

# A Blueprint for Equity and Inclusion in Artificial Intelligence

WHITE PAPER  
JUNE 2022



# Contents

3	Preface
4	Executive summary
5	1 Introduction
7	2 Building an inclusive AI ecosystem
11	3 Inclusion by design
14	3.1 Understanding the problem and identifying AI solutions
17	3.2 Inclusive model design
18	3.3 Inclusive data collection
20	3.4 Equitable and inclusive model development and testing
21	3.5 Equitable deployment of trusted AI systems & monitoring community impact
23	3.6 A revolving & evolving life cycle
26	4 Conclusion
27	Contributors and acknowledgements
29	Endnotes

## Disclaimer

This document is published by the World Economic Forum as a contribution to a project, insight area or interaction. The findings, interpretations and conclusions expressed herein are a result of a collaborative process facilitated and endorsed by the World Economic Forum but whose results do not necessarily represent the views of the World Economic Forum, nor the entirety of its Members, Partners or other stakeholders.

© 2022 World Economic Forum. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, or by any information storage and retrieval system.

# Preface

The number of initiatives advancing equity and inclusion has increased substantially over the past decades, in particular with greater attention paid to systemic inequality issues impacting experiences at home, in school or in the workplace. With this increased awareness, many companies have begun to recognize the importance of integrating inclusive efforts into organizational management and processes – for example, ensuring equitable hiring practices or promoting employee resource groups to improve the variety or quality of services to underrepresented customers, as well as the experience of underrepresented employees. Within technology companies specifically, added complexity comes with equity and inclusion challenges unique to the design, development, deployment and use of technologies such as artificial intelligence (AI).

This report paints a comprehensive picture of challenges and opportunities for improvements in equity and inclusion across the AI development life cycle and governance ecosystem – tying together issues such as hiring, culture change, impact assessments and more. Notably, the report acknowledges that each space has best practices but a holistic approach connecting otherwise siloed spaces can benefit all. For example, it is not enough to conduct product consultations with impacted communities. Community members must then be provided with safe ways to continue communicating

feedback or suggestions as they arise and to understand how their participation led to concrete changes in the end product. While it may be more resource-intensive, there is far greater value for the AI ecosystem as a whole to invest in a systemic, integrated approach to inclusion.

The 2021-2022 cohort of the Global Future Council on Artificial Intelligence for Humanity embarked on a 10-month journey mapping the vast amount of equity and inclusion challenges across each phase of the AI technical life cycle and throughout the governance ecosystem and integrating them into a digestible framework. The group did not aim to reinvent the wheel but to leverage and share existing literature and initiatives in both equity and inclusion, as well as in AI ethics – simply connecting the dots where they may not have been previously connected.

The following blueprint was developed through monthly meetings of the council members and also draws upon anonymous stakeholder interviews and one workshop held with members of the World Economic Forum's Global AI Action Alliance. The holistic nature of the recommendations, as well as the methodology by which they were developed, is part of a continued effort to bring new voices into business, policy and technology discourse within the World Economic Forum and beyond.

# Executive summary

Artificial intelligence (AI) has been accelerating across sectors. It has great potential to benefit society but the technology's full potential can only be realized if it includes the diversity of the populations it represents throughout every step of its development. With growing concerns about bias, data privacy and lack of representation, it is critical to re-evaluate the way in which AI is both designed and deployed to ensure that all affected stakeholders and communities reap the benefits of the technology, rather than any harm.

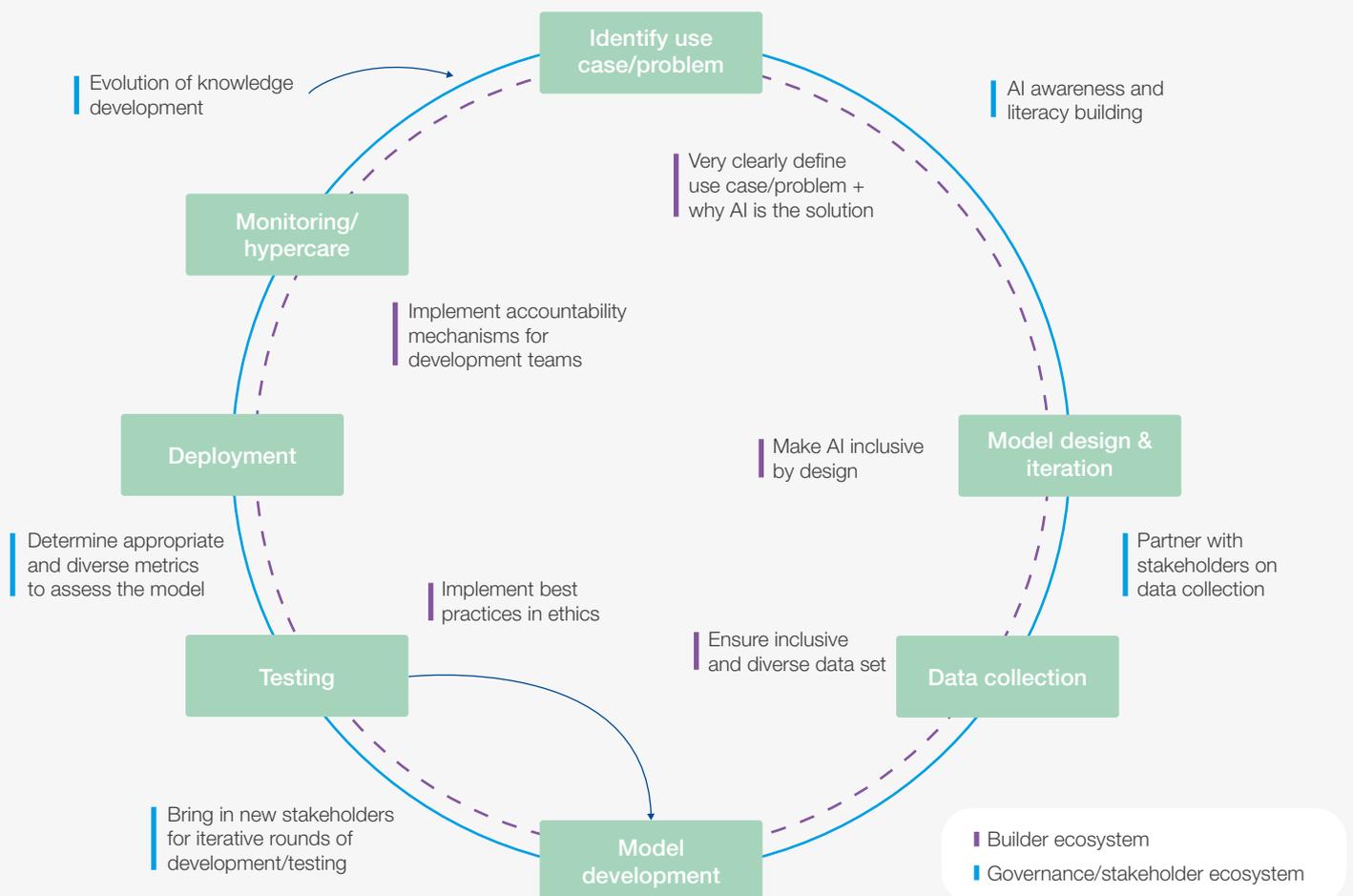
Evaluating the AI development life cycle, the Global Future Council on Artificial Intelligence for Humanity has identified gap areas and opportunities to make AI more equitable and inclusive for all. The current AI life cycle can be split into two areas: those that govern AI use (e.g. those who will receive and use the AI) and those that will design, develop and deploy AI to be fit for stakeholder needs. While each is on its own pathway, they both

work simultaneously to ensure AI is equitable and inclusive throughout their individual area.

The seven broad steps in the AI life cycle (see below) can be optimized to ensure equity and inclusion are prioritized in the development and deployment of AI. However, this common standard can only be achieved by looking at the current ecosystem in which artificial intelligence is distributed and understood. Through awareness-raising, educating, building accessible infrastructure and upskilling, current and future generations can be enabled to make informed decisions about their use of AI.

Further, it's important to note that the AI life cycle does not have a start and finish; rather, it's a continuous evolution that aims to improve. Its purpose is to enable AI practitioners to expect and allow for change based on governance structures and evaluations and then to apply those lessons learned to promote inclusive practices.

FIGURE 1 AI life cycle



1

# Introduction

This blueprint was designed with an inclusive methodology to guide organizations in achieving equitable and inclusive artificial intelligence outcomes.



There is no doubt that artificial intelligence (AI) is having a profound impact on all industries and, more importantly, on the lives of people in all communities. However, in the midst of this rapid digital transformation, many have realized that the promise of AI as a tool to improve the lives of people in an inclusive way is a promise yet to materialize.

Inclusive AI is a concept that has been commonly used in global discussions; however, there are few guiding principles to help decision-makers operationalize this concept within their institution or field. The objective of this blueprint is to address this gap.

Furthermore, inclusive AI is not only about equity and inclusion in the development of the technology. It is systemic in nature and thus requires an ecosystem approach. The lack of inclusive AI has proven harmful to businesses (leading to financial or reputational harms) and certain communities, in particular ethnic, cultural, linguistic, ideological and generational minorities. Thus, the main purpose of this blueprint is to enable a better understanding of how equity and inclusion by design can be adopted at two levels: the ecosystem (broad) and the AI life cycle (stages of technical development). In addition,

the adoption of equity and inclusion strategies for AI must go hand in hand with an integrated AI ethics approach as other AI principles and values are crucial and have an indirect impact on enabling an AI ecosystem that does not discriminate and does promote fairness, justice and shared prosperity for people and the planet.

The intended audience of this guide includes managers and teams responsible for the different stages of AI development, as well as decision-makers from all sectors part of the AI ecosystem. Furthermore, this guide builds upon other knowledge resources that various key institutions have published and is by no means exhaustive. It is the result of a collaborative effort of members of the World Economic Forum Global Future Council on Artificial Intelligence for Humanity and includes input from interviews held with people of diverse backgrounds and representatives of institutions in the AI diversity, equity and inclusion ecosystem. Moreover, the resources found in this guide have also been included in the [AI Fairness Global Library](#) (see Box 8: AI Fairness Global Library), where other knowledge resources from leading institutions can be found to deepen the topics presented here.



**Unity does not mean we are all the same, but we each take our responsibility to further collective well-being, we agree to bring together our separate and unique abilities, ways of seeing and doing things, thinking, to work together for an agreed purpose, intention.**

Tā Himi Henare, Rangatira o Taitokerau

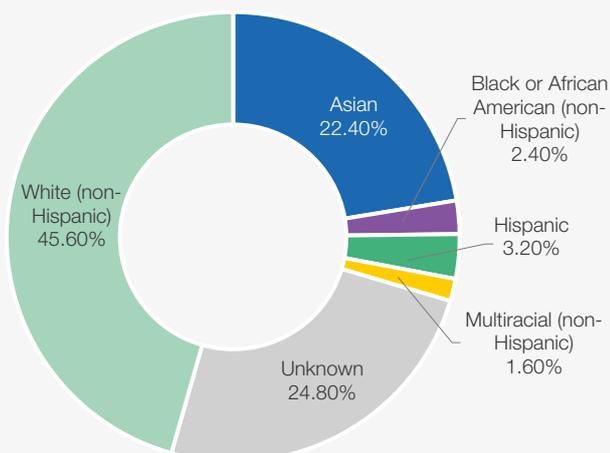
**BOX 1 What do we mean by AI?**

An artificial intelligence system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments.

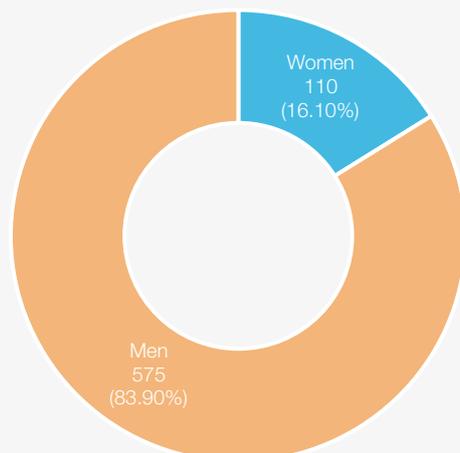
**Source:** Organisation for Economic Co-operation and Development (OECD), "Recommendation of the Council on Artificial Intelligence", 2019, <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>.

**FIGURE 2 Snapshot of AI's diversity shortfall in AI PhDs resident in the US and tenure-track faculty worldwide, by gender**

**New US resident AI PhDs (% of total) by race/ethnicity, 2019**



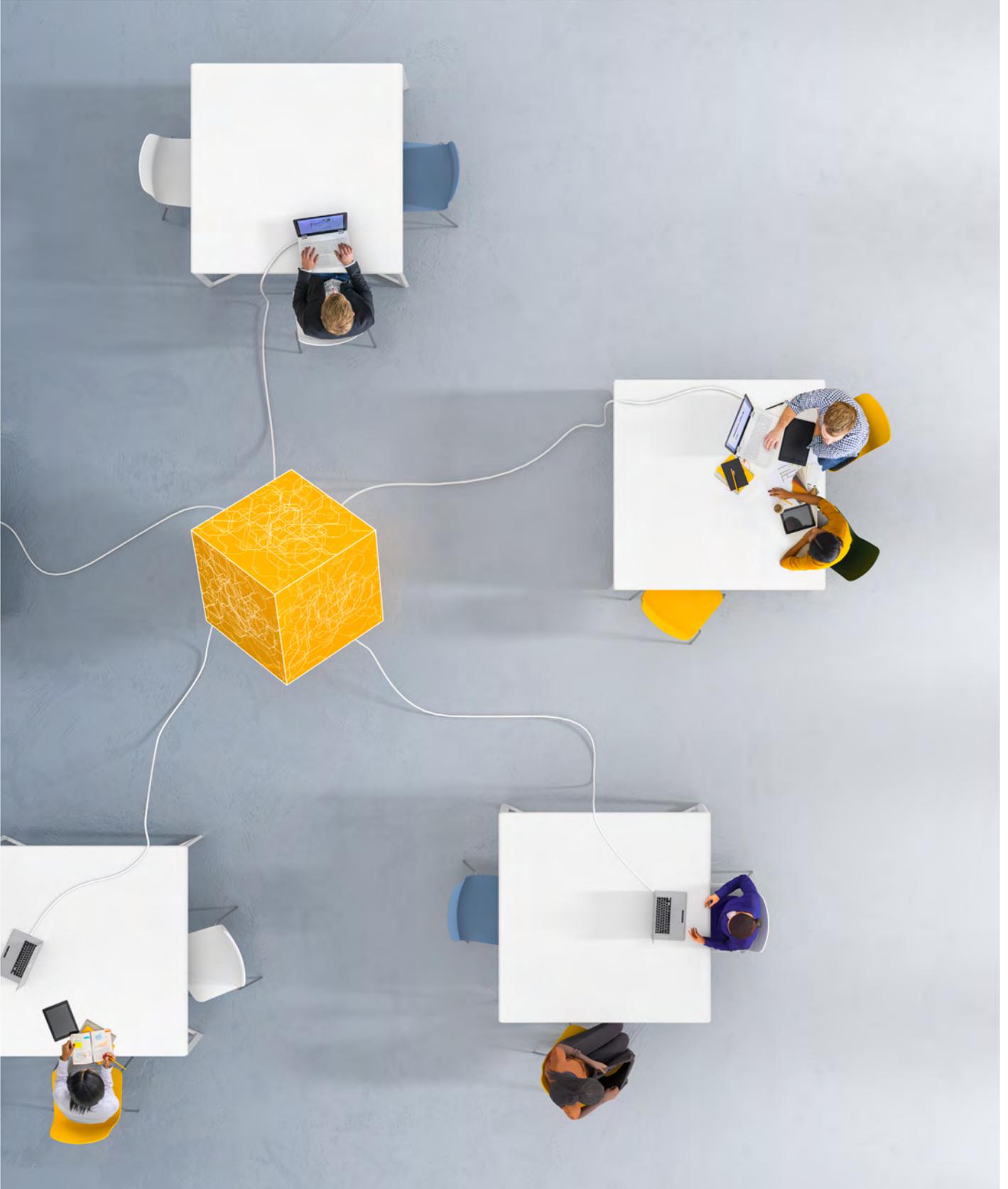
**Tenure-track faculty at computer science departments of top universities, by gender, 2019-2020**



**Source:** Zhang, D. et al., *The AI Index 2021 Annual Report*, AI Index Steering Committee, Human-Centered AI Institute, Stanford University, March 2021.

2

# Building an inclusive AI ecosystem



## Inclusive AI infrastructure

At the most basic level, an inclusive ecosystem enabling the participation of the broadest range of community members requires equitable access to the technical infrastructure (computing, data storage and networking) needed for AI system development. This infrastructure must be available both for the education of new AI practitioners and for the development of AI systems by citizens who lack the ability to pay for cloud computing. Access can promote inclusion – government investment in national and regional computing and data handling capabilities, either through the acquisition and provision of technology by user facilities or by funding national or regional access to commercial cloud resources – encourage greater numbers of citizens to engage with AI in technical or non-technical capacities, and funnel members of the population into AI-relevant jobs.

Facilitating access and equity can mean, at the baseline, prioritizing technology as a public or common good: putting the allocation of public sector resources first to increase access to modest

amounts of computing among a general population, rather than allocating resources to established applicants that have a history of successfully developing AI systems, such as major information and communication technology (ICT) companies or academic research groups that already have significant experience using AI methods. Government and civil society organizations have an opportunity to convene interested groups in a global network to share best practices in regulation and avenues for redress, provide the necessary feedback, create funds and embrace regional partnerships on data collection infrastructure.

Resource allocation processes must also incentivize the development of AI applications that benefit rather than harm the environment and people in a community. Through a holistic approach to governance and processes described in the sections that follow, the public sector can implement legal consequences and pathways for redress in the event of harm.

## AI literacy, education & awareness building

People – from adults, parents and caregivers to children – interact with AI systems in myriad ways every day. A second prerequisite to achieving equitable and inclusive AI is for all those interacting with these systems to have an understanding of the basics of AI in order to be aware of both the opportunities and risks posed by their use. While not everyone can be an AI specialist, each person can build an understanding of how they might be directly impacted – for example, through recommendation algorithms in their favourite social app – or indirectly, such as when amplified disinformation over decades erodes trust in communities. In short, every individual should be a critical user of AI systems, conscious of their rights and responsibilities and how they can exercise them in an AI-driven world.

Formal education institutions are one key place where governments can drive the development of AI-related skills, ideally from as early an age as possible. Since AI curricula in schools are not yet commonplace, extracurricular programmes can serve as crucial venues for children to learn about AI. Governments can [undertake a number of key tasks](#), such as supporting the development and updating of formal and informal education programmes to include technical and soft skills like critical thinking and emotional intelligence building, and digital and data literacy on basic AI concepts. They can also ensure gender equity in AI education efforts, with a focus on increasing the representation

of girls. Further, governments should partner with civil society organizations on educational campaigns to raise awareness of digital safety, privacy and other potential harms from technology – and pathways to justice (i.e. avenues to seek redress upon suspicion of harm or discrimination).

Together, these kinds of programmes can enable stakeholders to proactively engage with the impact of AI systems on their lives and those of the people around them. With greater AI and data literacy, stakeholders can better inquire as to how platforms collect and process their data and determine whether appropriate protective policies are in place. From a young age, children can benefit from parents thinking critically about the data and privacy impacts of AI systems used at work, in the home, at school and even in toys. For those wanting to go beyond the level of awareness, community groups and informal networks built around a shared interest in AI are crucial to further developing the conversation.

The role of companies in this space – elaborated upon below – is also immense. To support an ecosystem of AI-ready individuals, organizations can do much, including offering paid internships to aspiring practitioners, promoting community visits and engagement with a diverse range of AI workers beyond engineers, and organizing inspirational talks about the technological benefits of and career opportunities in AI.

# Equitable hiring practices & career-building opportunities for expertise in AI and AI governance

In recent years there has been a growing commitment to diversity, equity and inclusion (DEI) values and best practices among industry stakeholders. To further their progress in this space, companies must look outward and inward by establishing internal strategies for hiring, retention and workplace culture and external strategies for engaging key partners, stakeholders and experts.

Across industries, it is essential that organizations invest in diversifying and upskilling cadres of AI professionals to boost innovation, equity and inclusive outcomes. The following levers, among others, can strengthen the inclusive practices of AI professionals in an organization: increased career opportunities and related roadmaps, upskilling for diverse workers, complementary partnerships with diverse organizations and a culture of belonging in the workplace.

First, organizations must **widen career paths** related to AI to bring individuals from non-traditional backgrounds into the field. For example, a social media marketer could be cross-trained in product management for an AI-driven capability supporting the sales function. Similarly, a lawyer could contribute to the organization's AI risk management function. Embedding these widened paths and development roadmaps into any strategic workforce planning that an organization undertakes will be crucial to bringing a greater number of employees into the AI ecosystem.

The second lever to pull is to **embed the topic of inclusivity into training and development** of a greater number of the organization's staff. This could entail: a mentorship programme for staff to be paired with culturally diverse experts in diversity, equity and inclusion; simulation exercises for managers to identify and manage bias in AI products and services as part of standard risk management training; job-shadowing opportunities for technical and analytical staff and customer- and user-facing staff to understand each other's perspectives; or convening a diverse panel of end-users to evaluate simulated AI products and services as part of a required training programme.

A third lever to consider is **establishing partnerships** with academic, civil society and public sector institutions to embed equitable and inclusive processes into in-house AI capabilities. Partner institutions can contribute to the holistic review of AI systems by measuring equity in outcomes of solutions, providing continuous learning on responsible AI, or providing an "auditing" function for equity and inclusion.

Finally, it is important that employers **create and maintain a workplace culture of belonging**. Such a culture allows workers to bring their authentic selves, celebrates the unique attributes that make individuals who they are, ensures equitable opportunities for participation in important work, and recognizes and compensates contributors fairly. It is also a culture where systemic biases are brought to the surface and addressed on a routine basis – from the recruiting processes (which may, ironically, be leveraging AI in ways that systematically discriminate against applicants) to evaluation and promotion processes. Establishing systems encouraging employees to routinely engage in honest discussion and provide confidential feedback on items related to inclusion, belonging and general workplace culture also ensures that employers can respond and be adaptive to changes in the workplace. Likewise, it is important that this feedback be broken down by sex, race, age and gender, as workers from underrepresented groups tend to report lower rates of belonging.<sup>1</sup> Diverse workforces can minimize feelings of intimidation, especially with regard to novel or unusual ideas. They can also help reduce the chances that a bad idea or decision will continue to move forward.

In order for employers to leverage these practices to support inclusive AI ecosystems, it is important to acknowledge the wide spectrum of human identity across dimensions of diversity, including race, gender, age, sex, socio-economic status and religion. It is also necessary to create space for workers (from the boardroom and C-suite throughout all levels) to explore their own implicit and explicit biases. Additionally, employers must establish the clear, transparent and measurable goals and expectations of key internal processes, such as staffing, performance evaluation, compensation and career progression. These metrics serve to ensure accountability in the workplace.

## *Relevant guidelines & resources*

- [Blueprint: Artificial Intelligence for Africa, Smart Africa](#)
- [fAirlAC, Inter-American Development Bank](#)
- [A more meaningful and inclusive AI, C Minds](#)
- [AI Strategy 2019AI for Everyone: People, Industries, Regions and Governments, Government of Japan](#)

- [Digital Citizenship+ \(Plus\) Resource Platform, Youth and Media team, Berkman Klein Center](#)
- [The Toronto Declaration: Protecting the right to equality and non-discrimination in machine learning systems, Access Now](#)
- [Building the Data Economies of the Future: Tomorrow's Data Economies Shaped by the Youth of Today, PwC](#)
- [Innovating learning and education in the era of AI, MIT](#)
- [Alternate Curriculum Unit on Artificial Intelligence, Exploring Computer Science](#)
- [Secretary-General's roadmap for digital cooperation, United Nations](#)
- [Reimagining Regulation for the Age of AI, World Economic Forum](#)
- [AI AND CHILDREN: AI guide for parents, UNICEF Office of Global Insight & Policy](#)
- [Indigenous Data Sovereignty, United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#)
- [DIVERSIFYING GLOBAL ACCOUNTING TALENT: Actionable Solutions for Progress](#)
- [Diversity & Inclusion Leadership Skills Needed In Artificial Intelligence](#)
- [How to Foster Inclusion & Trust in Artificial Intelligence Work Groups](#)
- [3 Ways to Promote Inclusive Decision Making](#)
- [Bias and AI: The Case for Inclusive Tech](#)
- [Digital literacy for children: exploring definitions and frameworks](#)

#### Cultural competency

- Culture: the embodiment and expression of values, principles and protocols pertaining to diverse epitomes, ontologies and knowledge systems.
- Competency: revealing the cultural biases within the lexicon of AI, its conceptual manifestation and typically historically western industrial perspectives regarding the purpose of artificial intelligence (AI).

## BOX 2

### Case study – Te Mata Ira Guidelines for Genomic Research with Māori

The AI life cycle as viewed by the Māori indigenous population is based on key core concepts including:

- Whakapapa – The interconnection of people, planet and purpose
- Whanaungatanga – Creating, maintaining, enhancing human and environmental relationships, now and for a sustainable future.
- Manaakitangi – inclusion and participation.

The Te Mata Ira Guidelines project was created by Māori, for the interests of Māori as a response to the increasing prevalence of genomic research, the creation of research biobanks, and the international nature of research collaborations. However, it is not limited to being used only if Māori are involved at any stage. “Māori ethical frameworks recognise that all research in New Zealand is of interest to Māori and outline community expectations of appropriate behaviour in research to deliver the best outcomes for Māori. Research contributes to the broader development objectives of society. Ethics has a specific role in guiding key behaviours, processes and methodologies used in research.”

The guidelines draw on a foundation of mātauranga (Māori knowledge) and tikanga Māori (Māori protocols and practices) and will be useful for researchers, ethics committee members and those who engage in consultation or advice about genomic research with Māori in local, regional, national or international settings.

The end result hopes to not only protect Māori interests but is an example of what is made possible by including diverse thinking, and provides a new way of identifying stakeholders, understanding ecosystems, and building trust and engagement in AI. It is a solution to mono-cultured, gendered players and methodologies, resulting in more representative data, with benefits going to participants or subjects themselves.

**Source:** Hudson, M., et al., *Te Mata Ira: Guidelines for Genomic Research with Māori*, 2016, University of Waikato (the world's first indigenous-led guidelines for genomic research and biobanking).

3

# Inclusion by design



Many systems within society – be they economic, social, socioeconomic or other – have proven to be inequitable by design; therefore, they can and must be redesigned. In striving for equity and inclusion in AI, all stakeholders in the ecosystem occupy a role in ensuring inclusive outcomes and can use their unique positioning – as designers, developers, oversight bodies, etc. – to disrupt inequitable or non-inclusive processes.

Many different types of stakeholders may be involved in the development or governance of AI systems. It is important to consider the needs of all potential stakeholders, as they may have specific knowledge, expertise, concerns or objectives that can help to ensure that the system is designed effectively.

- **Government agencies** responsible for regulating AI systems and ensuring that they are safe and effective

- **Civil society organizations** involved in monitoring the impact of AI systems and advocating for the rights of people who are affected by them
- **Private companies** responsible for developing or operating AI systems
- **Individuals** affected by AI systems in different ways

The remaining sections of this report break down the different phases of an inclusive AI development and governance life cycle. From identifying a use case to designing, deploying, monitoring and iterating on the AI model to find the best solution, it is crucial to place care and due diligence in embedding equity and inclusion throughout each stage of the AI life cycle.



**Technological progress has to be designed to support humanity's progress and be aligned to human values. Among such values, equity and inclusion are the most central to ensure that AI is beneficial for all.**

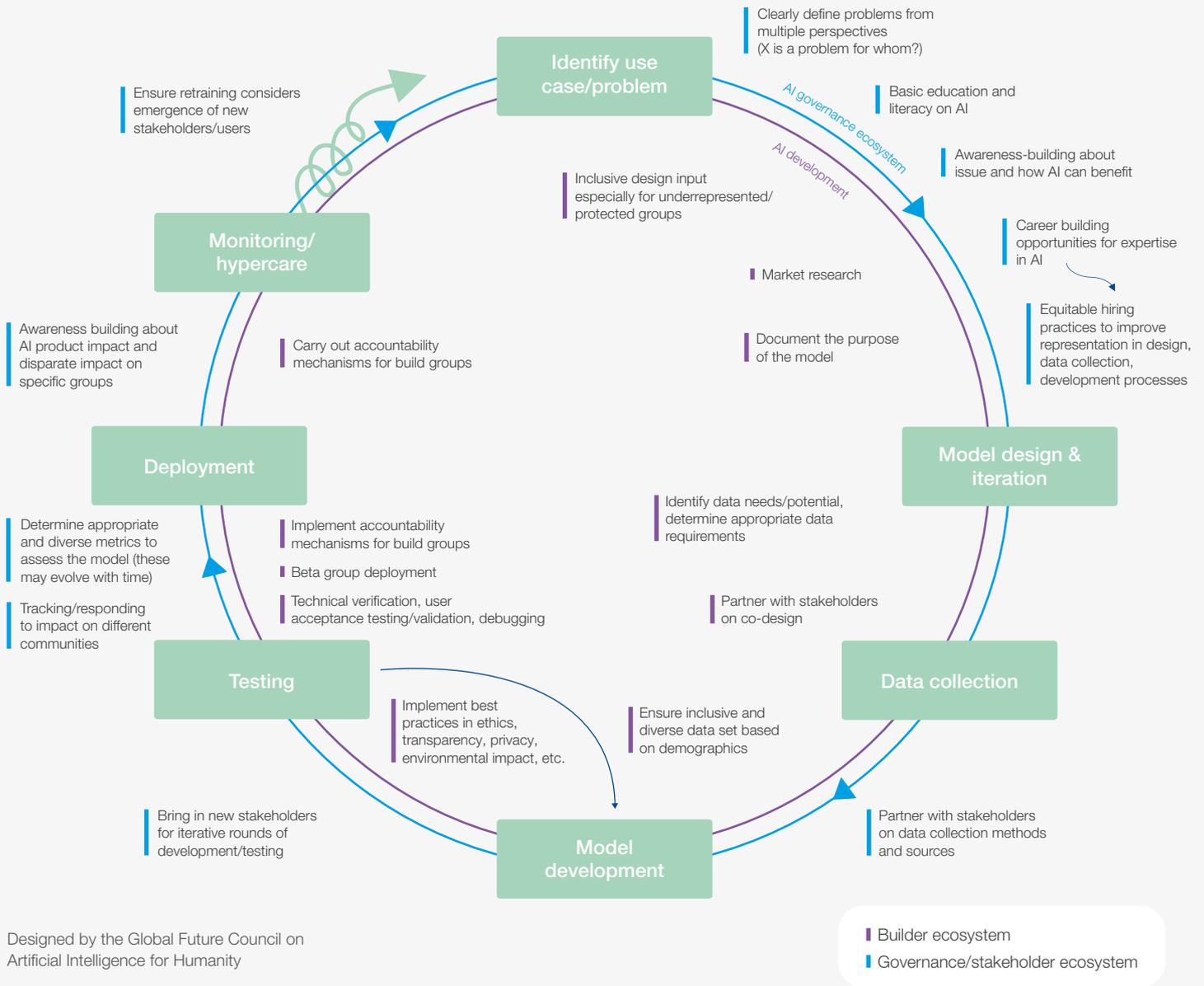
Francesca Rossi, AI Ethics Global Leader, IBM



The diagram below, while not comprehensive, attempts to provide a systems view of equity and inclusion in AI, rather than separating the development, business and governance ecosystems. However, it is vital to acknowledge that many aspects of governance, such as

education and resource allocation, as described above, are transversal to all stages of the AI life cycle and while represented in the early stages of the life cycle, cannot and should not be captured along one timeline.

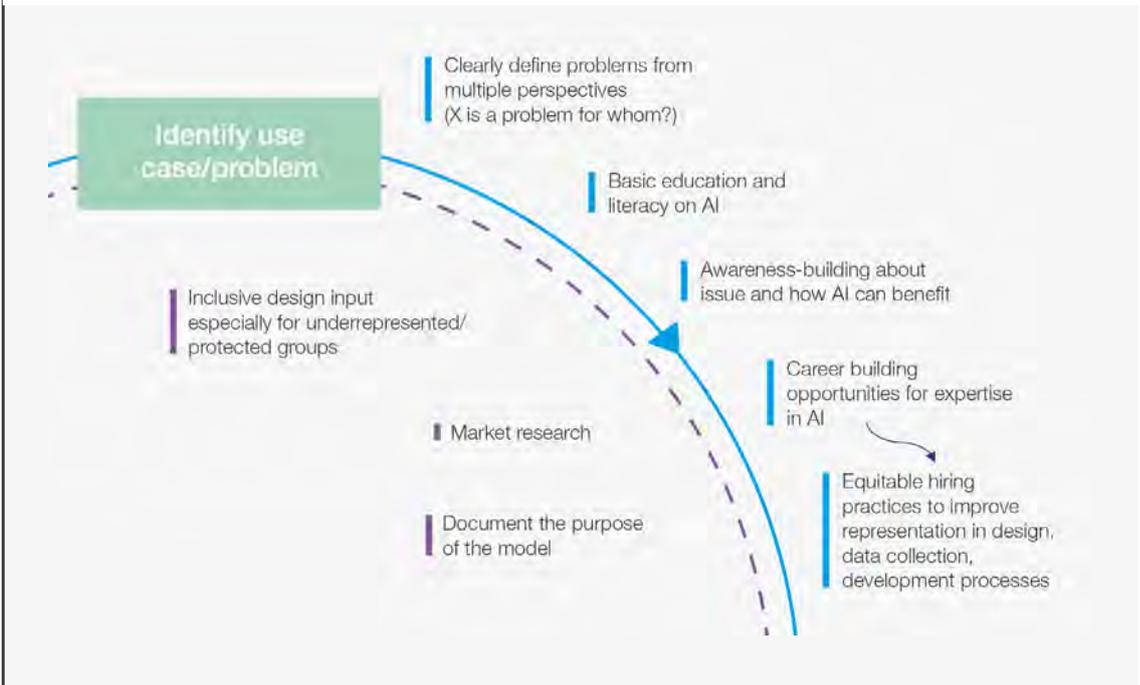
FIGURE 3 An inclusive AI life cycle



Designed by the Global Future Council on Artificial Intelligence for Humanity

## 3.1 Understanding the problem and identifying AI solutions

FIGURE 4 Identify use case or problem



### Inclusive problematizing: Identifying the potential for AI deployment

The first phase of developing inclusive AI systems is to identify the challenge at hand and why AI is needed. What is the problem and ideal outcome? Is AI the best tool to solve this problem? Who is asking for an AI solution? What are the benefits of using AI over other solutions? Clearly defining the problem that needs solving, from multiple perspectives, can ensure that AI is deployed only where necessary and desired by the surrounding community and that the project embeds inclusion by design from its inception.

At this point, interventions can also be made to ensure the AI system is designed for socially beneficial use cases. AI is often deployed to optimize a target variable such as revenue, quality of life or access to services such as healthcare. For example, if a company wants to target a wider audience, it may consider adding features that make the product more accessible to people with different needs. This could include things like adding support for multiple languages or adding an audio interface for people who are blind or have low vision, or helping people with mobility impairments book appointments or find resources they need. However, target variables such as production efficiency can sometimes act as proxies for revenue – leading, in the end, to unhappy or exploited workers.

Identifying a target variable with honesty, integrity and transparency can help teams avoid potential harms emerging down the line.

Assigning responsibility and oversight for the project from the earliest stage is also crucial. This includes understanding which organization or individual has the necessary expertise, and resources, to sustainably manage an AI system, and ensures that appropriate accountability mechanisms are built in the event of harm. Once the project owner is identified, it is important to consider which other government agencies, civil society organizations or private companies will be involved in developing or regulating the AI system.

Upon gaining a clear understanding of the problem and AI solution, the emphasis must now be placed on the impact the system will have across its lifetime, both intended and unintended, both positive and malicious. There are many examples of best practices in this space, such as Microsoft's [Community jury](#), all of which involve partnering with communities to understand stakeholder needs and the potential impact of the AI system not only on business or technological outcomes, but on humans and the environment.

One way to ensure that inclusive AI systems are designed with consideration for their lifetime value and impact is to establish, from the earliest stages of the project, a process of continuous monitoring and improvement. This means setting up mechanisms to regularly assess the team's

and the system's performance, identify areas for improvement and make changes accordingly. This iterative process, elaborated upon in later sections of this report, can help to ensure that AI systems meet the needs of all stakeholders and do not cause inadvertent harm.

### BOX 3 Unintended consequences of AI and big data

Misuse and politicization of AI and big data have the potential to trigger instability in a region. In recent months (Q2 2022), there have been massive demonstrations in Jakarta, Indonesia: Minister of Politics, Law & Security of Indonesia Luhut Panjaitan's claims that a big data analysis revealed more than 100 million Indonesians want the country's presidential election to be postponed has resulted in President Joko Widodo's cabinet extending his term.

Government leaders have so far been unable to retrieve and present the data, draw transparent conclusions and present it to the public.

**Source:** Konrad Adenauer Stiftung, *Regulating Data in India and Indonesia: A Comparative Study*, March 2021, <https://www.kas.de/documents/278334/278383/Final+Report.pdf/bd12d617-e562-4d30-cfae-1cc7ede12fd1?version=1.0&t=1620083064637>.

In another example, Politico details how the Dutch tax authority ruined lives after using an algorithm to spot suspected benefits fraud: [Dutch scandal serves as a warning for Europe over risks of using algorithms](#).

## Operationalizing inclusive community engagement, especially for underrepresented or protected groups

As discussed above, establishing means for stakeholder input from the earliest stages of the AI project throughout the system's life cycle is necessary. But as organizations engage with communities to be part of the design process, they must recruit these perspectives and create safe (as determined by the underrepresented and protected groups), inclusive, accessible and culturally responsive approaches to the communities they are seeking to engage with.

Inclusive community engagement does not have a one-size-fits-all approach. When executed well, engagement practices that incorporate diverse voices can build lasting and meaningful relationships, deep insights and mutually-beneficial opportunities for organizations and the communities they serve. When executed poorly, they can have the opposite effect – eroding trust, fostering exclusion, limiting participation and harming underrepresented or protected groups.

*Areas of focus to consider*

### – Developing an inclusive community engagement framework or code of conduct

Organizations can proactively address inclusion by defining expectations for community engagement. Steps may include identifying the capacity and capabilities needed among community representatives, determining the desired level of stakeholder engagement and

any implications of the collaboration model (e.g. a non-disclosure agreement), specifying roles and responsibilities within the engagement and feedback process, delineating how individuals will be ensured free and safe participation, determining compensation for participants from underrepresented or marginalized groups, and providing resources for supporting community members engaged.

The International Association for Public Participation (IAP2) outlines five key levels of engagement. It is important to understand and establish alignment on the appropriate level of engagement for a set project. New practices, such as those by the [Creative Reaction Lab](#), are reimagining the design process to promote equity. Guidelines and an [in-depth review](#) of these levels by CoCreative are a helpful starting place for approaching change to systemic issues.

### – Getting an organization ready for inclusive community engagement

Organizations looking to execute effective community engagement can do so by allocating time and resources to cultivating and nurturing strong, meaningful and reciprocal relationships with impacted communities – avoiding a “fly in, fly out” experience where organizations extract insights only when needed. Time and resource investments should include employee training and assessment

in communication, implicit bias, systemic inequality, allyship and cultural competency with members of marginalized communities. While relationship managers or engagement specialists can support design, planning, record keeping and oversight of external engagement, community engagement responsibilities are ideally allocated across employee levels, so that community representatives have opportunities to directly share their requests with company decision makers.

#### – Designing inclusive community engagement

An invitation to participate does not guarantee a sense of welcome or belonging. It is crucial to understand and address barriers to participation for each participating group – including historical mistrust of institutions, safety (physical, emotional, political, etc.), lack of existing relationships with communities, time, capacity and resource limitations – as well as their needs and preferences for participation processes such as compensation (beyond financial, such as childcare, transport, etc.), timing, privacy, interpretation, cultural customs or norms, location, online versus in-person, and other methodology considerations (e.g. one-on-one versus large group formats, “empathy interviews” to ground a systems analysis in the experiences of those most impacted by the system, or “vote weighting” to give people from marginalized communities a greater voice). Culturally appropriate food and refreshment offerings, as well as the use of preferred titles, names or terminology can also help to build a supportive and inclusive environment for participants. These considerations can promote participation from a range of groups and individuals from diverse backgrounds. Indeed, organizations willing to acknowledge histories of harm or trauma among impacted communities will be better placed to establish trusted and meaningful relationships with those communities moving forward.

Prior to delivery, teams should ensure a representative of the community with which

they are seeking to engage has approved their planned community engagement methods. It may at times be effective to offer management of the engagement process to a trusted partner or stakeholder who is respected by the community at hand. Further oversight can be provided for through robust feedback channels, to both receive word from participants and to inform the participating stakeholders about what has resulted from their engagement.

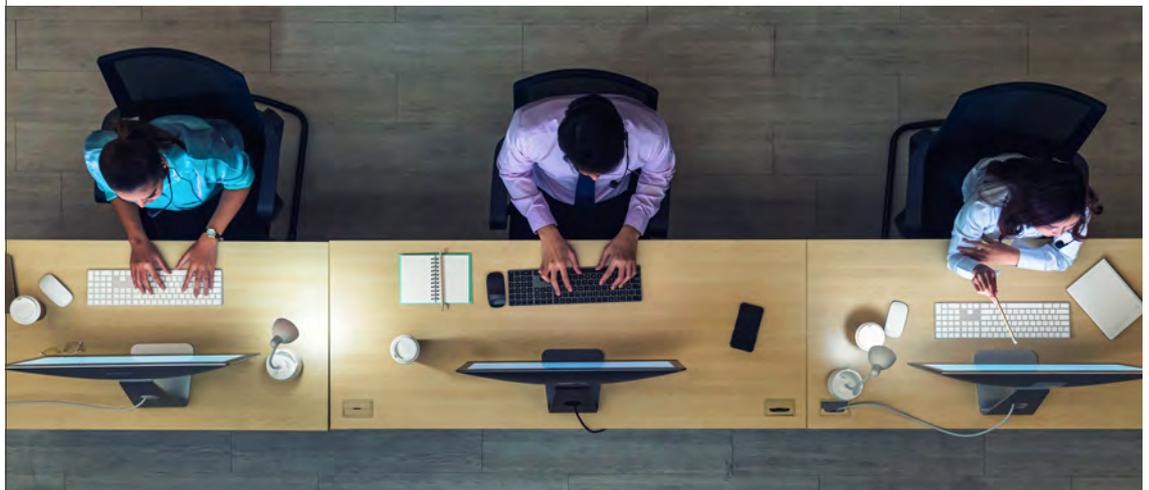
#### – Delivering inclusive community engagement

Prior to executing the community engagement process it will be vital to ensure that all design elements and preferences have been incorporated and that venues and resources are accessible and reflect what communities shared prior to the engagement.

The process does not end when participants go home or close their computers. When implementing community engagement outcomes into an AI project, organizations must continue to put the voices and experiences of those most marginalized at the centre.

#### *Relevant guidelines*

- [Field Guide for Equity-Centered Community Design, Creative Reaction Lab](#)
- [AI Risk Management Framework: Initial Draft](#)
- [Design Justice Network Principles, Design Justice](#)
- [Managing Machine Learning Projects in International Development: A Practical Guide, USAID](#)
- [Te Ara Tika Guidelines for Maori Research Ethics](#)
- [AI readiness assessment, fAIr LAC Jalisco / C Minds \(Spanish\)](#)
- [The Context Experts, Tamarack Institute](#)

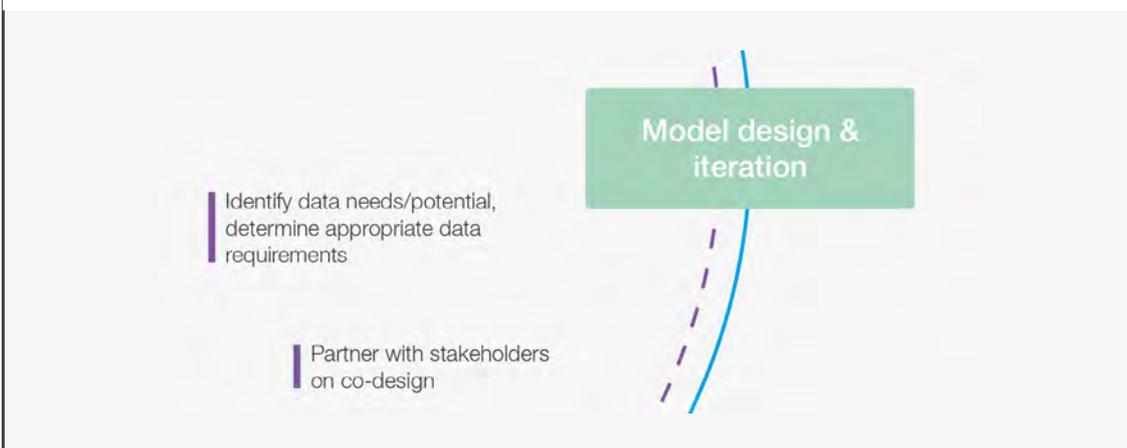


fAIr LAC Jalisco is an initiative led by the Inter-American Development Bank (IDB), the action tank C Minds, the Monterrey Institute of Technology (Tec de Monterrey) and the Government of Jalisco, Mexico. It is the first living lab in Latin America on AI for impact that stems from a quadruple helix (academia, government, civil society, industry) partnership. This initiative seeks, among other objectives, to generate pilot projects that harness responsible AI for the public sector. Inclusion and diversity of stakeholders at every stage of the life cycle are core components of the work.

One of its use cases focuses on finding better, more effective and inclusive ways of diagnosing diabetic retinopathy, which is the leading cause of blindness in the state of Jalisco and a disease that impacts 103 million people worldwide. The project underwent an early assessment of AI's appropriateness for the beneficiary population and context using the [Feasibility Guide and risk analysis of AI systems](#) for use cases of social good developed by C Minds in collaboration with the project's partners. Inclusion by design was a priority throughout the entire life cycle of the pilot project. It was developed with the participation of more than 1,000 people from diverse backgrounds, thematic specialists from all sectors, early adopters, and potential beneficiaries. The project was also deployed in underserved communities, among various other actions that led to a more inclusive way of approaching this initiative.

## 3.2 Inclusive model design

FIGURE 5 Model design and iteration



### Design with communities and impacted stakeholders in mind

Much like any product design, from physical to digital ones, AI systems need to be conceived from the start with all potential users and stakeholders – those in existence today and potential ones in the future – in mind. Successful system design starts with ensuring key questions about “*why, for whom, and by who*” are appropriately answered and with continuous revisiting throughout the development process. Partnering with stakeholders and representatives of impacted communities (particularly non-western perspectives) can bring clarity to this process. Of course, ensuring members of AI design teams themselves are representative of potential impacted stakeholders can serve to proactively address many potential harms related to inclusion, as well as increase the trust external stakeholders place in the organization.

To begin with, AI systems are at the core mathematical equations identified based on the data used to train the machine learning models used for the systems and with potentially many components. As such, they tend to be significantly more flexible than other products, with – both theoretically and in practice – “infinite” possible end-product designs. Design decisions should consider multiple trade-offs covering aspects ranging from the predictive accuracy of the system (itself often measured using many metrics, such as false positives, false negatives, total accuracy, accuracies by sub-populations or across different contexts and use cases, etc.) to fairness outcomes across multiple contexts (e.g. different sub-populations of people the AI system will eventually be used by or applied to), its robustness, generalizability,

interpretability, explainability and transparency, among others. This flexibility – and complexity – can be both an opportunity to create better AI systems and a risk of ending with solutions that behave unfairly or perform differently across groups of people or contexts. The data challenges discussed below compound the challenges of finding an “optimal” and inclusive AI system design.

Perspectives from multiple stakeholders and populations about design trade-offs need to be considered proactively, as diverse values (and cultures) need to be “codified” in the mathematical models and eventual AI design. This can prove to be challenging. Some best practices include proactively incorporating input from diverse stakeholders, ensuring cognitive and other diversity in the development team – effectively reflecting the diversity of the system’s end-users and stakeholders – identifying appropriate metrics, and ensuring end-to-end transparency on all design choices made and which are properly

debated and documented. Of course, this does not mean that organizations do not also have to be reactive in solving issues as they arise. Despite efforts on inclusive design, it is also important to decide early on what paths to follow in the event of an unintended or malicious use case and how to provide users with informed consent and opportunities to opt out of being impacted by the AI system, without significant inconvenience to those opting out. AI systems must be built to respect such needs “by design”.

*Relevant guidelines*

- [Ethically aligned design: A vision for prioritizing human well-being with autonomous and intelligent systems, IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems](#)
- [The seven principles of universal design, Universal Design Living Laboratory](#)

### 3.3 Inclusive data collection

#### Identifying paths for more inclusive data collection with robust governance and privacy by design

FIGURE 6 Data collection



Creators, owners, gatekeepers and custodians of AI systems have power over how data is used and stored. They should implement existing best practices in privacy and ethics in data collection and storage and use. Yet, additional considerations for collecting more inclusive data are also important.

Online data can pass through many hands and reach numerous devices worldwide. This convenience is beneficial in many ways, such as engaging with customers or partners or sending and sharing important information. However, this greater connectivity raises some issues, including the ability to maintain privacy and confidentiality

and concerns over who owns the data. Keeping data privacy at the top of the agenda, particularly when managing data from marginalized populations, is critical.

For data collection involving human subjects, developers must establish for what purpose the data is being collected, how and by whom, on top of ensuring that their training data sets are demographically representative of the communities to which the AI system will be applied. Minority groups, particularly Black and Indigenous people of colour, have been at best under-represented and at worst targeted in the analogue world:

underrepresented in health, education and economic successes, and overrepresented in the criminal justice system because of biased data sets, poor health, poverty, employment statistics, biased insurance policies, and gender discrimination. Designers should identify and partner with representatives of these impacted stakeholders on data collection methods – especially when identifying new or non-traditional resources for gathering data. It is important to consider opt-out methods for data collected for model training as well as model application. Qualitative data is equally as important as quantitative – teams should go back to the drawing board if it becomes clear that the existing set is not representative or new information is acquired.

Data sovereignty, both theory and practice, is crucial in considering the use, management and ownership of AI to house, analyse and disseminate valuable or sensitive data. This report does not aim to present one definition of data sovereignty. Operationally, data sovereignty refers to the representation of stakeholders within an ecosystem, representatives from outside those groups to be included as partners throughout the data and AI life cycle. For some, data sovereignty is a concept that relates to what country's laws should apply to a piece of data over another's – in particular, how data originating from one country should be subject to the other's laws<sup>2</sup> – with implications for privacy, security and informed consent. In an inclusive system, it is crucial to work to understand what data sovereignty means to the people whose data is being used – this is not uniform across cultures or communities.

In Aotearoa, New Zealand, for example, the concept of Māori Data Sovereignty,<sup>3</sup> in existence since 2015, refers to data collected by or about Māori. More broadly, holding “sovereignty” is understood to be having autonomy or determination over, participating in and being accountable for the collection, protection and dissemination of (at the least) your own or your community's information, as well as the data about the environment your community looks after. The vision for Māori is to have built their own cloud, have the capability and capacity to host their own data, to manage it as best serves them. Enacting equity and inclusion

here means to be partners with governments, organizations and corporations in building products that represent the indigenous population.

If data is seen as a resource to be distributed for the prosperity of the collective well-being, people and planet, now and for the future, then data will be created and used to carry out that function through AI. But if the purpose of data gathering, collection and use is for economic gain, if it is seen as a commodity in the market place to be consumed, as assets have been seen in the consumer economy, data will be used and abused like every other asset or resource that is “owned”, bought and sold, exponentially driving inequity and exclusive outcomes. It is crucial for alternative perspectives to become part of the AI ecosystem.

Access, including infrastructure to host data, may be another concern. Capability education to build cloud or other data storage infrastructure is often held by governments and corporations who are entrusted to share, protect and manage on their own terms. Data sovereignty movements have the potential to boost the creation of services, products, systems and institutions by underrepresented communities, and promote resource allocation to the right communities as determined by users and stakeholders on the ground.

#### *Relevant guidelines and reading*

- [Refugees help power machine learning advances at Microsoft, Facebook, and Amazon](#)
- Kukutai, T., & Taylor, J., Data sovereignty for indigenous peoples: current practice and future needs, in *Indigenous data sovereignty: Toward an agenda*, 2016, ANU Press
- Pihama, L., Cram, F. & Walker, S., Creating Methodological Space: A Literature Review of Kaupapa Maori Research, in *Canadian Journal of Native Education*, 26, 2002
- Tuhiwai Smith, L., *Decolonizing Methodologies, Research and Indigenous Peoples*, 2012
- [Data trusts report, UK Open Data Institute](#)

## BOX 5

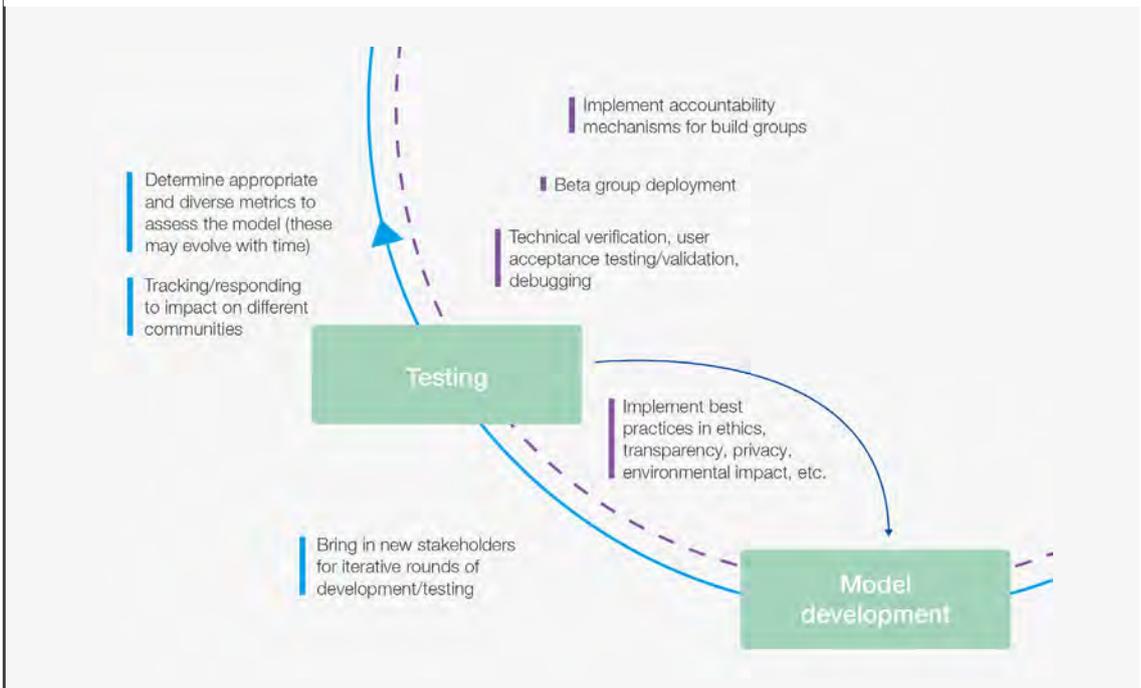
### **Data collection in developing countries**

In many low and medium income countries, the practice of collecting data in a structured and electronic way is limited. In Indonesia, for example, most government agencies still prefer to store data in hardcopy, making data processing difficult in the future. In addition, existing electronic data files are not centralized nor structurally stored and, thus, challenging to obtain and retrieve. Without a minimum of digital transformation, data scientists on the ground must work with a limited amount of data, which tends to underrepresent the full population. It is thus common for data scientists to use open-source data available on the internet through social media or search engines for their primary data sources.

## 3.4 Equitable and inclusive model development and testing

### Processes to ensure equity and inclusion for development, testing and measurement

FIGURE 7 Testing



As stated in prior sections, the development process begins by ensuring product teams leading and working on the project are diverse. Diverse teams more likely to develop new, innovative products and having a representative group of developers enables more inclusive decision making and development. It is also critical to make inclusion, ethics, transparency, privacy and impact the foundation of product and development teams. Developers should approach projects with these priorities and goals should include metrics that track these elements. Further, organizations should implement existing responsible AI best practices to track accountability.

Driving equitable outcomes when deploying AI requires the foresight to collect any demographic data needed to conduct fairness testing. Organizations should bring in new stakeholders for iterative rounds of development and testing and recruit beta groups for test deployments so that product teams may leverage new viewpoints that evaluate both the function of the technology and its inclusivity. Teams must incorporate these user groups with different needs and abilities in training data, user testing and product development. By ensuring populations selected for testing are sufficiently representative of the overall population,

bias may be identified prior to full deployment. Lessons learned from testing should be taken back to the development team and re-evaluated and designed as required – technical verification, user acceptance testing and validation, and debugging, as well as prioritized metrics on inclusivity and ethics.

Teams should determine appropriate and diverse metrics to assess the model, which may evolve with time. Once teams have developed, tested and validated the product, they should obtain informed consent on the developed product features from impacted stakeholders. This recommendation is key to tracking and responding to the technology's impact on different communities, which can take time and be a difficult, yet necessary, step to ensure equity and inclusion by design in the AI life cycle. These communities can also include youths and custodians for groups that are often without a voice. If issues or recommendations arise from these discussions, developers should make changes, accommodate or return to the drawing board.

#### Relevant guidelines

- [Cultural Diversity, Innovation, and Entrepreneurship: Firm-level Evidence from London](#)

Facial recognition in the United States was designed as a way of identifying or confirming an individual's identity by using their face. The intent was to create a useful tool. However, it was quickly realized that facial recognition adversely impacted marginalized communities. Today, the top six ethical concerns related to facial recognition systems include racial bias and misinformation, racial discrimination in law enforcement, privacy, lack of informed consent and transparency, mass surveillance, data breaches, and inefficient legal support.

From 2019 through 2021, about two dozen U.S. state or local governments passed laws restricting facial recognition. These include the states of Virginia and Massachusetts and the cities of Boston, Minneapolis, San Francisco, Oakland, and Portland, listing concerns about facial recognition accuracy and privacy. However, the use of facial recognition is increasing in the United States as bans to thwart the technology and curb racial bias in policing come under threat amid a surge in crime and increased lobbying from developers.

Repeating history by shipping AI tools without diverse perspectives can be avoided with a new way of thinking. This begins with re-evaluating the life cycle of AI tool development. Tech companies can change the AI life cycle – especially for those that directly impact marginalized communities. The question to ask is, “What actions are required to create more diverse perspectives at the AI development table?”

The answer comes from creating a network of diverse resources beyond the typical AI development team to proactively explore the potential impact on marginalized communities. A tech employee from a non-technical role can provide a diverse perspective, similar to how an external stakeholder from a diverse community can lend a helpful perspective before the product is shipped. Creating more inclusive AI can also be achieved with perspectives from employee resource groups (ERGs) and external stakeholders – before the product touches the lives of all communities. Through more diverse and inclusive exercises at the early stages of the AI life cycle, the history of releasing flawed AI tools can be avoided.



### 3.5 | Equitable deployment of trusted AI systems & monitoring community impact

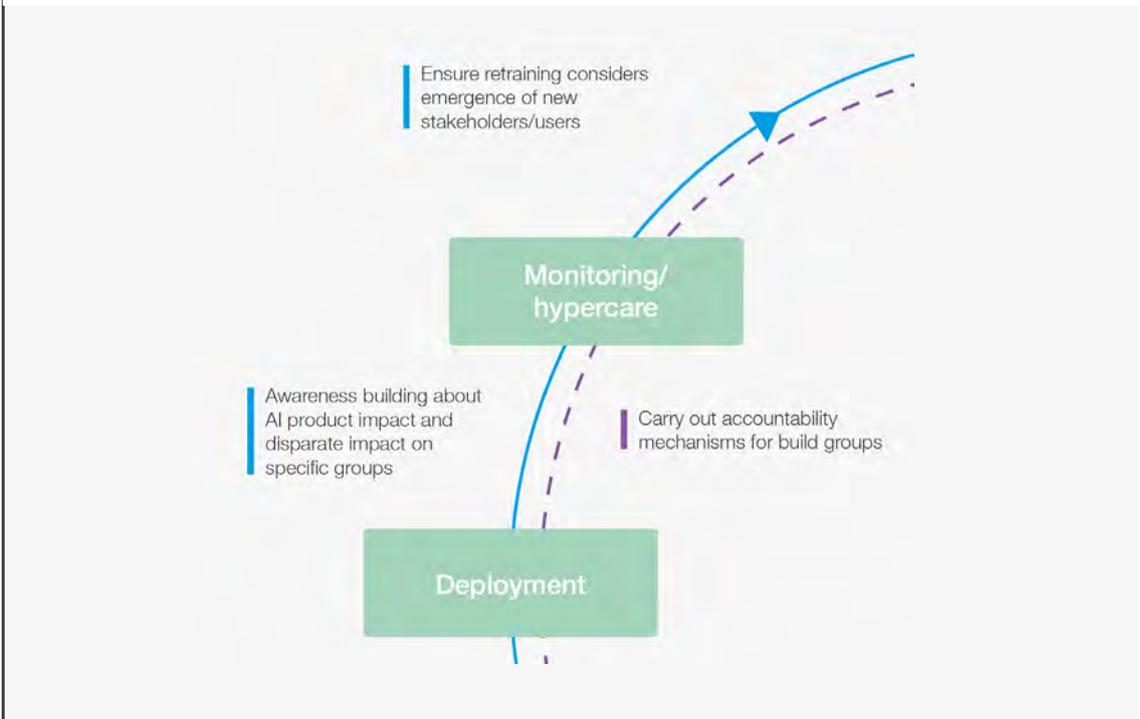
**Intentional deployment and continuous monitoring to ensure the benefits of AI are equitably distributed and harms are reduced**



**For AI to remain inclusive while in use, it is necessary to have feedback and redress processes to manage potential incidents that are clear for everyone impacted.**

Theodoros Evgeniou, Professor of Decision Sciences and Technology Management, INSEAD

FIGURE 8 | Monitoring and hypercare



## Equitable and inclusive practices in AI deployment

Facilitating conversations about equity and fairness early on in the product life cycle is crucial. However, the evaluation must also carry forward through all stages, including before, during and after deployment. Deploying an AI system occurs after iterations of testing and debugging, followed by a walk-through of the system’s functionality for the involved stakeholder groups. But prior to final deployment, stakeholders should be given an opportunity for a final review and sign-off – particularly if their input led to significant changes

in the design or development process. Additionally, careful thought should be given to public communication and transparency regarding any possible impact on their lives or services they use.

There should be alignment on post-launch monitoring, whether automated or manual, as well as clear and accessible escalation processes within the organization should any bias or disparate impact be identified. Teams should identify and be clear on individual or team accountability to specific outcomes.

## Monitoring and retraining must take into account the emergence of new stakeholders and users

If there is one key feature that differentiates AI systems from others, it is their ability to continuously evolve as they are being used thanks to machine learning capabilities. However, the context in which they operate may also change. This can create significant challenges in terms of managing AI risks, including potential differential treatment of sub-populations of people. New stakeholders may emerge or existing ones may themselves evolve or change behaviour due to external factors such as health or the economy. An AI system that started as fair and inclusive could evolve to make unfair decisions that possibly exclude certain populations from access to resources such as credit, health services, educational opportunities or jobs.

It is therefore critical that, once deployed, AI systems and the environment they operate in be

continuously monitored, with the right metrics in mind – including impact on users and the climate (e.g. energy consumption) – and the right processes in place to address issues when identified. Here, tools such as software to monitor system behaviour can be useful if accompanied by teams with resources dedicated to robust, fair and transparent responses to impacted stakeholders.

Users should also be actively provided with mechanisms to identify and report harmful or questionable AI incidents, with all relevant information shared across relevant stakeholders, including, when necessary, with regulators or law enforcement agencies and other government entities. They can be offered incident and appeal management processes, which ensure access to redress for potential adversarial behaviours of AI. These

processes need to be clear, transparent and simple to enable everyone – independent of data literacy and education – who may be adversely impacted by AI systems to be capable of reporting such incidents. Feedback should be continuously incorporated into updates of the AI system and then communicated to relevant stakeholders. Accountability must remain a priority throughout the life cycle of the AI systems, with proper governance in place, while best efforts need to be made to protect, and not punish, users opting out of AI usage.

Moreover, processes to identify changes in the operating context, including the potential appearance of new groups of users – who may be treated differentially by the AI system – need to be put in place. For example, a medical AI system trained in resource-rich hospitals in metropolitan cities may not work as intended when used in small rural hospitals for reasons that may relate to the training of the local healthcare providers, the

quality of the medical data entered in the system, or behavioural factors affecting how people interact with AI. Simultaneously, monitoring how AI systems impact different groups of stakeholders needs to continue – these are metrics that are meant to be tracked during the AI development and testing process and throughout the system’s use. Finally, the environmental impact of AI systems, when they require significant computing resources, needs to be tracked and managed. Any such impact directly or indirectly on the environment due to the AI systems may also need to be considered and measured accordingly.

#### Relevant guidelines

- [Climate Change and AI, GPAI](#)
- [FACET, an open-source library for explainable AI to support exploration and understanding of supervised machine-learning models](#)



## 3.6 A revolving & evolving life cycle

### Applying lessons learned and making adjustments to promote inclusive practice

Has equity and inclusion worked? By whose account? If yes, how can this scale to other projects? If not, what needs to change in future iterations? How do you restore inclusion?

Organizations and businesses must invest resources and time to review lessons learned and make the changes necessary to improve inclusion in all stages of the life cycle. This goes beyond

implementing incremental technical adjustments to the technology itself – it requires critically examining the current process – stakeholders, use cases, design practices, community collaborations and metrics – for the purpose of reshaping the life cycle. Rather than taking a traditional approach as a repetitive or circular process, the AI life cycle flows, unfolds and evolves in response to new opportunities, new stakeholders and new needs.

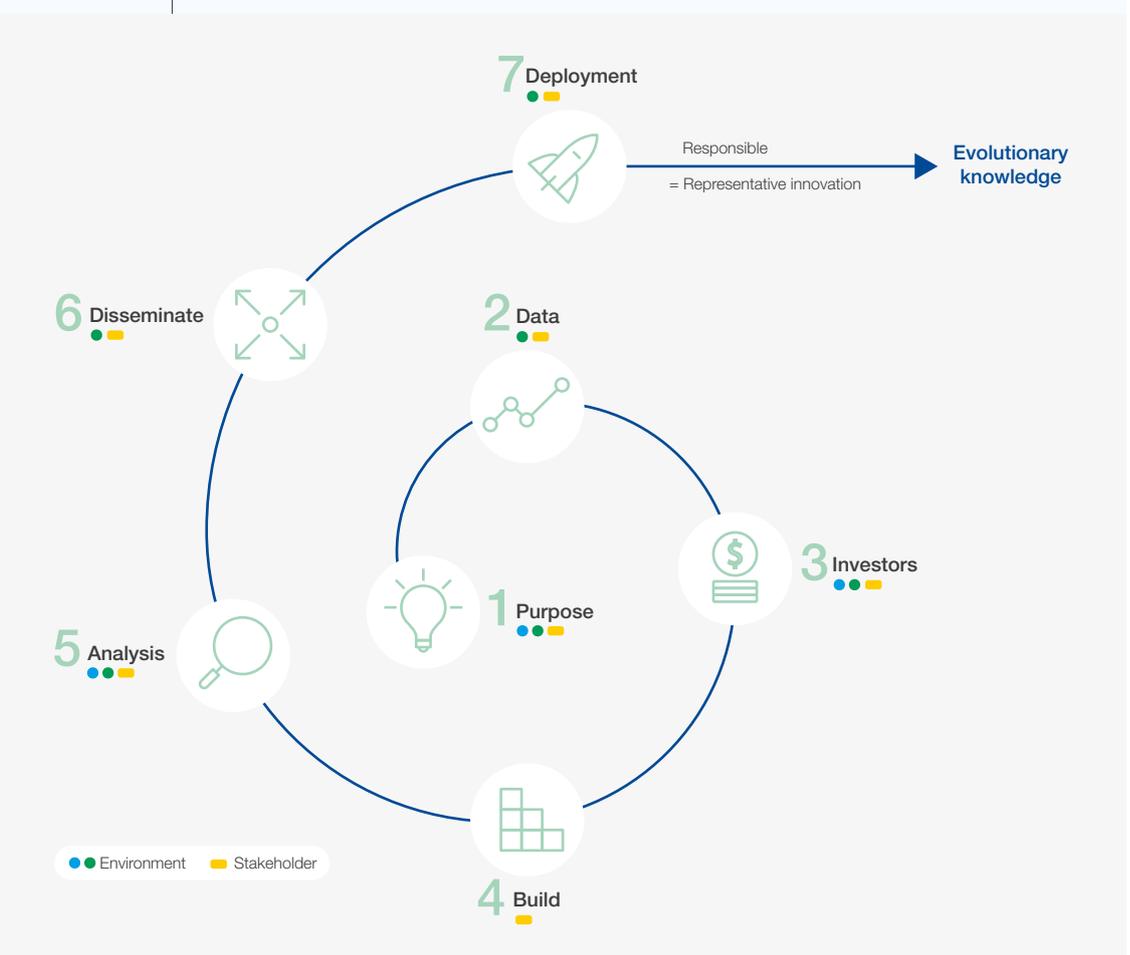


**After AI technologies are deployed, the scale of impact can change quickly and unevenly over time; organizations must invest in building resilience, flexibility and sensitivity to respond to the evolving needs of the AI life cycle and ensure AI continues to serve in an equitable & inclusive manner.**

Ryoko Imai, Principal Research Scientist, Hitachi

Symbols are a crucial way in which to understand complex societal challenges. The Punga fern, found in New Zealand, unfurls in a spiral shape called, in Māori, a “koru”. Some see the Punga’s shape as a symbol of new life, perpetual movement, with the inner circle pointing to its origins, and the outer edges containing seeds, which scatter and start a new cycle.<sup>4</sup> It does not return on itself as a circle does. In its analogy to the AI life cycle, the koru shape can be understood to represent an opportunity to evolve and expand out of a purely cyclical process.

FIGURE 9 | The Māori Lab “koru”



Source: Māori Lab, Māori Lens on an AI Lifecycle, <https://www.maorilab.maori.nz/post/m%C4%81ori-lens-on-the-ai-lifecycle>.

The project teams and stakeholders may review their progress and challenges by reflecting on questions such as:

- What best practices for equity and inclusion emerged in this life cycle?
- What practices may no longer serve the project group and stakeholders?
- Was the initial vision for equity and inclusivity achieved in this life cycle?
- Were the use case and user group equitably defined?
- Was a proactive approach to inclusivity prioritized in every phase of this life cycle?
- Whose perspective was over-represented vs under-represented?
- What posed unforeseen challenges to the activities defined in this life cycle?
- What additional metrics may be included to measure success in achieving inclusivity?
- How does this life cycle further inform the understanding of the protected groups?
- Are there any flaws in the governance system?

Best practices should be documented, reviewed regularly, streamlined and scaled, while shortcomings should be carefully examined, redesigned and improved. The assessment of the life cycle should in turn guide the reshaping of the inclusive AI ecosystem. Expertise and knowledge acquired in the process of developing or using

one AI model, including through stakeholder feedback, should benefit future model development processes. This ensures a continued commitment to creating a balanced ecosystem for inclusive AI while also fostering robust infrastructure and organizational wisdom for all stakeholders in future AI innovation projects.

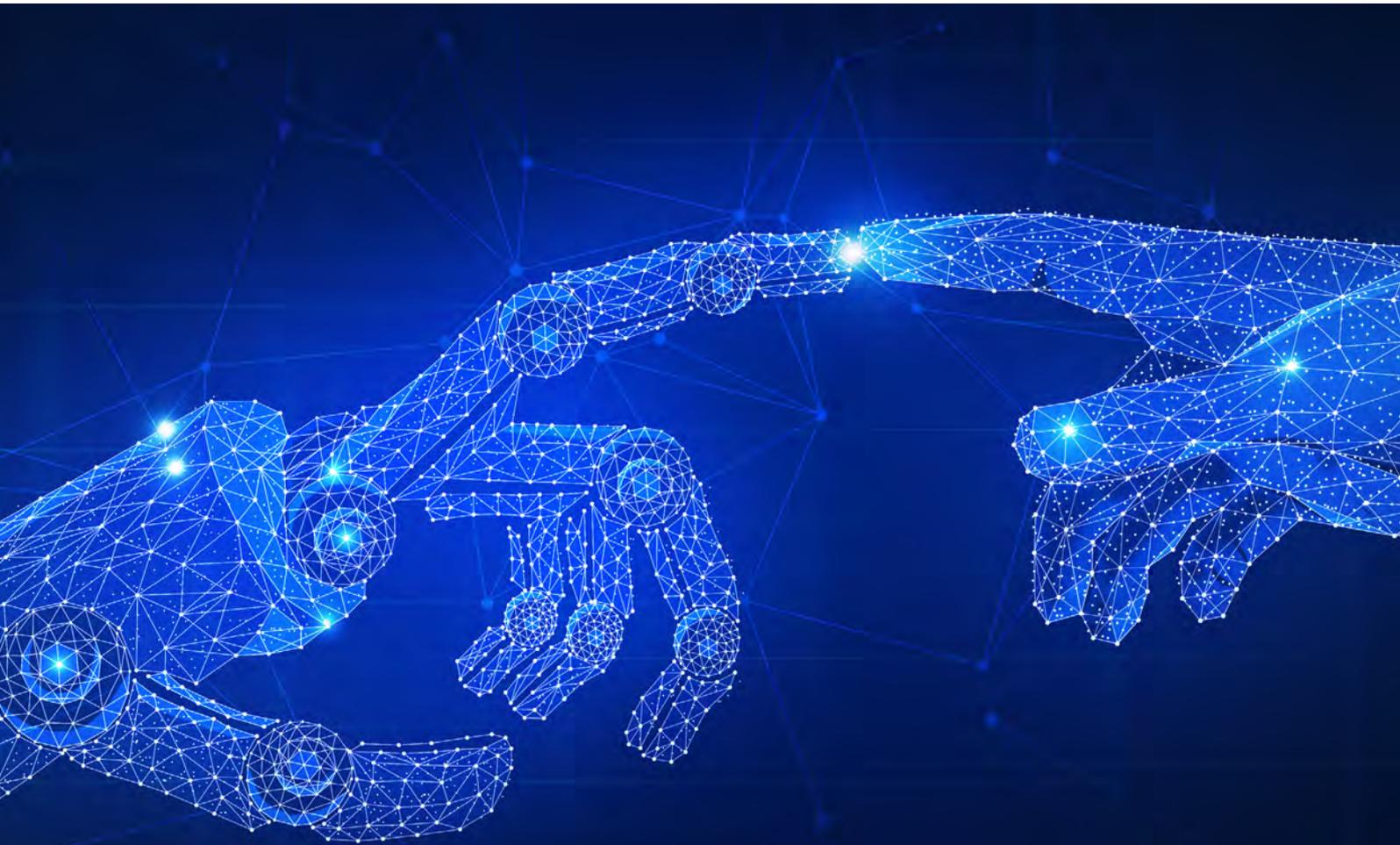
## BOX 8 AI Fairness Global Library



To complement the information presented in this guide, the Global Future Council invites readers to visit the Global AI Fairness Library, a digital space that unites key reports, resources, tools and methodologies on the subject across geographical and linguistic barriers. This space makes it easy to keep track of the latest developments in the AI ethics field and access actionable information in an agile way.

This initiative was created by the members of the World Economic Forum's Global Future Council on AI for Humanity (2020-2021), which is composed of 24 experts from around the world, and Latin America-based action tank C Minds.

Check it out: [www.aifairnesslibrary.com](http://www.aifairnesslibrary.com)



# 4

# Conclusion

AI is already pervasive in life and it will be even more so. All sectors benefit hugely from AI. However, this is a very rapid digital transformation and all societal actors need to make sure that it happens in a way that improves lives and does no harm.

The concrete blueprint and guidelines in this document support the operationalization of the concept of an inclusive AI ecosystem and life cycle. The AI ecosystem should include all the stakeholders that play a role in AI and it should help them be an active part of the ecosystem, through inclusive infrastructure, education and training practices, hiring and career building processes, and workplace environments. Moreover, inclusive community and stakeholder engagement need to be present in all dimensions of creating and using an AI system, from data collection and labelling to model development, training, testing, deployment and monitoring.

The World Economic Forum's Global Future Council on Artificial Intelligence for Humanity created the blueprint itself in an inclusive way. This allowed the council members to better identify the challenges and needs for inclusivity and equity in discussing and creating AI.

The hope is that this blueprint will contribute to, facilitate and accelerate the path that companies, governments, education institutions and society at large are designing and following to build a future where technological progress supports the progress of humanity and its most important values.

# Contributors and acknowledgements

## Lead authors

### [Global Future Council on Artificial Intelligence for Humanity](#)

**Julia Arnott-Neenee**, Co-Founder and Director, PeopleForPeople\_NZ

**Ilene Carpenter**, Manager, Earth Sciences Segment, HPC AI (Artificial Intelligence) and Mission Critical Systems, Hewlett Packard Enterprise

**Theodoros Evgeniou**, Professor, INSEAD

**Ryoko Imai**, Principal Research Scientist, Hitachi America

**Mark Minevich**, Chairman of the Executive Committee, AI for Good Foundation

**Constanza Gomez Mont**, Founder and Chief Executive Officer, C Minds

**Susan Gonzales**, Founder and Chief Executive Officer, AlandYou.org

**Wilneida Negrón**, Director, Policy and Research, Coworker.org

**Francesca Rossi**, IBM Fellow and AI Ethics Global Leader, IBM

**Uttara Sivaram**, Global Head, Privacy and Security Public Policy, Uber Technologies

**Sara Stratton**, Founder, Māori Lab

**Steven Vosloo**, Policy Specialist, Digital Connectivity, UNICEF

**Nadjia Yousif**, Managing Director and Partner, Boston Consulting Group

### [World Economic Forum](#)

**Safaa Khan**, Artificial Intelligence and Machine Learning Design and Communications Specialist

**Emily Ratté**, Artificial Intelligence and Machine Learning Specialist; Manager, Global Future Council on AI for Humanity

## Acknowledgements

The Global Future Council on AI for Humanity thanks its 24 members from various disciplines and more than 20 countries for their work and diverse insights, the World Economic Forum Artificial Intelligence and Machine Learning Platform, the Global AI Action Alliance, and all those who contributed to the development of this document. Achieving equity and inclusion in the AI ecosystem is not an easy task. However, inclusive efforts like this one and others that push for global collective action will hopefully become cornerstones in designing an equitable AI-driven present and future.

### Global Future Council on Artificial Intelligence for Humanity

**Angie Abdilla**, Chief Executive Officer, Old Ways, New

**Rohit Adlakha**, Adviser, Circle of Blue – Vector Center

**Carlos Affonso Souza**, Director, Institute for Technology & Society (ITS) Rio

**Beatrice Dias**, Assistant Professor, University of Pittsburgh

**Akram Dweikat**, Engineering Manager, Network Economics (ML), Deliveroo

**Anne Marie Engtoft Larsen**, Tech Ambassador, Ministry of Foreign Affairs of Denmark

**Nikhil Malhotra**, Chief Innovation Officer, Tech Mahindra

**Alice Munyua**, Director, Africa Innovation Mradi, Mozilla

**Safiya Umoja Noble**, Professor, University of California Los Angeles (UCLA)

**Julie Owono**, Executive Director, Internet Sans Frontières (Internet Without Borders)

**Tess Posner**, Chief Executive Officer, AI4ALL

**Onno Purbo**, Vice-Rector, Institute Technology Tangerang Selatan (ITTS)

**Aimee van Wynsberghe**, Alexander von Humboldt Professor of Applied Ethics of Artificial Intelligence, University of Bonn

**Jane Zavalishina**, President and Co-Founder, Mechanica artificial intelligence (AI)

### Women in AI

**Elizabeth M. Adams**, Chief Culture and Ethics Officer

**Debbie Botha**, Chief Partnership Officer

**Angela Kim**, Chief Education Officer

**Anne-Katrin Neyer**, Chief Human Resources Officer

### Appen

**Andrea L. Clayton**, Chief People Officer

# Endnotes

1. De Smet, A., Dowling, B., Mugayar-Baldocchi, M. and Schanin, B., [‘Great Attrition’ or ‘Great Attraction’? The choice is yours](#), McKinsey, 8 September 2021.
2. Lindbloom, L., [What Is Data Sovereignty in NZ?](#), LegalVision New Zealand, 2021.
3. Walter, M., Kukutai, T., Russo Carroll, S. and Rodriguez-Lonebear, D. (Eds.), *Indigenous Data Sovereignty and Policy*, October 2020, Routledge.  
  
Kukutai, T. and Taylor, J. (Eds.), *Indigenous Data Sovereignty: Toward an agenda*, 2016.  
  
Rainie, S. C., Schultz, J. L., Briggs, E., Riggs, P. and Palmanteer-Holder, N. L., [Data as a Strategic Resource: Self-determination, Governance, and the Data Challenge for Indigenous Nations in the United States](#), *The International Indigenous Policy Journal*, 8(2), 2017.
4. Royal, T. A. C. [“Māori creation traditions”](#), *Te Ara – the Encyclopedia of New Zealand*, New Zealand Ministry for Culture and Heritage/Te Manatū Taonga, 4 March 2009.



---

COMMITTED TO  
IMPROVING THE STATE  
OF THE WORLD

---

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

---

**World Economic Forum**  
91–93 route de la Capite  
CH-1223 Cologny/Geneva  
Switzerland

Tel.: +41 (0) 22 869 1212  
Fax: +41 (0) 22 786 2744  
[contact@weforum.org](mailto:contact@weforum.org)  
[www.weforum.org](http://www.weforum.org)