Illuminating 'unknown' domains of impact and uncovering new practices and pathways for transformative innovation for children

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Note: The findings, interpretations and conclusions expressed in this science-policy brief are those of the researchers and authors, and do not necessarily reflect UNICEF policies or approaches.

Abstract

This science-policy brief explores the implementation of and early insights from the United Nations Children's Fund (UNICEF) Innovation Nodes. Nodes are transdisciplinary collaborations that focus on generating novel wisdom in new and unknown areas of potential innovation for children that can accelerate progress for the Sustainable Development Goals (SDGs). Nodes meaningfully engage young people as knowledge holders by applying a transdisciplinary approach to science-policy-society interfaces.

Breakthroughs in science, technology and innovation (STI) are rapid, numerous and dispersed, and impact individuals and societies at all levels of development. Effective interfaces among science-policy-society stakeholders are needed for every person to realize their rights[1] to benefit from STI. 'Interfaces' are processes that put science into action to inform decisions that enhance social and environmental wellbeing.[i] Meta-studies[ii] [iii] identify bi-directional knowledge flows as a common characteristic of numerous traditional interfaces.

Research shows that a number of these interfaces do not adequately consider contextual factors, differences in culture, knowledge, values, and perspectives[iv] and that the science-society gap is widening.[v]

We have observed challenges that arise in the absence of transdisciplinarity. Researchers may not fully grasp the potential applications of their technologies for underserved children in unfamiliar contexts.[vi] Policymakers lack access to emerging science expertise,[vii] [viii] [ix] hindering SDG progress.[x] [xi] Young people may not be meaningfully engaged in exploring the implications of STI on their lives.[xii] Development practitioners, familiar with children's challenges, may struggle to explore unknown domains of emerging science. There is a need for intermediaries, multidisciplinary approaches, and bringing together specialized and diverse knowledge and value systems.[xiii].

**Figure 1.** Bi-directional knowledge flows characteristic of numerous interfaces
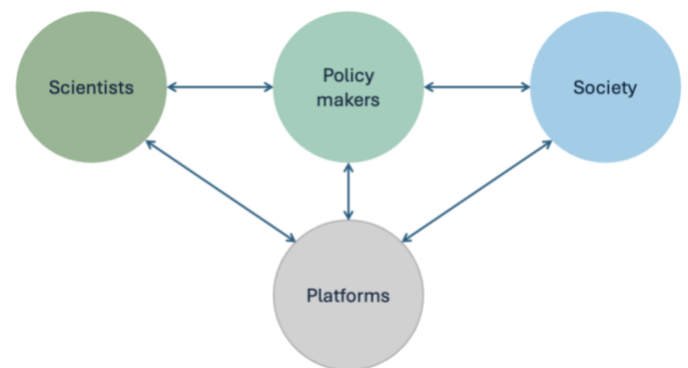
Innovation Node Concept

Innovation Nodes (hereafter "nodes") implement aspects of UNICEF's Global Innovation Strategy[xiv] that call for identifying gaps and opportunities and uncovering unknown approaches. Nodes help UNICEF and partners anticipate, adapt to, and leverage the latest scientific advancements earlier, which is more effective.[xv xvi xvii xviii]

Unlike the traditional interfaces, nodes apply a transdisciplinary approach[xix] that is well-suited to addressing complex sustainability challenges.[xx xxi xxii xxiii] By 'transdisciplinary' we mean a purposive approach[xxiv] with the intent to create change toward sustainability[xxv] that transcends individual disciplines to collaborate, integrate and co-produce knowledge stocks in a pluralistic manner[xxvi] with associated, multi-directional flows.[xxvii]

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[1] These are enshrined in multiple international human rights instruments regarding peoples' rights to "share in scientific advancement and its benefits" in Article 27 of the Universal Declaration of Human Rights, and to "enjoy the benefits of scientific progress and its applications" per Article 15 of the International Covenant on Economic, Social and Cultural Rights.

Figure 2. Multidirectional 'meshwork' knowledge flows in a transdisciplinary approach
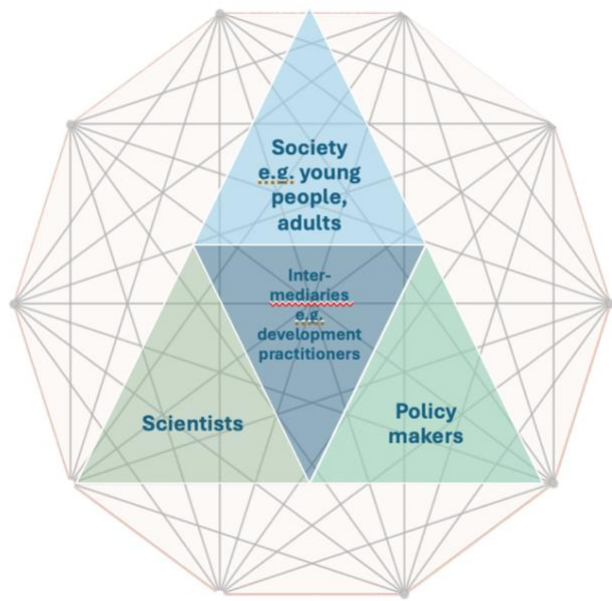
Illuminating the Unknown in Practice

UNICEF has implemented nodes over three years,[xxviii] co-producing with 34 individuals ranging from young researchers to research chairs. Ten new and unknown areas of potential innovation for children have been explored, including aptamer technology's impact on point-of-care diagnostics[xxix], the comprehension of emerging technologies by 10-13-year-olds, advancements in solar cell technologies for increased efficiency and versatile applications[xxx], and the potential of precision health contingent on policymakers addressing health equity questions.[xxxi] Additional areas of exploration encompass additive manufacturing, future water, sanitation and hygiene (WASH) and emerging business models for innovations for sustainable development.

UNICEF and its collaborators[2] have explored different models for nodes since initiating the approach in 2021. We have experimented with scope, structure, length and team composition. Nodes tackle different problem spaces (unknown unknowns, known unknowns etc.), bringing together different stakeholders (young people, researchers, practitioners etc.), across knowledge areas (from museum curation and marketing to forensic science, digital technology and business etc.), and varying lengths of engagement

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[2] Node collaborations include diverse institutions on four continents such as the Rhodes University Biotechnology Innovation Centre, California College of the Arts MDes Social Lab, Judge Business School at the University of Cambridge, and the University of Technology Sydney.

(from two months to three years), with different degrees of structure (from open and emergent processes with only a defined collaboration period to collaborations with structured phases). Nodes have been sourced as a case study by the UN Staff System College and LinkedIn.

Table 1. Innovation Nodes models

Type	Who is involved	Characteristics
Frameworks for freedom	Young researchers	4-6 people over multiple months with moderate structure. Open exploration characterized by high degree of ambiguity. e.g. Explore "known unknowns" and "unknown unknowns" to illuminate potential innovation for children.
Scoped explorations	Senior researchers and academics	2-5 people over multiple months to explore and probe a "known unknown" e.g. Future WASH
Sustained exploration	Professors to junior researchers	Multiple people. A multi-year collaboration with a center of excellence in a "known unknown", emerging domain of transformative innovation for children. e.g. applied biotechnology for children

Recommendations

The experience of UNICEF's Innovation Nodes supports three recommendations to improve science-policy-society interfaces.

1. Strengthen meaningful youth engagement

- **Scale what works.** Draw on demonstrated approaches that support more substantive and early co-creation with young people in collaborative research and policymaking.

- **Leverage the Summit for the Future.**[xxxii] Promote opportunities that facilitate young people's engagement as knowledge holders in the convenings and consultations that are part of the Summit and its follow ups.

2. Enhance existing interfaces to support SDG progress:

- **Build UN 2.0 capacity.** Include transdisciplinary capacity building among the cutting-edge skills being developed to strengthen United Nations system impact as part of UN 2.0.[xxxiii]
- **Apply a transdisciplinary approach.** Shift sustainability-oriented science-policy-society practices to apply a transdisciplinary approach that equally includes, values and is shaped by the individuals and communities it seeks to serve and fosters multidirectional knowledge flows.

3. Reinforce knowledge as a public good

- **Advocate for Open Science.**[xxxiv] Promote innovative approaches for open science at all stages of the scientific process.
- **Enable intermediaries.** Support and leverage development and humanitarian practitioners as intermediaries and knowledge brokers in strengthened science-policy-society interfaces.

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