

Integration

A Strategy for the 13th Kentucky Geological Survey

Preamble

Successful strategic plans are organizational roadmaps for the future that require their users to ask, answer, and act upon three fundamental questions:

- First, what do we want to become as an organization? The vision and mission statements in this plan articulate the answers to those questions.
- Second, what beliefs intrinsically motivate us and give meaning to our work? The KGS core values describe those beliefs.
- Third, what is our plan to attain our vision, fulfill our mission, and honor our core values? The 16 strategic actions enumerated in this plan offer an ambitious yet achievable plan to move KGS forward on a program of transformative integration over the coming decade.

This plan is the product of a process that began in late 2016. The process included group discussions within each KGS section, a strategic planning retreat for the KGS leadership in January 2017, preparation of a draft plan by the director, review and comments by the KGS leadership, an internal presentation and discussion to solicit additional KGS staff input, and finally comments from the UK Vice President for Research and the KGS Advisory Board. Each set of discussions led to minor revisions of the plan, ultimately producing this document you are now reading.

Like all good plans, this one acknowledges that the future is unpredictable; the plan is therefore a living document to revisit and revise as appropriate.

151.030 Duties and functions of survey.

The Kentucky Geological Survey shall make a continuing geological study of the state and perform such other functions as are directed toward the development of the mineral resources of the state.

Created 1948, Ky. Acts ch. 224, sec. 3

Vision

To be the primary source of geologic information about and for Kentucky.

Mission

The Kentucky Geological Survey is a state supported research center and public resource within the University of Kentucky. Our mission is to support sustainable prosperity of the Commonwealth, the vitality of its flagship university, and the welfare of its people. We do this by conducting research and providing unbiased information about geologic resources, environmental issues, and natural hazards affecting Kentucky.

Core Values

KGS does its work and treats people in accordance with its core values, which support and celebrate:

- The land-grant mission of the University of Kentucky
- The practical value of science in the public interest
- Environmental stewardship and sustainability
- Excellence in research and public service
- Unselfish collaboration and cooperation
- Intellectual curiosity and inquiry
- Ethics, accountability, and safety
- Diversity, respect, and human potential
- Continuous professional and personal development
- A holistic and productivity-centered approach to work-family-life balance.

History

Kentucky's state geologists and geological surveys have investigated the resources and hazards of the state since 1838. With a nod to history, a new survey commences with the appointment of each new state geologist and/or director. The current survey is the 13th.

As the official geologic research organization for the Commonwealth of Kentucky and since 1948 a research center within the University of Kentucky, today's KGS conducts research, performs public service, and provides geologic information to industry scientists and engineers, planners, government regulators, educators, and the public. Some of these activities—for example, conducting a continuous geological survey of the Commonwealth and serving as its official archive for its oil, gas, and groundwater data—are statutory. KGS scientists also contribute technical expertise to organizations such as the Kentucky Water Resources Board. The state geologist, who is also the KGS director, is an *ex officio* member of the Kentucky Board of Registration for Professional Geologists.

KGS disseminates information via its website and Internet map services; through social media such as Facebook and Twitter; in its own publications ranging from fact sheets to highly technical reports and maps; by making presentations at scientific conferences and stakeholder events such as the KGS annual seminar; and by publishing research results in peer-reviewed scientific journals and books.

The 10th, 11th, and 12th Surveys: A Legacy of Grand Visions

Each of the past three Surveys has taken on a broad and transformational challenge that provided practical and economic benefits to Kentucky while maintaining the stature of KGS as one of the top state geological surveys. While appreciating the value that small and transactional changes can bring to an organization, KGS has a long tradition of imagining the future on a grand scale, setting its aspirations accordingly, and supporting its scientists as they rise to each new challenge.

The 10th Survey, under the direction of Wallace Hagan, undertook an ambitious 20-year collaboration with the U.S. Geological Survey to produce 707 detailed bedrock geology maps covering the entire Commonwealth at a scale of 1:24,000. The final map in the series was published in 1982 and, 35 years later, other states still aspire to Kentucky's level of accomplishment. The availability of modern geologic maps for the entire state has yielded economic benefits far exceeding the initial investment. Geologic maps are fundamental to the discovery of energy resources, protection of environmental and water quality, and avoidance of hazards such as sinkholes and landslides as Kentucky grows into the 21st century.

The 11th Survey, under Donald Haney, was a pioneer in the digitization and assimilation of public geologic databases as Kentucky and the rest of the world moved into a new age of

unprecedented interconnectivity via the Internet and World Wide Web. It also saw construction of a modern research building on the UK main campus and the KGS Well Sample and Core Library in the UK research park.

The 12th Survey, under James Cobb, began a program to make its publications and databases freely accessible via the Internet, including interactive and user-friendly Internet map services that are unrivaled among state geological surveys. KGS does not charge for its digital products or require users to provide personal information such as email addresses or passwords, which would inhibit the transfer of information and increase costs to the public.

“To me, the art of leadership is not about spending time measuring or evaluating. It’s about selecting the right people, giving them the freedom and authority to innovate and lead with very simple measures, and then guiding them to succeed.”

–Pierre Nanterme, chairman and CEO, Accenture

A Strategy for the 13th Survey: Transformative Integration

The 13th Survey began on September 1, 2016, with the appointment of William Haneberg as state geologist and director. Its transformative strategy for the coming decade will be to become a leader in integrated research on earth-related topics by conceiving research problems, drawing upon data, and applying tools that not only cross the boundaries of traditional geologic fields but build cross-disciplinary bridges with researchers in engineering, public health, geography, planning, agriculture, archeology, economics, data science, and other fields. Some of the necessary information and technology already exists, but in disparate and differently formatted databases not typically integrated to perform holistic analyses. Other pieces will come from experts in allied fields.

Our focus will be on issues relevant to the economic prosperity, environmental quality, and practical well-being of the Commonwealth and its people: the things that can make Kentucky a compelling place to live, work, and do business.

KGS will seek to identify and solve geologic problems that by their nature require collaboration across disciplines both within and outside of the geosciences. Although traditional KGS administrative sections may remain for convenience, the norm will become project teams with knowledge drawn from multiple KGS sections and other cooperating departments or organizations. Examples might include:

- Combining expertise in earthquake scenario modeling, engineering geology, geotechnical and structural engineering, geologic mapping, geographic information

systems, drones and airborne laser-scanning technology, satellite remote sensing, scientific computing and visualization, and emergency response planning to develop infrastructure-specific risk models and maps that will help Kentucky recover from a New Madrid earthquake like the magnitude 7 to 8 events that have occurred about every 500 years.

- Supplementing geologic mapping, hydrogeology, geochemistry, and geomorphology skills with public health and epidemiology expertise to address issues such as geologic controls on radon gas or dust-borne carcinogens to ultimately reduce cancer mortality and health care costs within the Commonwealth. Or, teaming with pharmacology researchers to explore deep subsurface environments for microorganisms that could lead to breakthrough drugs.
- Expanding our ongoing collaboration with the UK Mining Engineering program to not only evaluate processes for extracting strategically critical rare earth minerals from coal and its byproducts, but also to better understand the distribution of rare earth concentrations throughout Kentucky using our extensive knowledge of regional geology, coal geochemistry, resource assessment, and computer mapping techniques.

The possibilities for doing good are endless.

“Making strategy is no longer about filling three-ring binders with five-year plans. It’s about enabling “random collisions of unusual suspects.”

–William C. Taylor, business author

Strategic Actions

Ambitious goals are of little use without the means, desire, and leadership necessary to achieve them.

Some strategic plans are checklists of uninspiring yet quantifiable performance indicators for pursuit without regard to passion, commitment, or motivation. Perhaps some quantification is inevitable. This strategic plan, however, is by and for people who care about the development of an agile research organization that thrives on change, rises to challenges, and radiates the confidence necessary to help Kentucky move forward in the 21st century.

Through our daily conversations and actions, we will create an organizational culture that embodies our core values and maximizes random collisions of unusual suspects.

In support of the UK 2015–2020 Strategic Plan and while continuing to fulfill its State-mandated responsibilities described in KRS 151.010–151.050 and other statutes, KGS will take a series of

16 actions to foster integrated science at a transformative level during the 13th Survey:

1. Establish **ambitious and clearly articulated standards of performance** for the Geologist job title series, knowing that motivated scientists rise to challenges when given the freedom to define their career paths and the resources necessary to achieve their goals. Promotion expectations will include **conception and execution of integrative and cross-disciplinary research, both within UK and with colleagues from other organizations**. Our Geologist IV and V scientists will be **nationally and internationally recognized experts in their fields**, as evidenced by accomplishments such as distinguished lectureships, outstanding publication or practice awards, invited papers, and elected fellowships in scholarly societies.
2. **Increase the diversity of people and ideas within KGS** by advertising nationally for scientific positions and actively seeking to attract the widest possible pool of qualified applicants. KGS will also continue to support its ongoing scholarly exchange programs with Chinese seismological institutions—which bring Chinese researchers to KGS and provide opportunities for KGS researchers to visit China—and identify new opportunities to develop similar programs in other countries, for example, by encouraging staff to pursue and support Fulbright fellowships.
3. Through aggressive recruitment as positions become available and professional development of existing staff, KGS will, within the next 5 years, **increase the percentage of its scientists who hold doctoral degrees** from the current 34 percent to at least 50 percent, with a long-term goal of 75 percent.
4. Increase the publication of **external peer-reviewed papers and book chapters by KGS authors from the current rate of about 0.3 to 0.5 per geologist per year to more than one per geologist per year within 5 years**. Research scientists publish peer-reviewed papers, and that is what we will do.
5. Publicly **recognize and reward initiatives to obtain external funding** that leverages the KGS State appropriation and supports integrative research on topics of benefit to the Commonwealth. We will also **broaden the geographic scope of our externally funded work** beyond the borders of Kentucky when it promises to yield knowledge beneficial to the Commonwealth.
6. For section heads and senior researchers, include **cultivation of professional and agency contacts, team building, and development of productive working relationships** with academic colleagues, government agencies, and industry as merit criteria.
7. Encourage and expect the **practice of continuous feedback**, allowing managers to offer and employees to request performance feedback as often as desired or necessary, either formally with documentation or informally, so that **performance**

becomes the focus of an ongoing constructive discussion rather than something to be reviewed only once or twice each year.

8. Actively **emphasize the importance of continuing professional development** capabilities—including opportunities within UK, cost-effective external options such as short courses associated with scientific conferences, participation in professional and scholarly society activities, and the pursuit of professional licensure in Kentucky—to support integrative capabilities and remain at the cutting edge of our science. To that end, KGS will adopt an expectation that research staff will, in consultation with their section heads, **devote 10 to 20 percent of their time to professional development** (subject to constraints imposed by ongoing grants and contracts).
9. Through a combination of internal professional development and aggressive recruitment of top scientists as positions become available, seek to **significantly strengthen or develop new KGS expertise** in fields such as quantitative spatial analysis, geostatistics, machine learning, cloud computing, public health, natural resource and environmental economics, mathematical modeling of geologic processes, and remote sensing.
10. Through a combination of internal professional development, internal and external collaborations, and new hires, become the **recognized center of expertise for the application and integration of airborne laser scanner (LiDAR) data** in support of geologic, engineering, and environmental projects in Kentucky. LiDAR has in many ways revolutionized geologic mapping, and Kentucky will soon have complete statewide airborne LiDAR coverage. KGS is a natural home for Kentucky's top experts in LiDAR applications.
11. Through a combination of internal professional development, internal and external collaborations, and new hires, become a nationally and internationally **recognized leader in the development and distribution of 3D and 4D geologic data and maps** at a variety of scales and relevant to topics of societal and economic benefit to Kentucky. This will necessitate development of computer programming tools to find, extract, integrate, and visualize information from a variety of geodatabases at different scales and resolutions.
12. **Double the number of KGS seminars** from monthly to biweekly while expanding the scope to include speakers from UK departments and colleges, other universities, and government agencies. Active seminar participation—attendance, presentation, and discussion—is expected for KGS scientists as members of an active and creative research community.
13. To better communicate our value to Kentucky, **evaluate and implement emerging technologies** such as interactive 3D PDF documents and constantly evolving social

media options to disseminate research results and geologic information to the widest possible constituency.

14. Collaborate with the UK Center for Business and Economic Research or similar organizations to **develop a defensible and transparent estimate of the economic value of KGS** to the Commonwealth.
15. **Develop a flex-time option**—consistent with UK policies and applicable to both nonexempt and exempt staff—that will help attract, retain, and motivate high-performing scientists and support staff while increasing overall KGS productivity and value to the Commonwealth.
16. Renovate locker, shower, and storage space to **encourage pedestrian and bicycle commuting** to support the UK goal of reducing on-campus carbon emissions by 25 percent by 2025 as well as to promote wellness among KGS staff.

"We are all apprentices in a craft where no one ever becomes a master."

—Ernest Hemingway