Issues at the Intersection of
ENGINEERING &
HUMAN RIGHTS
A Symposium

NOVEMBER 18-19
Washington, D.C.

Integrating Human Rights Principles into Systems and Product Design Panel

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Blum Center for Developing Economies

Development as Freedom

The ends and the means of development call for placing the **perspective of freedom at the center of the stage.** *The people have to be seen, in this perspective, as being actively involved—given the opportunity—in* **shaping their own destiny**, *and not just as passive recipients of the fruits of cunning development programs. – Sen, 2001*
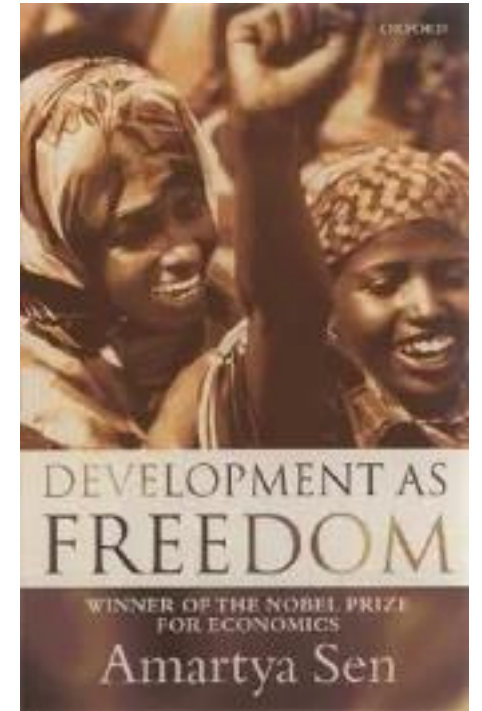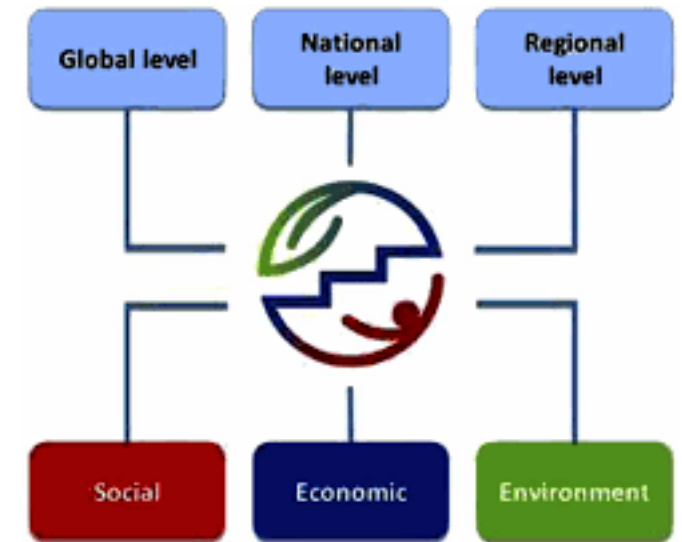
Development should enable people to *"lead the kind of life they have reason to value"* (Sen, 1999)

Design as Freedom

A human-centered design approach puts greater responsibility on the designer to understand **what is the kind of life the people, users, have reason to value, before coming up with solutions and empowering them with co-designing those solution.**

This is the essence of Development Engineering education

Design Freedom: Constructing the Social Pillar of Sustainable Development, Yael Valerie Perez, 2019

Development Engineering:
Engineering for Positive Social Impact

Development engineering is a field of research and practice that combines:

- ❖ Engineering, design, physical/biological sciences, energy & resource development
- ❖ Economics, entrepreneurship, business & social sciences, policy . . .

To create technological interventions in accordance with the needs and wants of individuals living in complex, low-resource settings that are scalable.

What do students **learn** in DevEng?

Breadth:

- Master problem-conceptualizing and problem-solving for implementation of technologies in low-income regions;
- Knowledge of political and cultural complexity and place-based nature of technological interventions;
- Core skills in qualitative and quantitative methods for evaluating technological interventions;
- Professional skills that involve community-based approaches, teamwork, communication, cross-cultural awareness, capacity building, and sustainable design.

Depth: Deep knowledge in their research area (PhD) or concentration area (Master).

BREADTH | Ethics & Reflection, Data Analysis, Social Entrepreneurship, Communication, Design Thinking, Systems Thinking, Critical Thinking

CONCENTRATIONS

- Sustainable Design
- Healthcare
- AI/Data Analytics
- Energy, Water, Environment
- Self-Designed

DEVELOPMENT ENGINEERING
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Development Engineering Model

Scaling for Impact

Framework
(Insights)

Imperatives
(Concepts)

Qualitative &
Quantitative
Data

Observations
(Contexts)

Solutions
(Prototypes)

Development Goals & Constraints
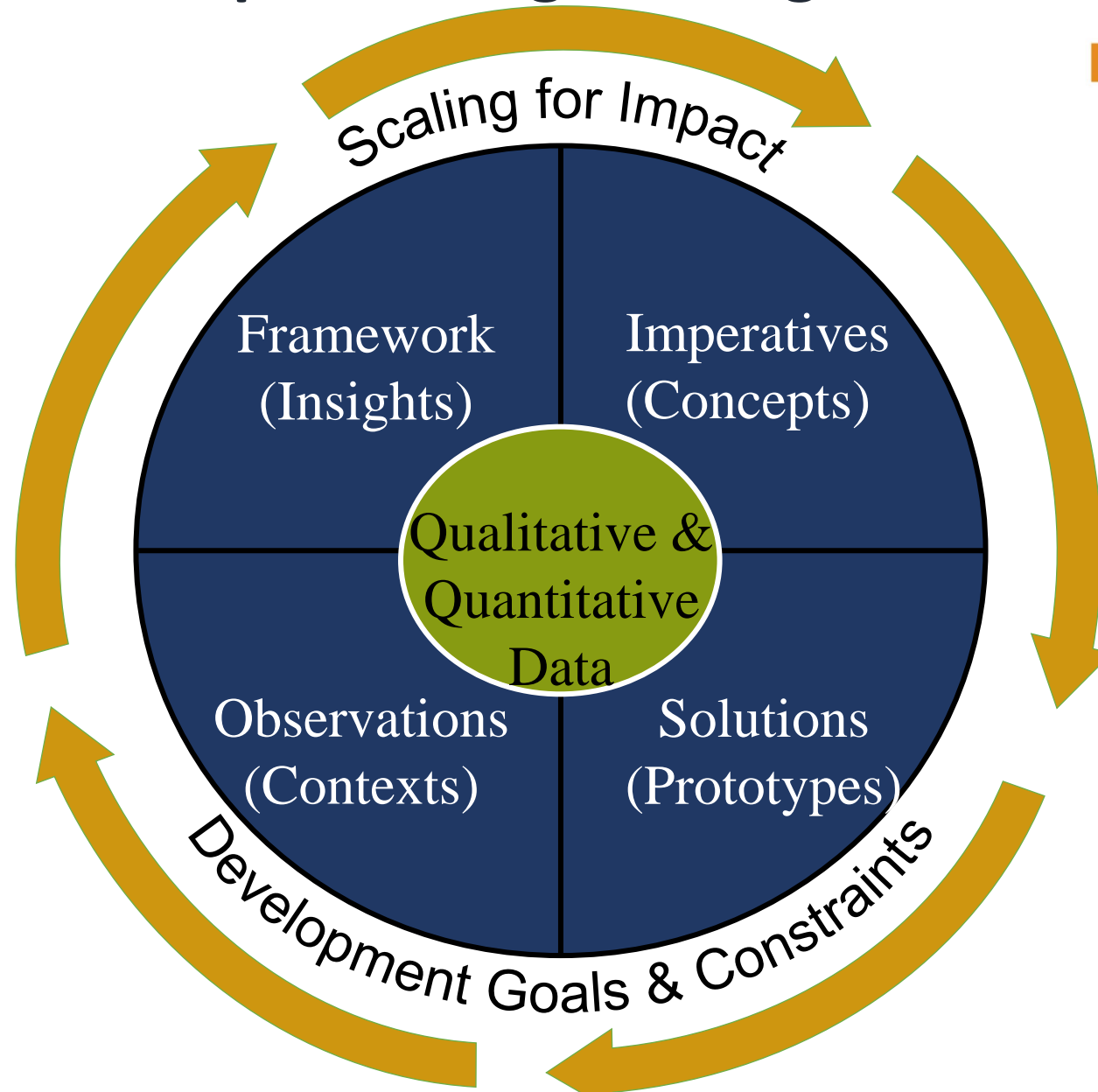
Design
Equality
Development
Freedom
Human
Peace
Trust
Justice
Engineering
Rights

DEVELOPMENT
ENGINEERING
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The Role of Gender

Motivation:

Gender roles affect almost every facet of life, and in turn affect almost every product and service

Illustration:

Individual pay-per-use for public toilets appears perfectly fair at first glance. However, it often requires women to pay more than men (due to menstruation, pregnancy, and taboos against women exposing themselves in public). A possible solution is family membership.

What stage are you in?

Just beginning (pre-prototype):

Ideation Questions:

1) Make a projection: What would happen if women and men used the same product?

2) Are there any roles or customs your product could take advantage of to empower women *in ways the community understands and accepts*?

3) Can you design a solution just for women? Just for men?

Intermediate (post-prototype):

Reframing Questions:

1) How do existing gender roles affect what your product needs to do? How it will be used? Barriers it will face?

2) Will your product or service interact with existing gender roles in harmful ways?

3) Can your product advance desirable norms?

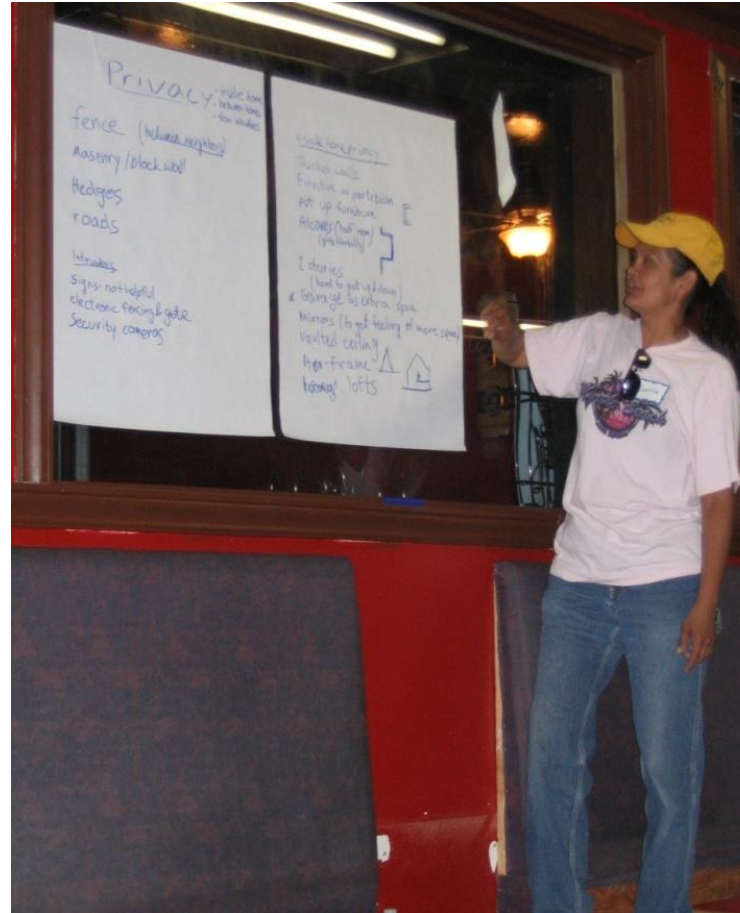Design
Development Equality
Freedom Human
Peace Trust Justice
Engineering
Rights

DevEng Ideation & Reframing Cards

National Academies: Issues at the Intersection of Engineering and Human Rights Nov 18-10, 2024

Framing Example: Pinoleville Pomo Nation

- HUD-financed housing provides basic necessities

- No representation of the cultural and traditional culture and values

- Rising heating and cooling costs

Dr. Ryan Shelby

Co-Designed, Co-Built: Culturally-sensitive sustainable buildings, energy, water systems and native plants, Pinoleville Pomo Nation
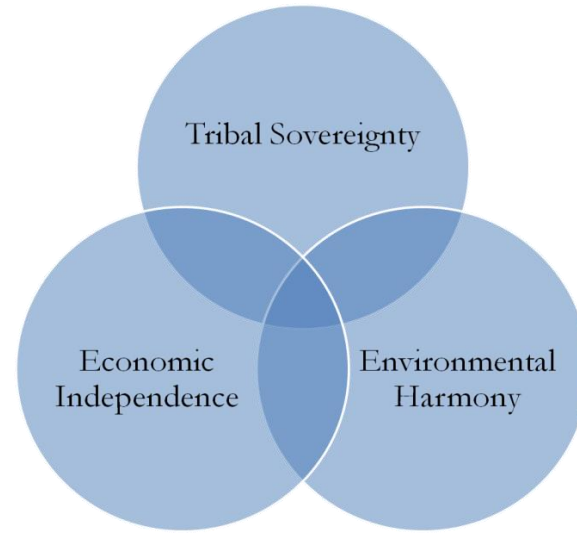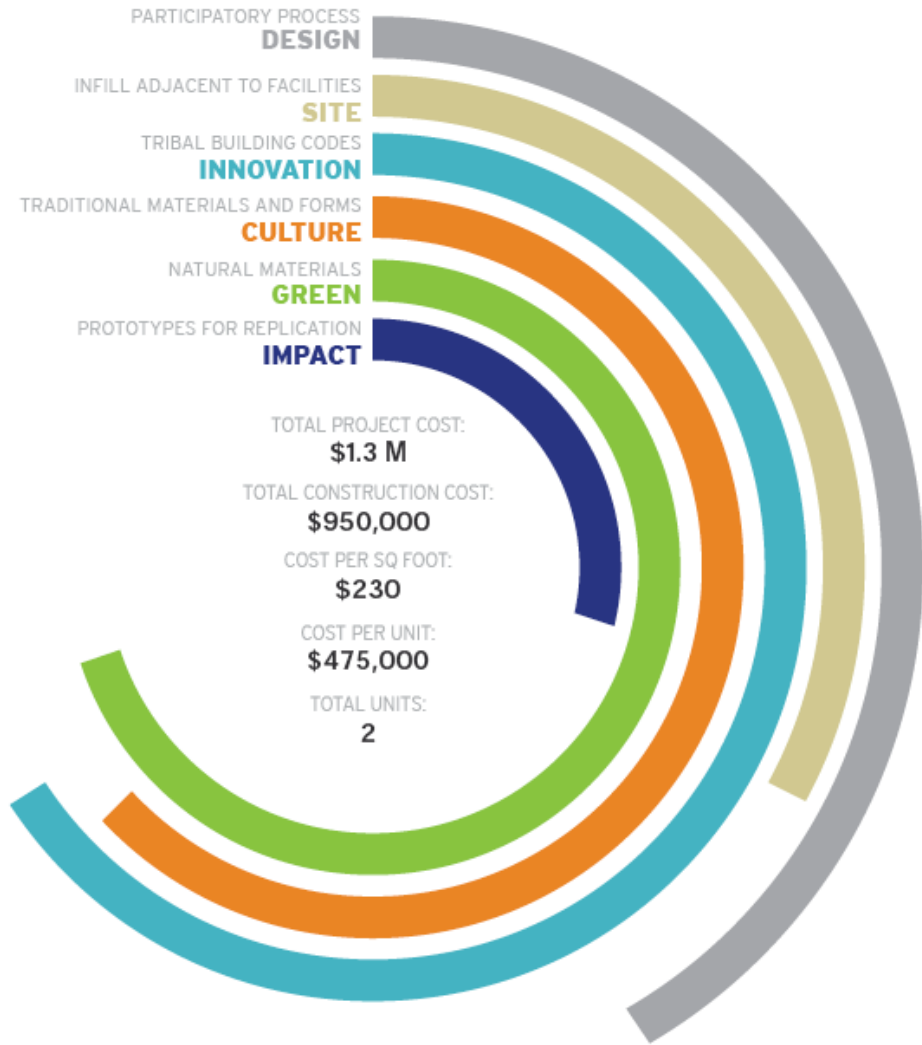
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PARTICIPATORY PROCESS
DESIGN

INFILL ADJACENT TO FACILITIES
SITE

TRIBAL BUILDING CODES
INNOVATION

TRADITIONAL MATERIALS AND FORMS
CULTURE

NATURAL MATERIALS
GREEN

PROTOTYPES FOR REPLICATION
IMPACT

TOTAL PROJECT COST:
$1.3 M

TOTAL CONSTRUCTION COST:
$950,000

COST PER SQ FOOT:
$230

COST PER UNIT:
$475,000

TOTAL UNITS:
2

Tribal Sovereignty

Economic Independence

Environmental Harmony

Development
Design
Equality
Freedom
Human
Trust
Justice
Peace
Engineering
Rights

Renewable energy-efficient systems were co-designed and built by tribal citizens

Rainwater catchment and grey-water systems reduce vulnerability to water shortages

Smithsonian's Museum of American Indian Case Study

National Academies: Issues at the Intersection of Engineering and Human Rights Nov 18-10, 2024

Learning from Indigenous research methods

The Six Rs of Indigenous Research

1. **Respect** – For Indigenous cultural identity, communities, and topics

2. **Relationships** – Connects to the concept of all of our relations and building relations with communities

3. **Responsibility** – Responsibility to share only when we are allowed, and to publish in an ethical way while considering ownerships, protocols and community practices

4. **Reverence** – Respect for the sacred

5. **Relevance** – Legitimize and incorporate Indigenous Knowledges into curriculum when it makes sense

6. **Reciprocity** – Both receiving and giving with communities

Learning from Indigenous research methods

NATIVE FEWS ALLIANCE

Design Equality
Development Human
Freedom
Peace Trust Justice
Engineering
Rights

Research Is Ceremony
Indigenous Research Methods

Shawn Wilson
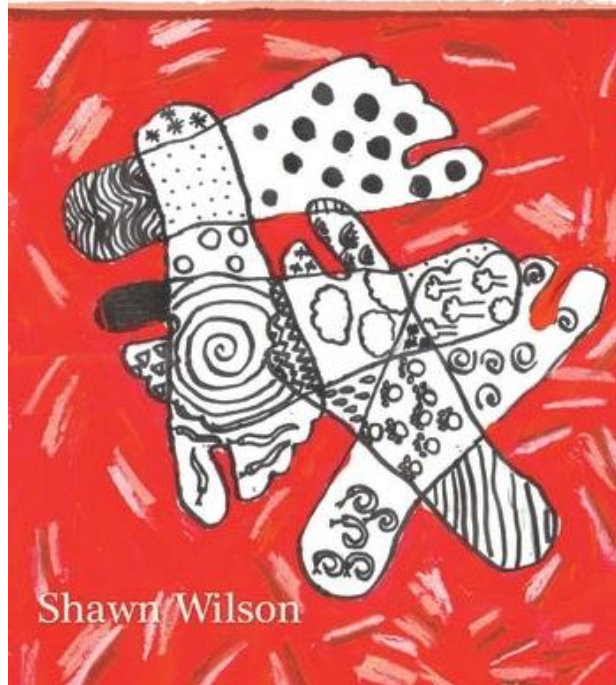
What will be the impact of your research 7 generations from now?

Finding Place: Intersections of Human Rights and Engineering

TAMARA E. BROWN

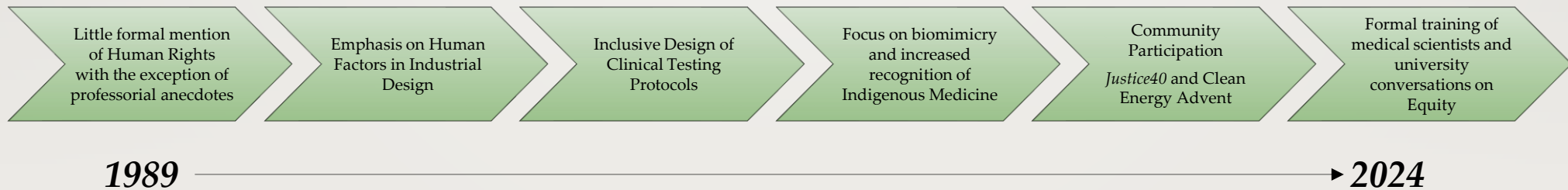NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE

ISSUES AT THE INTERSECTION OF ENGINEERING AND HUMAN RIGHTS: A SYMPOSIUM

NOVEMBER 19, 2024

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My own perspective of the journey: Human Rights in as a Design Consideration…

| Little formal mention of Human Rights with the exception of professorial anecdotes | Emphasis on Human Factors in Industrial Design | Inclusive Design of Clinical Testing Protocols | Focus on biomimicry and increased recognition of Indigenous Medicine | Community Participation *Justice40* and Clean Energy Advent | Formal training of medical scientists and university conversations on Equity |

1989 ————————————————→ *2024*

3

Solving the "right" problem isn't an additional consideration to your design table….
It's why you came to the table.

| Little formal mention of Human Rights with the exception of professorial anecdotes | Emphasis on Human Factors in Industrial Design | Inclusive Design of Clinical Testing Protocols | Focus on Biomimicry and increased recognition of Indigenous Medicine | Community Participation *Justice40* and Clean Energy Advent | Formal training of medical scientists and university conversations on Equity |

1989 ——————————————————————————————— ► *2024*

Human Rights aspects are relevant across all design phases and across product/application lifespan
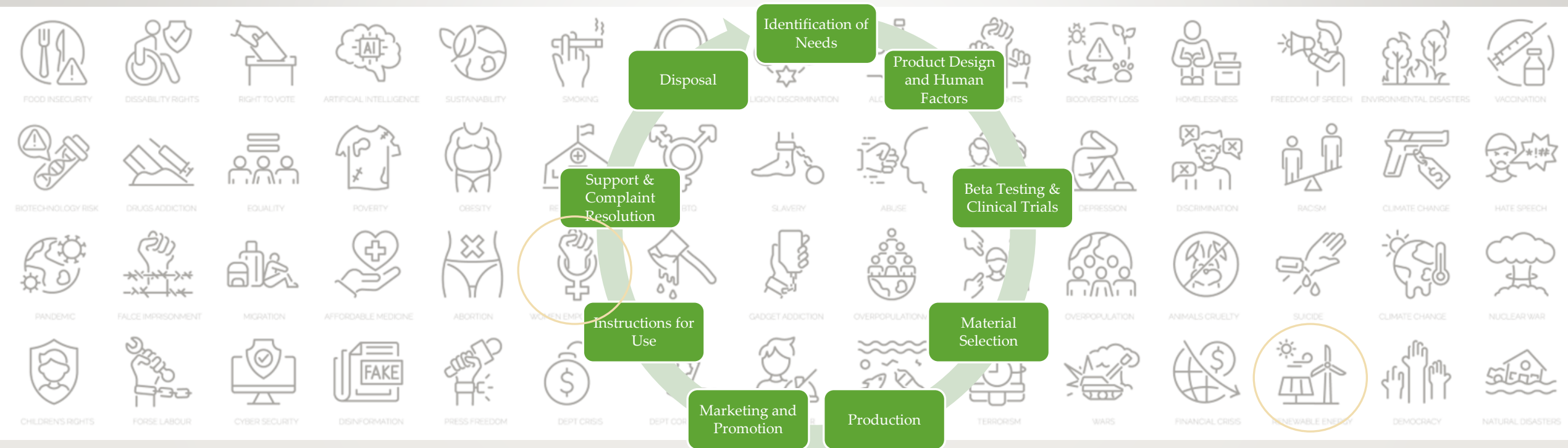
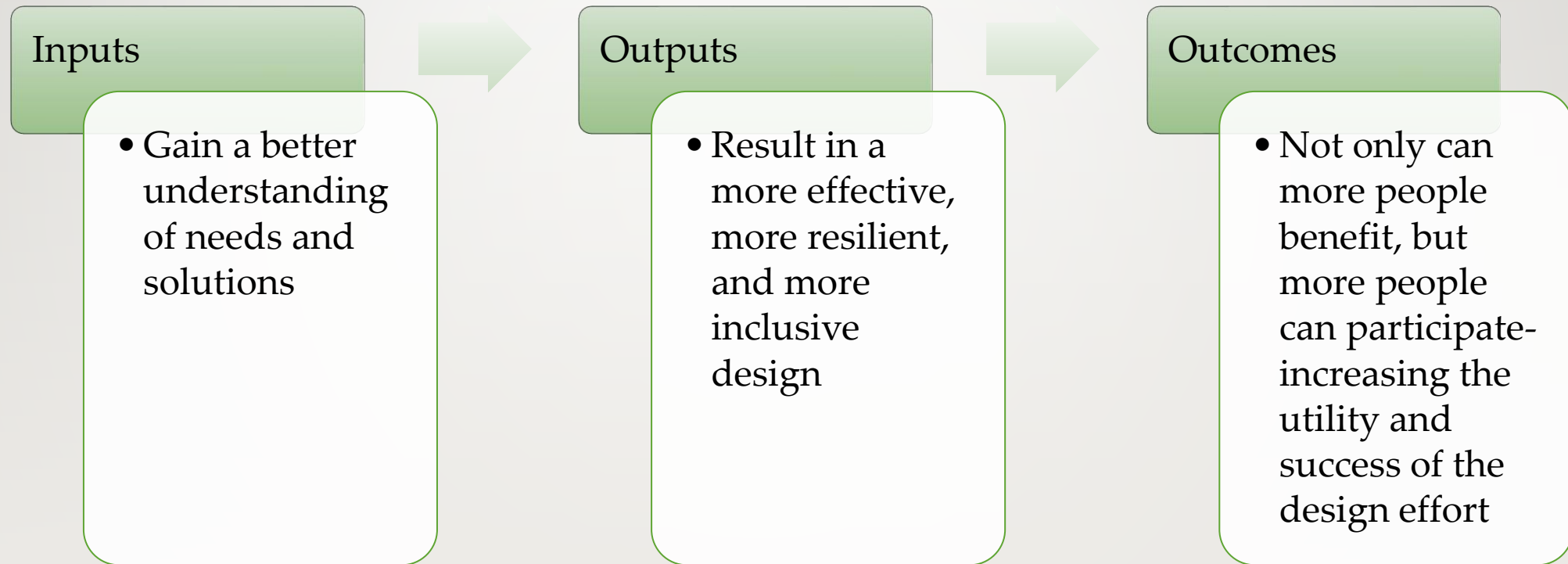# 5 | A little smart design can make an unimaginable difference.

Example: issues pertaining to conflict minerals and sourcing of cobalt and other materials.

"Concern for man and his fate must always form the chief interest of all technical endeavors. *Never forget this in the midst of your diagrams and equations.*"

- Albert Einstein

[*humans and their*]

Thank you.

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- Page 5: *left* Vertex Space (Adobe Stock); *right* Mark (Adobe Stock)

- Page 7: Metamorworks (Adobe Stock)

About Tamara

Tamara E. Brown loves seeing things grow—whether a medical device, chemical plant build, future careers for children in STEM, and (of course) sustainable organizations that are poised for the future- including one with cleaner energy.

After twenty-two years at Linde, Brown recently retired from the company as Vice President Sustainability, where she was responsible for the sustainability strategy, performance reporting, programing, goals, and engagement for the industrial gases leader, with operations spanning across more than 80 countries and amassing the talents of more than 65,000 colleagues worldwide.

Prior to joining Linde (Praxair, Inc.), Brown spent nearly a decade in traditional medical device design and regulatory approval. Her career has spanned medical device development, technology project management, sustainable development and community engagement and impact.

Named a White House *Champion of Change* in 2011 and one of *Fortune Magazine's* Heroes of the 500, Brown's work experiences have informed her personal passion: creating opportunities so that others can realize the potential in their lives. The *Tech Savvy* program she founded nearly two decades ago has introduced thousands of middle school girls across the country and the adults in their lives to the multiple possibilities in science.

Brown earned her undergraduate degree from Vanderbilt, double-majoring in biomedical engineering and chemical engineering, a master's degree in chemical engineering from the University at Buffalo, and an MBA from Canisius College.

She is a fellow of the American Institute of Medical and Biological Engineering and sits on the boards of Connecticut State's Naugatuck Valley Community College Foundation, Red Hen Press, and Common Denominator. She also serves on advisory boards for Vanderbilt University's biomedical engineering program as well as its business school's sustainability education development efforts, and for Boston University's Graduate Women in Engineering and Science.

Brown is committed to fostering sustainable organizations across all aspects and is looking forward to the next challenge. She calls Mississippi home and enjoys living and working in Western Connecticut, where she also writes and gardens, but neither frequently enough!

Cisco Responsible AI

Katie Shay
Associate General Counsel; Director, Human Rights

November 2024

Cisco's Responsible AI Journey

Responsible AI is driven by a cross-functional volunteer group with executive sponsorship

FY19
Customer Inquiry
at CEO Level

Results in R-AI Working
Group with representation
from Government Affairs,
Security, Privacy, Human
Rights and Communications

FY20
Tracks for Security,
Privacy, Human Rights
and Trust

Assessed Responsible
AI risks and developed
controls in CSDL

FY21
Executive Sponsorship
and Pilot Launch

Anurag Dhingra named
Executive Sponsor

Launched Engineering
workshops, pilot
assessments and
Incident Response

FY22
Announced
Governance and
Principles

- Q1: Internal Rollout
- Q2: External Rollout
- Assessment Maturation
- Governance Committee
- Regulatory Tracking

FY23
Graduation to
Resourced Program

Proposal to R-AI
Governance Committee
to formally establish and
resource the working
group's efforts into a
centralized program

Responsible AI at Cisco

Cisco's Responsible AI Principles

Artificial Intelligence (AI) can be leveraged to power an inclusive future for all. By applying this technology, we have a responsibility to mitigate its potential harms.

We translate our Responsible AI Principles into controls that can be applied to model creation and the selection of training data.

These controls embed Security, Privacy, and Human Rights by Design throughout the model's lifecycle and its application in products, services, and enterprise operations.

Transparency

Fairness

Accountability

Privacy

Security

Reliability

Responsible AI Framework

Cisco's Responsible AI Framework

The [Responsible AI Framework](#) operationalizes our principles throughout the company.

Cisco is committed to continuing internal focus and collaboration with our external partners and stakeholders to improve our collective understanding of the societal and human rights impact of AI.

We work to continuously improve our framework to support fair, explainable, and transparent results of the AI systems we develop and use.

Governance & Oversight

Controls

Incident Management

Industry Leadership

External Engagement

Case Study: Responsible AI in Webex

Responsible AI in Webex

Responsible AI Impact Assessments focus on the potential impacts of intelligent product components but may not consider the cumulative impacts of those components.

Noise Removal

- **Benefits**: Noise Removal increases user privacy, representation, and comfort in meetings

- **Risks**: Pre-release models did not perform as well for higher-pitched voices

- **Remediation**: Created pitch-balanced test sets, added more high-pitch voices to training data, and expanded the subjective test suite

Virtual Backgrounds

- **Benefits**: Virtual backgrounds can increase user privacy and representation in meetings

- **Risks**: Pre-release models did not perform as well for all hair textures, hairstyles, or lighting conditions

- **Remediation**: Added more hair textures, styles, skin tones, and lighting conditions to training data

Webex Assistant

- **Benefits**: Virtual Assistants can increase meeting accessibility and efficiency in meetings

- **Risks**: Virtual Assistants may not perform as well for all languages, dialects, accents, or pitches for transcription into captions and translation. Poor transcription contributes to product inaccessibility

- **Remediation**: Include diverse, high-quality training data appropriate for Webex's use cases

Learn More

Cisco's Approach to Responsible AI:

Cisco Responsible AI Framework

Cisco Principles for Responsible AI

Rights Respecting AI:

Weapons of Math Destruction, Cathy O'Neil

Sex, Race, and Robots, Dr. Ayanna Howard

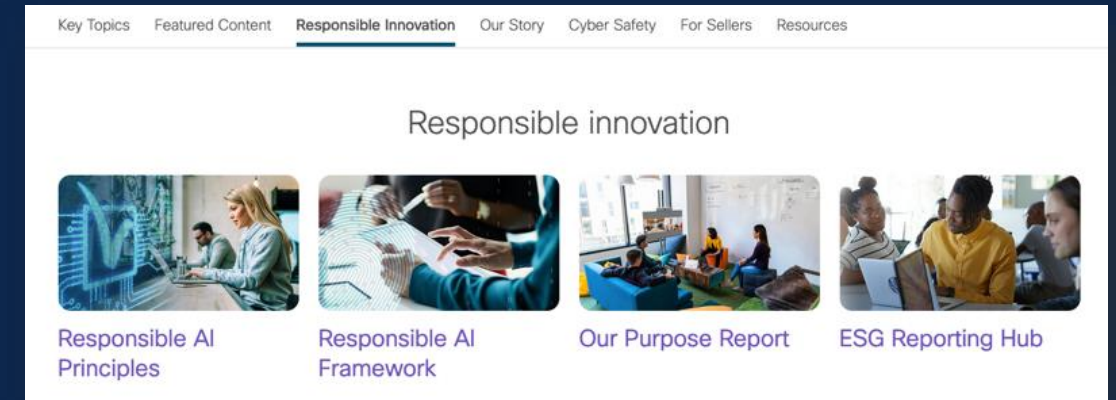Tools and Weapons, the Promise and Peril of the Digital Age, Brad Smith

Responsible Innovation:

TTC Labs, Responsible Innovation Workshop Toolkits

All Tech is Human, Responsible Tech Guide

COMPASS EU, Responsible Innovation Self-Check Tool

CISCO

The bridge to possible