinary, providing a natural context for collaboration across departments and at times across schools. These programs provide flexibility for faculty to develop and pilot new curricula, courses, and materials that might not fit into the undergraduate curriculum or doctoral education.

The School will continue to hold a high standard of academic excellence in its professional master's programs, beginning with the recruitment of the best students. It will seek further engagement of SAS standing faculty in teaching and program oversight while at the same time marrying their expertise with that of expert practitioner instructors. The School will increase opportunities for professional master's students to engage in research under the guidance of faculty. SAS will assess and strengthen the learning outcomes and career impact of these programs. We will evaluate opportunities with SAS faculty to create new master's degrees and evolve current ones to meet the needs of professional audiences and leverage the existing strengths of SAS departments and centers; we will also work with faculty to explore the possibility of delivering these programs online.

Professional and Liberal Education

Outreach to non-traditional communities and populations has long been part of SAS's educational mission, but has become increasingly important as the University adapts to the changing demographics of higher education in the 21st century. From adult students pursuing alternate pathways to a bachelor's degree, professionals under pressure to continually update knowledge, and global audiences who seek the benefits of liberal arts study, to alumni who want to stay connected to Penn, many students are no longer strictly pursuing traditional degree programs. Arts and Scienc-

es is well positioned to provide exceptional lifelong learning opportunities to these audiences through its Division of Professional and Liberal Education (PLE), which offers a diverse portfolio of degree, non-degree and non-credit programs including summer academies for high school students, post-baccalaureate programs, professional master's degrees, English as a second language courses, and arts-and-sciences-based executive education. Reaching non-traditional audiences often prompts PLE to design and deliver education in novel ways, and what we learn from that experience can be leveraged to benefit education in other parts of the School and University.

New Program Development

As audiences emerge and their needs change, PLE will continue to develop new credit and non-credit offerings, including hybrid programs that involve shorter stays on campus with online instruction and laboratory models that combine study, research, and practical application. Among the topic areas for development are those relating to the emerging academic opportunities identified later in this plan. In order to expand Arts and Sciences' impact, PLE will grow its non-credit programming—certificates, short-term executive courses, and customized training programs—that engage professionals and pre-professionals in flexible and accessible ways with major philosophical, moral, and scientific questions. Such programming provides opportunities for faculty to experiment with new content that crosses disciplinary boundaries, to pilot courses that they might not be able to offer through traditional undergraduate or graduate curricula, and to translate research to application. Broader outreach to organizations, employers, and alumni will help the School to understand how needs are evolving and to connect those needs with relevant Arts and Sciences scholarship through innovative programming.

PLE will continue to bring lifelong learners to campus during the Summer Sessions and for short stays throughout the academic year. Through Penn Summer Abroad and the English Language Programs, the division will provide programming in locations around the globe. Expanding international partnerships to bring students of all ages (high school, university, working professionals) to campus and connecting PLE programming to Penn's and SAS's global initiatives in India, China, and elsewhere will support both access and global engagement.

Online Learning

The continued creative deployment of digital learning within both our traditional and non-traditional programs offers enormous potential for extending our reach and impact. The rapid evolution of this mode of education and the development of new delivery platforms have provided SAS with an opportunity to deepen its decade-long engagement with online learning and to broaden access to educational opportunities on an unprecedented scale. SAS faculty have played a leading role in Penn's experiment with Coursera and massive open online courses, enrolling more than 600,000 individuals around the world in Arts and Sciences MOOCs and sparking an active discussion about implications for pedagogy on-campus as well as online. Reaching younger generations of learners will require the School to embrace the new media these students are accustomed to and to adapt media to support our educational goals.

Faculty Engagement

To ensure the academic excellence of the lifelong learning enterprise, SAS must pursue broader and deeper engagement of the standing faculty in content development, teaching, and program oversight. Pairing the expertise of SAS faculty with that of practitioners will allow development of programs that blend foundational research and scholarship with application. Seeking out additional partnerships with the University's professional schools will help to strengthen existing programs and lead to opportunities for new programs that leverage the best of Penn as a whole.

Emerging Academic Opportunities

Formal academic disciplines lie at the foundation of research and education in SAS, and the previous section of this plan articulated several strategies for ensuring the continued strength of our departments. Yet we also recognize the power of the innovations and new ways of thinking that can emerge when multiple disciplinary and theoretical perspectives are brought to bear on complex problems, questions, and ideas. In building distinguished departments, the School is also deeply committed to promoting the integration of knowledge among them.

Just as we emphasize the importance of planning by departments, programs, and centers, so too is planning and coordination a key to the success of integrated knowledge initiatives. Efforts such as the ones described below are intended to spur further interaction among the many entities within SAS and around Penn in articulating common academic pursuits. Such coordination requires that we maximize not only the School's intellectual resources to ensure the most academic impact, but also our financial resources by promoting efficiencies and avoiding duplication of effort.

In addition to formal organizational units, the School and University have developed several other means to bring faculty together to foster interdisciplinary activities: faculty working groups that explore a focused topic; cluster hires made across departments around a common theme; and senior faculty appointments across departments, both within SAS and across schools via the Penn Integrates Knowledge program. As this strategic planning process itself has demonstrated, a crucial step in advancing the integration of knowledge in SAS is gathering the right people from around the School together for sustained discussion. Therefore, while some of the efforts outlined below seek to promote coordination through the creation of formal centers, others will be led by planning boards, initiatives, and other flexible mechanisms of the type the School must continue to develop.

The School is also committed to removing the financial and administrative barriers, within SAS and across Penn, that can stand in the way of the integration of knowledge in research and teaching. We will work with the Provost and the other Penn deans to identify the most promising opportunities to collaborate and then explore new financial structures that do not disadvantage any participating school in pursuit of these unique initiatives.

As part of its goal to promote the integration of major areas of knowledge, the School will undertake the series of eight initiatives outlined below. They fall into two categories. One seeks to focus our existing broad resources in a given area through improved organization and coordination. The other calls for strategic investments in more narrow areas of emerging knowledge. In all cases, these eight opportunities will:

- advance both fundamental knowledge and have transformative applications
- capitalize on distinguishing research strengths across SAS and Penn
- strengthen relationships among departments, programs, schools, and disciplines
- have a significant impact on undergraduate and graduate education

Focusing Our Strengths

The following four themes represent broad areas of inquiry where the School and University already have considerable resources, but where enhanced coordination of research and teaching agendas and more unified organization would strengthen their overall academic impact, institutional visibility, and efficiency in the engagement of people, facilities, and funds.

Arts and Culture

Arts and culture are central to being human. They are the focus of considerable scholarly and creative work among many of the School's faculty and play a key role in our liberal arts education, where they enhance students' capacities for critical and creative thinking in a variety of modes. At the same time, arts and culture enrich the experiences of the entire campus community, and the rich diversity of their offerings constitutes a considerable amenity to all who work and study here. As befits the only school in the University with the word "Arts" in its name, SAS will take a leading

role to help raise the profile of the arts and culture across our campus.

Penn is home to a vibrant constellation of resources for arts and culture. A wide variety of SAS departments and programs both support the academic study of art and culture and nurture creative expression in writing, theater, the visual arts, and music. The work of colleagues in Annenberg, Design, Education, and Engineering adds further to this academic base. Students, faculty, and staff can also enjoy the activities sponsored by the Penn Humanities Forum, the Platt Student Performing Arts House, the Annenberg Center, Kelly Writers House, the Institute for Contemporary Art, the Penn Museum of Archaeology and Anthropology, the Morris Arboretum, the Kislak Center for Special Collections in the Van Pelt Library, the Arthur Ross Gallery, WXP, and the Charles Addams Gallery.

These many activities will gain in prominence and impact with greater coordination. In cooperation with the Provost (under whose aegis many of Penn's cultural centers fall), SAS will develop an infrastructure to optimize resources for arts and culture at Penn. This infrastructure will work to highlight the importance of art, culture, and the humanities in the School's local and global initiatives, and to increase opportunities for the practice of the public humanities.

In education, a more sustainable and coherent arts and culture program will make Penn a desired destination for promising artists and support our commitment to renewing the curriculum, since teaching in these realms invites innovation. And some of these innovations could in turn further energize our efforts to increase diversity across campus, to engage locally, and to strengthen our global connections. We will continue to support freshman seminars that generate excitement about these areas early in students' Penn careers, and encourage innovative object- and performance-based pedagogies that take full advantage of campus resources to help students develop modes of thinking that go beyond the logical-mathematical and linguistic modes of intelligence that otherwise dominate their educational experience at Penn. We will expand offerings of local and global arts and culture internships and will explore the creation of undergraduate and graduate certificates in public humanities. The School will seek means of attracting distinguished practitioners of arts and culture to teach, such as by expanding the use of its Artist-in-Residence track.

Global Inquiries

The rapid pace of globalization continues to highlight the extraordinary complexity of cultural, social, political, and economic forces shaping peoples, nations, and regions and their relations with one another. One of the definitional strengths of SAS is the range of expertise it brings to the study of global issues: it has a mission to "teach the world" in its historical and contemporary contexts, a charge reflected in the very names of a large portion of its departments, majors, and research centers. Some programs focus on individual peoples, nations, or regions, including diaspora populations in the United States and elsewhere. Others work in transnational contexts that seek to transcend and question the single nation-state as a unit of analysis. They use as their lens a host of methodological approaches from the humanities and social sciences. They are complemented by the College's undergraduate degree requirements emphasizing cross-cultural analysis and cultural diversity in the U.S., and by two pioneering joint degree programs with Wharton that combine international and management studies (the undergraduate Huntsman and graduate Lauder programs). The School is recognized for its excellence in teaching a wide array of foreign languages, and its Division of Professional and Liberal Education offers Study Abroad opportunities and teaches English as a foreign language through its renowned English Language Programs.

These strengths are plentiful, but disparate. We plan new School-wide global initiatives, including one on India, building on Penn's long tradition of scholarship and teaching on South Asia and our outstanding India-focused centers. We seek in particular to promote new faculty hires, faculty exchanges, and student programs that will expand the work of the Center for the Advanced Study of India (CASI), its New Delhi affiliate, the University of Pennsylvania Institute for the Advanced Study of India, and the South Asia Studies department and center in promoting research

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by Penn faculty and students at all levels on and in India. We also plan initiatives on China, with the Center for the Study of Contemporary China adding to our strengths in East Asian studies and the new Penn-Wharton China Center; and on Africa, where our Africana Studies department and our center and program resources are complemented by the University's program in Botswana.

To support more generally other activities in the global realm, the School will establish a Dean's Integrative Global Inquiries Fund to support research projects, faculty working groups, seminars, and other activities that stimulate collective investigation of global topics between the humanities and social sciences; across departments, programs, centers, and schools; or across time periods. On its completion, the Perelman Center for Political Science and Economics will become an important hub for programming in the global realm, as home to two major social science departments; the Browne Center for International Politics; the Center for the Advanced Study of India; the Center for the Study of Contemporary China; the Democracy, Citizenship, and Constitutionalism Program; and the Penn Institute for Economic Research. The College's emphasis on expanding undergraduate research options will include growth in opportunities for international internships and short-term study abroad. Given the volume of its global activities, it is also important that the School be an energetic participant in the global strategies of the University, working closely with the Office of the Vice Provost for Global Initiatives and being highly involved and visible in the activities of the new Perry World House. SAS will also continue to build on partnerships with Annenberg, Design, Education, Law, Medicine, Wharton, and the University Museum.

Public Policy and Social Impact

Among the many ways that research universities contribute to the public good, they have a profound responsibility to use the knowledge they create to address complex public policy questions and social problems. A stellar array of SAS departments, centers and programs, along with many University programs to which SAS faculty contribute, feature research and teaching with substantial public policy relevance and value. The School's potential to draw together its pertinent resources to develop public policy analyses and recommendations is great, but not fully realized.

Significant SAS expertise already exists on a wide range of public policy topics, including criminal justice, energy and the environment, gender and sexuality, health, immigration, international security, race and ethnicity, and social welfare. Our social science departments, centers, and programs feature leading scholars on all these topics and sponsor public policy-relevant graduate and undergraduate research, as do many humanities and natural science programs. SAS faculty and students participate in public policy initiatives in Annenberg, Design, Medicine, Wharton, and other Penn schools as well. A variety of interdisciplinary SAS undergraduate programs offer further coursework on public policy issues, and graduate-level training includes professional programs like the Master of Public Administration and Master of Environmental Studies.

In an effort to better consolidate these activities School-wide and increase their influence in policy spheres, we will establish an SAS Public Policy Research Program within the Fels Institute of Government. The program will serve as a clearinghouse for policy-relevant work taking place in Arts and Sciences, but more consequentially, it will identify important issues that can be illuminated by SAS scholars, organize faculty working groups drawn from the School and beyond to generate studies evaluating the problems and policy options, and help to disseminate findings to appropriate audiences. It will also leverage and strengthen linkages to other key policy-related efforts on campus to maximize the University's overall policy impact. In addition, the co-location of several relevant social sciences programs in the Perelman Center for Political Science and Economics will stimulate these activities.

The School also contributes to social welfare through a wide range of outreach activities. SAS provides core support for the Netter Center for Community Partnerships that pioneered the much emulated academically-based community service course model that our faculty continue to

carry out in Philadelphia schools and with community groups. SAS faculty assist Philadelphia teachers through programs including the Science Outreach Initiative, the Teachers Institute of Philadelphia, and several humanities faculty initiatives. Civic House, the Fox Leadership Program, the Fels Institute, the Netter Center, Penn in Washington and other programs help place students in public service internships. Humanities departments and faculty work with Philadelphia museums, theaters, Slought, and community groups on educational and cultural events. Beyond Philadelphia, many faculty and students perform service in other areas of the nation and the world. And the School disseminates the knowledge that it generates not only to scholarly and student audiences but through public programming ranging from on-campus talks to MOOCs that attract tens of thousands of participants from around the world.

These activities operate so independently that their collective impact is often underappreciated; moreover, with little knowledge of what the others are doing, opportunities for them to coordinate and build on one another are lost. We will create an SAS outreach coordinator position responsible for maintaining a School-wide inventory of outreach efforts, promoting greater awareness of those activities at Penn and beyond, and serving as a resource to support existing efforts and stimulate new ones. The coordinator would also bring the leaders of these activities together to foster awareness of cognate activities and opportunities, to maximize impact through collaboration, and to identify ways and means of program evaluation.

Quantitative Explorations of Evolving Systems

The world we live in consists of evolving structures and patterns. The application of quantitative methods and computational tools to study complex, evolving systems reflects an ongoing shift in the intellectual landscape of the natural and social sciences and also parts of the humanities. Each domain is undergoing a revolution sparked by the dramatic increase in the availability of data and in methodologies that allow for deeper interpretation of the patterns present in data. What many arts and sciences disciplines seek, more than ever before, is underlying theory—mathematical in nature in some fields, qualitative in others—for the dynamical processes that produce data, i.e., a framework to draw inferences from data without being overwhelmed by the amount of data collected. Many also wish to master and use new technologies capable of conducting “big data” analyses. This initiative recognizes that these enterprises are linked, requiring expertise for navigating scholarship as well as infrastructure for managing large data repositories.

Our unique strengths across SAS in the quantitative exploration of evolving systems hold great collective potential to provide intellectual leadership. The School will tap the deep reservoir of expertise in this area to aid scholars throughout the University, from undergraduates to faculty, to tackle disparate problems through a common understanding of the dynamic and path-dependent processes responsible for generating data. Problems that can be approached in this way span the natural and social sciences and the humanities. Just a few examples are the evolution of social networks as studied in Psychology and Biology, bioinformatics, studies of the evolution of publishing through customizable search algorithms in English, the dynamics of knowledge production in Philosophy, the evolution of language studied through Linguistics and Biology and enabled by our pioneering Linguistic Data Consortium, evolution of prices in Economics and Computer and Information Science, and the dynamics of crime with Criminology and Statistics. Expertise spans not just SAS but Annenberg, Wharton, Medicine, and Engineering. Although some faculty and students have already formed collaborative links across fields to study evolving systems, in many cases they have been unaware of the vast potential for synergy within the School. In addition, little effort has been made to expose undergraduates to the value of analyzing evolving systems in a data-rich world.

The breadth of interdisciplinary research coupled with the depth of existing strengths in theory and analysis within SAS calls for a centralized body to serve as a focal point for research and education in evolving systems. The primary aim of this function will be to foster interdisciplinary interactions that generate novel and unexpected intellectual pursuits

through sponsorship of intensive “boot camps” in quantitative modeling and data analysis across diverse disciplines for faculty, post-doctoral fellows, and graduate students; support of post-doctoral scholars who undertake research projects that bridge the interests of two faculty sponsors from different SAS departments; an annual symposium on a theme chosen each year to highlight an application of evolving systems to two or more disciplines; and the development of three undergraduate courses, to be taken in a series, that introduce model-based thinking, statistical programming, and cross-disciplinary topics in data analysis. This focus calls for expertise among scholars not presently on campus; hence the School will seek opportunities to build its faculty resources in these areas when authorizing regular faculty searches in Mathematics, the social sciences, and the humanities. Such appointments would emphasize faculty whose strengths are in “big data,” or whose theoretical work is on complex evolving systems, or whose interests enhance bridges between subject matter experts in SAS and data-science experts in other schools at Penn. They would facilitate the development and use of technological infrastructures needed for the University to lead in the quantitative evaluation of evolving systems.

Advancing Integrated Knowledge

The following four areas represent the most compelling and far-reaching opportunities for SAS to integrate important and rapidly emerging areas of knowledge and inquiry at a school-wide level in the next several years. While building on existing strengths, these initiatives will also require strategic investment in faculty, facilities, education programs, and research activities. Each one of these new initiatives holds the promise for accelerating the pace of discovery and promoting pedagogical innovation. Each draws upon and will benefit (to varying degrees) the humanities, social sciences, and natural sciences, as well as other parts of the University.

Diversity, Inequality, and Human Well-Being

Few topics are as important or as challenging as grasping the sources and character of human diversity and inequality, and exploring how they can work for and against human health, economic prosperity, governance, and cultural achievement. Diversity and inequality result from physical environments and human physiological features interacting with economic, political, cultural and social institutions and practices in complex ways, involving historical as well as contemporary forces. How, for example, do the stresses of financial insecurity or racism affect the immune system? Voter participation? The writing of poetry? How do environmental toxins more prevalent in disadvantaged neighborhoods affect child development? The ability to turn knowledge of fundamental causes and mediating mechanisms into interventions with demonstrable social impact requires innovative, integrative, and responsible scholarship and teaching that explores the interfaces among global social processes, biological phenomena, and recognized categories of identity.

SAS and Penn are well-positioned for preeminence in research that draws on the humanities, social sciences, and natural sciences to improve our understanding of the causes, character, and consequences of diversity and inequality. SAS scholars across the social sciences, together with Biology, Philosophy, and Psychology, have long been renowned for their examination of the links between social phenomena and human health, often with specific attention to inequality, in the U.S. and internationally. Within the School, the Population Studies Center, the Center for Neuroscience and Society, and the Positive Psychology Center are foci for this research, and SAS scholars participate in pertinent programs in Annenberg, Education, Law, Medicine, Nursing, and Social Policy and Practice.

In the area of wealth and income, faculty in Economics and the Penn Institute for Economic Research are studying links between discrimination and a variety of social and economic disparities, while in Anthropology, History, Sociology, and Political Science scholars are exploring economic and social welfare policies and their implications for economic inequality. The School is home to a growing core of scholarship in Economics, History, and Sociology on educational mobility and achievement in relation to class, race, ethnicity and gender, bolstered by work taking place in Education and Social Policy and Practice. Through its History and Sociology of Science and Philosophy departments SAS has developed strengths in

studying the ethical, legal, and societal aspects of scientific progress, work that is complemented by scholars in Law and Medicine.

Representing a wide range of methodologies and theoretical foundations, a large number of departments, programs, and centers in SAS study the sources and consequences of diverse racial and ethnic identities. The interdisciplinary Gender, Sexuality, and Women’s Studies Program and the Alice Paul Research Center link SAS scholars across the humanities and social sciences along with scholars from other Penn schools, to study multiple dimensions of gender identities and inequalities in many eras and world regions. SAS also has significant strengths in research and teaching on the origins and impacts of diverse religions.

The School will build on these strengths by launching an SAS Initiative on Diversity, Inequality, and Human Well-Being that will serve as an umbrella for academic planning and investments that promote interdisciplinary research and pedagogical innovations on these topics. The initiative’s faculty governing board will identify School-wide themes and concentrations to guide future collaborations. SAS will fund selected major research projects and curricular innovations that have unusually far reach across disciplines. Another focus of investment will be the strategic addition of faculty across the School, through cluster searches and other means, who can build further bridges across disciplinary strengths in these areas.

Topics of diversity and inequality also offer special opportunities to enhance teaching as well as research through the kinds of local and global engagement envisioned in the Penn Compact. To take full advantage of those opportunities, SAS will sponsor “Making a Difference in Diverse Communities” initiatives in which interdisciplinary teams of three or four faculty members will work with groups of 20 to 30 undergraduates in underserved communities in Philadelphia, elsewhere in the United States, or in other countries. SAS will also provide further opportunities for service and learning in diverse communities, particularly those marked by socioeconomic inequalities, by building on the work of the Center for the Advanced Study of India, Civic House, the Fox Leadership Program, the Netter Center, and Penn in Washington, among others. The School will also explore the creation of undergraduate minors on topics of diversity and inequality.

Energy, Sustainability, and Environment

An overwhelming scientific consensus exists that human activity is having an unintended but predicted negative impact on the global environment. As the accelerating changes in climates are increasingly evident, the ethical necessity of understanding environmental systems and determining potential paths to sustainability has never been clearer. The scientific, technical, and social issues related to climate change are complex, but it is clear that a key driver of environmental change, and hence a challenge to establishing truly sustainable development, is the capture and conversion of energy for society’s needs in a way that respects the rights and interests of future generations. An emerging academic opportunity lies in integrating scientific advances with changes in social policy to effect changes in the behavior of individuals, communities, and nations.

SAS is well-positioned to assume a leadership position in this integrative approach to addressing this complex set of global challenges. In Chemistry and Physics it has faculty strength in the study of mechanisms for energy capture and conversion, most notably in spectroscopy, with applications to understanding basic properties of matter, light absorption and emission; catalysis, with applications for photosynthesis and fuel cells; and transport, the study of the flow of electrons through materials and guiding them with nanoscale patterning of materials. Biology offers expertise in ecology, biodiversity, evolution, and plant science. Earth and Environmental Science explores how the earth’s past and present biological and physical processes impact natural-resource conservation and environmental quality. Through the evolving field of eco-criticism, a growing number of humanists are studying themes in literature and history surrounding humans’ relationship with their natural environment. Scientific research in this theme is facilitated by a trove of existing research centers at Penn, while several new centers are poised to explore relevant domestic and global policy research.

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SAS investments in this area will advance research into new methods for energy capture, storage, and conversion from one form to another by sustainable means; improve scientific inquiry into environmental change and the subsequent adaptations that it causes; increase humanistic and social-scientific study of historical and contemporary perspectives on sustainability; and convert of our deep understanding of these issues into policy proposals that enhance societal energy use and sustainable living.

A centerpiece of this strategy will be the establishment of a center for energy, sustainability, and environment to provide leadership and coordination required to advance research and education in these fields. Although housed in SAS, the center will act as a campus-wide catalyst for efforts that link innovation to impact. The center will establish the highly-skilled technical staff needed to support faculty research in energy and lead a coordinated effort to address infrastructure issues that reside in many of the ESE-aligned science departments. The center will provide a home for shared research on fundamental questions in physics, chemistry, biology, and earth and environmental science pertaining to energy science and ecological impacts. It will lead new initiatives which reveal the extent of environmental perturbation by human activity and extend this knowledge into assessments of the global and local impacts on all forms of life and on human society. The center will enable a continual dialog between natural science and social science researchers exploring the drivers for decisions on energy use and environmental policy.

Supporting the integrating goals of the center, we will continue to invest in faculty across the School. These include appointments in Chemistry and in other departments through the Energy cluster. Through our partnership with Engineering in nanoscience, including our new joint Singh Center for Nanotechnology facility, we will build our capability in energy capture, storage and conversion. We will also build in the areas of evolution, ecology, and physiology, creating linkages among all of the natural sciences departments. We will make appointments in social science departments that address historical and contemporary policy and the ethics of energy production and environmental issues, and in humanities departments to build on our nascent core in eco-criticism.

Establishing curricula coordinated across disciplines to educate the next generation of responsible citizens and leaders will also be a key goal of this initiative. All of the above efforts will benefit our students with the added opportunities they present for learning within our existing programs and through the formation of new courses that cross disciplinary boundaries. Given the large number of relevant academic programs, the center will have a role to play as a central point of contact to ensure that students maximally benefit from the research opportunities and vast array of curricular options offered on these topics. The erosion of traditional departmental silos for faculty hiring will also increase the number of novel doctoral and post-doctoral opportunities.

Humanities in the Digital Age

The remarkable proliferation of digital and computational technologies is impacting scholarship across the academy. Captured loosely under the rubric “digital humanities” (but in fact embracing methodologies and scholarship from the social and natural sciences), these technologies have transformed the way humanists work. A spirit of ambitious experimentation is taking hold as researchers tackle questions about history, the arts, and culture in radically new ways, producing both new knowledge and new ways of knowing. From computers that can read massive amounts of digitized writing, scholars can extract major historical, aesthetic, and cultural patterns that were previously invisible to them; using geographic information systems (GIS), researchers can present complex histories in the form of interactive maps; and employing 3D-modeling technologies, students of the ancient world can produce immersive recreations of archaeological sites and artifacts. These new technologies invite a mode of research that is inherently collaborative. Projects can involve fairly large teams drawn from multiple institutions, and with collaborators drawn not only from traditional humanities departments, but including linguists, computer scientists, librarians, information technologists, and student assistants. This team-based approach best takes place in spaces that resemble laboratories.

As a world-renowned center of humanities scholarship, it is a propitious moment for SAS to invest in the digital humanities. Not only has momentum built among faculty and students across humanities departments and programs who wish to participate more fully in this significant new mode of scholarship, but an investment now will allow SAS to leverage significant and distinctive existing institutional assets. The Penn Humanities Forum and its pilot initiative, the Digital Humanities Forum, have helped develop fundamental skills among the School’s faculty and students. Several centers, consortia, collections, and institutes have emerged as logical partners across the campus, including the University Libraries and its Kislak Center for Special Collections, Schoenberg Institute for Manuscript Studies, and Vitale Digital Media Lab; the Penn Museum of Archaeology and Anthropology and its Center for the Analysis of Archaeological Materials; Engineering’s Digital Media Design program, Center for Visualization of Digital Information, and Penn Institute for Computational Science; Medicine’s Cartographic Modeling Lab; and in Arts and Sciences, the Linguistic Data Consortium.

Strategic additional investments will enable SAS to emerge quickly as a leader in key areas of digital humanities research, including material text history, sound studies, digital archaeology, mapping of urban social geography, and the computational modeling of literary forms. The School will direct its strategic investments into several related areas. We will create a laboratory for digital research in history, arts, and culture. This lab will evaluate, incubate, and support complex interdisciplinary research projects. It will provide a common hub for communication and exchange across the many departments, centers, and schools likely to be partners in the digital humanities. It will provide capacity for GIS, mapping, and visualization technologies within SAS. And it will oversee the development and approval of digital humanities courses and curricula. The School will also make related investments in the information technology infrastructure that will be required in order to host research projects.

SAS will appoint new humanities faculty that add distinguished coverage in both topical areas and in the use of these new digital methods; we will also add the professional staff positions needed to support these new efforts. These may include cluster hires of outstanding scholars with experience in digital humanities and programming skills; an academic technologist; and technical staff to manage the laboratory for digital research, install software, advise project leaders, and meet increased demand for support.

The School’s initiative in the digital humanities will significantly impact our teaching and learning. It will enable pedagogies that emphasize building and making, and learning by doing. It will help narrow the “technology deficit” that can disadvantage humanities majors as they enter the broader work force. And for graduate students, the facility they develop with digital methods and the proficiencies they gain in a programming language will be significant assets in the academic job market across all humanities disciplines. We will develop new courses and curricula that introduce students to these methods. We plan to propose a minor in Digital Texts, Maps, and Networks, and to work with departments, programs, and graduate groups to create digital humanities concentrations within existing majors as well as a graduate certificate program in the digital humanities. In addition, we will collaborate with librarians at the David B. Weigle Information Commons, the Vitale Digital Media Lab, and the Kislak Center for Special Collections to provide new opportunities for faculty and student skills training.

Mapping the Mind

Deciphering the complex relationship between brain activity and the vastness of human intelligence and behavior is one of today’s most daunting and important scientific challenges. Technologies such as high resolution fMRI, deep brain stimulation, nano-size and multi-array recording devices and optogenetics have led to the unprecedented ability to measure and manipulate brain activity from gene expression to the coordinated activity of brain circuits underlying complex skills such as language, memory, decision making, social networks and creativity. The next major cutting-edge research questions for scholars involve the measurement and analysis of patterns of brain activity and how these patterns relate to com-

plex behavior: in other words, “mapping the mind.” These newest neuroscience frontiers seek to understand the nature of human intelligence in its broadest sense; they also promise valuable insights into the diagnosis and treatment of brain abnormalities.

A core focus of this effort will be in the area of computational, cognitive, and systems neuroscience, which will require new levels of sophistication in applying theory to the use of computational tools to make sense of the vast amounts of data now available about complex behavior and brain activity. Neuroscientists and cognitive scientists in Psychology, Biology, Linguistics, and Physics will serve as the foundation for this work, together with the Institute for Research in Cognitive Science, the Center for Cognitive Neuroscience, the computational and systems neuroscience initiative, and colleagues in Medicine and Wharton.

A critical related question at the interface of the natural sciences, social sciences, and humanities is whether an understanding of the mind at the individual level will lead to a deeper understanding of the behaviors of a group. By focusing on social behavior, decision-making, and the newer field of neuroeconomics, this initiative will establish SAS and Penn as an important source of insights into the philosophical questions of mind, identity, and social order and that will also necessitate the development of new analytical, computational, and experimental tools. This dimension of the initiative will promote linkages among SAS departments such as Economics, Psychology, Philosophy, and Political Science as well as with colleagues in Medicine, Wharton, Engineering, and Annenberg. This initiative will also extend our scholarship beyond the traditional boundaries of neuroscience, to enhanced understandings of individuals, societies, and their creations. It will lead to new approaches to cognitive, perceptual, and neural processes and human expression, and contribute to conceptions about embodied, enacted, and distributed cognition.

Investments in this initiative will build on those made over the course

of the School’s previous two strategic plans, including through the “Genes to Brains to Behavior” effort of the 2006 plan; they will also take place in a university with a deep tradition of interdisciplinarity in brain and human behavior dating to the pioneering Mahoney Institute of Neurological Sciences. SAS has made large infrastructure investments to create a brain and behavior “zone” at the southwest edge of campus consisting of the Lynch Laboratories, the Neural and Behavioral Sciences building, and the housing in Goddard/Richards of the Centers for Cognitive Neuroscience, Functional Neuroimaging, and Neuroscience and Society that will co-locate computational and social scientists. These contiguous facilities will now be used to promote intellectual synergies and serve as a dedicated home for shared instrumentation and collaborative laboratory facilities. The School will establish a Neuroscience Council composed of faculty across the disciplines to propose additional targeted faculty hiring particularly where it will foster meaningful connections between the humanities, social sciences, cognitive science, and neuroscience. Recruitment strategies will include cluster hiring and the appointment of senior faculty who build bridges across schools, including through the Penn Integrates Knowledge program. SAS will also support post-doctoral “junior fellows” who will be recruited for their ability to work across disciplines and with multiple faculty mentors.

Through this initiative transformative research will also inspire innovative teaching and public programs, benefiting several departments as well as interdisciplinary majors including the Biological Basis of Behavior; Cognitive Science; Visual Studies; and Philosophy, Politics and Economics; and minors such as Computational Neuroscience, Consumer Behavior (with Wharton), and the proposed Neuroeconomics. This initiative will also fund new opportunities for undergraduate research, especially in the summer. Strengthened outreach efforts will include those of the Center for Neuroscience and Society and the Penn Humanities Forum.

Achieving Our Aspirations

The realization of our ambitious strategic goals will require careful, phased academic and resource planning over several years. To support the plan’s proposed initiatives, the School will chart “milestone maps” that set clear implementation timelines, assess existing resources and identify incremental needs, and orchestrate funding strategies. Mere implementation, however, will be only one marker of success. We must also conduct ongoing assessment to evaluate the outcomes and impact of our activities, how they advance excellence in our research and teaching missions, how they foster cross-campus collaboration, and how the knowledge and learning that result make a difference in the world around us.

Research and Teaching

Faculty: The plan offers many strategies for solidifying faculty excellence School-wide and for supporting faculty across their careers. It also calls for several specific standing faculty appointments in support of our integrated knowledge initiatives. The selected creation of non-standing faculty tracks will bolster a number of our education programs. Ultimately it will be the School’s ability to recruit and retain eminent scholars and teachers that will testify to our success in these efforts. In addition, our review of the faculty assessment process will seek to ensure that we have the most effective mechanism for evaluating faculty productivity in today’s rapidly-changing academic landscape. Of course, SAS will continue to examine School-wide measures of productivity and recognition, such as publications, grants, and honors, to assess the collective activity of our research enterprise.

Education: The extensive education goals of this plan strive to ensure that SAS admits the most talented students from around the world and provides them with the finest arts and sciences education. There are many quantitative measures of student excellence, such as admissions, honors, and job placement data, but SAS will also pursue qualitative indicators of program excellence and learning outcomes through its continued as-

essment activities. Evaluating the quality of teaching remains a priority, particularly as we test new pedagogical approaches. The plan also focuses on increasing student involvement in the School’s research mission and we will monitor data on the rate of the rate of undergraduate participation in structured research experiences.

Integration of Knowledge: The eight emerging academic opportunities identified in the plan propose several ways for the School to advance key areas of integrated knowledge in the years to come. Our achievement of greater interdisciplinary research and teaching activity will be measured through a variety of means. These include hiring faculty through multidepartmental searches such as for PIKs and clusters. Evidence of collective research, grants, and publications, as well as the visibility and external recognition of that work, will also be an important indicator. We will continue to promote and assess integrative education programs at all levels across Penn schools.

Supporting Resources

Organization: Our strategic goals will require large-scale coordination, and the plan places an emphasis on building healthy academic organizational structures (departments, centers, programs) with effective faculty leadership and long-term planning. It also makes room for flexible approaches to academic oversight through bodies such as planning boards. The School will strengthen its procedures for the regular review of all of these entities. Sustaining a highly skilled and creative staff is essential to carrying out our strategic goals in terms of program coordination, the provision of technical expertise, the management and development of resources, and the delivery of outstanding customer service. The School must continue to incentivize and reward staff excellence and remain one of the top places to work in the Philadelphia area.

Funding: Providing financial support for the School’s highest priorities will require a combination of effective stewardship of its current resources as well as the aggressive pursuit of new ones. SAS must be vigilant in

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sustaining its culture of operational and financial efficiency in all of its activities. We will continue to diversify our portfolio of externally-sponsored grant support. Our pursuit of innovative non-traditional programming through the Division of Professional and Liberal Education will not only extend our educational reach but also offer new revenue streams. The plan's priorities also offer a crucial guide to our fundraising efforts. The School's ability to achieve its fundraising goals in support of faculty, undergraduate, and graduate financial aid, the integrating knowledge initiatives, and facilities will also be an important indicator of our success.

Infrastructure: Cutting-edge research and teaching require specialized physical resources and tools. In support of its strategic goals, the School will invest in the following capital projects that will ensure the ongoing renewal of its facilities:

- Complete construction of the Ronald O. Perelman Center for Political Science and Economics, in support of the initiatives in Global Inquiries and in Public Policy and Social Impact
- Complete construction of the Neural and Behavioral Sciences Building, which will support the Mapping the Mind initiative
- Address the space requirements associated with the Energy, Sustainability, and Environment initiative
- Address the space requirements associated with the Humanities in the Digital Age initiative

- Resolve the need for teaching space that supports new forms of pedagogy

Keeping pace with advances in information technology will be paramount to the work of faculty, students, and staff across SAS as well as to many of the specific initiatives of this plan. The School will sustain its high performance computing in the natural and social sciences, including in support of the activities and infrastructure that will support our initiatives in Quantitative Explorations of Evolving Systems and Mapping the Mind, and will also build capacity in the humanities in support of our digital humanities efforts. Our instructional support will continue to evolve so that we can make the fullest use of the latest online and other teaching and learning technologies to enhance pedagogy.

This plan reflects the high aspirations of the School at a particular moment in time, under a unique set of SAS, Penn, and external circumstances. An important dimension of any long-range planning effort is flexibility: we will monitor closely not simply our progress toward our goals but their ongoing alignment and compatibility with their broader setting, and make adjustments as needed. As the academic heart of Penn, our aspirations are not only for ourselves but for the entire University, and we seek to use our goals as a means for advancing the very best scholarship and teaching across the campus and for making a positive impact on society at large.