



**SUMMIT ON SCIENCE ENABLEMENT FOR THE
SUSTAINABLE DEVELOPMENT GOALS**

November 29, 2016

**MEETING REPORT ON THE EARLY CHILDHOOD
DEVELOPMENT STREAM**

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SUMMARY

On November 29, 2016, the New York Academy of Sciences hosted the Summit for Science and Technology Enablement for the Sustainable Development Goals. One hundred representatives from industry, academia, NGOs, and UN organizations and Member States, came together for the first meeting to mobilize the scientific community on behalf of the Sustainable Development Goals (SDGs.)

Participants were assigned to one of four task groups, or “streams,” charged with creating a roadmap for applying existing and emerging technologies to the Global Goals. The groups were instructed to identify research and data gaps, discuss best practices for bringing innovation to scale in their fields, and agree upon a list of action items and recommendations. The four streams—Early Childhood Development, People in Crisis, Sustainable Consumption and Production, and Urbanization—cross-cut multiple SDGs and targets, encouraging participants to think holistically and consider solutions that may advance multiple Goals. At the close of the Summit, all attendees reconvened for report-outs and recommendations from each task group.

What follows is a summary of the Early Childhood Development (ECD) task group’s discussion and recommendations. The group united behind a central goal of creating a dashboard for children’s well-being that could be implemented at the community level, along with an evidence-based package of interventions for children from preconception to age eight. The discussion included ideas for harnessing technology and forging partnerships to formulate standardized ECD metrics and affordable, field-based assessment instruments; to improve ECD data collection and foster data sharing via mobile technologies; and to advocate a new approach to implementation research that reveals which ECD interventions optimize child development in various environments.

OVERVIEW

Adopted by the United Nations in 2015 as the centerpiece of the 2030 Agenda for Sustainable Development, the SDGs are a roadmap for the future: a set of 17 global goals and 169 specific targets aimed at saving the planet and its people and forging peaceful, just societies. The Goals are both extraordinary and ambitious, seeking to raise the world’s most vulnerable people out of poverty and strife, ensure access to clean water, nutrition, and education, and transform urban centers into safe, livable cities reliant on clean energy. Gender equality, inclusive employment, and urgent action to combat climate change and protect wildlife are also included.

Science and technology are central to achieving the Sustainable Development Goals. Indeed, former UN Secretary-General Ban Ki-moon has commented that scientists themselves are also crucial to the success of the SDGs, not only as innovators, but also as nonpartisan players capable of marshaling global cooperation.

The Early Childhood Development task group comprised 24 participants with a wide range of expertise including child development and pediatrics, telecommunications, bioethics, early childhood education, and

nutrition. The discussions centered around three broad topic areas common to all four task groups—Research and Data, Innovation and Implementation, and Partnership and Collaboration.

Early Childhood Development was defined as “a comprehensive approach to policies and programs for children from birth to eight years of age, their parents and caregivers. Its purpose is to protect the child’s rights to develop his or her full cognitive, emotional, social and physical potential.”

Stream leads were as follows:

- Michael McBurney, DSM
- Pia Britto, UNICEF
- Aisha Yousafzai, Harvard School of Public Health
- Mariola Pogacnik (facilitator) , PwC

SCOPE AND OPPORTUNITIES

Early Childhood Development is a Foundation for Sustainability

The SDGs represent an unprecedented opportunity to showcase the role of ECD as a foundation for sustainable development—prior to the 2030 Agenda, the many dimensions of child development had never been prioritized on a global scale. Early Childhood Development is mentioned in the fourth SDG, which aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” Further, a Goal 4 target specifies that girls and boys must “have access to quality early childhood development, care and pre-primary education so that they are ready for primary education.”

Early Childhood Development (ECD) encompasses basic needs including adequate nutrition and sanitation, a safe home and nurturing caregivers, protection from violence, and enrichment activities that feed a child’s natural curiosity and create a firm foundation for learning. The human brain develops most rapidly during the first three years of life, and stress, poor health, malnutrition, and a lack of stimulation during this crucial time has lifelong, negative impacts on developmental potential. At the time of this writing, more than 250 million children under the age of five are failing to reach their developmental potential due to adversity.

ECD is one of the most cost-effective strategies to alleviate poverty. Research shows that early intervention to address deficits in nutrition, education and nurturing care significantly improves adult outcomes, and can bring disadvantaged children into closer parity with more advantaged peers in terms of health, employment, and income. Further, research by the economist James Heckman shows that the earlier a society invests in a child’s development, the higher the returns. Breaking generational cycles of poverty, violence, and underachievement requires investment in ECD.

ECD interventions have a multiplier effect. Thus, taking these interventions to scale will directly impact SDGs that seek to end hunger and poverty, as well as those that strive to eliminate inequalities and promote equal opportunity regardless of gender. A sustainable future for people and the planet is

impossible without global access to the programs and services proven to help children reach their full adult potential.

RESEARCH AND DATA

A Broader Definition of ECD

One of the first subjects discussed was a desire to broaden the definition of ECD to capture the prenatal period, and to include expectant mothers—and perhaps even women of childbearing age—in some aspects of ECD interventions, particularly those related to mental health, nutrition, and supplementation. It was noted that maternal mental and physical health tightly correlate with perinatal child health. Maternal deficits in either area can have an immediate impact on the newborn and may even have transgenerational negative effects.

The group also noted that the field of ECD differs from others included in the SDGs in its focus on enhancing positive factors rather than mitigating an obvious disaster. The definition lacks a well-defined problem statement, and nowhere are the consequences of inaction clearly articulated. It was suggested that using science to help formulate a strong problem statement—a “rallying cry” to add to the current definition— might help galvanize the public and boost support for expanding the reach of ECD programs.

Developing Standard Metrics and Indices

The ECD field is lacking when it comes to specific metrics and assessment techniques for population-level measures of child development. Most assessments of child development rely on proxy measures—for example, stunting, micronutrient deficiencies, or poverty. While these factors certainly correlate with child development, they provide little nuance or insight into the aspects of cognitive, social, and emotional development ECD programs seek to strengthen. There is also no widely used template or “data dashboard” for aggregating indicators of child risk and development, nor for tracking and presenting such data. This is a clear barrier to scaling up ECD in support of the SDGs.

The nutrition field fares better in terms of metrics, although there are no rapid, minimally-invasive field-based technologies to assess child health measures such as vitamin status, hemoglobin, omega-3, docosahexaenoic acid (DHA) or eicosapentaenoic acid (EPA) levels, all of which are early health indicators that may impact cognitive development. As a result, the ECD field is hampered by difficulties assessing children in the remote or impoverished areas where services are most likely to be needed, a lack of standard metrics, and population-level assessment instruments that provide only indirect measures of child well-being.

There are efforts underway to develop universal measures of ECD. The World Health Organization, The Bill and Melinda Gates Foundation, and Harvard University, among others, have launched initiatives to develop population-level indicators of child development. One participant shared the outcomes of a recent meeting of ECD research groups from the World Health Organization, Harvard, and the University of the West Indies, each pursuing different strategies for obtaining population-level measures of ECD for children ages three or younger that could be used in a field setting. The group merged their existing data

sets, agreed upon a common set of ECD criteria, and settled upon a single strategic approach for future work. They adopted an item-response theory method for testing whereby each ECD criterion or item is scaled, and a child's result or response to each item dictates the next step, be it no action or an intervention. This was mentioned as an example of progress toward the goal of arriving at standardized measures of child development that could be adopted on a global scale in service of the SDGs.

Affordability was emphasized as a key element of all evaluation and assessment approaches, as demonstrating the value of ECD to policymakers requires meaningful amounts of local data. As one participant remarked, "You can't measure 100 people in a country of 100 million and expect to draw good conclusions...and even with a good sample size, one country's data may not apply elsewhere. Everyone wants data on their own country."

Maximizing Existing Field Data for Monitoring

The discussion turned to the issue of how ECD field data is collected and shared—or more often, not shared. Specifically, there is usually a gap between those working in the field to test children and perform evaluations and those who monitor a program's progress. Field workers and program monitors and administrators are often separated by thousands of miles and may be working on different continents. Emerging trends and results recorded in the field may not be communicated to or noted by administrators for months, complicating efforts to make timely programmatic adjustments. Closing this gap and improving data sharing and communication was suggested as a key step in scaling up ECD programming and ensuring that existing programming is effective.

Improving data reporting systems will not only boost the quality of ECD services delivered to children and families, but will ensure that policymakers have access to localized data that accurately represent both the positive outcomes from ECD programs as well as unmet needs and challenges. Additionally, a lack of timely reporting can have real costs to children, as the window for taking action to improve developmental outcomes is very short. When milestones are missed or deficiencies become evident, prompt intervention is essential. "A child is only 6 months old for a brief time, and if you miss the chance to intervene, that opportunity is gone forever," one participant remarked.

Mechanisms that bring together those who can test children and monitor a program are necessary for ECD programs to be effective at scale. The ability to gather actionable data and share it quickly is at the heart of closing the information gap. The group agreed that technology was a clear source of solutions in this area.

Unleashing Technology for Data Collection

The potential for mobile and smartphone technologies to aid in ECD data collection is vast and underutilized. Participants discussed the triumph of microloans in the developing world—a success story that hinges on mobile technology and smartphones—as a model for understanding how these 21st century technologies can, and in some instances, must supplement or replace more traditional data collection methods. Absent the usual banking and payment channels, smartphones have allowed millions of people in the developing world to use existing infrastructure (mobile connectivity) to create businesses and achieve

independence. That same mobile infrastructure can and should be tapped for ECD, especially in light of projections that show nearly everyone on the planet who wants a smartphone will have one by 2020.

One researcher commented that not tapping the power of mobile devices specifically for nutrition or ECD data collection is “a missed opportunity,” and that embracing these technologies will require a less “constrictive” stance about who can perform such assessments and how. “Surely there’s an opportunity to unleash technology and data collection and make it more available for these purposes,” he said. “It may be less precise than what we’re accustomed to, but the opportunities are there. We should build a bridge instead of trying to make people do things ‘our way.’”

One researcher commented that gathering actionable, ecologically-valid data is particularly difficult in areas lacking electricity or in countries in crisis. Energy-independent technologies can be deployed anywhere, even in refugee camps. These may include solar-powered charging stations for mobile devices or computers, or hybrid solar smartphones that have onboard power conversion capabilities, an emerging technology. Tapping these innovations would offer both a cost-effective way to collect local data and as well as an opportunity to advance the relationship between the science and technology sector and ECD in support of the SDGs.

Better Data Can Help Build Political Support and Partnerships for ECD

The research and data discussion concluded with the consensus that more universal metrics and better data collection, likely aided by technology, will bring much-needed rigor to the ECD field and may help build political and industry support for programs and partnerships. One participant commented that “any business leader will agree that if you don’t know how good or bad a situation is right now, you don’t know if you’re making progress or what the next steps should be.” The lack of standardization in assessment, data collection, and reporting complicates efforts to make data-driven, globally applicable recommendations to governments and other partners regarding what works—and what doesn’t—in ECD programs. These variations also make it difficult to assemble a diverse set of case studies or “champion stories” that can be used to motivate policy and stimulate partnerships and funding for ECD programs.

IMPLEMENTATION AND PARTNERSHIPS

INNOVATION AND IMPLEMENTATION

Adapting Existing Technologies for ECD

The innovation and implementation discussion began with a brainstorming session about existing technologies and programs that may be adapted for ECD purposes.

A tablet-based data collection system called Tangerine was discussed as a potential model for a device-based system that assesses interaction between a parent or teacher and a child in an ECD context and provides real-time feedback. Tangerine is currently used in teacher coaching, providing moment-to-moment analysis of teacher-student interaction and offering instant feedback to help teachers improve their techniques. A similar methodology, Ecological Momentary Analysis (EMA), uses real-time assessment

methods to capture behavior in everyday life and is an increasingly common protocol in behavior change research. EMA has already been used in research settings to analyze interactions between toddlers and their mothers, so there is some precedent for using this methodology in the context of ECD. The group believed that both EMA and the Tangerine system could be usefully adapted for ECD purposes; the feedback mechanisms would be valuable for users (mainly parents), and the ability to capture ecologically-valid, real-time data would further ECD program monitoring and research.

In the mobile health (mHealth) community, smartphone apps have been successfully deployed to help community medical workers improve their skills and services, and text messaging programs like text4baby are popular sources of health and safety information for mothers around the world. The idea of amplifying these existing mechanisms by adding a “feedback” functionality that would allow users to respond to text or email prompts and provide their own comments or questions in return was well-received throughout the group.

A system currently being tested in China syncs a patient’s health records with an app accessible to both healthcare staff and patients. The app also features consumer-facing elements such as questionnaires for parents about a child’s environment or developmental milestones, and a gaming component to test areas of young child development. Results are immediately available, allowing healthcare providers to flag potential developmental deficits or other issues between patient visits.

A Barrier to Innovation: The Implementation Science Gap

Despite an enthusiastic discussion about adapting current technologies and potentially creating new ones in service of ECD, the task group acknowledged that even the most exciting scientific or technological advances are useless without a better understanding of ECD program implementation. The group identified a lack of implementation science as it applies to ECD programs as the single greatest barrier to scaling up services and achieving the SDGs in this area.

Most ECD program research is focused on child outcomes, with little investigation into *why* a program or intervention succeeded or failed. This missing information is critically important for scaling. As one participant said, “The way we do research has been informative, but it cannot take us forward. There’s a reason ECD hasn’t really scaled yet, and it’s because we need new methodologies that can inform diffusion and scale.” In this vein, the group proposed a series of bold recommendations and ideas.

First, a new set of reporting standards for ECD programs that transcends outcomes to shed light on the “why” factors. Next, a commitment to “scaling evidence”—research specifically designed to yield best practices for taking ECD programs to scale. Randomized controlled trials would be designed to inform scale, and include a clear Theory of Change as well as a set of standard elements that must be reported *in addition to outcomes*. These may include information about what strategies were used to create demand for the program, or how the interventions were tested prior to the program launch. The goal is to understand how every factor that goes into designing and implementing an ECD program impacts success or failure in implementation.

In this new research realm, case studies from the field that were not designed as randomized controlled trials (RCTs)—and would normally not meet the criteria required for some research publications— would serve as legitimate, valuable evidence to inform scaling efforts. There are several supports for this rationale. First, some aspects of ECD, notably social and emotional development, are not readily quantified, and RCTs are designed to gauge impacts of interventions with agreed-upon, standardized measures. For example, an RCT is ideal for assessing the impact of a nutritional intervention on stunting, but cannot fully measure the impact of some ECD interventions on a child’s development, nor the potential impact on the community that may come from behavior change in some families. Second, due to resource constraints and the nature of field work, it can be challenging to sufficiently power an RCT in remote communities or countries in crisis. Finally, many aspects of ECD encompass nurturing care of children, which is unquestionably beneficial, yet it would be difficult to measure the long-term impact of a single care-related intervention tested at a specific time.

The group acknowledged that it will be no small feat to build momentum in the scientific community for embracing less traditional data or research methodologies. However, there was clear consensus that a new paradigm is needed for ECD research.

A group member noted that the parameters for funding often constrain the types of evidence that can be obtained, due to methodologies, time limits and other factors, and that these parameters work against efforts to understand ECD implementation. It was suggested that NGOs, academia and funders partner in the early stages to design a Request for Applications specifically intended to draw interest from ECD researchers who may otherwise not qualify for such funding, and that a pioneering publisher agree to “take a chance” and publish the results. If accomplished, this could be a major contribution to implementation research as applied to ECD.

Implementation Costs at Scale are Unknown

The cost of scaling up ECD is another “black hole” identified by the group. There are few case studies and sparse research and analysis on the costs of implementing ECD at scale. As such, there are no best practices for translating these costs into budget allocations and financial mechanisms. Should ECD funds be given to parents as a tax credit or subsidy, or are block grants a better approach? There is little information to inform these options, and the team agreed that such gaps make ECD a harder sell for government and private sector investors and partners.

“Ownership” of ECD Impacts Implementation

Governance was mentioned as a final issue when it comes to ECD implementation at scale. Unlike nutrition, where a specific sector is accountable for results, there is no clear ownership or accountability for whether a child meets their full potential by age 18. In fact, ECD could arguably “belong” to several sectors—such as health, education, social services. Some members of the group described this lack of accountability and ownership as a challenge when talking to governments about the SDGs and plans to achieve them.

PARTNERSHIPS

A discussion about partnerships opened with a statement of principles. The group set forth a mandate that all partnerships to advance ECD must embrace shared core values—among them, the belief that a sustainable future is impossible without the success of children, and that all parents and communities share a universal wish for children to thrive. Participants also felt strongly that long-term partnerships with government and private sector partners must serve to advance each entity’s business goals while moving ECD forward. As the expansion of mobile technology into developing countries has shown, there must be a strong business case for investment first, and the social benefits follow.

Partnering with the ICT Sector

The group identified the information and communications technology (ICT) sector as a primary partner, with a focus on mobile technologies. Mobile apps have been used and studied in the healthcare and social services realms, but there are no real-world examples of mobile technologies being tapped for ECD.

An ICT/ECD partnership is key to improving ECD data collection, and the group felt strongly that ICT partners must be engaged as early as possible to ensure that any mobile technologies designed for ECD meet researchers’ specifications and collect the right kind of data.

Existing apps that track users’ activity or test cognitive skills routinely collect data, but the information rarely leaves the user’s device. One participant commented that ECD apps could run on similar platforms that were designed to *share as well as store* data. Routing user data back to the research community (with users’ permission) could quickly provide a trove of actionable, ecologically-valid data to inform ECD research and scaling.

There was consensus that data gleaned from mobile ECD projects must be open to the research community at large, not proprietary, and that technology partners must share this commitment to making such information available for the public good.

Participants who have worked with or studied mHealth programs made a strong case that any apps built for ECD should include some routine element of human interaction, such as a phone call or an online chat session. Case studies show that a personal connection, no matter how brief, motivates users to maintain engagement with the program and encourages accurate, truthful reporting. Overall, the group agreed that any technology used for ECD should supplement, not supplant, human interaction in the settings of education and nurturing care.

Parents and Communities are Partners

Parents are the primary demanders of ECD services, and are thus important partners in global implementation. In many parts of the world, however, parents are unaware of ECD programs and do not know how to demand them. Conversely, other parents may be desperate for such services, only to be unable to access them.

There is a “demand gap” between those in communities who are aware of ECD programs—usually teachers, healthcare or advocacy workers— and the parents who want them. The group agreed that these workers can play an important role in drumming up demand for ECD among parents and communities at

large. Religious groups may also be useful generators for demand, as they set social norms and expectations in many parts of the world.

Government Support

The group wished to acknowledge that in many parts of the world, governing regimes are oppressive, unscientific, or both. In such regions, it is unreasonable to expect government support or partnership, but some level of sanctioning will be required to ensure that ECD services can reach children and families. While no specific strategies for obtaining such support were discussed, one participant suggested that perhaps expanding ECD messaging to include a “problem statement”, as described in a prior discussion, may be useful in some instances.

KEY ACTIONS

The Early Childhood Development task group identified the following as priority action items and recommendations.

Innovations in measurement and data collection

Data and measurement issues are a major hindrance to scaling up ECD services globally. There is no universally accepted set of indicators for child development, and assessment tools, particularly at the population level, are limited. As such, communities and professionals have no common criteria nor a dashboard for tracking data to monitor child outcomes. Difficulties with data collection further exacerbate the situation—it is challenging to collect ecologically-valid ECD data, and the data that exists from the field is not shared broadly within the research community.

The group identified the ICT sector as a natural partner to bring innovation to the data collection and sharing processes. They recommend crowdsourcing existing examples of platforms and applications—particularly mobile technologies—that collect and share data and may serve as model platforms upon which to build apps for ECD data collection. Technology partners should be engaged early, and the relationship must be based on shared values and a strong business proposition.

A New Approach to Implementation Science

There is a research gap in implementation science as it relates to ECD programs. Despite many case studies and reports from programs past and present, little is known about why some programs succeed and others fail, or about what constitutes a winning package of interventions for young children. Absent any scientific assessment of the “why factors,” attempting implementation at scale becomes a failure at worst, a guessing game at best.

In a bold recommendation, the ECD task group suggests creating a new paradigm for ECD reporting and results—one that transcends outcomes and drills down to illuminate the mechanisms of program success or failure. Information not typically regarded as evidence, including some case studies from the field, would be regarded as both valid and valuable in understanding the factors that impact the outcome of ECD programs. It was recommended that the key partners—NGOs, academia, CSOs, funders, and research

publications—convene now and come to consensus, agreeing to collaborate differently and set new criteria for publishing ECD implementation research. The group suggested that the *Annals of the New York Academy of Sciences* consider partnering with the ECD field and being the first to embrace this paradigm shift.

NEXT STEPS

Per the action items above, the Early Childhood Development task group expressed interest in convening additional meetings with representatives from the ICT sector, funders, and publishing to begin to identify data collection and sharing platforms that may be adaptable for ECD, and to explore the feasibility of a new approach to ECD implementation research.

APPENDIX: WORKING GROUP PARTICIPANTS

Full Name	Title	Primary Affiliation
Stefan Swartling Peterson	Associate Director	UNICEF
Joanna Rubinstein	President & CEO	World Childhood Foundation
Michael McBurney	VP Science Communications & Advocacy	DSM
Harrison Xia	Secretary General	STEM Education Foundation
Pia Britto	Senior Advisor on Early Childhood Development	UNICEF
Maureen M. Black	Clinical Professor	University of Maryland School of Medicine
Sara Watson	Global Director	ReadyNation
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