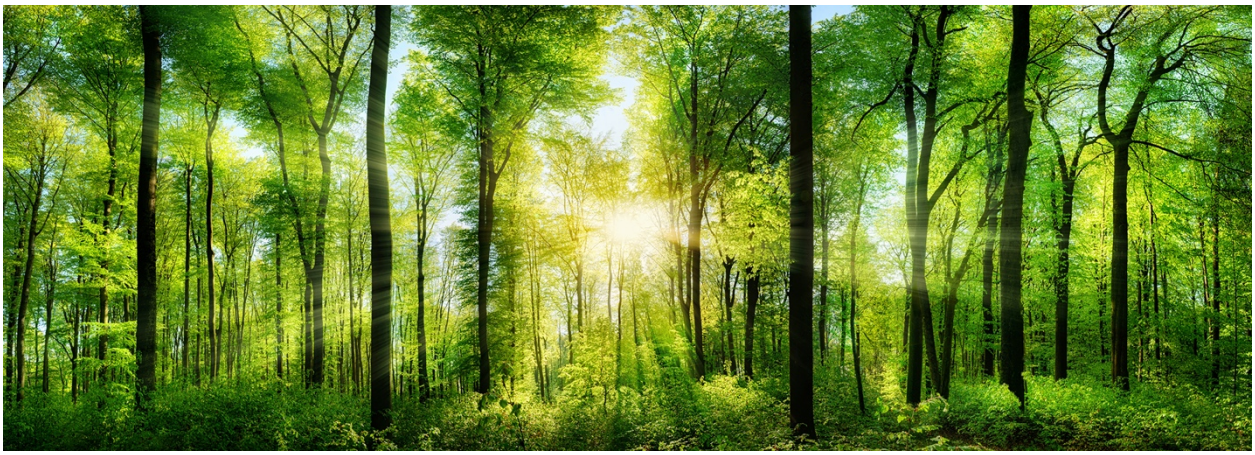
GLOBAL SYSTEMS SCIENCE DA & POLICY SGA
Synergies and Opportunities Workshop
Skelton Conference Center



GOALS AND OBJECTIVES

GOAL #1: Identify areas for collaborative synergy and cooperation between the Global Systems Science DA and the Policy SGA

GOAL #2: Showcase a model for future DA/SGA collaboration and shared innovation

OBJECTIVES (in order of priority):

- Promote DA/SGA-level collaboration (institutional level)
- Develop project-level collaboration (existing and future projects)
- Provide concept-level feedback (existing concepts/projects)

**Note that this workshop is just a start to set a precedent for ongoing collaboration across these, and other DAs and SGAs.*

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WORKSHOP FACILITATOR

Dr. Todd Schenk is an Assistant Professor in the Urban Affairs and Planning Program of the School of Public and International Affairs at Virginia Tech. He has extensive research and consulting experience working on collaborative governance, and environmental policy and planning issues in North America, Europe, Asia, Africa and the Middle East. Dr. Schenk received both a Ph.D. in Public Policy and Planning and a Master in City Planning from the Massachusetts Institute of Technology, and a Bachelor's degree in Geography from the University of Guelph. He served as the Assistant Director of the MIT Science Impact Collaborative, and held a research fellowship with the Program on Negotiation at Harvard Law School. Dr. Schenk has also held positions with the Regional Environmental Center for Central and Eastern Europe and the Consensus Building Institute (CBI). With CBI, he worked as a professional neutral on a variety of projects and training programs at different scales and around a range of issues. Dr. Schenk regularly uses 'serious games' as a way to engage stakeholders in collaboratively examining and addressing their challenges.

Acknowledgements

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Friday, 09.29.2017 | 8:30am-3:00pm | Cascades Meeting Room | Skelton Conference Center

AGENDA

Morning Session

8:30 AM	Speaker check-in and coffee/continental breakfast
8:45 AM	Introduction to the day (Schenk)
8:50 AM	Opening Remarks, Dennis Dean, Fralin Life Science Institute
9:00 AM	Welcome and Vision for the Day, Karen Roberto, ISCE
9:10 AM	Exercise on communicating science, Carolyn Kroehler, CCS
9:30 AM	Concept 1: Freshwater Resources (GSS)
9:45 AM	Concept 2: Renewable Energy (Policy)
10:00 AM	Concept 3: Environmental-Human Health in Rural Communities (GSS)
10:15 AM	Break
10:30 AM	Concept 4: Autism in Rural America (Policy)
10:45 AM	Concept 5: Smart Farms for Global Food (GSS)
11:00 AM	Concept 6: Nuclear Science and Policy (Policy)
11:15 AM	Concept 7: Coastal Resilience (GSS)
11:30 AM	LUNCH (50 minutes)

Afternoon Session

12:20 PM	Reconvene in Cascades and format for afternoon (Schenk)
12:25 PM	Concept 8: Synergy & Strategy: Overview & Gap Analysis of Policy at VT (Policy)(Khademian)
12:40 PM	Concept 9: Synergy & Strategy: Systems Integration of DA/SGA themes (GSS)
12:55 PM	Outline format for the afternoon and get into groups (Schenk)
1:00 PM	Breakout sessions begin
2:00 PM	Report back, Synthesize, Identify Priorities & Action Items; Wrap up
2:45 PM	Wrap up and final thoughts
3:00 PM	End workshop

AFTERNOON BREAKOUTS

Homework – Please come prepared to engage in the below activity.

You will be asked to reflect on the following three things:

1. ***'Blue sky' visioning*** - Envision what a perfect institutional arrangement supporting the GSS DA, Policy SGA, and the intersection of the two would look like.

2. ***Grounding*** - Identify barriers inhibiting this 'perfect world' scenario

3. ***Advancing*** - Brainstorm opportunities for capitalizing on the opportunities and overcoming the barriers. In particular, *what investments and institutional support* are necessary? What are the priorities? While recognizing the diversity of projects, seek out common needs.

Integrative Science and Solutions for Freshwater Systems

Abstract

The overall goal of this focus area is to develop an interdisciplinary program to meet the pressing challenges facing freshwater ecosystems (lakes, river networks, and wetlands). This Integrative Science and Solutions for Freshwater Systems program will enable integration of freshwater ecosystem-relevant biophysical sciences with the social sciences, arts, and communication, through relevant research, education, policy support, and outreach. Ultimately, this entire integrative process will help inform management and allow for restoration and sustainability of waterbodies and their watersheds, which currently face four critical socio-ecological problems: Anthropogenic pressures on watersheds, inadequate quantity and quality of fresh water, losses of biodiversity and biosphere integrity, and transmission of water-borne disease. This new knowledge will also allow for further exploration of how the human condition depends on functioning aquatic ecosystems and to effectively identify, discuss, and manage fundamental social choices regarding living and working within watersheds.

Investment in sustainable conservation and restoration of freshwater systems and adaptation to the changing climate through traditional funding, as well as support from governments, industries and philanthropic programs of major foundations, is already a billion dollar industry. However, many restoration and management projects fail because they are too focused on limited surface water habitats or stream reaches, have a short timescale over which projects are assessed, and lack adequate interdisciplinary scientific input and societal needs guidance. This program seeks to develop a framework allowing meaningful engagement from multiple disciplines and multiple public enterprises in complex issues. This will better address water-relevant gaps in social science, policy, law, communication, conflict resolution, and structured decision-making to have on-the-ground impacts through broad approaches.

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Hitching the Wind and Sun: A Transdisciplinary Renewable Energy Facilities Sustainable Siting Project

Abstract

The legal, moral, and strategic imperative to address the threats posed by climate change necessitates an extraordinary increase in the number of wind and solar facilities for significant reduction in US greenhouse gas emissions. Wüstenahngen, et al., argued that social acceptance may be the limiting factor for renewable energy development. Building a large number of these facilities will be challenging due to economic, environmental and social challenges with siting commercial-scale renewable energy facilities.

The transdisciplinary Renewable Energy Facilities Sustainable Siting Project (REFSS) will conduct a coordinated research strategy to identify how to site renewable energy facilities in a more publicly acceptable way via university, industry, government, and community partnerships. The action research will help reduce uncertainty for renewable energy developers and financiers, and allow local and state governments to develop policies that will enable affected communities to engage more effectively in the highly complex decision-making processes required to site renewable energy facilities so that they are economically, socially, and environmentally beneficial.

This research and service project brings together expertise from the social sciences (including public policy), visualization and geospatial technology, landscape architecture, business management, and fish and wildlife management, for the development of a comprehensive model for addressing siting challenges. The knowledge generated should have significant policy application at the local, state, and national levels. This project is in its early stages, so several options for development have yet to be explored, but decisions will be made in consultation with the Policy SGA on future priorities and directions.

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Ecological and Human Health in Rural Communities

Abstract

Despite considerable evidence linking human industrial and agricultural activities to ecological health, very little data are available directly linking exposure to environmental pollution and human health in rural areas, even though these communities have repeatedly been identified as subject to the most extreme health disparities. Building on existing interdisciplinary strengths in environmental science, natural resources, and public health, this program is poised to pursue urgent unanswered questions regarding the linkages between humans' well-being and conditions of the broader ecologies they inhabit in rural areas. This initiative's education, research, and engagement activities will focus initially on Central Appalachia, simultaneously known for unique ecological richness and dramatic landscapes, as well as worsening health disparities that cannot be fully explained by socio-behavioral factors. As the initiative grows, activities will expand to rural communities worldwide, potentially collaborating with ongoing university initiatives and investments in India, China, Malawi, and Ecuador. Motivated by the motto, "Ut Prosim," service to the surrounding region will fulfill Virginia Tech's mission as a land grant university, with the global reach going "beyond boundaries."

Specific research questions include: 1) Are ecological health indicators, such as species diversity, predictors of human health in nearby communities, and vice versa? 2) How do long-term exposures to different combinations of environmental contaminants affect human and ecological health across generations? 3) How can researchers and educators connect with communities to inform and support their decision-making, and strengthen the opportunity for community voices to influence research priorities, policy, and education? Substantial connections and ongoing collaborations with other destination areas, including Data Analytics and Decision Sciences, Intelligent Infrastructure for Human-Centered Communities, and Adaptive Brain and Behavior will be necessary to address these overarching issues. Addressing health disparities related to geography, social class, and race, will require strong linkages with the Strategic Growth Areas in Policy and Equity and Social Disparity in the Human Condition.

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Rurality as a Social Determinant of Health in Autism Spectrum Disorder (ASD): Using Technology to Improve Access to Critically Important Services

Abstract

This initiative will conduct policy research on the use of technology to facilitate access to evidence-based autism spectrum disorder (ASD) services in rural communities, addressing rurality as a factor causing social inequity. The project will 1) conduct a systematic assessment of barriers to services access for parents of children with ASD in rural, under-served communities, 2) conduct a workshop panel on rural needs to provide leadership and policy implications, and 3) apply the information to develop an internet-based parent training for ASD in a rural agency for future testing.

Additionally, the aim is for this to be a community-based participatory research design between VT and a rural agency, to collect qualitative and quantitative data in a specific rural setting. This will position VT for implementation of evidence-based parent training that innovatively integrates face-to-face and telehealth formats to serve specified client needs. Thereafter, this model can be tested in larger feasibility and effectiveness trials, and can be disseminated for use in other locales to address place-based social disparities in their access to ASD care.

The program will capitalize on a multidisciplinary team from the VT Center for Autism Research, the Center for Human Computer Interaction, the Center for Public Administration and Policy, and the VT Carilion Research Institute to collect pilot data informing a collaborative NSF grant. This project also aligns with the Equity and Social Disparity in the Human Condition SGA, the Adaptive Brain and Behavior DA, and the Intelligent Infrastructure for Human Centered Communities DA.

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SmartPlants/Animals and SmartFarms for Global Food, Feed, and Fiber Security

Abstract

Meeting the food, feed, and fiber needs of a growing world population represents one of the signature challenges of this century. This challenge necessitates implementation of advanced technologies, sustainable management of natural resources, and coordination of political forces.

The first component of the vision is SmartPlants/Animals, in which crops, livestock, and their associated microbes, will be designed to optimize yields in agro-ecosystems compromised by disease and pests, climate disruption, and other environmental stressors. Fundamental research will be conducted on animal and plant genotype-environment interactions, integrated with translational research in breeding and biodesign. These efforts will exploit cutting-edge technologies such as gene editing, genetic selection, genomic breeding, and engineering of microbiomes.

Equal in importance to resilient crops and livestock are innovations in precision agriculture and management of resources to increase efficiency, reduce pollution, and enhance ecological health (agriculture accounts for 30% of greenhouse gas emissions and 70% of all freshwater use). Thus, the second component of the vision is the "SmartFarm." This is the farm of the future—efficient, productive, sustainable, and automated. Irrigation systems will harvest and deliver appropriate amounts of water to the right areas of the farm at the right time. Coordinated unmanned robots on the ground (tractors) and in the air (drones) will gather data on animal and plant health and developmental status that informs targeted, automated delivery of inputs and enables optimal harvest schedules. Turbines will harvest wind energy, and power meteorological sensors to forecast weather and the onset of diseases. Farm data will be stored and accessed through the cloud. Big data techniques will transform the raw data into actionable intelligence available to stakeholders on mobile devices, anywhere, anytime. This paradigm can be extended to SmartForests and into urban areas, where SmartGreenhouses and SmartRoofs will enable crops to be grown in close proximity to local markets. Architects and civil engineers will work closely with animal, plant, and environmental scientists to create opportunities for aesthetic, yet purposeful, farms, structures, and facilities to invent the future of agriculture.

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Integrating Safety, Security, and Safeguards in Nuclear Science and Policy

Abstract

This project takes an interdisciplinary perspective on issues of nuclear safety, security, and safeguards. Nuclear energy has great potential as a carbon-neutral, base-load energy source. Yet, nuclear energy also poses grave concerns about a) safety and the risk of a severe nuclear accident, b) security and the risk that a terrorist or non-state actor might steal nuclear materials, and c) safeguards and the risk that nuclear programs might be used to develop weapons. Safety, security, and safeguards are closely interconnected, but often evaluated as distinct elements. Moreover, those involved in overseeing and evaluating safety risks often have little training or understanding of security, and vice versa.

This project proposes an integrative approach to safety, security, and safeguards by developing the idea of nuclear culture, and the way different countries handle these risks and approach international standards and norms for the management of nuclear energy. Through publications, curricular development, programming, and pursuit of external grants, the project aims to bridge gaps between policy-makers and nuclear scientists and engineers, and between those involved in safety versus security and safeguards, to better evaluate risk and its manifestations.

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Coastal@Virginia Tech (VT): Sustaining Prosperity, Increasing Diversity, and Achieving Resilience

Abstract

The coastal zone hosts more than half of the world's human population, large port facilities vital to the global economy, and military installations important to national and global security. Accelerating sea-level rise, coastal hazards, ocean acidification, population growth, and rapid economic development threaten livelihoods, tourism, health, fish and wildlife species, and ecosystem services in this area. The cascading impacts of these stressors represent a complex and formidable problem that can only be addressed by coordinated investment in research, teaching, outreach, and inclusive engagement efforts, bringing together academia, industry, foundations, non-governmental organizations, governments, and local stakeholders.

The focus of Coastal@VT includes coastal systems research, teaching, outreach, and innovation, and is characterized by disciplinary strength and excellence, and by strong interdisciplinary links among the different disciplines. These interdisciplinary linkages, developed through research and education programs, are institutionally manifested through the Destination Areas, such as Data and Decisions, Intelligent Infrastructure for Human-centered Communities, Integrated Security, and Global Systems Science themes in food, infectious diseases, and water. Collaboration across these Destination Areas will be vital to the development of new methodologies, such as advanced quantitative techniques and scenario planning, new technologies, for e.g., autonomous vehicles, and new virtual interactive tools, in order to communicate more effectively information on hazards, risk, adaptation, and resilience to stakeholders in coastal areas. Coastal@VT will serve as an incubator for advancing technology, policy innovation, and knowledge exchange, as well as for forging sustained and long-lasting partnerships with industry and other organizations that work to make coastal zones more resilient and capable of adapting to rapidly changing environments.

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Global Systems Science DA - Systems Integration

There is growing recognition of the need for a systems approach when attempting to solve complex societal problems. Building on our strengths, we will develop an interdisciplinary, system-of-systems framework that focuses on societal challenges, using sustainability and resilience as common integrating themes. Within Global Systems Science, the five initial concepts to be considered include Infectious Disease, Rural Health, Freshwater Systems, Smart Farms, and Coastal Systems. The initial set of systems include land use, watershed, air, soil, and climate. Ecosystems will also be included, but need to be narrowed down to more specific ecosystems. We will consider economic and social systems to be "implicitly" included in all concepts, although we also need to focus these.

We will employ a tiered framework with different levels of abstraction to model complex interdependent systems. Each system will have a more detailed model at the process level and a more aggregated model at the systems level. Our system-of-systems framework will be designed so that it can be extended to include additional systems in a modular fashion. This will enable us to continue to add systems within Global Systems Science, as well as connect to systems within other DAs and SGAs. Our curriculum will have an analogous overriding conceptual framework that embraces systems thinking and complexity, crosses disciplinary boundaries, and encourages innovative approaches to intractable problems. Collectively, we envision a new generation of specially-trained scientists (including natural and social scientists), engineers, and professionals who are familiar with models at both the process and the systems level, and whose role will be to couple the systems models in a common, computational framework, while acting as facilitators for communication between the process level and the systems level.

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Policy SGA - Systems Integration

Abstract

Today's global problems defy disciplinary silos and government jurisdictions. The challenges of growing inequalities, strained families and communities, access to health care, crumbling infrastructure, unstable political regimes, national security, cyber threats, energy scarcity, water crises, and climate change require complex collective efforts to analyze, understand, engage and solve or mitigate.

Effectively engaging these problems requires a multidisciplinary capacity in policy to (i) understand the complexities and implications of decision making at multiple scales, across jurisdictions, and throughout institutional processes, (ii) work with science and technology to capture and translate STEM knowledge and expertise and (iii) bring that insight forward to inform real-time decision making. This capacity is key to the development of a comprehensive global land grant university.

Virginia Tech has this expertise, but it extends across colleges, and across the Blacksburg, Alexandria and Richmond campuses. The Policy Strategic Growth Area (SGA) is a force for mobilizing this expertise to inventory what is in place, to connect and enhance existing areas of expertise, and to foster novel innovative approaches to policymaking and policy analysis, through the synthesis of research, curriculum, and outreach across multiple disciplines in collaboration with the Destination Areas. Building a capacity for policy research and curriculum across the university will set us apart from leaders in the policy space by extending our strengths beyond a "policy school" to include the sciences, engineering, and a networked and collaborative approach to the policy-relevant social sciences and humanities linking with science, technology, engineering and math, among other areas.

Working at the intersection of scientific evidence, governance, analysis, and complex decision-making, the Policy SGA facilitates the translation and interplay between scholarship and practice. In this unique space of collaboration, experts from non-policy related disciplines will gain insights into the complexity of worldwide issues, organizational dynamics, regulatory policy, and more, and policy experts will gain insights into the science, technology, and analytical strategies that must be incorporated into complex decision-making across multiple jurisdictions. We envision students learning in the policy strategic growth area as "bridging professionals", uniquely trained for translating complex techniques and concepts as innovative policy makers, and using analytical techniques to bring evidence to policy processes.

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