

# *Innovation, Culture, and Creativity*

## **Summary Recommendations to NSF TIP**

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The ICC project focused on ways to strengthen regional innovation ecosystems, support continued competitiveness of U.S. creative industries, and expand the STEM workforce. For more information on these goals, see [icc.ucla.edu](http://icc.ucla.edu). This document summarizes what the team learned from interactions with the creative and technology sectors during ICC activities in 2024, and recommendations for NSF TIP and other agencies supporting innovation in these sectors going forward.

### **Innovation and the U.S. Creative Sector**

Four overall observations distilled from the ICC project frame the stakeholder feedback and recommendations in the sections that follow.

**Lack of engagement by the national R&D enterprise with the world-leading U.S. creative industries limits innovation and puts continued competitiveness at risk.** Artificial intelligence provides a key example: while markets drive AI use for efficiency, government investment enables discovery of disruptive and fundamentally new opportunities. But despite the critical impact and global relevance, academic AI R&D is rarely supported to engage deeply with domain experts from the creative sector, relying on surface-level understanding of challenges or the limited scales of production possible in a typical academic setting. As with any sector, enabling deeper investigation of the requirements and experience of our leading companies and workers, whose livelihoods depend on the intersection of creative and technological skills, is vital.

**Many in the creative industries view technological change, particularly in AI, as something happening without their input or expertise *and* disconnected from their own professions.** The gulf between technology innovation and the creative sectors is exacerbated by a historically proprietary approach to basic research by the creative industry players that are capable of funding it—for example, major studios and production companies, and the technology players who are interested in the markets—e.g., Adobe, Autodesk. This results in uneven engagement with critical emerging technologies and limits innovation by individuals and small businesses. Government investments can incentivize stronger pre-commercial and small business opportunities that drive innovation, shifting both mindset and opportunity, potentially enabling a broader geographic distribution of the industry. They can also derisk the opportunities for larger players in the creative industries to engage in open research.

**Translational research in this domain should integrate new technology developed through use-inspired research into creative production.** While there are examples of

technology innovation throughout the creative industries, the sustained and methodical integration of R&D with production is limited. Public investment is key to unlocking the potential for our leading technology and creative sectors to work more closely and in ways that benefit the entire creative economy. As in other sectors, NSF can incentivize higher-risk, higher-reward collaborations, encourage big-picture thinking and sharing of research results, and fund integrated workforce training. While NSF is unlikely to directly fund creative production, it can take other strategic steps to catalyze and enable translational research, as well as to encourage investment in entrepreneurship, which are described in later sections.

**The creative industries are full of entrepreneurial capacity for innovation in critical and emerging technology.** Its products are both tangible and knowledge-based goods - from the artisan-as-small-business model across regional crafts and low-volume manufacturing to the single-purpose companies created to make independent films and games, sports teams, and location-based experiences. With media, entertainment, and consumer experience now intertwined into business ideas, strategic connections with TIP's leading entrepreneurial efforts could have a transformative impact on small business innovation within today's economy. Federal investments can enable individuals and organizations to adapt their methods to available and emerging technological tools to remain competitive, reach new markets, and access new formats for creative production.

## Priorities from ICC Stakeholders

The following priorities were identified by ICC stakeholders in response to the factors summarized above:

### Fostering Regional Innovation and Economic Growth

In the same way that NSF has served other emerging research areas by both fostering national networks of researchers and creating focused regional investments, participants recommended a similar set of steps for creative industry innovation:

- **Network-building for cross-sector alignment.** Continuing and expanding the connectivity among the 65+ organizations the ICC project brought together who are interested in societal benefits of innovation at the intersection of the creative and technology sectors.
- **R&D Centers of excellence.** Developing regional hubs for creative sector technology innovation based on local strengths, focused on the foundations above. A consistent comment from stakeholders in the ICC project was the lack of infrastructure for sustained, collaborative research at the intersection with production. In the same way that NSF center-scale programs have catalyzed advances and industry-university partnership in other areas, they can do so in this critical area.

## Accelerating Technology Translation and Development

Participants emphasized the need to reduce barriers for creative professionals to be able to engage with critical and emerging technologies *and* to have avenues of support for creating new commercial opportunities from that exposure. They were also inspired by NSF support in other sectors for bigger-picture, non-incremental ideas that could have transformative impacts.

- **Sandboxes.** Creating facilities—potentially located within the centers of excellence above—dto enable creative sector exploration of advanced technologies not currently well-supported by existing means, even in industry. These can act as laboratories for engaging and training engineering researchers on methods for collaboration with creative industry practitioners.
- **Moonshots.** The relatively modest market size for technology used in professional arts and entertainment has tended to focus moonshot-style investment in non-incremental translational research opportunities in creative technology towards consumer products or PR-friendly engagements with major entertainment brands. Federal investment can take a long-term view, considering the impact of moonshot-type creative capabilities on the economic competitiveness of the creative industries enabled by investment the tools that they use.
- **Entrepreneurial support.** Offering small-business innovation grant opportunities that target creative sector startups building on federally-funded innovation.

## Preparing the U.S. Workforce

There was strong support and interest for training at all levels, and for recognizing that the broad range of STEM skills that are already part of creative sector work will only increase in the future.

- **Workforce development.** Regional and online training opportunities (potentially outside of traditionally higher-ed pathways) for upskilling in emerging technology, as well as supporting interfaces across professional technology R&D and creative practice, engineering and artistic education, and opportunities in informal economies.

## Role of Government Investment

The table linked [here](#) maps opportunities based on these priorities to sources of capital and potential performers in this arena, illustrating potential NSF engagement that is consistent with the agency’s goal to “strengthen our domestic workforce to fuel economic prosperity, national security, and global S&E competitiveness.”

The government is a key player in generating cross-sector alignment around national priorities that are on longer time horizons. For example, it can directly support and encourage the creative industries in engaging with fundamental research that will transform their fields, the technology industry in engaging with the future of human creativity, institutions of higher

education with advanced professional practice in the creative industries, and regional / local governments in advancing the competitiveness of creative industries in new markets.

## Opportunity

### Develop Global Leadership in AI for the Creative Sector

Considering the **creative industry as a key US-based industrial sector—involving both physical manufacturing and knowledge production** suggests key opportunities for TIP to “accelerate use-inspired research and the translation of research results to the market and society.” (TIP Website)

Recognizing that this is a time of transition and reprioritization for NSF, rather than presenting a multiyear roadmap, we propose the following **initial opportunities**, in which TIP acts as a catalyst to stimulate the innovation support needed for the above priorities in service of the originally proposed goals of 1) strengthening regional innovation in the creative industries, 2) ensuring global economic competitiveness of the creative sector, and 3) promoting workforce development. While AI was not the sole technology focus of discussions in the ICC convenings, it was a dominant concern and area of opportunity. We recommend that an initial set of TIP activities could be organized around developing leading programs in this area, which can in turn connect to other critical areas such as real-time rendering, novel fabrication techniques, and human-machine interfaces.

### Research Coordination Network

The ICC project developed a network of over 300 stakeholders in innovation at the intersection of the creative and technology sectors, including participants in the regional workshops, industry summit, and national convening. These included industry professionals and entrepreneurs, regional government officials, organized labor, academics, and the staff of philanthropic foundations. **We recommend that TIP continue to convene this network and expand it to incorporate more regional and state government representatives, particularly those involved in economic development and incentive programs for related industries.** Prior NSF models such as the RCN (Research Coordination Network) could be used.

### Innovation Engine / Translational Research Institute

While industry may eventually become a key source of support for translational research, the federal government remains the key catalyst for developing leadership in *new* areas of use-inspired research. Based on the pace of global investment and the broad interest, we recommend that TIP consider **Engines-scale funding in the near-term (next two years) to build leadership in trustworthy AI for creative applications.** In addition to maintaining competitiveness in technology and workforce training, this will also develop a better understanding of models to bridge the “gig economy” and project-focused nature of much of professional creative practice with the sustained R&D necessary for innovation. If a smaller scale investment is desired, applications could be encouraged to SBIR or STTR programs could be considered instead.

## Cross-Sector Entrepreneurship

**Bring NSF-supported R&D into tools and services for professional practice.** A key challenge articulated by stakeholders are the limited investment vehicles available to support entrepreneurial activity at the intersection of creative production and technology development, particularly at a small business scale. Creative production is rewarded with market success based on its tangible outputs, not the technologies used to produce them; technology development is rewarded generally by how many customers will pay for a given product or service. Taking balanced risks in both areas is challenging. Government investment can drive parallel innovation in ways demonstrated successfully in other countries. We recommend conducting a pilot SBIR activity focused on increasing small business / product startup with AI and other emerging technologies that are co-led by professionals from the creative industries, similar to the efforts by UKRI.

**Upskill university tech transfer offices:** A parallel opportunity exists to develop and share best practices in intellectual property agreements and tech transfer activities in the creative industry with university tech transfer offices, which have historically focused on different sectors.