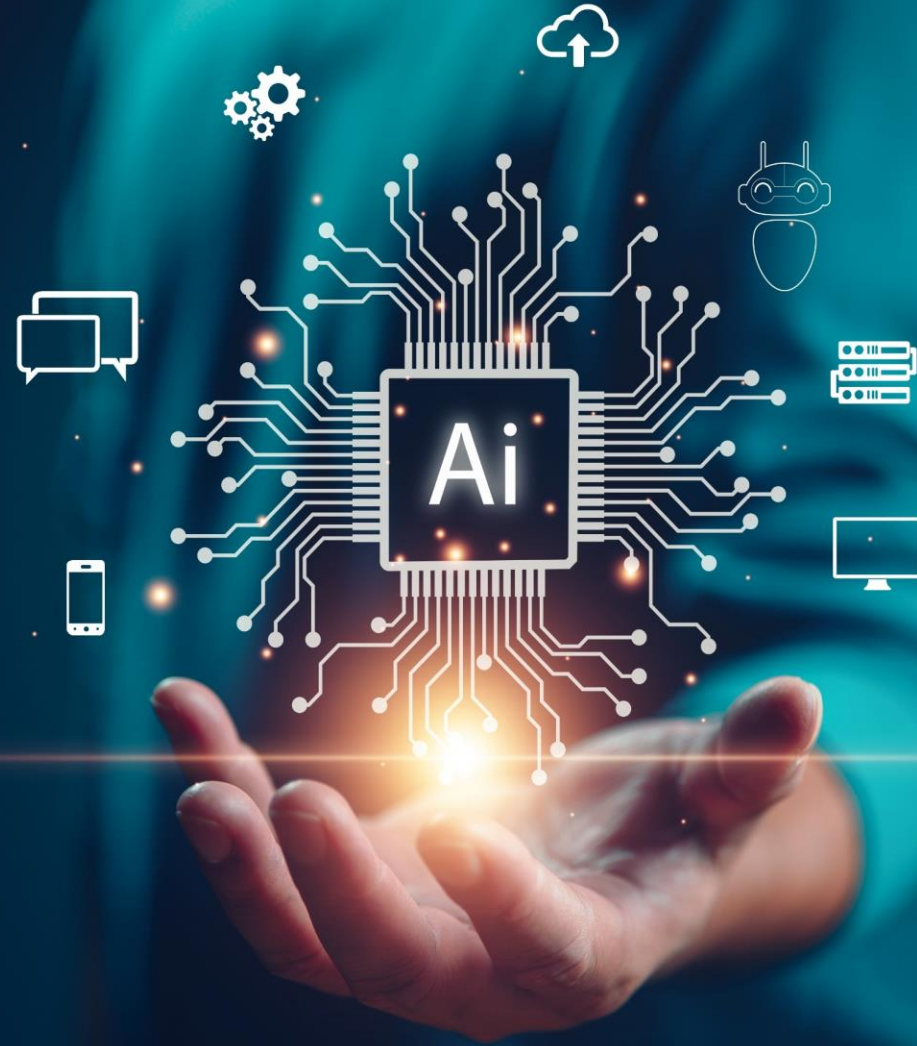


# A Technology Game Changer: How GenAI Will Reshape Learning



## Speakers:

Gian Marco Iodice, AI tech lead @ Arm and Chair of the TinyML Global meetup

Milja Laakso, Programme Specialist, UNICEF Learning Innovation Hub

# No one is left behind



## Definition

\*The Global Goals are an agreed-upon set of goals, targets, and indicators that all member states of the UN agreed to in 2015 with the goal of ending poverty, fighting inequality, and urgently addressing the climate crisis

## How are designed

\*...designed to provide lifelong education for all.

This is the story we are going to tell you today

# Ed Tech for Good Curation Framework

- We are seeing today a plethora of educational technology (EdTech) tools emerging:
  - Adaptive learning programs for math, gamified language learning apps, and robotics kits powered by **tinyML!**
- However, how can governments, organizations, schools, teachers, and parents know which tool better suits their needs?
- Unicef Learning Innovation Hub-Office of Innovation with the Asian Development Bank (ADB) has been developing, along with partners such as Arm, the **EdTech for Good Curation Framework**.
- In August 2023, we met in Helsinki to shape the framework's pillars together.

# A scalable learning experience

How can we help kids learn new technologies or programming languages in a scalable way in the global south?

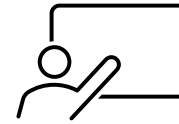
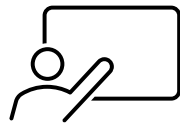
# A scalable learning experience

- Consider the following example:
  - Let's assume we provide a fancy, cool robot in the Global South to teach the foundations of technology.
- Would it be enough to teach technology?

The answer depends upon whether educators/teachers know the technology and the robot.  
If not, the robot will be just a toy.

# A scalable learning experience

- Educators/teachers are indispensable contributors to children's education.
- However, they need continuous professional development to help them broaden their knowledge, which can be very tricky in some countries.



Professional development



Local educators



Kids

# GenAI to scale professional development and learning experience

- GenAI at the Edge is a MUST in some countries (you will know why in a few slides)
- However, is the edge technology ready for genAI?
- The answer is...YES!

# GenAI on smartphones and edge single-board computer

- Recently, we demonstrated that large language models (LLMs) can already run on the Arm CPUs of many of today's smartphones at a speed higher than the average human speed reading.
  - For example, higher than **20 tokens/second** thanks to the i8mm extension (matrix-multiplication extension) available on **Armv8.6-a** onwards
- Software optimizations, like those that enabled LLMs to run on smartphones, also make it possible to run LLMs on single-board computers like Raspberry Pi 5!



# LLM performance on Raspberry Pi 5

|                                       | <b>TinyLLaMA (1.1B)</b> | <b>Phi-2 (2.7)</b> |
|---------------------------------------|-------------------------|--------------------|
| Text generation speed (tokens/second) | 10.05                   | 5.90               |
| RAM use                               | 606 MBytes              | 1526 MBytes        |

- 2 threads on Arm Cortex-A76 @ 2.4GHz
  - SDOT instruction available to speed up the matrix multiplication
- Out-of-the-box performance from the llama.cpp framework
- Int4 blockwise weights compression

The technology is here, but why do we need genAI at the Edge?

# UNICEF Learning Innovation Hub

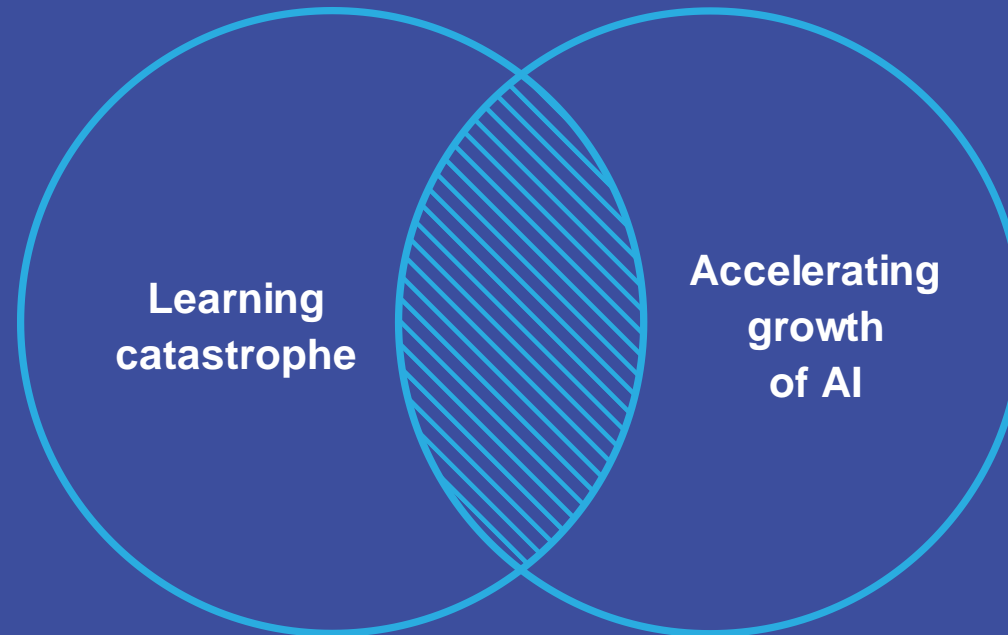
The Future of Learning is Now

# Opportunities of AI and genAI in education

## Education management and delivery

## Learning and assessment

Personalized learning: intelligent tutoring systems, exploratory learning environments, AI-supported reading & language learning, adaptive assessments, smart robots, teachable agents, educational VR/AR, AI-enabled collaborative learning, accessibility & inclusion



## Empowering teachers and enhancing teaching

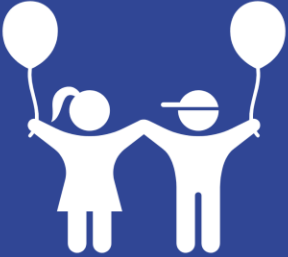
AI-powered teaching assistants (data analysis and insights), AI-human 'dual teacher' model

## Lifelong learning

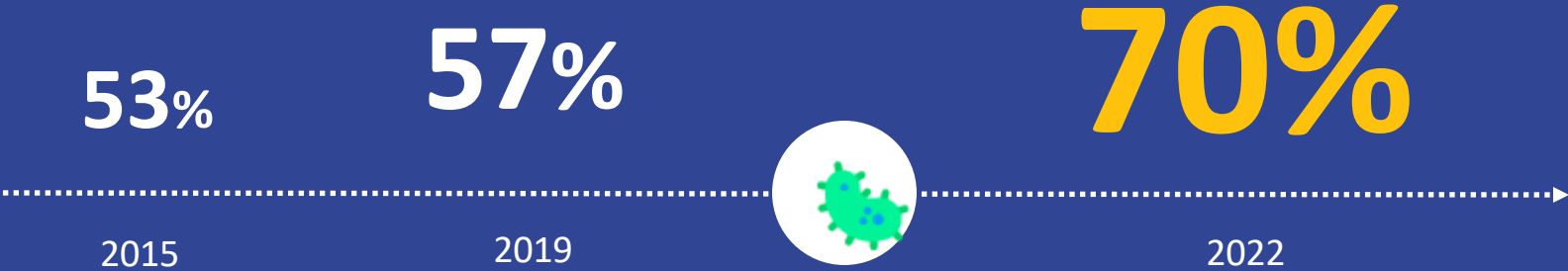
AI-driven lifelong learning companions, AI-enabled record of lifelong learning achievements

**LEARNING ~~CRISIS~~ CATASTROPHE GROWING TREND**

share of children unable to read and understand a basic text by the age of 10  
in low- & middle-income countries



% 10-year-olds  
in low & middle-income  
countries



Source: <https://www.unicef.org/reports/state-global-learning-poverty-2022>



# Snapshot: Rwanda

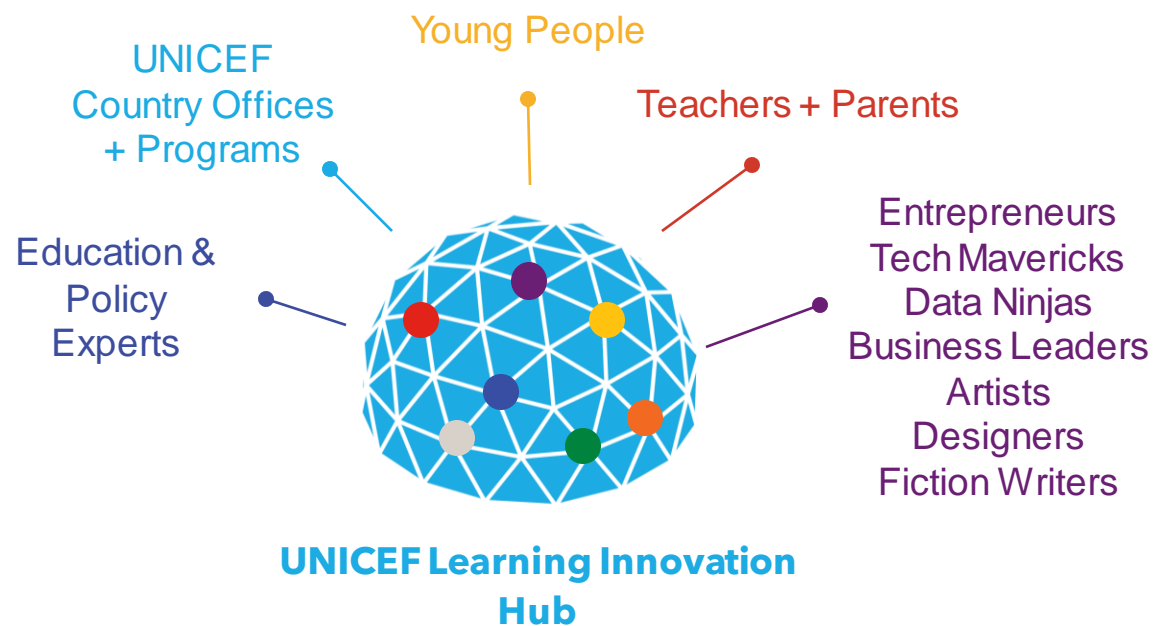
## Connectivity

- **30.5%** National internet penetration rate
- **Internet costs** are high and often unaffordable for families
- **1 smartphone per family** (in remote areas “feature phone”)

## Infrastructure

- **40%** Schools with ICT equipment (usually 1 laptop & 1 projector per school)
- **“Smart classrooms”**: computer labs – students share devices
- Frequent **power cuts**

# A global home for the architects of the future of learning in Helsinki

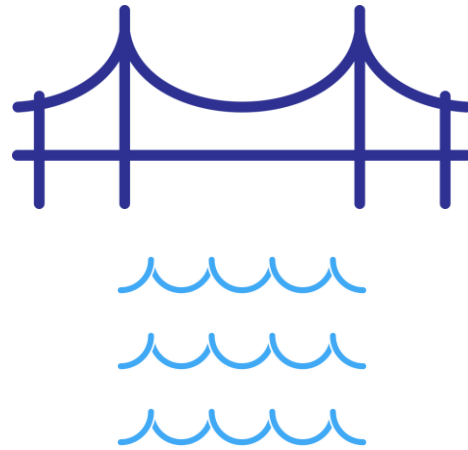


# Hacking the road to children

by accelerating and scaling access to digital learning



EdTech  
innovations



ALL Children





# THE LEARNING CABINET

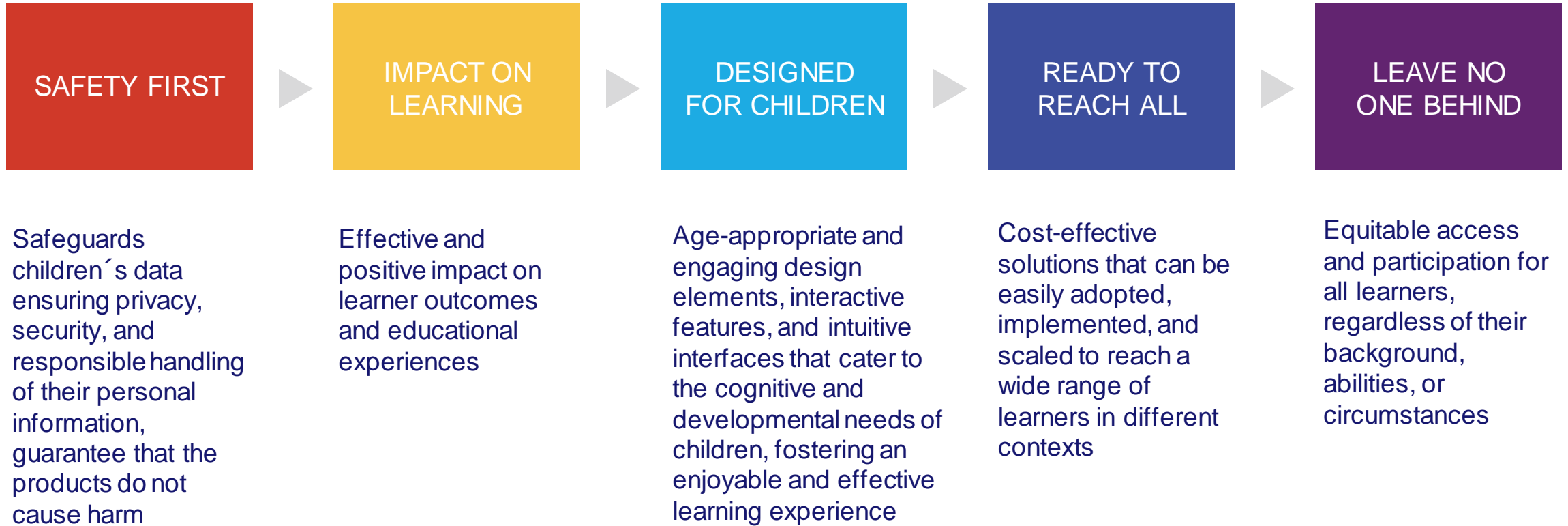
Online platform of curated EdTech tools

A publicly accessible platform that aims to become the go-to place for anyone looking for cutting-edge digital learning solutions, serving as:

1. An easy-to-explore, search and filter **curated collection of ed-tech tools** that can inform governments, organizations working in education and educational institutions on their education digital transformation.
2. An **open pipeline** of digital learning solutions to be considered **for the Learning Innovation Hub portfolio investments.**



# EDTECH 4 GOOD CURATION FRAMEWORK





## Blue Unicorn “moonshot”

Challenge the search for 1+ Billion dollars ventures and seek to build ventures that **impact 100 million children** with quality learning experiences that **promote gender equality, non discrimination and integrates children with disabilities.**



“We are called to be the architects of  
the future, not its victims.”

*Buckminster Fuller*

# Join us

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[www.unicef.org/innovation/learninginnovationhub](http://www.unicef.org/innovation/learninginnovationhub)



Are you ready to join our network?