

# An introduction and invitation



**KSS is a global research alliance that builds and tests knowledge systems for sustainability to better manage complex risks related to food, energy, water, climate and human security**

## A step change in science toward a secure and sustainable future

Current trends undermine food, energy, and water security in many regions of the world, which could trigger cascading global risks to all nations and communities. Interacting underlying causes include globalization and technology, climate change, population growth, persistent poverty, and poor trans-boundary resource governance, which together contribute to social unrest, large-scale migration, and the advance of ideological extremism.

The global science community has largely failed to respond to these challenges and has not yet developed implementable solutions capable of meeting humanity's resource demands within the Earth's long-term system limits. To date, even the most advanced global science fails to integrate key social and material dimensions and is not

able to offer practical innovations or redesigned systems to reduce security and prosperity risks. Fundamentally new, decision-relevant options are needed.

Knowledge Systems for Sustainability (KSS) offers a step change in the development and delivery of decision-relevant science to inform improved management of complex risks and uncertainties at national, regional, and global scales. KSS brings together mutually committed world-leading research organizations and a global community of practice organized around regions, programs or themes, societal priorities, and technical capabilities. KSS seeks to deliver practical fit-for-purpose solutions that respect humanity's requirements for equity, agency, and privacy, and better promote human security and global sustainability. KSS intends to both innovate in the human-earth system and provide the evidence base regarding deployment of those innovations to better reveal our choices and their consequences for our future.

## How KSS Works

KSS achieves change by:

1. **Partnering** with key decision makers across sectors and boundaries, whose decisions have large effects, and who make their decisions based on objective criteria and fit-for-purpose information from the science and technical community
2. **Bringing clarity to existing knowledge**, building on the best available science and information, and distilling this to enable well-informed decisions and risk management
3. **Designing and delivering transformative responses**, through networked high-leverage interactions with global and national organizations, communities, and the private sector.

## Partnering

KSS works with decision makers in multiple sectors and practitioner communities that are able to act on their own authority or influence major policy decisions when provided with relevant, usable research products. KSS action partners are typically:

- Motivated to understand and better manage linked, systemic risks across scales where existing knowledge base are inadequate
- Expected to catalyze cascading positive effects at large scale
- Prepared to act.

KSS engages partners to co-design research programs and outputs to ensure they are decision-relevant, timely, actionable, and set in the context of learning systems.

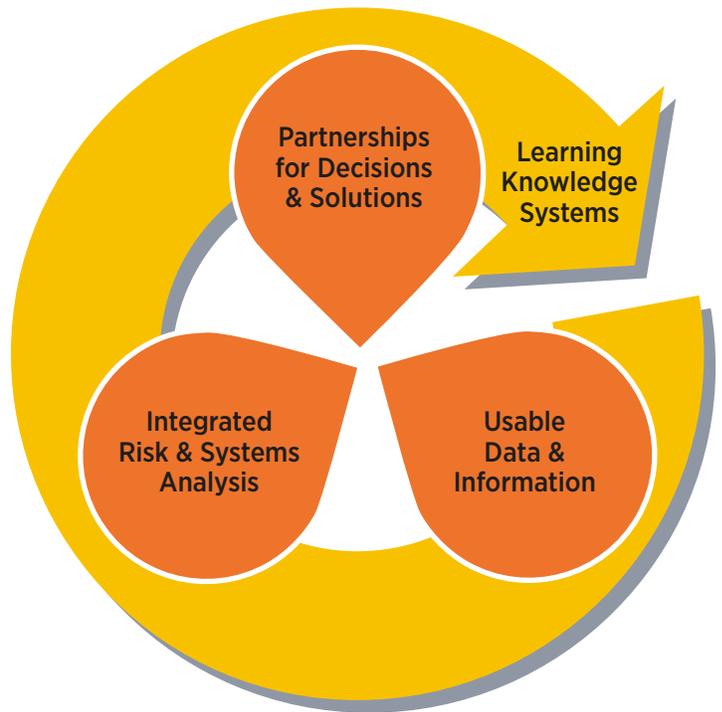
Funding may be provided by the decision maker, related research communities, or third parties.

## The KSS Framework

All KSS programs and activities are designed and delivered with attention to four key elements:

- Anchoring outputs to the needs, timelines, and context of key decision makers and change agents

- Designing and implementing data and information systems that are useful, relevant, and actionable
- Providing integrated analysis, modeling, and assessment of risks, options, and potential scenarios
- Building and testing knowledge systems for sustainability through multi-loop learning, reflection, and action.



## KSS Focal Challenges

KSS offers deep expertise in food, energy, and water systems, interactions across these systems, and linkages to social stability, economic development, and wider human-earth system processes. KSS' work is arranged around two major themes:

**Promote food-energy-water security and social stability**, supported by sustainable provisioning systems, by addressing system risks and major stressors over multiple scales and timeframes.

**Accelerate low carbon development and climate resilience**, through systems modeling and systems solutions to simultaneously address both human and environmental development.



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To achieve global impact in promoting these themes and addressing systems risk and sustainable solutions at-scale, KSS partners have identified three key core Program Areas in which to focus the collective research actions of KSS. These KSS Program Areas include:

- **Nexus Outlook Scenarios (NOS)**

This framework is for modeling multiple linked large-scale systems, such as water, energy, food, and climate, at a national, regional, or continental scale for improved community and policy decision support. The framework is based on the Commonwealth Scientific and Industrial Research Organization (CSIRO) Outlook Forum, that is being applied in Australia to explore the decision environment for stakeholders from large banks to farming communities, where every scale is part of the full scale.

- **Food System Risk: Multiple Breadbasket Failure**

The Food System Risk program area includes the Multiple Breadbasket Failure Initiative. This KSS initiative, in collaboration with actuaries, reinsurance, government, private sector and others, seeks to identify plausible risk scenarios in the food system, then value and avoid global to local risks to humanitarian, economic, political and human security dimensions.

- **E-biss (Evidence-based intervention support system) – Designing Anticipatory Interventions**

This program area intends to identify the benefit of preparing for an uncertain but likely disaster, in part by valuing risk avoided, closing the climate-poverty gap, and building a learning relationship with humanitarian networks.

## **KSS Founding Partners and Capacities**

KSS is a collaboration of world-leading mission-inspired research organizations, with four founding partners. KSS is a tax-exempt non-profit research organization incorporated in the United States, governed by an independent board. It is operated by the Joint Institute for Strategic Energy Analysis (JISEA).

This collaboration creates a one-stop-shop for our partners and key decision makers by supporting long-term relationships with change agents who require—and can leverage—a better understanding of systemic risks and management options. This structure also enables KSS to integrate intellectual resources and research capabilities to quickly scope and field highly effective project teams to develop and test responses to critical needs and opportunities, and to learn across programs and domain areas.



The founding partner organizations are:

- **CSIRO** (Commonwealth Scientific and Industrial Research Organization), the national science agency of Australia
- **CIMMYT** (International Maize and Wheat Improvement Center), a leading agricultural research institute located in Mexico and member of international network of agricultural research centres
- **IIASA** (International Institute for Applied Systems Analysis), a research institute that delivers solutions for the science-to-policy interface, based in Austria
- **NREL** (the U.S. Department of Energy's National Renewable Energy Laboratory), a research institute focused on development and integration of clean and renewable energy and energy efficiency, based in Colorado.

## Options and Opportunities for Supporting KSS

All KSS programs and activities are co-designed with partners and supporters. Following are some illustrative options and opportunities to support KSS.

### Enabling specific projects for strategic decision making in global and local food systems

KSS and member organizations are already working with business and public-sector partners to deliver better assessment and management of complex risks related to food, energy, water, climate, and human security. Project opportunities include:

- Assessment of global food security risks, such as multiple bread basket failure, and options to reduce the probability and consequences of threats to food security and related societal stress
- Improved methods for understanding and modeling the cascading effects of food and water insecurity, including across locations (such as through commodity and food prices) and across domains (such as two-way interactions between food prices and social stability)

- Technology development that can enable open, participatory data and narratives on global risks and implications for national and local decision making
- Novel approaches to assessing human-earth system interactions to support implementation of the United Nations Sustainable Development Goals, including promoting human development and health, promoting social and economic inclusion, protecting natural capital, and ensuring safe and sustainable supplies of food, water, and energy
- Multi-sector development planning and 'nexus outlook' scenario modeling, including integrated analysis and engagement processes to support exploration of risks and opportunities, and to help build the consensus and confidence required for action by different stakeholders and government agencies.

### Enhancing KSS impacts by underwriting effective portfolio leadership

Realizing the full potential of KSS requires highly effective leadership to develop and oversee a portfolio of programs and ensure synergies and learning within and across individual programs. Once the KSS portfolio achieves scale, this core leadership function will be funded through project revenues.

Donor support for core leadership and management functions will enable KSS to achieve earlier and larger impacts by enabling full-time staff, attracting additional programs, and supporting more effective communication of KSS insights and methods. KSS member organizations will continue to support targeted KSS demonstration and proof-of-concept research activities, as well as contribute to joint business development and project scoping activities.

## Contacting KSS

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