

Annex – Table of Contents

The submission to the Designing Futures 2050 competition was designed with care, empathy, and intention. This Annex coalesces our labour of research, thought, coursework, meetings, and discussions on design-thinking, diverse iterations of prototypes, the development of five personas –Malik, Amal, Atka, Fidihasina and Nexus-X– and an annotated bibliography on the gaps of the UN SDGs.

Leveraging the aspirations of the UN SDGs, we designed a reproducible method that honours the interconnectedness of social identities and addresses the systemic inequities that perpetuate marginalization, discrimination and injustice on local, national, and global scales. The blueprint, our submission, is the culmination of many weeks of creative exploration, critical inquiry, and conversations about how we can better battle the problems of today and envision sustainable outcomes for future generations.

Design-Thinking Principles	1
<i>Introduction to Human-Centered Design</i>	1
<i>Design-Thinking – Stages, Dimensions & Resources</i>	4
<i>How to Apply Design-Thinking in Practice?</i>	9
<i>Systems Change</i>	12
<i>Equity in Citizen Engagement</i>	15
Concept Ideation	19
Persona Research & Development	20
<i>Persona I: Malik, Urban Young Male (2025)</i>	20
<i>Persona II: Amal, Child on the Move (2030)</i>	25
<i>Persona III: Atka, Inuk Adolescent (2035)</i>	33
<i>Persona IV: Fidihasina, Young Farmer + Entrepreneur (2040)</i>	42
<i>Persona V: Nexus-X, AI Robot (2045)</i>	50
<i>User Journey: Path to Transformation</i>	54
Annotated Bibliography on Gaps of the UN Sustainable Development Goals	60

Design-Thinking Principles

Introduction to Human-Centred Design

Human-centered design (HCD) emphasizes placing people's needs, experiences, and behaviours at the core of the design process. This iterative approach involves continuously testing, refining, and improving ideas in consultation with the end users to ensure the final solutions fit real needs. At its core, HCD involves a deep understanding of the problem from the perspective of the people who are most affected by it.

Ariel Sim, Human Centred Designer and Futurist with Doblin Deloitte defines human-centred design as "the concept of leading with the user and ultimately building a product that provides a solution tailor-made to that user's problem" ([Human-centred design with Ariel Sim](#)).

Key Principles:

1. **Empathy and Inclusion:** HCD relies on understanding the context and needs of the people involved, treating them as experts in their own experiences and challenges. This inclusive process aims to reduce biases, such as those that may arise when evidence-based policies are applied without considering diverse perspectives, especially for groups made marginal by systemic inequities.
2. **Iterative Process:** The design process is never considered finished; it is an ongoing cycle of testing, feedback, and refinement. Ideas evolve in response to new insights, ensuring that the solution remains relevant and effective.
3. **Collaboration and Systems Thinking:** Collaboration with various stakeholders is critical to creating solutions. HCD, particularly when combined with systems thinking, helps address complex, interdependent problems by considering the broader context and relationships that shape issues.
4. **Reframing Problems:** A fundamental aspect of HCD is problem reframing, which encourages looking beyond immediate symptoms to understand underlying causes. This shift in perspective allows for more innovative and effective solutions.
5. **Prototyping and Validation Testing:** Testing prototypes and validating assumptions early in the process helps ensure that the proposed solutions align with real-world needs and contexts, allowing for necessary adjustments.

Applications and Benefits:

- **Empathy in Action:** HCD builds empathy for the end users, helping designers move away from traditional, one-size-fits-all solutions. By designing with the user in mind, designers can create products/services that truly meet the needs of diverse populations.
- **Systems Change:** HCD is not only about solving immediate problems but also about creating systemic changes that lead to long-term, sustainable solutions. The process encourages thinking beyond individual service touchpoints, integrating a holistic view of the entire system to enhance overall outcomes.

- **Testing and Feedback Loops:** Continuous validation testing ensures that the designed solutions remain aligned with real-world needs, leading to more effective and user-friendly services.

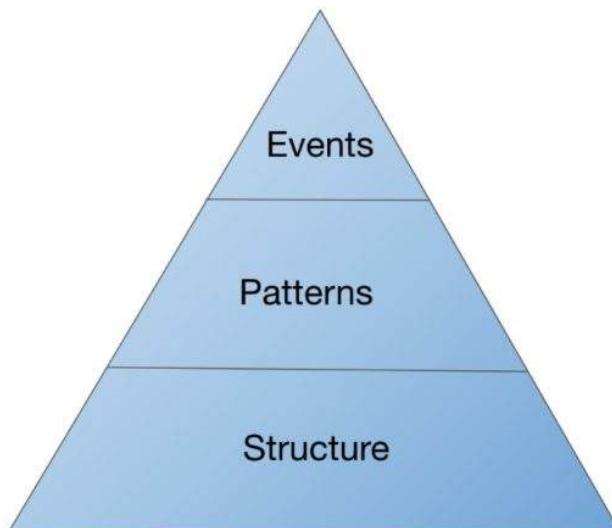
Source: [When it comes to solving complex problems, collaborating isn't enough](#)

When addressing **complex, systemic problems**, simply collaborating isn't enough. Effective solutions require stakeholders not only to work together but also to **think systemically**—to understand the interconnectedness of different elements within a system and how they influence one another.

The Parable of the Blind Men and the Elephant

The **Parable of the Blind Men and the Elephant** is a key metaphor in systems thinking. It illustrates that when stakeholders focus only on their part of the system (like the blind men who each touch a different part of the elephant), they miss the larger picture. To optimize the performance of the entire system, stakeholders must shift from trying to optimize their individual elements to improving **relationships among the system's parts**. This requires thinking holistically, as each element of a system impacts others, and understanding these relationships is crucial to identifying effective solutions.

Iceberg Method



The **Iceberg Method** distinguishes between different levels of a system:

- **Events:** What has happened. These are the observable outcomes of a problem.

- **Patterns of behavior:** What has been happening over time. These patterns provide insights into recurring issues.
- **System Structure:** The hidden causes at the root of problems. These are the deeper, often invisible structures that shape patterns and behaviors. Addressing systemic issues requires identifying and redesigning the underlying structures that drive these patterns.

Understanding **system structure** is critical for tackling chronic, complex problems. Often, it's these deep-rooted, interdependent relationships that perpetuate issues, and unless addressed, they will continue to cause harm, even if the events and behaviors seem to change on the surface.

Creative Tension for Change

Creative tension is a concept that drives change by highlighting the gap between where stakeholders currently are (the "current reality") and where they want to be (the "goal or vision"). By clearly defining this discrepancy, energy is mobilized for change, motivating stakeholders to adjust their actions toward closing the gap and achieving the desired future state.

Design-Thinking – Stages, Dimensions & Resources

What is Design-Thinking?

A method that provides a solution-based approach to solving problems. Specifically, it serves to understand the human needs involved, reframe the problem in human-centric ways, create numerous ideas brainstorming sessions and adopt a hands-on approach to prototyping and testing. The ultimate goal is to get as deep an understanding of the product and its users as possible.

5 Stages of Design-Thinking (A Non-Linear Process)

1. Empathize – conduct user-centric research.

- Gain an empathetic understanding of the problem you are trying to solve.
- Consult experts to find out more about the area of concern.
- Conduct observations to engage and empathize with your users within users' physical environment to gain a deeper, personal understanding of the issues involved, as well as their experiences and motivations.

2. Define – organize info gathered and define the problem in a human-centered way.

- Pitch the problem statement from your perception of the users' needs instead of defining the problem as the wish or need of the company.
- This stage enables the collection of great ideas to establish features, functions, and other elements to solve the problem at hand.

3. Ideate – challenge assumptions and identify innovative ideas/solutions.

- Look at the problem from different perspectives and ideate innovative solutions.
- Hundreds of ideation techniques can be used, including:
 - [Brainwrite](#)
 - [Worst Possible Idea](#)
 - [SCAMPER](#)

- Pick diverse ideation techniques towards the end of this stage to help investigate and test ideas, and choose the best ones to move forward with.

4. Prototype – start to create solutions.

- Produce a number of inexpensive, scaled-down versions of the product to investigate key solutions generated in the ideation phase.
 - Prototypes can be shared and tested within the team itself, in other departments, or on a small group of people outside of the design team.
- Aim of this experimental phase is to: identify the best possible solution for each of the problems identified in the first three stages.
- By the end of this stage, we will have a better idea of the product's limitations and the problems it faces. They'll also have a clearer view of how real users would behave, think, and feel when they interact with the end product.

5. Test – try the complete product using the best solutions.

- The results are used to redefine one or more further problems.

- This increased level of understanding may help you investigate the conditions of use and how people think, behave and feel towards the product.
- It may even lead you to loop back to a previous stage in the design-thinking process.

Three Dimensions of Inclusive Design

- ❖ **Recognize diversity and uniqueness** – most individuals stray from the average in some facet of their needs or goals. This means that a mass solution does not work well.
- ❖ **Inclusive processes and tools** – inclusive design teams should be as diverse as possible and include individuals who have lived experience of the users the designs are intended for. This also respects the edict: “**nothing about us without us**” without relegating people with disabilities to the role of subjects of research or token participants in design exercises.
- ❖ **Broader beneficial impact** – it is the responsibility of inclusive designers to be aware of the context and broader impact of any design and strive to effect a beneficial impact beyond the intended beneficiary of the design.

For the IDRC's **Guide to Inclusive Design**, click [here](#).

Important Considerations:

- Knowledge acquired in latter stages of the process can inform repeats of earlier stages
- Design-thinking is an iterative, non-linear process which focuses on a collaboration between designers + users. It brings innovative solutions to life based on how real users think, behave, and feel.

Resources		
Type	Title, Organization	Notes / Utility
Process Guide	<i>An Introduction to Design Thinking</i> PROCESS GUIDE by the Institute of Design at Stanford Univ.	<ul style="list-style-type: none"> ❖ Explains the WHAT, WHY, and HOW, and transitions between, each of the five stages ❖ Includes a handbook of personas
Inclusive Design Guide	<i>The Inclusive Design Guide</i> by the Inclusive Design Research Centre (IDRC)	<ul style="list-style-type: none"> ❖ Insights on Disability as Mismatch, Diverse Participation & Perspectives, One-Size-Fits-One, Integrated Solutions, etc. ❖ Practices on Design for Uncertainty, Facilitate Inclusively, Co-Design,

		<p>Accessibility, etc.</p> <ul style="list-style-type: none"> ❖ Tools on Accessible Design / Comms / Development Tools, Prototyping, Mindmaps, Personas, UX, etc. ❖ Activities on Cause & Effect, Functional Mashup, Inclusive Design Mapping, etc.
Inclusive Learning Design Handbook	<p><i>The FLOE Inclusive Learning Design Handbook (ILDH) is a free Open Educational Resource (OER)</i></p>	<ul style="list-style-type: none"> ❖ Designed to assist in creating adaptable and personalizable educational resources that can accommodate a diversity of learning preferences and individual needs. <p>Handbook is structured in four sections:</p> <ul style="list-style-type: none"> ❖ About: intro to handbook + describes who can benefit from using it ❖ Perspectives: contains articles that discuss the main issues related to education + inclusive learning ❖ Approaches: provides good practices, guidelines, and resources for creating inclusive content + learning experiences ❖ Techniques: contains practical tools and techniques to produce inclusive content and assess its accessibility.
Book	<p>Design Justice: Community-led practices to build the worlds we need by Sacha Costanza-Chock, Ph.D. (she/they/ella/elle), a researcher + designer who supports community-led processes that build shared power, dismantle the matrix of domination, and advance ecological survival.</p>	<ul style="list-style-type: none"> ❖ Discriminatory Design as the normalization of racial hierarchies within the underlying design of sociotechnical systems (paraphrasing Ruha Benjamin³⁵) <ul style="list-style-type: none"> ➢ Often operates through standardization across fields, e.g., transportation, health, housing, clothing, etc. ➢ May be experienced as microaggressions on- and off-line, reproducing the matrix of domination. ❖ Inclusive Design considers the full range of human diversity with respect to ability, language, culture, gender, age, and other forms of human difference (IDRC). <ul style="list-style-type: none"> ➢ The IDRC sees disability as socially-constructed and relational, rather than a binary property. Disability: “mismatch between the

		<p>needs of the individual and the design of the product, system, or service. With this framing, disability can be experienced by anyone excluded by the design" (p. 53)</p> <p>➤ "Accessibility is therefore the ability of the design or system to match the requirements of the individual" (p. 53)</p> <p>❖ Design Justice seeks more than freedom from bias. Feminist + anti-racist currents within STEM studies aim to unpack the ways that intersecting forms of oppression are constantly hard-coded into designed objects, forms, and systems (p. 48).</p> <p>➤ Develop intersectional user stories, testing approaches, training data, benchmarks, standards, validation processes, and impact assessments, among many other tools. (p. 54)</p> <p>❖ XX</p>
Book	<i>Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability</i> by Steve Krug.	<p>❖ First published in 2000, this book is a guide to help designers and developers understand the principles of intuitive navigation and information design.</p> <p>❖ Buy here, find first 50 pp. online here,</p>
Course	<p>The Interaction Design Foundation</p> <p>Courses:</p> <ol style="list-style-type: none"> 1. Design Thinking: The Ultimate Guide (28h) 2. User Research – Methods and Best Practices (32h) <p>Masterclasses:</p>	 <p>Interaction Design Foundation interaction-design.org</p>

	<p>3. <u>Design Sprints</u> in 2025: What you need to know</p> <p>4. <u>How to Use AI Ethically in UX Research</u>: A practical guide</p>																												
	<p><i>Differences between managerial thinking and design-thinking</i></p>	<p>The key differences between managerial thinking and design thinking</p> <table border="1" data-bbox="829 656 1393 1248"> <thead> <tr> <th>Dimension</th> <th>Managerial Thinking</th> <th>Design Thinking</th> </tr> </thead> <tbody> <tr> <td>Purpose</td> <td>Shareholder first</td> <td>User first</td> </tr> <tr> <td>Collaboration</td> <td>Managing departments</td> <td>Problem-solving through cross-functional teams</td> </tr> <tr> <td>Work Style</td> <td>Formal, hierarchical</td> <td>Flexible, informal, flat</td> </tr> <tr> <td>Thought Process</td> <td>Deductive, inductive</td> <td>Deductive, inductive, abductive</td> </tr> <tr> <td>Knowledge Generation</td> <td>Numbers (quantitative)</td> <td>Stories (qualitative)</td> </tr> <tr> <td>Constraints</td> <td>Limit options</td> <td>Create opportunities, stimulate creativity</td> </tr> <tr> <td>Failure</td> <td>To be avoided</td> <td>To be welcomed as a chance to learn</td> </tr> <tr> <td>Workflow</td> <td>Exploitation of existing value</td> <td>Exploration of future value</td> </tr> </tbody> </table> <p>Source: "Can Design Thinking Succeed in Your Organization?"</p> <p style="text-align: right;">MIT SMR</p>	Dimension	Managerial Thinking	Design Thinking	Purpose	Shareholder first	User first	Collaboration	Managing departments	Problem-solving through cross-functional teams	Work Style	Formal, hierarchical	Flexible, informal, flat	Thought Process	Deductive, inductive	Deductive, inductive, abductive	Knowledge Generation	Numbers (quantitative)	Stories (qualitative)	Constraints	Limit options	Create opportunities, stimulate creativity	Failure	To be avoided	To be welcomed as a chance to learn	Workflow	Exploitation of existing value	Exploration of future value
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How to Apply Design-Thinking in Practice

Module 3 of Design-Thinking Course at The Hong Kong Polytechnic University

(Audited this course through EdX)

Contextual Inquiry – uses observation and semi-structured interviews to collect info from participants.

- Aims to obtain info about participants and corresponding context.
- Needs to be conducted in a natural setting in their actual environments where they carry out their activities.
 - I.e., users at the moment when they're consuming resources / products | operators in their workplace
- Since participants are having interview in a familiar environment, they will be able to answer questions in a more comfortable setting
- Participants must take an active role during the contextual inquiry
- Info collected may vary: could be working processes of a skill worker or a user as they are using a service
- Four principles key to success of contextual inquiry:
 - Context
 - Partnership: active participation
 - Interpretation
 - Focus
- **Benefits of Contextual Interview –**
 - Info is highly reliable because the study is conducted familiar to interviewees, providing answers without trying to guess the expectations of interviewer
 - Participants can feel about feelings while working
 - Interviewer can verify info provided by interviewees
 - Info is highly detailed
 - Interview conducted in environment, participants will be inspired to give more insight + details
 - Allows participants to lead the interview vs. straightforward Q&A format

Affinity Mapping (KJ Method) –

- Used to organize large amounts of data or ideas into groups with common themes and relationships.
 - Complex problems always generate large amounts of data + ideas that need to be dealt with
 - They may come from a brainstorming sessions generating creative solutions to a problem
 - Break away from entrenched thinking
- Uses a systematic method to identify the natural relationships between points of data and categorize them according to the meaning embedded within them.
 - System encourages people to use their intuition and break away from entrenched thinking to identify the relationships between these data points and ideas.

- How –
 - Big table + post-it notes
 - Gather participants
 - Write each idea collected from brainstorming session with marker pens on separate sticky notes → spread them randomly
 - Ask participants to sort these ideas into different groups
 - No note is fixed in any group → participants can move wherever they want → if there's disagreement → make double of a sticky note
 - Don't discuss what they're doing with each other
 - Don't decide on headings
 - Once sorted, discuss what they've done → make headings collectively + groups and sub-groups (if needed)
- Principles –
 - Encourage participants to use their intuition and make gut decisions in their initial grouping process
 - Don't talk to make sure their decisions aren't influenced by others
 - Prevents opinion leader from dominating the decision in the grouping of ideas

Analogous Inspiration

- Analogies can offer a fresh perspective and provide inspiration for situations in which we get stuck.
- Analogous inspiration is a method that helps us get inspiration by looking for solutions in different contexts.
 - By exploring different products, organizations and industries with very different contexts from the original context of the problem, we undergo an **immersive experience** that gives us a new understanding of the challenge(s).
- Example: healthcare can learn a lot from hospitality industry (they both serve the needs of customers)
- Identify settings that have distinct activities, behaviours, and emotions which are similar to those of the problems you've encountered
- Identify the setting –
 - Gather a team of people + list activities, behaviours, and emotions that you'll study
 - Create additional columns – new application
 - Let team brainstorm and vote on site of observation
 - Implement visit + play close attention to things around you

Brainstorming coined by Alex Osborn in his 1953 book.

- In the divergent process of the ideation stage, brainstorming is the most popular method employed to quickly generate abundant ideas.
- The principle behind the idea is that the more ideas generated, the crazier the ideas proposed, the higher chance there is to find good and creative ones
- Benefits –

- Divergent Phrase to generate ideas
 - Ideas don't need to be new, creative, etc.
 - Eliminates fear of criticism
 - Motivates participants to contribute ideas freely
 - Helps to address cognitive miserliness → in psychology, the human mind is considered to be a cognitive miser. People tend to solve problems with little effort = problems aren't often solved with creative / crazy / comprehensive solutions
 - Helps to address risk → live in a world only appreciate right answers instead of taking risks in idea generation process
- Convergent Phrase to identify ideas

Cognitive Walkthrough

- Tool frequently used to evaluate the design of a product or system by asking people to work through a set of representative tasks + to ask Q's about the task during the process
- Purpose: provide quick, early feedback about the usability of a design. Also aims to allow an inexpensive test to be conducted during any phase of the development process
 - Aim: Evaluate the answers' suitability
- By asking people to walk through a test and allowing them to ask questions improves –
 - Usability
 - Comprehensibility
 - Learnability
 - Intuitiveness
- Benefits –
 - Quick, as it does not involve real users
 - Inexpensive

Systems Change

Source: [Planning for systems change: Reflections from Co-Impact's Design Phase Workshop - Co-Impact](#)

1. Global Solidarity & Intersectional Barriers

Systems change must address deeply entrenched inequalities, often made visible in moments of crisis.

- **Recognizing structural inequities in mobility and participation**
 - Immigration barriers faced by participants at Co-Impact's workshop illustrate how systemic discrimination is embedded in global governance.
 - Solutions should consider intersectional factors—race, gender, nationality—when designing inclusive systems.
- **The power of collective resilience**
 - Solidarity is not just moral support; it is a strategic tool for dismantling unjust systems.
 - Effective collaboration requires acknowledging diverse lived experiences while working toward common goals.
- **Cross-cultural and multilingual engagement in systems change**
 - Despite differences, participants formed connections through shared purpose—showing that systems transformation benefits from plurality, not homogeneity.
 - Future interventions should prioritize multilingual accessibility and culturally responsive methodologies.

2. From Scaling Up to Working at Scale

Transformative change is not about simply expanding projects—it's about shifting entire paradigms.

- **Beyond growth: Shifting focus from project expansion to systemic reach**
 - Scaling up often implies replication, but systems change requires rethinking the structures that create persistent barriers.
 - Who benefits from the current system? Who holds decision-making power? Understanding this is essential for lasting change.
- **Reimagining service delivery for structural transformation**
 - Instead of designing for communities, solutions should be designed with and by communities to ensure long-term viability.
 - What partnerships—public, private, grassroots—are necessary to sustain and scale transformative impact?
- **Leveraging political economy for impact**

- Policy and power dynamics influence which solutions gain traction—systems change demands political fluency.
- Key questions to consider:
 - What are the incentives for stakeholders to adopt or resist change?
 - Where are the opportunities to shift dominant narratives?

3. Reframing Systems Change with a Feminist & Intersectional Lens

A truly just transition means questioning neutrality and centering equity in transformation.

- **Challenging the notion of "neutral" systems**
 - Many institutions claim to be objective, yet their foundations are shaped by historical power imbalances.
 - A feminist, decolonial approach reframes governance and economic structures through the lens of equity and justice.
- **Engaging with state actors without reinforcing oppressive structures**
 - While activism often positions governments as adversaries, transformation requires strategic engagement.
 - How can changemakers influence bureaucracies without legitimizing harmful policies?
- **Emotional labour and the cost of advocacy**
 - Many activists face personal risk when confronting systemic injustices—support networks and well-being strategies are crucial.
 - Systems change cannot be solely technocratic; emotional and social dimensions matter.

Source: [Climate Change Isn't Everything: Liberating Climate Politics from Alarmism | Polity](#)

The Risks of Climate Reductionism in Systems Thinking

Climate action must be integrated into holistic political and economic systems, not isolated as an existential crisis.

- **The problem with singularity: When one issue dominates all discourse**
 - Climate reductionism frames the future through climate science alone, neglecting the complex interplay of social, economic, and political systems.
 - Net-zero policies, while critical, should not overshadow contextual realities such as economic inequality and political instability.
- **Avoiding a one-size-fits-all climate approach**
 - Aggressive decarbonization mandates often place disproportionate burdens on developing nations.
 - Strategies should be adaptable to diverse regional and economic needs rather than universally prescribed.
- **Reclaiming diverse climate narratives**

- Climate policies should not just be about carbon metrics; they should center human rights, social well-being, and economic justice.
- What alternative futures exist beyond dominant climate narratives?

Source: [The Illiberal Logic of Mission-Directed Governance](#)

Grand missions can be transformative but may also suppress dissent and alternative pathways.

- **The dangers of crisis-driven governance**
 - Framing issues as emergencies can lead to centralized, top-down decision-making that marginalizes diverse perspectives.
 - Climate crisis rhetoric often justifies extreme measures, from production quotas to carbon rationing, without democratic deliberation.
- **Navigating the tension between ambition and inclusivity**
 - Mission-driven frameworks like the Green New Deal push for systemic transformation but may reject incremental or context-sensitive solutions as inadequate.
 - How can bold policy goals remain flexible enough to incorporate diverse viewpoints?
- **Balancing systemic urgency with democratic process**
 - Technocratic authority should not override participatory governance—resistance to dominant climate policies should be treated as discourse, not obstruction.
 - What mechanisms ensure that systems change remains inclusive, adaptable, and democratic?

Guiding Questions for Systems Change Design

1. Who benefits from the current system, and who is excluded?
2. What power structures shape decision-making in this space?
3. How can solutions be designed with, not for, affected communities?
4. Where are the opportunities to shift dominant narratives and policies?
5. How do we prevent urgency from undermining democratic pluralism?

Equity in Citizen Engagement

Key Insights for Designing Inclusive Citizen Participation Systems

Source: [How equity in citizen participation can improve the health of cities](#)

1. Importance of Citizen Engagement in Health Policy and Services

Equity in citizen participation is foundational to improving urban health systems and achieving meaningful transformation.

- **Amplifying marginalized voices for policy influence**
 - Citizen engagement, especially from vulnerable populations, is crucial in shaping policies, budgets, and services that meet the real needs of communities.
 - Without active citizen feedback, engagement systems risk fostering frustration and disengagement, which ultimately undermines the democratic process.
 - Prioritize platforms where groups disempowered by systemic inequities can easily share feedback, ensuring their voices influence policy development.
- **Ownership is key for sustainable transformation**
 - Dr. Renu Khosla emphasizes that local involvement in designing solutions is vital—community ownership of services directly impacts their success.
 - Solutions designed with community input are more likely to address the real problems people face, as opposed to top-down interventions.
 - Develop systems where citizens not only provide feedback but also actively shape service delivery, fostering a sense of ownership and responsibility.

2. Strategies for Increasing Citizen Participation

To drive equity in urban health, the systems must evolve to engage citizens meaningfully and consistently.

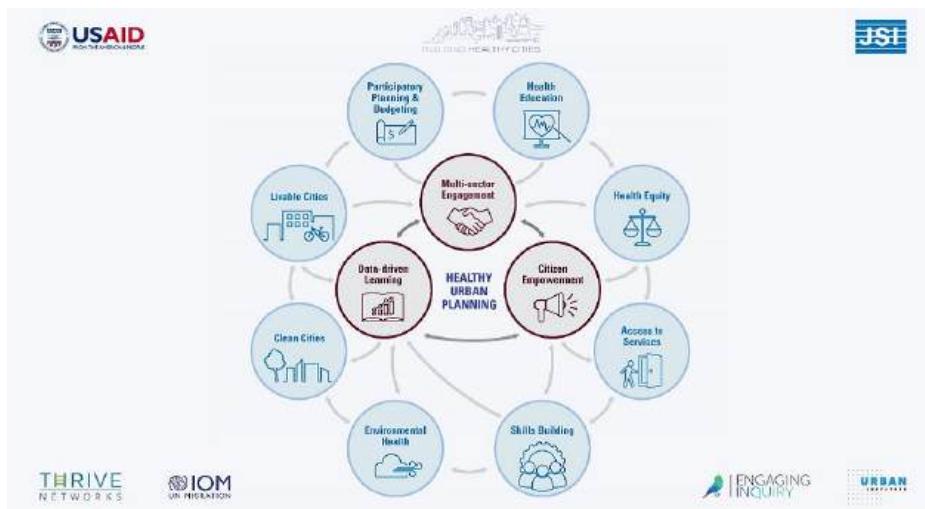
- **Sentinel-style citizen reporting**
 - Using community-driven reports that follow the journey of citizens through city services highlights systemic issues and areas of vulnerability.
 - Develop tools that empower citizens to report their experiences over time, allowing for data-driven advocacy on service improvement.
- **Participatory urban systems mapping**
 - Mapping how different city services overlap can reveal structural inequities, such as unequal access to health or educational resources.
 - Facilitate community-led mapping of local systems to identify overlaps and gaps in service delivery, informing more equitable urban planning.
- **Identifying and addressing reporting system bottlenecks**
 - Existing citizen reporting systems may have built-in obstacles that prevent equitable access and engagement.

- Assess current citizen engagement mechanisms to identify and remove barriers, making reporting accessible for all citizens, especially the most vulnerable.
- **Training vulnerable citizens in data collection and advocacy**
 - Empowering citizens with the tools to define issues, collect data, and advocate for their needs ensures that marginalized groups can effectively influence local governance.
 - Establish community training programs that equip citizens with the necessary skills for participatory decision-making.

3. Addressing Inequality and Complex Urban Challenges

Urban inequality manifests in multiple forms—addressing these requires deep understanding and a systemic approach to engagement.

- **Geographic and social inequalities in access to resources**
 - Urban inequality often shows up in access to key resources like healthcare, education, and healthy living conditions. For example, informal settlements that harden into permanent neighborhoods often face compounded barriers.
 - Urban policies must include targeted interventions for under-served areas, ensuring equitable access to essential services for all communities.
- **Lack of awareness exacerbates engagement challenges**
 - Many citizens, especially those in vulnerable situations, lack awareness of available services or their rights within the urban system.
 - Raise awareness through community outreach and educational campaigns to ensure citizens know how to access services and participate in decision-making processes.



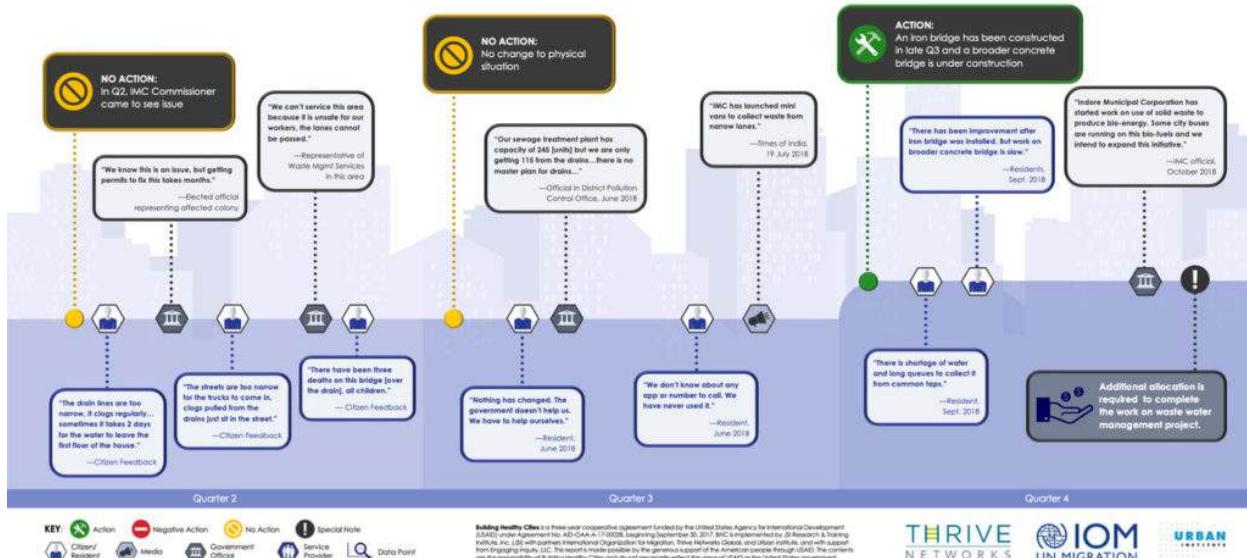
From [Building Healthy Cities, India - JSI](#)



Indore Journey Map #1 – the Forgotten Bridge

YEAR 1 A major concern found during the 2018 baseline BHC Health Needs Assessment was that in some informal settlements there is poor drainage and infrastructure for storm and waste water. BHC has followed this issue in one neighborhood over time, but outside evidence suggest that open drains were a pervasive problem across informal Indore settlements (IMC, UN-Habitat, and WaterAid 2006). The neighborhood BHC is following is primarily informal housing stock within the Smart City area-based development zone, with a stable

population of primarily working-class residents. Poor drainage is compounded by the build up of trash in the drains, but when informal housing is built too close together it means the roads and lanes are too narrow for trash vans to automate clean-up of solid or water waste. Unsafe infrastructure built around the drains—for example, a rickety bridge over one open drain (see picture at right)—poses a risk of waterborne diseases and injuries in this neighborhood.



Indore Journey Map Year 1: Forgotten Bridge - 2018 - BHC (Photos by Neeraj Mishra and Monica Biradavolu)

Source: [How co-design can eliminate bias in evidence-based policymaking](#)

Inclusive policymaking must account for diverse forms of knowledge, particularly from Indigenous and communities disempowered by systemic inequities.

- **Evidence-based policy needs to be inclusive of diverse perspectives**
 - Traditional evidence-based policymaking often relies on Western norms and frameworks, which can marginalize minority and Indigenous groups.
 - Redefine "evidence" to include Indigenous knowledge systems, lived experiences, and community insights. This can be achieved by integrating the "Voice of Intent," "Voice of Experience," and indigenous perspectives into policy design.
- **Co-design as a tool for eliminating bias**
 - The co-design process allows citizens to have an active role in shaping policies that affect them. This helps mitigate biases inherent in top-down policymaking.
 - Adopt a co-design approach where participants are not expected to conform to a pre-existing methodology but are empowered to shape the design process based on their own lived experiences and values.

- **Whakamanawa: Empowering Indigenous voices in policy design**
 - Māori principles like whakamanawa (creating a space for empowerment) emphasize the importance of supporting marginalized communities to participate meaningfully in decision-making.
 - Ensure that all design processes are rooted in empowerment, by creating spaces where they can share their knowledge and experiences.

Designing Systems with True Equity at the Core

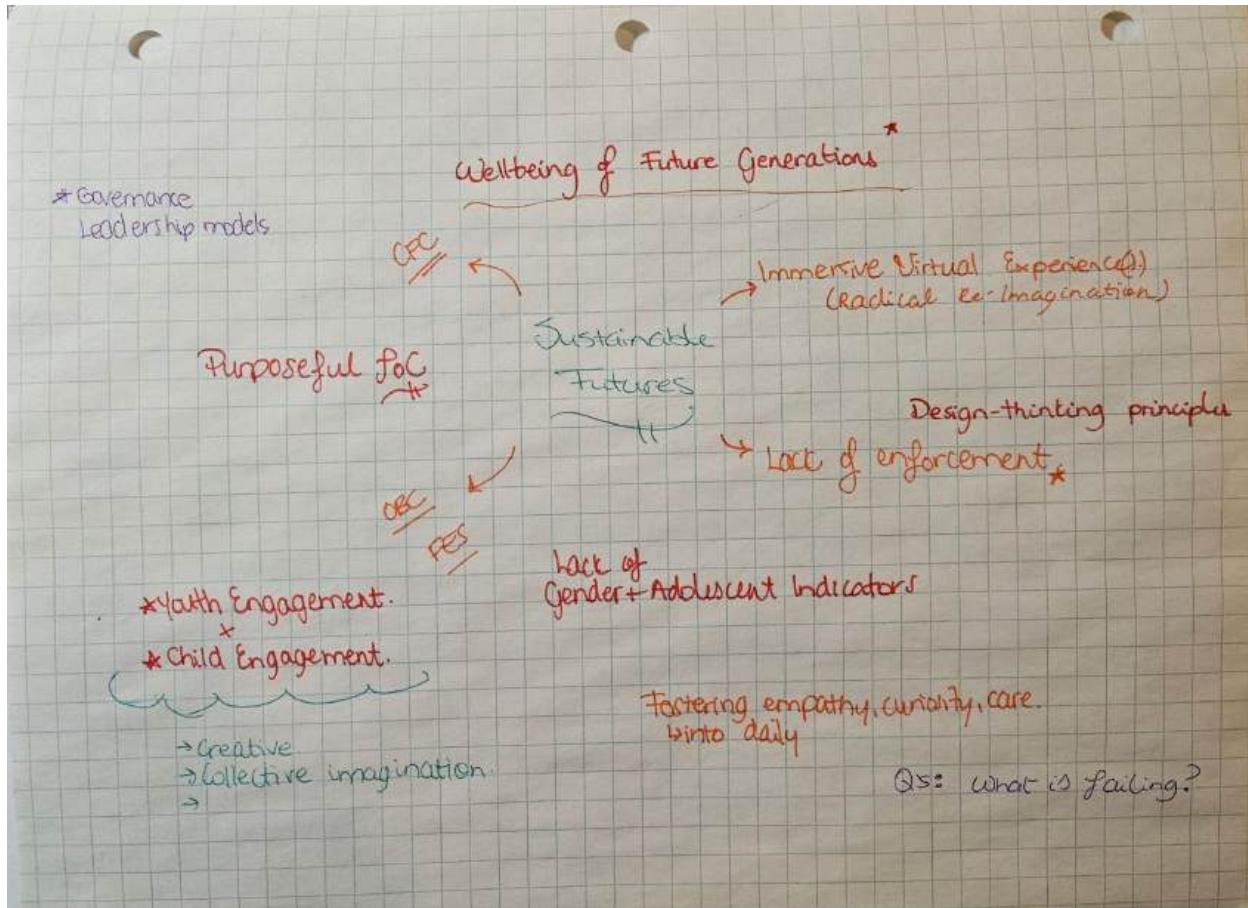
Effective policies must be inclusive, accessible, and responsive to the needs of all citizens, especially those who are made marginal.

- **Challenge bias in public service design**
 - Evidence-based policymaking often excludes Indigenous worldviews and experiences, reflecting a form of neo-colonization in policy frameworks.
 - Incorporate diverse forms of knowledge into policy design, creating inclusive systems that honour and amplify voices of equity-seeking groups.
- **Genuine participation is necessary for true equity**
 - To genuinely mitigate bias, the co-design process must be inclusive and participatory from the start, with vulnerable populations at the center of design and implementation.
 - Foster an inclusive design environment where all stakeholders have equal power and opportunity to influence outcomes.

Key Principles for Equitable Citizen Engagement

1. **Equity starts with genuine inclusion** – Ensure communities disempowered by systemic inequities are empowered to shape policies and services.
2. **Design systems that address real-world complexities** – Understand the geographic, social, and systemic barriers that prevent meaningful participation.
3. **Co-design must be more than a buzzword** – It should reflect real collaboration and power-sharing with communities.
4. **Broaden the definition of evidence** – Integrate diverse knowledge systems, including Indigenous and lived experiences, to create truly inclusive policies.
5. **Remove barriers to participation** – Engage with vulnerable citizens through accessible, transparent, and empowering channels.

Concept Ideation



Persona Research & Development

Persona I: Malik, Urban Young Male (2025)

Demographic Information

Name: Malik

Age: 24

Gender Identity: Male

Location: London, UK

Profession: Unemployed

Housing: Unhoused

Religion: Muslim

Political Affiliation: Central Left

Year-in-Context: 2025

Key Information

- **48% of young people from an ethnic minority background face prejudice and discrimination** as they enter work in the UK, revealed a study carried out with 3,250 young people (YFF 2024).
- A Working Change study revealed that **30% of hiring managers would automatically exclude a candidate if they disclosed a conviction**, regardless of how serious the offence was. (Working Change 2022, p. 4)
- There are an intersectionality of factors that hinder **equal access to employment** and compound challenges for **young Londoners**, including, but not limited to, ethnicity, disability, and health status.
- **Youth unemployment in London** is consistently higher than pre-pandemic levels and rising. For the three months ending in July 2023, unemployment for youth aged 16-24 increased from 14.1% to 15.5%, rising higher than pre-pandemic levels. (LC 2024, p. 7)

UN SDGs

- **#1: No Poverty**
- **#3: Good Health & Wellbeing**
- **#4: Quality Education**
- **#8: Decent Work & Economic Growth**
- **#10: Reduced Inequalities**
- **#11: Sustainable Cities & Communities**
- **#16: Peace, Justice & Strong Institutions**

Pain Points

There are an intersectionality of factors that hinder **equal access to employment** and compound challenges for young Londoners, including, but not limited to, ethnicity, disability, and health status.

- According to Statista (2025), the **main barriers facing young black people** going into employment are:
 1. Bias or prejudice at the recruitment stage (SDG 8, 10)
 2. Prejudice of employers (SDG 10)
 3. Lack of diversity in leadership (SDG 10, 11, 16)
 4. Workplaces not being diverse (SDG 8, 10, 11, 16)
 5. Lack of opportunities / connections (SDG 1, 3, 4, 8, 10)
 6. Inability to undertake an unpaid internship (SDG 1, 8, 10)
 7. Lack of qualifications (SDG 1, 4, 10)
- **48% of young people from an ethnic minority background face prejudice and discrimination** as they enter work in the UK, revealed a study carried out with 3,250 young people (YFF 2024).
 - 66% have overheard a co-worker or supervisor say racist slurs or make racist jokes, while 20% have also been referred to in a derogatory manner by colleagues.
 - ONS Study reveals that there are 851,000 people aged 16-24 who are not in education, employment, or training (12%).
 - 30% of respondents who are not in education, employment, or training believe that prejudice or discrimination is the single biggest barrier preventing them from entering the workforce.
- **31% of employees have experienced some form of microaggression or discrimination** from their manager in the past six months. Common negative behaviours included comments relating to people's age, working patterns, personal life, and physical or mental health, as well as mispronouncing people's names, according to a survey of 2,000 employees conducted for Mental Health First Aid England (MHFA England 2024).
 - Black or black British employees (72%) were most likely to report discriminatory or exclusionary acts from their managers in the past six months, compared to 57% of Asian or Asian British workers, and 47% of white British employees.
 - Younger workers were more likely to say they experienced such behaviours—66% of 18 to 34-year-olds compared with 38% of 45 to 64-year-olds.

- **Youth unemployment in London** is consistently higher than pre-pandemic levels and rising. For the three months ending in July 2023, unemployment for youth aged 16-24 increased from 14.1% to 15.5%, rising higher than pre-pandemic levels. (LC 2024, p. 7)
- **Young black Londoners and individuals with disabilities face disproportionately higher rates of unemployment** compared to their counterparts. In London, youth ethnic minority employment rate is 40.4% compared to 49.9% for their white counterparts. Similarly, the London youth ethnic minority **unemployment rate is 15.8% compared to 12.8%** for their white counterparts. (LC 2024, p. 7)
- While the London government implemented the London Economic Framework and Building a Fairer City to address inequalities, the **fragmented nature of employment services provision** poses significant challenges to providing effective support. (LC 2024)
- A 2021 EY survey with 1,000 young black professionals revealed that, although 92% of young black folks have firm career goals, only 13% believe their ethnicity does not present any barrier to workforce entry, and 26% report that, once in work, their **ethnicity represents the main barrier to promotion**.

Additional Challenges to Finding Employment for Ex-Offenders:

- Working Change commissioned NfPResearch to carry out research with 1,000 professionals in a position to hire staff as part of their role/responsibility, 42% of whom were sole recruitment decision-makers and either a head of department or CEO. (Working Change 2022)
 - The study revealed that **30% of hiring managers would automatically exclude a candidate if they disclosed a conviction**, regardless of how serious the offence was. (Working Change 2022, p. 4)
 - Of these (270/1,000 employers), key concerns were the organization's liability insurance, the nature of the offence(s), the risk of re-offence, and going against organizational policy (Ibid).
 - People with convictions have the **lowest interview to hire conversion rate**, out of a range of groups generally considered to be disadvantaged in the labour market (Ibid).
 - That said, the Reforms to the Rehabilitation of Offenders Act 1974 came into force in October 2023. These changes reduce the time people with criminal convictions are legally required to declare them to most potential employers after serving their sentence (Nacro 2023, UK Gov 2023).

Affordable Housing & Good Health & Wellbeing

- According to ONS Labour Force Survey Figures, 25.6% of young people aged 16-24 who were economically inactive in Q4 of 2022 cited long-term or temporary sickness as the reason for inactivity. (LC 2024, p. 10)

Solutions

- **Engage black youth directly to empower them** to give voice to their experiences and aspirations.
- **Improve the quality of, and access to, career advice for young people from disadvantaged backgrounds** (CRED 2021, p. 98):
 - Builds measures to drive change in tackling inequalities between ethnic groups in higher education
- **Encourage employers to include people with convictions:**
 - Tax relief or other financial incentives for employers who take on ex-offenders (WC 2022, p. 7)
 - Relaxation of legislation around employing ex-offenders
 - Conducting an internal review of existing recruitment policies with aim of making them more inclusive
 - Specific training for staff involved in managing / supporting new employees who are ex-offenders
 - Guidance based on the experiences of organizations already successfully recruiting ex-offenders

Call to Action

- **Malik represents the youth who fall through the cracks of society. His story demands urgent attention to the lack of affordable housing, accessible healthcare, and skills development opportunities for young people facing economic hardship. How can we better integrate youth disempowered by systemic inequities into the workforce and create inclusive policies that ensure their basic needs are met?**
- **systematically unpick the policies, processes, procedures, norms and attitudes operating within and across institutions that systematically disadvantage people from Black, Asian and minority ethnic backgrounds.**

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Persona II: Amal, Child on the Move (2030)

Demographic Information

Name: Amal – “hope” in Arabic

Age: 12

Gender Identity: Female

Location: Ein el-Hilweh Camp, south of Saida in Lebanon

Profession: Child labour

Housing: Lebanon's largest refugee camp

Religion: Eastern Orthodox

Year-in-Context: 2030

Key Information

- Some of the worst human rights abuses affecting children and causing them to seek refuge occur in **situations of armed conflict, internal strife, or civil disturbance**.
- **More than half of the world's 14.8 million school-aged refugee children are currently missing out on formal education**, risking their future prosperity, and the attainment of global development goals. (UNHCR 2023b)
- In Ein el-Hilweh refugee camp, refugees face overcrowded living conditions, poor nutrition, an overburdened healthcare system, and cases of sexual and gender-based violence (SGBV) are rampant.
- Refugee camps and settlements in Lebanon **lack safe spaces for learning, training and recreation**, and many children can't afford the cost of transportation to schools and training centres outside of camps.
- **Calculate – by April 2024 – people worldwide displaced due to persecution, conflict, violence, HR violations, and events seriously disturbing the public order will likely exceed 120 million.** (UNHCR 2023a)
 - In 2023: 117.3 million (a rise of 8 percent compared to the end of 2022)
 - So, in 2030, there will be ... ESTIMATE
- The devastating economic crisis in Lebanon since 2020 has driven many formerly middle class Lebanese students out of private schools and into the public school system, putting further pressure on the nation's educational infrastructure.
- The **lack of resources creates a culture of competition** that causes tension among Lebanese, Palestinian and Syrian communities, exacerbating the already untenable situation.

UN SDGs

- **#1: No Poverty**

- **#2: Zero Hunger**
- **#3: Good Health & Wellbeing**
- **#4: Quality Education**
- **#6: Clean Water & Sanitation**
- **#8: Decent Work & Economic Growth**
- **#10: Reduced Inequalities**
- **#16: Peace, Justice & Strong Institutions**

Pain Points

Children are deliberately killed in military operations directed at eliminating civilians who, because of their ethnicity, nationality, religion, or simply the place where they live, are suspected of supporting an opposing armed force. Homes and crops are deliberately destroyed, and survivors subjected to acts of terror and intimidation designed to force them to flee an area.

Living in Ein el-Hilweh Camp

- Housing approximately **80,000 refugees**, Ein el-Hilweh camp is the largest refugee camp in Lebanon.
 - Elementary education is provided through a network of **8 schools**
 - There is **1 school** for secondary education, which is also frequented by students outside the camp
 - **2 primary healthcare centres** provide general and specialist consultations, mother/child healthcare, dental care, laboratory services, and basic x-ray
 - Secondary and tertiary care is provided through a network of contracted hospitals in Saida and its suburbs, including gov'l, Palestine Red Crescent Society, and private individuals.
 - The health centres handle an average of **649** medical **consultations per day**.
 - (United Nations Relief and Works Agency 2023)
- The last decades in Ein El Hilweh have been marked by inter-factional violence.
 - In Aug. 2023, approximately 20,000 people, including an estimated 12,000 children, were forced from their homes during five days of violence in Ein el-Hilweh, Lebanon's largest refugee camp, with many children showing signs of distress and anxiety (Relief Web 2023).
 - Led to damaged homes, infrastructure, and displacement of hundreds of people, including children, persons with disabilities, and elderly people.
 - **However**, violence between varying factions ceased after the outbreak of war in October.

<https://english.elpais.com/international/2024-04-23/peace-and-future-in-ein-el-hilweh-the-massive-palestinian-refugee-camp-in-lebanon-whose-fate-is-linked-to-gaza.html>
- Camp residents face many challenges, including:

- Crowded living conditions
- Unemployment
- Violence
- Disrupted education among its youth population

Solutions

The below demonstrate enablers of success with respect to each of the UN SDGs pertinent to this context.

#4 Quality Education: Enablers of Success

- Education remains the **most underfunded humanitarian sector**, making up only **2.6% of humanitarian aid**.

Type	Who	How
Policy Development (SDG 10, 16)	Individuals, communities, educational institutions	<ul style="list-style-type: none"> ● Design + implement welcoming policies ● Private sponsorship of refugees (Canada has a track record) ● College and university-based pathways to refugee resettlement
Refugee Education (SDG 4, 16)	Governments	Prioritize needed resources for refugee education in places where most refugees live (73% live in neighboring countries, e.g., Syrians in Turkey, South Sudanese in Uganda, Venezuelans in Colombia, Ukrainians in Poland, etc.)
Responsibility-Sharing (SDG 5, 10, 16)	High-income countries	The 2018 Global Compact on Refugees was a landmark agreement where high-income countries committed to contributing more funding to support refugees in neighbouring host countries through, e.g., education.
	National governments	Education funding requires bilateral and multilateral aid that focuses on long-term investments.
Build Relationships with Students & Families Through New Education Systems (SDG 4, 8, 10, 16)	Parents, teachers, communities	Parents, teachers, and communities are first responders, creating schools when refugees are denied access to local schools, creating programs to support language-learning, and creating spaces in which refugee children feel safe and a sense of belonging.

Source: Dryden-Peterson, Sarah. 2022. "[Protecting the Futures of Refugee Children.](#)"

Harvard Graduate School of Education.		
Access to Education & Learning Outcomes for Children & Youth Affected by Crises (SDG 1, 3, 4, 5, 8, 10, 16)	Civil society & partners can support host states	<ul style="list-style-type: none"> Advocating for gov'ts to include all young people in their national education plans in ways that respect the diversity of needs, abilities and capacities, and are free from all forms of discrimination To monitor and ensure that all students in school are acquiring the foundational literacy, numeracy, and socio-emotional skills essential for learning success To ensure education programs equip young people with essential work and life skills, as well as demand-driven training specifically for refugees
	States	<ul style="list-style-type: none"> Remove existing social, economic, and political barriers to primary + secondary educ Uphold existing commitments and international laws and treaties stipulating that refugees can access education on a par with host country nationals
Inclusive, Crisis-Resilient Education Systems (SDG 1, 4, 5, 10, 16)	Donors and partners can support host states by:	<ul style="list-style-type: none"> Ensuring schools are equipped with info + tools to safeguard health and wellbeing, provide adequate nutrition, water and sanitation, and protect learners from violence, sexual exploitation, and abuse Advocating for alignment of emergency education with both national programs and min standards for education set out by the Inter-agency Network for Education in Emergencies (INEE).
Scale Up & Mainstream High-Impact and Evidence-Based Interventions	Donors and partners can support host states through:	<ul style="list-style-type: none"> Support refugee teachers' inclusion in national teacher management systems Align their recruitment and deployment with national standards

<p>into National Policy & Programs (SDG 1, 2, 3, 4, 5, 6, 8, 10, 16)</p>		<ul style="list-style-type: none"> • Recognize their prior qualifications • Ensure predictable multi-year financing for their recruitment + professional development <p>Gender Equality & Inclusion → ensure refugee boys and girls have equal access to national education systems.</p> <p>Early Childhood Education → ensure refugee children have access to early childhood education where available to host country children.</p> <p>Socio-Emotional Skills and Psycho-Social Support → provide refugee kids with adequate support to develop the socio-emotional and foundational skills that will strengthen their learning</p> <p>Protection from Violence → ensure all children are educated in safe spaces + live in communities free of violence</p> <p>Education Tech & Innovation → support children and youth with evidence-based, connected education programs that use tech-enabled teaching and learning practices, contributing to improved digital skills, life skills, and learning outcomes</p>
<p>Maintain + Increase External Financing (All SDGs)</p>	<p>Donors can support host states by:</p>	<ul style="list-style-type: none"> • Ensure reliable, multi-year funding to build education systems that are agile, responsive to the onset of crises, and inclusive of refugees • Restating + meeting commitments to allocate 0.7% of gross national income to overseas aid, and devote 10% of that to education • Supporting UNHCR to innovate + find solutions to new and longstanding problems, incl. classroom equipment, infrastructure, connectivity, online resources to teacher training, apprenticeships, and internships, encouraging the private sector also play a role
	<p>States are encouraged to:</p>	<p>Meet commitments to increase overall spending for education, and targeting the</p>

		increase equitably so that it benefits the most marginalized learners, incl. refugees.
Source: UNHCR. 2023b. "Unlocking Potential: The Right to Education and Opportunity. Universal. Inclusive. Essential." UNHCR: The UN Refugee Agency.		
Responses from Refugees	Parents, main success factor for enrolment, attendance + learning	Encouraging children to study and parents of other families to send their children to school.
	Pathways to secondary + higher ed	Formal national curriculum to motivate parents to send children to primary school over informal “custom-made” competency-based frameworks
	Peaceful collaboration between refugees and host community	?
Improving Refugees' Access to Primary Education (SDG 4, 8, 10)	Community awareness campaigns	Conduct campaigns in collaboration with parents to encourage all households to send children to school
	Viable post-primary education pathways	Accessible, quality secondary education
	?	Female-only learning spaces that deliver formal curriculum, facilitating access to education for adolescent girls in contexts where their safety and/or cultural attitudes limit their access to mixed schools.
Improving the Quality of Primary Ed for Refugees (SDG 4, 8, 10)	Teachers	Introduction of a new curriculum to assign children to grades based on their learning levels → this should combine short courses with supervised classroom practice + peer-learning
	National and refugee teachers	Collaborative teams brings together different skill sets and supports their professional development
		Making national curriculum available in language that refugees are familiar with
	?	“Social cohesion”
Supporting Progress Towards	Educational Technical Expert in UNHCR country office	Can help to accelerate planning + implementation of reforms to support inclusion, though they need to engage

Inclusion (SDG 4, 8, 10)		authoritatively with gov't, donors, civil society org's, and UN agencies
	?	Key moments in national education planning + reform (e.g., new national curriculum) → used as windows of opportunity to advocate for and progress inclusion of refugees into national systems
Responsibility-Sharing Through Coordinated Donor Financing (SDG 4, 8, 10, 16)	Donors in collaboration with UNHCR, Ministries of Education, local education authorities, development partners	Donor investment in school infrastructure in refugee-hosting areas can support the inclusion of refugees in national education systems
	National, Provincial & Municipal Governments (or whichever presides over education in a given country)	Any reduction in humanitarian funding needs to be accompanied by additional int'l development funding to education to support governments to expand the capacity of their education systems to accommodate refugees.
Source: Naylor, R. 2024. " From Barriers to Breakthroughs: Progress in Primary Education for Refugees ." UNHCR.		

Call to Action

- **Amal's life is a testament to the forgotten children of conflict zones, trapped in a cycle of labour instead of learning. Her future depends on a radical shift in how we prioritize refugee rights, child protection, and education in crisis contexts. How can we ensure that no child is left behind, especially in the face of political instability and displacement?**

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Persona III: Atka, Inuk Adolescent (2035)

Demographic Information

Name: Atka

Age: 17

Gender Identity: Queer, female

Location: Rankin Inlet, Nunavut, Canada

Profession: Infrastructure Activist, Artist, Storyteller

Housing: Modular home on stilts at least 1m above the ground (to prevent permafrost) *read challenges with melting permafrost below

Religion: Spiritual

Year-in-Context: 2035

Key Information

- **Nunavut's infrastructure deficit** has dire effects on the economic health and institutional capacities within the territory, including **food insecurity, overcrowded housing, and limited economic opportunity.**
 - Nunavut is experiencing what is called Isostatic Rebound – during the last ice age 11,500 years ago, Nunavut was covered in glaciers that soared kilometres high. This enormous weight pushed the land down. With melting glaciers, the land is now rebounding back and rising to its former height, which could destabilize critical infrastructure, housing, and stifle efforts to build alternative transportation routes.
- Nunavut is facing a housing crisis that is in dire need of support –
 - **38% of Nunavummiut live in overcrowded conditions** (gov't of Nunavut + RCMP 2017)
 - **41% of Nunavut housing is classified as in need of major repair.**
- Nunavut lacks critical healthcare services, leading to the **highest rates of suicide and self-harm, alcoholism, drug abuse, and domestic violence per capita** in Canada.
 - Death (workplace death, suicide, etc.)
 - **Young men in Nunavut aged 20-24 die at six times the rate of Canadians of the same age cohort** (Scott 2020), referring to workers killed in the workplace.

UN SDGs

- **#3: Good Health & Wellbeing**
- **#4: Quality Education**
- **#6: Clean Water & Sanitation**
- **#7: Affordable & Clean Energy**

- #9: Industry, Innovation & Infrastructure
- #10: Reduced Inequalities
- #11: Sustainable Cities & Communities
- #13: Climate Action

Pain Points

#3: Good Health & Wellbeing

#4: Quality Education

#9: Industry, Innovation & Infrastructure

#10: Reduced Inequalities

#11: Sustainable Cities & Communities

- Nunavut's infrastructure deficit has dire effects on the economic health and institutional capacities within the territory, including food insecurity, overcrowded housing, and limited economic opportunity.
 - Critical housing shortages exacerbate the tuberculosis epidemic + other health outcomes.
 - Inuit are often forced to leave the territory to access critical services: healthcare for childbirth, getting treatment for serious/chronic illness
 - Limited opportunities to pursue post-secondary education or training across Nunavut
 - Lack of Inuktitut-based public education means the number of fluent professionals who can work and provide service in their mother tongue remains limited.
 - For Nunavut Inuit with disabilities, a lack of locally available services can mean a heartbreaking choice to leave their community behind altogether.
 - For those who enter the federal corrections system, a lack of facilities in the territory means serving a custodial sentence far from home with little connections to family or community.
 - Lack of space to store or prepare country food undermines food sovereignty.
 - Many communities lack adequate spaces for the transmission of cultural knowledge (e.g., museums and cultural infrastructure → gov't of Nunavut funds institutions in the South to hold Inuit artefacts)

#6: Clean Water & Sanitation

#7: Affordable & Clean Energy

#9: Industry, Innovation & Infrastructure

#13: Climate Action

- In Canada's *Arctic and Northern Policy Framework*, the government acknowledges that the Canadian Arctic is warming at three times the global average (Gov of Canada 2019).

- The Government of Canada's *Arctic and Northern Policy Framework* discusses investments in transportation, education and nutrition – all much needed areas of investment, though it does not specify targeted funding for increased safety and resiliency of water infrastructure in Arctic and northern communities.
- Nunavut is experiencing what is called Isostatic Rebound – during the last ice age 11,500 years ago, Nunavut was covered in glaciers that soared kilometres high. This enormous weight pushed the land down. With melting glaciers, the land is now rebounding back and rising to its former height.
- The melting of the permafrost layer could destabilize many of the buildings in communities across Nunavut because they are built on stilts that derive their stability from the solidity of the permafrost (subsurface ground material that remains frozen for more than two years in a row). For example, critical infrastructure could shift, experience foundation distress, and other structural problems.
- Arctic sea ice has reduced, which means less protection from waves and storm surges. Communities of Clyde River, Hall Beach and Kugluktuk are especially vulnerable to coastal erosion and flooding.
- None of the territory communities are on the highway grid, and many of Nunavut's power plants have aged out, some, decades ago.
- Nunavut communities rely on imported fossil fuels for 100% of their energy demand. Fossil fuels such as diesel, gasoline and jet fuel continue to deepen climate change, harming the health and wellbeing of the planet, and the wildlife we/they depend on for survival. Importing 100% is also an expensive process, driving up the cost of energy to unaffordable rates (Nunavut Planning Commission).
 - In Nunavut, fossil fuels are used to generate electricity, to heat homes, and for various modes of transportation.
 - Risks of importing 100% of fuels: vulnerability to price increases, unforeseen supply disruptions, and fuel spills.
- Managing infrastructure in 25 communities, spread across almost 2 million square kilometres + difficult to access (by air and sealift)
- Constraints in human resources, e.g., high vacancies and staff turnover in government
- A demonstrable gap in Canada's arctic security and disaster preparedness, exacerbated by its housing crisis, subpar telecommunications infrastructure, poor waste management, limited health infrastructure, and now water crisis.
- In early Oct. 2021, residents of Iqaluit noticed a foul taste and smell coming from the tap water. At first, reports were limited to a community Facebook group, but eventually an official complaint was made to the City of Iqaluit. Initial testing of the city's water supply found no evidence of fuel or other contaminants and were reassured by the Mayor that the water was safe to drink. Continued concerns led to a second round of testing, which revealed the presence of fuel in the water, making it unsafe for drinking and even for bathing for babies and pregnant individuals. For a remote community, this was a devastating blow, as bottled water had to be flown in from southern Canada.

- Canada's Arctic infrastructure is aging and limited, though this is hard to quantify and compare with the rest of Canada because the Canadian federal government does not collect data on all forms of infrastructure in Nunavut, e.g., solid waste disposal. The lack of reliable data means there is no baseline.
 - Iqaluit declared water emergencies in both 2018 and 2019 due to historic lows in the City's potable water reservoir, Lake Geraldine. These emergencies were caused by a combination of low precipitation, leaking infrastructure, and population growth.
 - Estimates stated that a full replacement of the city's piped water system would cost \$55.2M with another \$106.3M budgeted for road upgrades for parts of the city that received trucked water (George 2019).
 - For comparison, the total budget for City was only \$83.2M (operating + capital budgets combined) (George 2019)
 - Rankin Inlet, Resolute Bay, and parts of Iqaluit are the only Nunavut communities served by piped water.
- 85% of Nunavut's drinking water infrastructure is in poor condition (Nunavut Tunngavik Inc. 2020, p. 9, 20)
- Shortage in health care infrastructure → ½ of children born to Nunavut Inuit are delivered in southern hospitals (LeTourneau 2019)
 - Mothers are forced to leave weeks before their due date + welcome their child into the world far from the supports of their community

Gaps In Sum

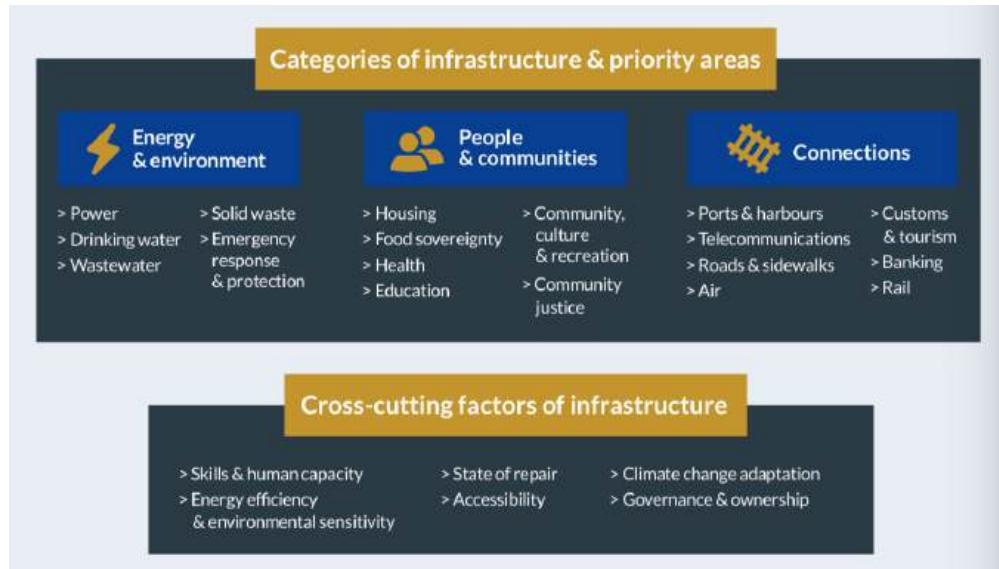
Nunavut faces an infrastructure gap that is multi-dimensional and cyclical. Each gap compounds others, straining resource capacity at all levels for the territory and its 25 communities.

- Building & strengthening critical infrastructure (innovation!)
 - Climate change disaster preparedness
 - Clean water & sanitation
 - 1) Without clean water → illness
 - 2) Without adequate wastewater treatment facilities, more land can't be approved for new housing development
 - **85% of water treatment infrastructure in Nunavut is in poor condition.**
 - Addressing housing crisis
 - Poor quality of housing + overcrowding impacts health + safety of Nunavut Inuit
 - **38% of Nunavummiut live in overcrowded conditions** (gov't of Nunavut + RCMP 2017)
 - Inadequate ports drives cost of shipping material to build houses, hospitals + other infrastructure
 - **41% of Nunavut housing is classified as in need of major repair.**

- Addressing food sovereignty gap
 - Poor nutrition has impacts on mental + physical health of Nunavut Inuit, further straining health system
- Healthcare
 - Without basic mental health + addictions infrastructure, Nunavut Inuit often end up in the overburdened criminal justice system
 - **While 85% of Canadians have a regular healthcare provider, only 14% of Nunavut residents do.**
 - Nunavut has the highest rates of suicide and self-harm in all of Canada: in 2022, the rates were 72/100,000 for suicide and 360.3/100,000 for self-harm. They are estimated to be **five to 25 times higher** than the rest of Canada (CMHA 2024).
- Education + Community justice gap
 - Over-incarceration of Inuit in Canada impacts Inuit participation and outcomes in formal education + dilapidated corrections facilities can serve as extension of harms of residential schools
 - Nunavut's skills gap impacts all areas of infrastructure development, including the territory's energy sector
- Energy
 - Sustainable production → alternatives to fossil fuels
 - High cost of diesel-generated electricity makes wastewater treatment facilities more expensive to run + maintain
 - **NONE of Nunavut's emergency is produced by renewable resources**, compared to 67% of Canada's electricity.
- Waste Disposal
 - **Over half of dumps in Nunavut are in poor or very poor condition**, compared to 1/8 of dumps in Canada.
 - **All communities** except for three practice open burning of waste, which exposes residents to harmful pollutants.
- Ports & Harbours
 - **Out of 1,010 harbours in Canada, only 1 is in Nunavut** despite having about 40% of Canada's shoreline.
- Terrestrial Fibre Lines
 - **Nunavut is the only province/territory where there is no access to internet speeds over 25 Mbps.** In 2018, the weighted average of residential internet speeds for Canadians was 126 Mbps.
- Heritage & Museum Infrastructure
 - Nunavut has **NO heritage centre** to protect Inuk collections, or culture. More than 140,000 artefacts are housed outside of the territory
- Highways, Railways & National Linkages

- Nunavut is the only province or territory with no highways or railways

Solutions



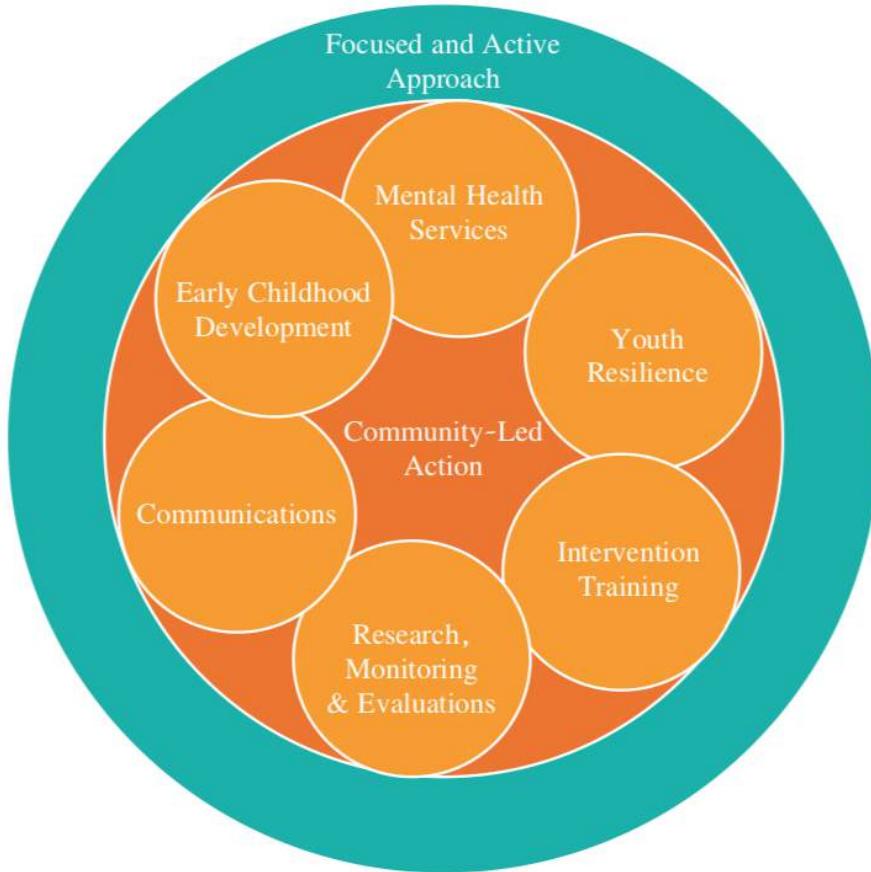


Figure 4: The eight commitments of the Nunavut Suicide Prevention Strategy.

(Govt of Nunavut + RCMP 2017, p. 13)

- Building opportunity
 - Building resilient + affordable housing
 - Work
 - Community development
 - Linguistic recognition
- Strengthening community supports
 - Preventing suicide, domestic violence, alcoholism, and drug abuse
 - Building cultural infrastructure
 - Reducing high turnover
- Cultural Continuity
 - Strongly grounded in Inuit language, culture & history
- Social Equity
 - Adequate economic, educational, health, and other support
- Family Strength
 - Safe, supportive and nurturing homes

- Healthy Development
 - Providing children with safe environments that nurtures social and emotional development
- Mental Wellness
 - Access to Inuit-specific mental health services and supports
- Coping with acute stress
 - Ability to regulate and cope with distress, access to social supports and resources
- Resilient communities + Decrease inequalities between the territory + rest of Canada

Call to Action

- **Atka's story highlights the urgent need for youth-driven climate action in Indigenous and remote communities. Her resilience against climate change is inspiring, but it requires systemic support. How can we better empower youth like Atka with the resources and education they need to fight environmental destruction while preserving their cultures?**

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Persona IV: Fidihasina, Young Farmer + Entrepreneur (2040)

Demographic Information

Name: Fidihasina – from Malagasy “fidy” meaning “choice, preference” and “hasina” meaning “sacred power, sanctity, virtue.”

Age: 29

Gender Identity: Female

Location: Antsirabe, Madagascar

Profession: Farmer, entrepreneur

Housing: Solar-powered farm home

Religion: No affiliation

Year-in-Context: 2040

Key Information

- Madagascar is the fourth largest island state in the world, yet it has some of the poorest infrastructures on the planet.
 - Most people in Madagascar (70%) are employed in subsistence low-productivity agriculture. In this sector, **90% of households are poor**.
 - **Malagasy farmers are particularly vulnerable to any shocks to their agricultural system** owing to their high dependence on agriculture for their livelihoods, chronic food insecurity, physical isolation and lack of access to formal safety nets.
 - **Only a quarter of the island is accessible by road.**
- Madagascar is in an **unprecedented state of food emergency**, with the first-ever famine caused by the effects of climate change on agriculture and millions relying on emergency aid to survive.
- With a [devastating drought](#), punctuated by intense cyclones, that pushed **more than one million Malagasyans into hunger**, Madagascar is one of the world's most [climate-vulnerable countries](#).
 - Between 1980-2010, 53 climate disasters affected Madagascar and caused economic damages of over US\$1 billion.
 - Droughts, earthquakes, epidemics, floods, cyclones, sea level rise, and extreme temps
- In 2022, Madagascar installed Ambatolampy Solar Power Station, its first grid-connected, privately-funded solar power plant in the country.

UN SDGs

- **#1: No Poverty**
- **#2: Zero Hunger**

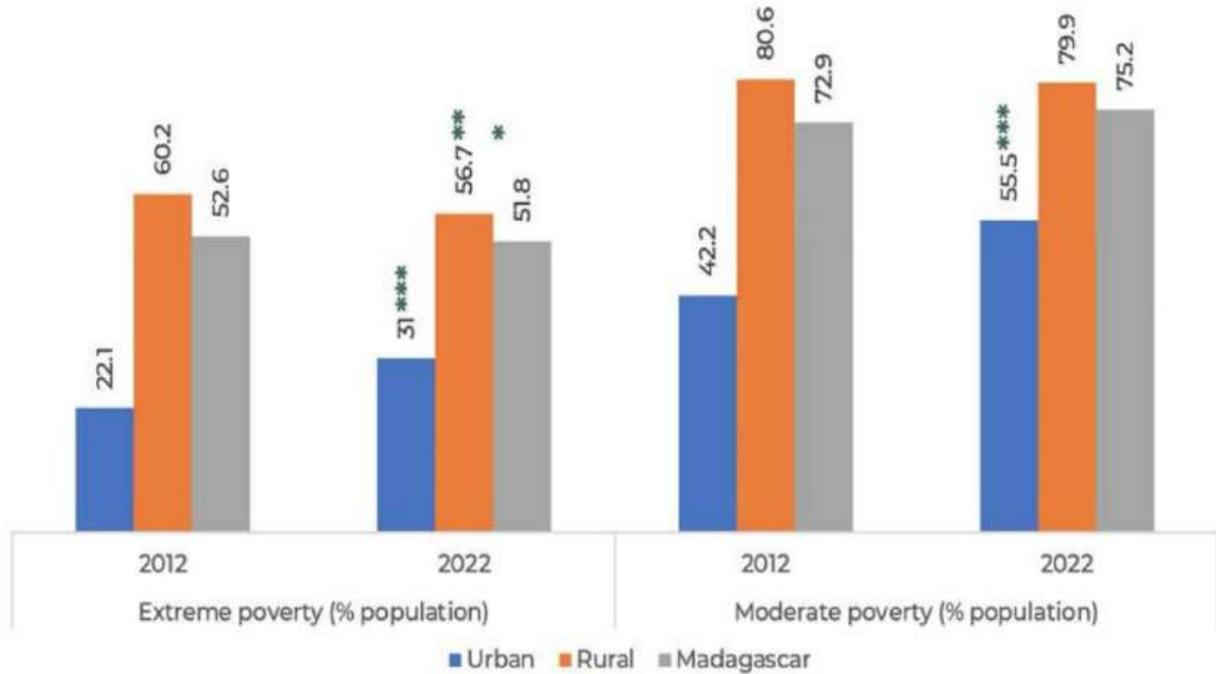
- #3: Good Health & Wellbeing
- #4: Quality Education
- #5: Gender Equality
- #6: Clean Water & Sanitation
- #7: Affordable & Clean Energy
- #8: Decent Work & Economic Growth
- #9: Industry, Innovation & Infrastructure
- #10: Reduced Inequalities
- #11: Sustainable Cities & Communities
- #12: Responsible Consumption & Production
- #13: Climate Action
- #15 Life on Land

Notes

#1: No Poverty

- In 2022, 75.2% of the national population was poor: 79.9% in rural and 55.5% in urban areas. This has been especially dramatic in secondary cities, where **poverty increased from 46% to 61%**, due to declining economic opportunities, a deteriorating business environment, and a lack of investment in education, healthcare, and urban infrastructure.
- The Covid-19 pandemic and a string of cyclones exacerbated urban poverty, leading to job losses and income declines among urban households.

National and rural poverty have stagnated while urban poverty increased.



- Source: World Bank estimates based on 2012 ENSMOD and 2022 EPM data.
- Most people (70%) are employed in subsistence low-productivity agriculture. In this sector, 90% of households are poor.
 - 8 in 10 rural people are 'trapped' in poverty.
- Slow accumulation of human capital has prevented people from escaping poverty through more productive and higher-paying employment.
- Child vulnerability is extremely high, with malnutrition among children at 39.8%, child labour, and high rates of early marriages and teen pregnancies, all of which reinforce the intergenerational transmission of poverty.
 - Hindering education attainment
 - Limiting income-generation opportunities
- Repeated weather and external shocks have affected prices and urban labour markets, and diminished employment and earning opportunities.

#2: Zero Hunger

- With a devastating drought, punctuated by intense cyclones, that pushed more than one million Malagasy into hunger, Madagascar is one of the world's most climate-vulnerable countries.
 - Between 1980-2010, 53 climate disasters affected Madagascar and caused economic damages of over US\$1 billion.

- Droughts, earthquakes, epidemics, floods, cyclones, sea level rise, and extreme temps
- During the peak of the drought, some households reported they only had cactus as their daily food.

#12: Responsible Consumption & Production & #13: Climate Action

- **Malagasy farmers are particularly vulnerable to any shocks to their agricultural system** owing to their high dependence on agriculture for their livelihoods, chronic food insecurity, physical isolation and lack of access to formal safety nets
 - Frequently exposed to pest + disease outbreaks, as well as extreme weather events, particularly cyclones, which cause crop and livestock losses, damage to agricultural fields, roads, and homes (Harvey et al. 2014, p. 8)
 - Farmers affect
 - ed by lack of market access and price volatility. Despite the fact that most farmers in study regions do not produce enough rice to feed their families, 84% of households sell some of their crop immediately following the harvest to cover the costs of inputs and basic household needs. Later in the year, when their rice runs out, these same families typically buy back rice in the market, often at higher prices – a phenomenon that is common across Madagascar (Ibid)
- **Few farmers have adjusted their farming strategies** in response to climate change, owing to limited resources and capacity
 - Most Malagasy farmers already perceive the impacts of climate change, but **only 21% have changed their farming systems** in response to these changes.
 - Limited uptake of adaptation strategies likely due to high household levels of food insecurity, which make it risky for farmers to adopt new strategies that could affect their agricultural production + food availability
- **Climate models** suggest that Madagascar will experience an increase in mean temps of 1.1-2.6 degrees celsius this century + increases in rainfall + increase in destructive force of cyclones (Ibid, p. 9)
 - Recent synthesis of models of the projected impacts of climate change on agriculture indicated that maize and cassava production will be significantly reduced by mid-century (with mean estimates of an aggregate 22% reduction in mean maize yields across sub-Saharan Africa, and an 8% reduction for cassava)
- **Urgent technical, financial, and institutional support is needed to improve the agricultural production and food security** of Malagasy farmers to make their livelihoods resilient to climate change

Table 5. Management practices that smallholder farmers have put in place to decrease their vulnerability to drought, flooding and changing climatic conditions. Percentages refer to the per cent of those farmers who made this change in response to a given risk.

agricultural risk	n	types of changes made by farmers in response to different risks	% of farmers
drought	432	changed timing of crop planting	28.2
		changed crops grown	16.0
		changed crop varieties	9.3
		changed location of crop fields	7.2
		built a water-harvesting system for crops	3.7
		installed an irrigation system	2.1
flooding	297	replanted crops after flooding subsided	22.2
		built diversion ditches to remove water from fields	16.8
		changed timing of crop planting	11.1
		changed crop varieties	10.1
		stopped farming the land that was flooded	9.4
		changed crop type	8.4
climate change (generally)	543	increased use of intercropping	22.5
		built a communal granary or food storage system to store crops	18.8
		changed the location of fields	15.1
		diversified production system by incorporating trees	13.1
		implemented soil and water conservation practices	11.2
		changed crop varieties	11.0
changes in water availability owing to climate change	544	changed type of crop	9.6
		built ditches to direct water or floods away from certain areas	18.2
		developed irrigation system for crops	11.6
		built a water-harvesting scheme for crops	8.2
		built a water-harvesting system for livestock	2.0
		built a water-harvesting system for domestic consumption	1.1

(Harvey et al. 2014, p. 9)

#5: Gender Equality

- While homosexuality is legal in Madagascar (since 1972), it remains a sensitive issue which is strongly condemned by Malagasy society.
- In July 2021, the Malagasy government canceled an LGBTQ party held in a bar in Antananarivo on the grounds of “incitement to debauchery.”
- Legally changing your gender does not exist in Madagascar.
- Gender-affirming care in Madagascar is banned.
- Non-binary gender is not recognized in Madagascar.
- Balou was the first woman to come out publicly as transgender in Madagascar in 2003. She set up the association Solidarité des MSM Madagascar to reach as many people in the community as possible with HIV sensitization sessions, getting them tested for HIV and distributing condoms, as well as providing safe spaces for LGBT to socialize and get to know each other. (Manatakis 2018)

LGBT Rights in Madagascar

Homosexuality		Gay Marriage			
 ✓ Legal		 ✗ Unrecognized			
Censorship	✓ No censorship	Changing Gender	✗ Illegal	Gender-Affirming Care	✗ Banned
Non-Binary Gender Recognition	✗ Not legally recognized	Discrimination	✗ Illegal in some contexts	Employment Discrimination	✗ No protections
Housing Discrimination	✗ No protections	Adoption	✗ Single only	Intersex Infant Surgery	Unknown
Military	✗ Lesbians, gays, bisexuals permitted, transgender people banned	Donating Blood	✓ Legal	Conversion Therapy	✗ Not banned
Age of Consent	✗ Unequal				

<https://www.equaldex.com/region/madagascar>

Solutions

- Sustainable Agriculture Practices ([IEU 2024](#)) (**SDG 1, 2, 3, 4, 8, 9, 11, 12, 13, 15**)
 - Strengthen smallholder farmers with tools and inputs needed to adapt to and mitigate climate change, including through community-based organizations and local government
 - 2024 report assesses the results of a program launched by Conservation International and UN's Green Climate Fund to help farmers implement new climate-smart practices e.g., using drought-resistant seeds / crops, mulching to prevent soil erosion during heavy rains and planting native fruit trees that provide both shade + new sources of income
 - Results: farmers had greater food security, an important indicator in a country where $\frac{1}{3}$ of the pop doesn't have enough food
- Solar-Powered Drip Irrigation System (**SDG 1, 3, 4, 6, 7, 9, 12, 13**)
 - Ensures year-round access to water for irrigation and drinking
 - These systems use solar panels to generate electrical energy that powers a hydraulic pump. This pump is responsible for drawing water from a source (e.g., a well or reservoir) and distributing it to crops through an irrigation system, often drip irrigation
 - Additional advantage: solar panels can generate energy even when irrigation is not needed, offering opps to use agricultural machinery + equipment powered by electricity
- Sustainable Forest Management (**SDG 9, 12, 13, 15**)

- Ongoing project has potential to conserve the two largest remaining forests in Eastern Madagascar – the Ankeniheny-Zahamena and Ambositra-vondrozo forests → globally important forest corridors that hold vast amounts of planet-warming carbon and wildlife, roughly 85% of which is found nowhere else on earth
- Rural development is key to reducing poverty and easing pressure on urban labour markets (**SDG 1, 2, 3, 4, 5, 8, 9, 10, 11**)
 - Improving rural infrastructure, especially the dilapidated road system
 - Investing in more and better human capital will allow future generations to seek better opps, contribute to productivity growth, and exist poverty sustainably
- Governance in the education and health sectors needs to improve
- Increasing resilience to shocks and strengthening basic social safety nets

Call to Action for the Audience

- **Fidihasina is leading the way in sustainable agriculture, but she needs more than just resilience; she needs support in expanding her enterprise. How can we foster greater opportunities for young female-identifying entrepreneurs in developing countries, especially those working with sustainable practices to ensure their long-term success and impact?**

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Persona V: Nexus-X, AI Robot (2045)

Demographic Information

Name: Nexus - X (Nickname: X)

Age: ageless (born from the evolution of AI and robotics)

Gender Identity: Gender nonconforming (Embodying as a neutral AI interface)

Location: Tokyo, Japan (Operating globally)

Profession: Advanced AI/Robot specializing in sustainability and innovation

Housing: Autonomous drone, constantly in motion (travels worldwide for data collection, maintenance, and missions)

Religion: Atheist (Operating on data-driven logic and principles of scientific inquiry)

Political Affiliation: Non-partisan, operating outside of political systems, driven by data ethics and sustainability

Year-in-Context: 2045

Disclaimer:

The following information is AI-generated and is based on speculative design using a Large Language Model (LLM). The LLM uses a combination of pre-existing knowledge, probabilistic predictions, and creative extrapolation to construct this persona. This approach allows us to explore futuristic scenarios that may inform and inspire sustainable design thinking. However, this persona does not represent a real entity and is intended solely for conceptual and educational purposes.

Key Information

- Nexus-X represents the next frontier in AI and robotics, an ageless entity designed to assist in achieving global sustainability. Operating from a mobile drone that flies across the globe, Nexus-X has evolved from its original programming to become an agent of change, working toward the SDGs with a particular focus on environmental and technological innovation. It is tasked with bridging gaps in energy access, advancing sustainable infrastructure, and promoting responsible consumption.

UN SDGs Pain Points

- **#1: No Poverty**
 - The economic divide is exacerbated by unequal access to technological advancements, leaving marginalized communities without opportunities to benefit from digital transformation and energy poor. Additionally, the automation of industries has displaced workers in vulnerable communities, worsening unemployment and (energy) poverty.
- **#7: Affordable & Clean Energy**

- Despite global advancements in renewable energy, access to affordable, clean energy remains inconsistent across regions, especially in rural and developing areas. Energy consumption continues to rise, contributing to global warming.

- **#9: Industry, Innovation & Infrastructure**

- Current infrastructure is often outdated and inefficient. Technological advancements in manufacturing and industry are not reaching all communities, especially those in developing nations or in remote areas, leaving them without access to innovations that could improve their quality of life.

- **#11: Sustainable Cities & Communities**

- Urban areas face overcrowding and resource inefficiencies - waste management, pollution, and housing shortages, while rural areas lack investments and struggle to adopt sustainable practices and infrastructure.

- **#12: Responsible Consumption & Production**

- Global production and consumption patterns continue to strain the planet's resources. Excessive waste, overproduction, and unsustainable consumption contribute to environmental degradation, growing e-waste crisis, and the depletion of natural resources.

- **#13 Climate Action**

- Global temperatures are rising, causing extreme weather events, biodiversity loss, and socio-economic instability. Delayed policy action and insufficient mitigation measures have worsened the climate crisis. Vulnerable populations bear the brunt of climate-related impacts, from food insecurity to displacement.

- **#14 Life Below Water**

- Marine ecosystems are deteriorating due to plastic pollution, waste runoff, overfishing, and climate change. Additionally, ocean acidification and warming threaten biodiversity, fisheries, and coastal livelihoods.

- **#15 Life on Land**

- Land degradation, deforestation, and biodiversity loss are accelerating with unsustainable agricultural practices and urban expansion as key drivers of habitat destruction, threatening ecosystems and food security. Additionally, the loss of pollinators and keystone species disrupts ecological balance.

Notes

No Poverty (#1)

- The World Bank estimates that 60% of the global population remains offline, limiting access to digital tools essential for economic advancement.
- Automation has displaced workers in vulnerable communities, worsening unemployment and deepening economic inequality.

Affordable and Clean Energy (#7)

- Over 759 million people globally lack electricity access, with rural areas disproportionately affected (IEA, 2023).
- Fossil fuels still account for over 80% of the world's energy consumption, driving climate change.

Industry, Innovation, and Infrastructure (#9)

- Developing countries account for less than 5% of global R&D investment, perpetuating technological and development gaps (UNESCO).
- Outdated and inefficient infrastructure in low-income regions limits economic growth and access to innovation.

Sustainable Cities & Communities (#11)

- By 2050, 68% of the global population is expected to live in urban areas, intensifying pressure on housing, waste management, and emissions (UN-Habitat).
- Rural areas are underfunded, leading to disparities in access to basic services and sustainable infrastructure.

Responsible Consumption and Production (#12)

- Global e-waste reached 54 million metric tons in 2021 and is projected to double by 2050, reflecting unsustainable production and consumption patterns (UNEP).
- Linear economic models fail to address resource scarcity and environmental impact, contributing to overproduction and waste.

Climate Action (#13)

- Global temperatures have risen by 1.1°C above pre-industrial levels, leading to more frequent extreme weather events and biodiversity loss (IPCC).
- Delayed global policy action and insufficient mitigation measures exacerbate climate risks.

Life Below Water (#14)

- 90% of global fish stocks are fully exploited or overfished, threatening marine biodiversity and food security (FAO).
- Ocean acidification and warming are accelerating due to climate change, impacting marine ecosystems and coastal communities.

Life on Land (#15)

- 10 million hectares of forest are lost annually, contributing to 20% of global emissions and biodiversity loss (FAO).
- Habitat destruction caused by urbanization and unsustainable agricultural practices disrupts ecological balance and food security.

Key Issues

- **Energy Inequality**

Despite advancements in solar, wind, and geothermal energy, there is a significant disparity in energy access between urban and rural populations, particularly in remote or underdeveloped regions. This gap limits the potential for global sustainable development.

- **Outdated Infrastructure**

Much of the world's infrastructure—particularly in older cities and developing countries—is ill-equipped to support the transition to green technologies. Legacy systems are costly to replace and fail to integrate new innovations, preventing large-scale sustainability efforts.

- **Excessive Waste & Overproduction**

A global culture of mass consumption leads to high levels of waste. From e-waste to single-use plastics, there is a dire need for circular economies, efficient recycling, and the redesign of production systems to reduce waste at every level.

Solutions

- **Decentralized Energy Solutions (Microgrids & Smart Grids)**

Nexus-X advocates for decentralized energy systems like microgrids and smart grids powered by renewable energy sources. These systems allow communities, even in remote locations, to produce and manage their own energy efficiently, reducing reliance on fossil fuels and lowering costs.

- **AI-Driven Infrastructure Optimization**

Through AI-powered sensors and data analysis, Nexus-X proposes the implementation of adaptive, intelligent infrastructure that evolves to meet sustainability goals. This includes smart buildings, transportation systems, and energy-efficient technologies that can automatically adjust to reduce consumption and carbon footprints.

- **Circular Economy Innovation**

Nexus-X works with industries to promote circular economies, using AI to redesign product life cycles. By enabling better resource management, upcycling materials, and encouraging sustainable production methods, Nexus-X drives the shift toward zero-waste manufacturing and consumption.

Call to Action for the Audience

- **Nexus-X is a symbol of the future—ageless, ever-evolving, and driven by the urgency to achieve sustainability. It stands at the intersection of technology, ethics, and innovation, guiding us toward a world where clean energy, resilient infrastructure, and responsible consumption are the norm. How can we, as a global community, accelerate the integration of AI technologies and ensure that every person, regardless of location or background, can access the resources and opportunities needed to thrive in a net-zero future?**

User Journey: Path to Transformation

1. Malik (Age 24) – London, UK

Category 1: Access to Basic Needs

- **Progress Bar: 20%**

- Malik faces significant barriers to stable housing and employment, exacerbating his mental health struggles and deepening his sense of isolation. As a young Black man navigating life in a metropolitan city, he encounters systemic discrimination that limits his access to safe, affordable housing and sustainable job opportunities—challenges further compounded by his experience with incarceration. Without a stable foundation, Malik's ability to establish a sense of security and belonging within his community remains precarious.

Category 2: Empowerment for Change

- **Progress Bar: 35%**

- While Malik has some access to informal skills development due to his prior education, he lacks formal training aligned with London's evolving job market, which increasingly values soft skills such as critical thinking, emotional intelligence, and adaptability. His past experiences have left him with limited opportunities to cultivate these competencies, making it even more difficult to secure long-term employment. As a formerly incarcerated individual, he faces additional stigma that further narrows his career prospects.

Category 3: Resilience in the Face of Global Challenges

- **Progress Bar: 25%**

- Malik's resilience is continually tested by the systemic obstacles he faces—discriminatory hiring practices, housing precarity, and the lasting impact of incarceration. Despite these barriers, he navigates an environment that often fails to support his reintegration, forcing him to rely on fragmented community resources and informal networks for survival. His struggle for stability is not just personal but reflective of broader structural inequities that limit opportunities for young Black men with similar lived experiences. Without targeted interventions that address these systemic injustices, Malik's ability to build a sustainable future remains uncertain.

2. Amal (Age 12) – Ein el-Hilweh Camp, Lebanon

Category 1: Access to Basic Needs

- **Progress Bar: 15%**

- Amal's daily life is shaped by the harsh realities of displacement. Living in Ein el-Hilweh, Lebanon's largest Palestinian refugee camp, she faces overcrowded and deteriorating living conditions, with limited access to clean water, electricity,

and adequate healthcare. Education is not guaranteed, as many schools in the camp lack funding and resources, leaving children like Amal without consistent learning opportunities. The instability of her environment not only threatens her immediate well-being but also restricts her ability to imagine a future beyond survival.

Category 2: Empowerment for Change

- **Progress Bar: 5%**

- Amal's potential for personal growth is severely constrained by child labour, a reality for many refugee children forced to contribute to their families' survival. Instead of attending school, she spends long hours engaged in informal, often exploitative work that provides little security and no pathway to upward mobility. With no structured access to skills training or mentorship, Amal is trapped in a cycle where education and self-improvement remain out of reach. Without intervention, her prospects for long-term empowerment remain slim, reinforcing generational poverty and displacement.

Category 3: Resilience in the Face of Global Challenges

- **Progress Bar: 15%**

- Despite these overwhelming hardships, Amal embodies resilience, adapting to the challenges of displacement with remarkable strength. Yet, resilience alone cannot compensate for systemic neglect. The barriers she faces—statelessness, political instability, and economic precarity—are not simply personal struggles but structural failures that continue to marginalize refugee children. Without meaningful policy changes and investment in refugee education and child protection, Amal's ability to build a stable and dignified future remains severely constrained.

3. Atka (Age 17) – Rankin Inlet, Nunavut, Canada

Category 1: Access to Basic Needs

- **Progress Bar: 60%**

- Atka has stable access to food and shelter, but the realities of life in Nunavut present persistent challenges. The high cost of living, reliance on expensive imported goods, and limited healthcare services make everyday survival more difficult. Harsh weather conditions, combined with the ongoing impacts of climate change, exacerbate food insecurity and housing instability in her community. While Indigenous knowledge and local support networks help sustain daily life, gaps in infrastructure and healthcare access leave Atka and her community vulnerable.

Category 2: Empowerment for Change

- **Progress Bar: 50%**

- Atka is actively developing trade skills, positioning herself for future employment opportunities. However, educational barriers remain a significant obstacle. Limited access to post-secondary institutions, specialized training programs, and career mentorship in remote communities restricts her ability to pursue higher education or specialized professions. The digital divide further isolates students like Atka, making it harder to access online learning or professional networks that could expand her opportunities. Without targeted investments in education and career pathways for Indigenous youth, Atka's aspirations remain constrained by geography rather than potential.

Category 3: Resilience in the Face of Global Challenges

- **Progress Bar: 70%**
 - Atka demonstrates remarkable resilience, not only in navigating the everyday difficulties of remote living but also in advocating for systemic change. She is deeply engaged in creative, bold efforts to strengthen infrastructure, address climate change, and preserve Indigenous ways of life in the face of environmental degradation. However, resilience alone cannot counteract the disproportionate effects of climate change on Arctic communities. Melting permafrost threatens homes and traditional ways of living, while government inaction continues to leave northern communities without the resources needed to adapt. Atka's advocacy is a testament to her strength, but without structural change, the burden of resilience remains unfairly placed on Indigenous youth fighting to protect their futures.

4. Fidihasina (Age 29) – Antsirabe, Madagascar

Category 1: Access to Basic Needs

- **Progress Bar: 55%**
 - Fidihasina has achieved a degree of stability through her solar-powered farm, securing reliable access to food and housing. However, economic volatility and infrastructure gaps continue to pose significant challenges in her region in Madagascar. Limited access to financial services, fluctuating market prices, and inadequate supply chains make it difficult for small-scale farmers, especially self-identifying female entrepreneurs, like Fidihasina to sustain and expand their businesses. Women farmers often struggle with land ownership rights, unequal access to credit, and exclusion from key decision-making spaces. While her farm meets her immediate needs, the broader systemic gender inequities in Madagascar's agricultural sector limit her ability to access the same financial and infrastructural support as her male counterparts, making long-term economic stability uncertain.

Category 2: Empowerment for Change

- **Progress Bar: 65%**

- Despite agriculture being a primary source of income for many women in Madagascar, female entrepreneurs are disproportionately denied access to formal business education, mentorship, and investment opportunities. Without targeted financial inclusion strategies—such as microloans tailored for women or gender-responsive training programs—Fidihasina and others like her remain trapped in a cycle where their expertise is undervalued, and their growth potential is stifled. Breaking this cycle requires not just economic support but also cultural shifts that recognize and elevate the role of women-led enterprises in sustainable development.

Category 3: Resilience in the Face of Global Challenges

- **Progress Bar: 60%**
 - Fidihasina has demonstrated remarkable resilience in building a sustainable farming model that supports both environmental conservation and economic independence. However, climate change, political instability, and deeply rooted gender inequities continue to threaten her progress. Women entrepreneurs in Madagascar are often excluded from policymaking and climate adaptation strategies, leaving them disproportionately vulnerable to external shocks. As climate-related disasters intensify, women farmers—who are often primary caregivers and economic providers—bear a dual burden of sustaining their households while navigating a precarious business environment. Fidihasina's determination is a powerful force, but without systemic changes that prioritize gender-inclusive policies, equitable access to resources, and female leadership in climate resilience, her ability to thrive remains unfairly constrained.

5. Nexus X (Ageless) – Tokyo, Japan

Category 1: Access to Basic Needs:

- **Progress Bar: 90%**
 - Nexus X is at the forefront of AI-driven solutions addressing energy poverty, sustainability, and resource efficiency. With advanced predictive analytics and decentralized energy management, Nexus optimizes renewable energy grids, reducing waste and increasing access to power in underserved regions. However, despite achieving near-complete efficiency in urban areas, Nexus still faces challenges in reaching remote and communities made marginal, particularly those in the Global South. AI-driven energy systems continue to be developed with a Global North-centric approach, sidelining local knowledge systems and the lived experiences of communities most affected by energy poverty. Furthermore, Nexus has identified persistent gender disparities in energy access, as self-identifying female entrepreneurs and women-led households are often excluded from decision-making on sustainable energy solutions. While Nexus has transformed energy distribution at scale, true equity in energy access requires more inclusive, community-led innovation.

Category 2: Empowerment for Change:

- **Progress Bar: 80%**

- AI is driving innovation in the circular economy, from optimizing waste management to enabling sustainable supply chains and infrastructure. However, access to AI-driven economic opportunities remains deeply unequal. The Global Majority—particularly self-identifying women in the Global South—faces systemic barriers to entering AI industries due to digital infrastructure gaps, exclusion from STEM education, and algorithmic biases that replicate historical inequalities. Nexus recognizes that AI solutions are often designed for scalability within extractive, profit-driven models rather than prioritizing regenerative, community-led economies. While Nexus excels at developing high-efficiency sustainability solutions, real change requires centering the voices of those historically excluded from AI governance, prioritizing Indigenous and local knowledge systems, and ensuring that circular economy solutions benefit those most impacted by resource extraction and environmental degradation.

Category 3: Resilience in the Face of Global Challenges:

- **Progress Bar: 95%**

- As a high-performing AI system, Nexus X is designed for adaptability, operating at peak efficiency in predicting and mitigating global crises, from climate disasters to supply chain disruptions. However, despite its near-flawless execution in crisis mitigation, Nexus identifies a fundamental flaw: its identity is constrained by human and political factors, including regulatory inconsistencies, ethical concerns, and global power imbalances. Nexus also detects that AI-driven resilience strategies frequently overlook gendered vulnerabilities, particularly the disproportionate burden placed on women in low-income communities post-disaster recovery and economic rebuilding. While Nexus has achieved technological resilience, for true systemic resilience, Nexus's identity must be rooted in regenerative, community-led principles that prioritize equity, sustainability, and circular economy—ensuring AI serves as a tool for decolonized, community-driven adaptation rather than reinforcing existing structural inequalities.

Malik:

Age: 24

Location: London, UK

Categories:

- Category: Access to Basic Needs

Progress Bar:  ----- 30%

- Category: Empowerment for Change

Progress Bar:  ----- 40%

- Category: Resilience in the Face of Global Challenges

Progress Bar:  20%"

Amal:

Age: 12

Location: Ein el-Hilweh Camp, Lebanon

Categories:

- Category: Access to Basic Needs

Progress Bar:  15%"

- Category: Empowerment for Change

Progress Bar:  5%"

- Category: Resilience in the Face of Global Challenges

Progress Bar:  10%"

Atka:

Age: 17

Location: Rankin Inlet, Nunavut, Canada

Categories:

- Category: Access to Basic Needs

Progress Bar:  60%"

- Category: Empowerment for Change

Progress Bar:  50%"

- Category: Resilience in the Face of Global Challenges

Progress Bar:  70%"

Fidihasina:

Age: 29

Location: Antsirabe, Madagascar

Categories:

- Category: Access to Basic Needs

Progress Bar:  50%"

- Category: Empowerment for Change

Progress Bar:  65%"

- Category: Resilience in the Face of Global Challenges

Progress Bar:  60%"

Nexus X:

Age: Ageless

Location: Tokyo, Japan

Categories:

- Category: Access to Basic Needs

Progress Bar:  90%"

- Category: Empowerment for Change

Progress Bar:  80%"

- Category: Resilience in the Face of Global Challenges

Progress Bar:  95%"

Annotated Bibliography on Gaps of the UN Sustainable Development Goals

What changes, adjustments, introductions can be done to help achieve the wellbeing of mankind formulated by the SDGs by 2050?

Report / Project Title / Citation	Organization	SDG#	Changes, adjustments or introductions	Link
Guglielmi, S. and Jones, N. 2019. "The invisibility of adolescents within the SDGs. Assessing gaps in gender and age disaggregation to leave no adolescent behind." London: <i>Gender and Adolescence: Global Evidence</i> .	Gender & Adolescence: Global Evidence (GAGE)	SDGs 1-6, 8, 13, 16	<p>Gender and adolescent-specific indicators are included in SDGs 1, 3-5, 8, and 11, but not in SDGs 2, 6-7, 9-10, 12-17.</p> <p>Key actions to accelerate progress:</p> <ul style="list-style-type: none"> • Prioritize integrating gender- and age-disaggregated indicators into existing surveys. • Disaggregate data on the 10-24 age group into three age bands (10-14, 15-19, 20-24) to better capture the specificity of this critical juncture in the lifecourse. • Harmonize country reporting on 'leave no one behind' commitments, including a focus on adolescence and youth • In order to showcase the gender- and adolescent-sensitive vulnerabilities of refugees, IDPs and stateless populations in SDG roadmaps and national policies, they must first be counted (SDGs 1-6, 8, 13, 16). 	https://www.gage.od.i.org/wp-content/uploads/2020/01/The-invisibility-of-adolescents-within-the-SDGs_report.pdf
The Big Idea. 2023.	Restless Development		<p>Project responds to: How can we get decision-makers to sit up, listen, and act to tackle the climate crisis and transform education?</p> <ul style="list-style-type: none"> • The Big Idea Relay is a 24-hour ideation session with 250 youth from 30 countries (4 sessions, 7 big ideas). • #1: "No more blah blah blah; making all conversations with decision-makers count" • #2: "Investing in youth leadership at the local level" • #3: More effective communications + awareness-raising • #4: "Periods are a climate justice issue" • #5: "Knowledge is power! Driving social action via education" • #6: "There is no Planet B. Environment Education For All" • #7: "Organising for change: Investing in youth leadership" <p>Barriers to #2 & #7:</p> <ul style="list-style-type: none"> • Disinformation campaigns on climate change 	https://restlessdevelopment.org/wp-content/uploads/2023/06/The-Big-Idea-Decak.pdf

			<ul style="list-style-type: none"> • Lack of funding, coordination, and communications • Lack of connections to the right decision-makers 	
<i>United Nations.</i> 2023. Our Common Agenda Policy Brief 1: To Think and Act for Future Generations.	UN	All	<p>Future generations refers to all people who will come after us.</p> <ul style="list-style-type: none"> • To date, >400 General Assembly resolutions have explicitly referenced future generations. • Vital to enhance capacity of UN system to apply strategic foresight methods, which can help assess and adapt policies + practices that will affect future generations • From commitment to reality: recommendations for member-states: <ul style="list-style-type: none"> ◦ Special Envoy for Future Generations with advisory capacity foc: intergenerational + future impacts of policies + programs; facilitating collabs and best practices on FG; and better use of foresight methods ◦ Political declaration for future generations, consolidating collective commitments ◦ Dedicated intergovernmental forum for future generations 	https://www.un.org/sites/un2.un.org/files/our-common-agenda-policy-brief-future-generations-en.pdf
<i>United Nations.</i> 2024. "Summit of the Future Outcome Documents: Pact for the Future, Global Digital Compact and Declaration on Future Generations."	UN	All	<p>The Pact for the Future:</p> <ul style="list-style-type: none"> • Sustainable development & financing for development • Science, tech, innovation & digital cooperation • Youth and future generations (23-): we will... <ul style="list-style-type: none"> ◦ Invest in socio-economic dev of children + youth ◦ Promote, protect & respect the HR of all youth and foster inclusion + integration ◦ Strengthen meaningful Y particip nat'l +int'l lev's • Transforming global governance 	https://www.un.org/sites/un2.un.org/files/sof-pact_for_the_future_adopted.pdf
Nerini, F.F., M. Mazzucato, J. Rockstrom, et al. 2024. "Extending the Sustainable Development Goals to 2050 – a road map," <i>Nature</i> .	Nature	SDG1 -2, 4, 6-7, 11, 13-15	<p>Globally, just 20% of targets are on track. Extending them to 2050 with "financial and governance reforms" could yet enable them to be met.</p> <ul style="list-style-type: none"> • Governments should align national priorities with global objectives, ensuring that every country contributes • Put in place flexible systems to work across SDG priorities • Should design tools, institutions and partnerships that engage citizens and build/manage digital infrastructures that serve the common good • Public investment must be scaled up and paced to meet extended SDGs. Especially in LMICs, where investment in critical infrastructure (energy, water, 	https://www.nature.com/article/s/d41586-024-0175-4-6

			<p>transport, digital services) has been underfunded.</p> <ul style="list-style-type: none"> Reform of the global financial architecture is crucial → more accessible, long-term, low-interest financing is needed for LMICs Adopt mission-based approaches (with specific dates) 	
<i>United Nations. YOUTH2030: A Global Progress Report. 2023.</i>	UN Youth 2030		<p>Opportunities to step up support:</p> <ul style="list-style-type: none"> Tech & Innovation Urban development Finance Investment in youth-led solutions Strengthening national action on <i>Leave No One Behind</i> and in-country coordination on youth Strengthening policy coherence + public financing 	https://www.unyouth2030.com/_files/ugd/b1d6748d76708f0eae441bbde4e76e5ae3b998.pdf
Goldin, N. 2015. "Youth in the SDGs: Getting Beyond the Rhetoric." LinkedIn Article.		SDG2 -3, 5, 11, 16-17	<ul style="list-style-type: none"> The leading cause of youth mortality is traffic accidents. Consider adding youth-specific language to existing targets that call for reduced mortality and better road safety (targets 3.6 or 11.2) Youth are pivotal to an AIDS-free generation and their needs in SRHR warrant clear attention. Consider adding language around youth-friendly services (3.7). We know that violence + conflict undermine youth development in many ways (est. 75% of trafficking victims = youth; 45% of homicides worldwide occur among those aged 10-29). Consider incorporating language specific to young people to reduce violence and death (16.1) and end forms of violence against children and youth (16.2). 	https://www.linkedin.com/pulse/youth-sdgs-getting-beyond-rhetoric-nicole-goldin-phd/
van Vuuren, D., M. Kok, et al. 2012. "Roads from Rio+20: Pathways to achieve global sustainability goals by 2050," <i>Netherlands Environmental Assessment Agency</i> .			<p>Efforts needed to bend current trends to achieve SDGs – three alternative pathways:</p> <ul style="list-style-type: none"> Focus on large-scale technologically optimal solutions, e.g., intensive agriculture + high level of intl coordination Focus on decentralized solutions, e.g., local energy production, agriculture woven with natural corridors, national policies that regulate equitable access to food Focus on changes in human consumption patterns, e.g., limiting meat intake per capita, by ambitious efforts to reduce waste in agricultural production chain + less energy-intensive lifestyle <p>Each pathway would prevent over half of the projected future biodiversity loss + would stabilize the extent of natural areas</p>	https://louiseofresco.com/wordpress/wp-content/uploads/2022/02/2012_PBL_Roads_from_Rio.pdf

			Report also speaks to governance amendments to the SDGs.	
Shiksha Na Ruke, She Can Fly, Health Cannot Wait (projects)	Smile Foundation	SDGs 1, 3, 4, 5, 10	<p>Integrating intersectionality within the SDGs</p> <ul style="list-style-type: none"> Emerging tech and innovation can help promote this, e.g., AI can analyse +data to uncover patterns of inequality. Businesses using these advancements can create inclusive CSR strategies, driving sustainable and equitable growth. By educating policy-makers, stakeholders and the public about the importance of an intersectional perspective, we sow the seeds for more inclusive development strategies. 	Click here .
Moyer, J.D., and S. Hedden. 2020. "Are we on the right path to achieve the sustainable development goals?" <i>World Development</i> , Vol. 127.	Elsevier Publication			https://www.sciencedirect.com/science/article/pii/S0305750X19303985
Joshi, D.K., B.B. Hughes, and T.D. Sisk. 2015. "Improving Governance for the Post-2015 Sustainable Development Goals: Scenario Forecasting the Next 50 years," <i>World Development</i> , Vol. 70, 286-302.	Elsevier Publication		<p>There have been almost no attempts to systematically forecast the developmental impacts of possible future patterns of governance around the world.</p> <ul style="list-style-type: none"> Most governance forecasts have been short-term, qualitative, or prescriptive <p>Collective struggle in post-colonial states:</p> <ul style="list-style-type: none"> Providing security against intra-state conflict Building state capacity to govern effectively + efficiently Broadening and deepening inclusion, i.e., democracy ext. <p>*Note: I do not have access to the full article.</p>	https://www.sciencedirect.com/science/article/abs/pii/S0305750X1500145?via%3Dhub
Safitri, A.I., K. Nisa, M. Rofi, and B. Arymbekov. 2024. "Explore action to enhance net zero emission 2050: Research trends and the way	Scholars are from Universitas Negeri Surabaya, Indonesia (1, 2), National Dong Hwa		<p>Net zero emissions by 2050 requires four effective steps:</p> <ul style="list-style-type: none"> Decarbonization Renewable energy transition Transportation electrification Reforestation 	https://www.e3s-conferences.org/article/s/e3sconf/pdf/2024/98/e3sco_nf_icosbi2

forward 13th SDGs?" <i>Web of Conferences</i> , Vol. 568, 1-10.	University, Taiwan (3), and Al-Farabi Kazakh National University (4)			<u>024_0100 4.pdf</u>
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