International Development Design Summit Ayuujk 2025

Santa María Tlahuitoltepec Mixe, Oaxaca, Mexico

July 29 to August 13, 2025

Oaxin Centro Oaxaqueño de Innovación

International Development Design Summits

International Development Innovation Network

CECAM Centro de Capacitación Musical y Desarrollo de la Cultura Mixe

MIT D-Lab designing for a more equitable world

Fundación Comunitaria Oaxaca

ACKNOWLEDGEMENTS

The vision for implementing an IDDS (International Development Design Summit) in Mexico began to take shape in 2019. Today, that vision is a reality, thanks to the invaluable support and commitment of our donors. Your generosity is the driving force that allows us to convene brilliant and passionate minds with the goal of co-creating solutions that generate a positive and sustainable impact on vulnerable communities. To each and every one of you, we extend our deepest gratitude for believing in this project and for being a fundamental part of its success.

Shanti Klein • Carol Zavalet • Adriana Abardía • Alex Briscoe • Linda Eckerbom Cole • Aura Mora • Tjada Mckenna • Kristin Mannion • María José Sáenz • Juliana Gonçalves de Olivera • Juliana Sauaia • Carolina Alzate • Paola Moreno Villalobos • Manuel Emilio Velis • Andrea Marín • María Isabel Noriega • Uriel García Gopar • Jorge Bermúdez • Dexter Manuel • Angnes Pyrchla • Maurice Jakesh • David Saleh • Thabiso Mashaba • Hazwan Razak • Ravi Chhatpar • Laura Bydyzna • Viviana Arango • Federico Brognoli • Cristiane Barreto • Alejandro Mejía Greene • Ariana Esestein • Darrat Corrales Sánchez.

Smith Family Foundation • Sullivan Family Charitable Foundation • Consejo Oaxaqueño de Ciencia y Tecnología • Conversa • Unuspat • El Caminero • Hotel Parador San Miguel • Doctor's Home • Central Estudio • Diversa • Invento • PamLab • Fundación Bosque Vivo • Ires y Venires • Circa A.C.

We especially thank to Ofelia Hernández, Tonatihu González, Raquel Díaz, Irving Sánchez, Nydia Delhi Mata, Agustín Vazquez, Carlos Sandoval Habib, Ariadna Vazquez, Carolina Magaña, Armando García Reyes, Jose Diego Díaz, Eduardo Gallardo and the local authorities of Santa María Tlahuitoltepec.

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I. INTRODUCTION

The IDDS Ayuujk 2025 (International Development Design Summit Ayuujk 2025), or Cumbre Internacional de Diseño para el Desarrollo Ayuujk 2025, was a two-week, hands-on experience hosted by the community of Santa María Tlahuitoltepec Mixe, located in the Mixe Region of the State of Oaxaca, Mexico, from July 29 to August 13, 2025.

With a primary focus on the co-creation of local livelihoods, a total of 28 innovators from around the world collaborated on the design and construction of 6 innovation projects based on the development of local technology.

By bringing together such a diverse global community, this summit sought to empower a new generation of innovators capable of leading development processes from and for their own communities. The ultimate goal is to establish a sustainable, community-focused innovation model that can be replicated in other regions of Oaxaca and the world.

"During the IDDS, I learned to share with authenticity, to listen without judgment, and to profoundly value the diversity of perspectives. The most valuable part has been feeling like I belong to a collective that trusts in collaborative creativity and in the power of community as a motor for transformation. This experience left me with a renewed sense of purpose and belonging."

Ana Milena Trujillo, participant from Colombia

II. ABOUT IDDS

The International Development Design Summit (IDDS) is a hands-on, transformative co-design experience. Originated at MIT D-Lab in 2007, IDDS brings together a diverse global community to co-create affordable and practical technological solutions for global challenges. As of the summer of 2025, IDDS events have been implemented in more than 15 countries, and IDDS Ayuujk 2025 stands as the first one organized in Mexico.

These summits last from 2 to 4 weeks with "hands-on" design experiences that are based on the belief that innovation is generated when diverse minds co-create directly with communities, working with them, not for them, empowering everyone to be technology creators and solve their own challenges through collaborative design.

"IDDS significó un espacio de transformación personal y de crecimiento profesional. Dentro de lo más valioso para mí fue la experiencia de plasmar en 2 semanas un proceso de diseño y pasar de unas ideas a algo material. Valoró además la interdisciplinariedad a la hora de compartir ideas y crear"

Karina Provedo Coto, participant from Costa Rica


THE CHAOS THEORY

III. ORGANIZING ORGANIZATIONS

OAXIN is a Non-Governmental Organization (NGO) dedicated to advancing social and economic justice through participatory processes. It works directly with community groups in Southeast Mexico to develop creative skills, enabling them to design bespoke solutions for local challenges, leverage existing opportunities, and diversify their income streams. https://www.oaxin.org/

CIINDER KUKOJ is a civil organization based in the Sierra Mixe region of Oaxaca, focused on rural development and biocultural conservation. Its work is centered on strengthening the traditional production systems of the Mixe communities, such as the milpa system, and on promoting agrobiodiversity

The **CECAM** in Tlahuitoltepec is a key musical educational center. Its mission is to train musicians, especially for philharmonic bands, thus preserving and disseminating the rich musical tradition of the Mixe people. It is recognized for its excellence and its approach on community development. https://cecam.org.mx/

MIT D-Lab is a program of the Massachusetts Institute of Technology (MIT) that works with communities around the world to develop practical solutions to global poverty challenges. It focuses on experiential learning, collaborative research, and community-driven innovation, seeking to create technologies and approaches that are relevant, sustainable, and generate real positive impact. https://d-lab.mit.edu/

The **International Development Innovation Network** is an international community of change agents who support innovators, entrepreneurs, and business owners worldwide in designing, prototyping, and disseminating technologies that improve the quality of life for people living in poverty. Composed of over a thousand members, all innovators in the network share one common experience: attendance at an IDDS. https://www.idin.org/

Fundación Comunitaria Oaxaca is a Mexican civil organization that, since 1996, has supported vulnerable communities in the state of Oaxaca by promoting sustainable development. Its work is strategically based on mobilizing resources and forging alliances to strengthen community capacity, focusing on key areas such as the social economy, environmental stewardship, and education. https://fundacion-oaxaca.org/


THE NORTH FACE
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IV. SUMMIT OVERVIEW

The IDDS was an **intensive, 16-day hands-on experience**

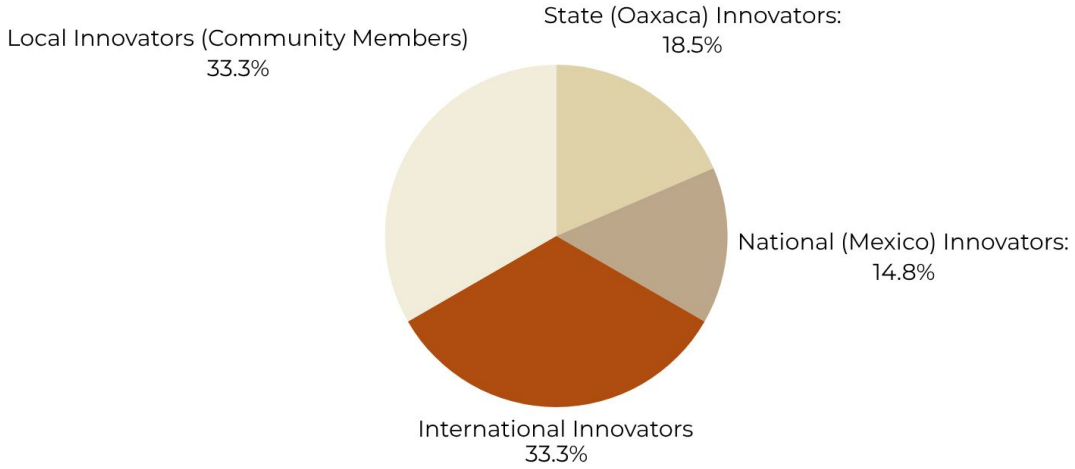
6 innovation projects based on local, appropriate technology were successfully prototyped.

A total of **27 innovators from around the world** participated

The IDDS demonstrated strong gender inclusion: **61.1% of participants were women**, while 39.9% were men

The Summit had representation from **11 territorial entities**, including 10 countries and the indigenous Mixe Nation.

The diverse composition of the innovator cohort, crucial for effective co-design, was distributed as follows:



V. ORGANIZING TEAM

Leticia Athala Carreño Bermúdez (Mexico)

Estrella Soto Hernández (Mexico)

Damián Martínez Gómez (Tlahuitoltepec)

Carolina Luna Pacheco (Mexico)

Isabel Martínez Martínez (Tlahuitoltepec)

Ana Magdalena Castellanos (Mexico)

Kofi Taha (U.S.A)

Ta Corrales Sánchez (Costa Rica)

Fernanda Ramírez Garzón (Mexico)

Oda Scatolini (Brazil)

Pamela Silva Díaz (Puerto Rico)

Aura Estella Mora (Colombia)

Daniel Moreno Jimenez (Colombia)

Efrain Pacheco Cortés (Tlahuitoltepec)

Alexander Freese (Colombia)

Tempei Borba (Brazil)

Francisco Sergio Sánchez (Mexico)

Enoc Josué Ramírez (Mexico)

VI. THE HOST: SANTA MARIA TLAHUITOLTEPEC

Santa María Tlahuitoltepec is an indigenous Ayuujk (Mixe) community located in the Sierra Norte region of the state of Oaxaca, approximately 123 km northeast of the state capital. Situated at an altitude of 2,240 meters (7,350 feet) above sea level, the community is nestled within a cloud forest environment, surrounded by mountains, ravines, and deep slopes. The territory of Tlahui is administratively divided into 8 agencias de policía (which constitute local districts): Frijol, Metate, Flores, Tejas, Guadalupe Victoria, Nejapa, Santa Cruz, and Santa Ana.

In the community, the primary language is Ayuujk, followed by Spanish (castellano).

Life in Tlahuitoltepec is governed and lead by the system of "Usos y Costumbres" (Uses and Customs), where the Community Assembly is the highest authority. Local authorities are elected through an escalafonary community service, a learning process where members start in lower-ranking positions to gain the necessary experience before taking on roles of greater responsibility.

Traditions are a fundamental pillar of community life. Ancestral practices, such as offering rituals at sacred sites, remain vibrant, and patron saint festivities are celebrated in both the municipal seat and its agencies. Music, cultivated and sustained through the local philharmonic bands, is an essential element of local identity, mentoring and developing new generations of musicians every year.

Regarding the economy, the primary activity is small-scale subsistence agriculture. Although the use of agrochemicals remains low (a key indicator of sustainability), crops face persistent challenges related to soil erosion and low productivity. To supplement their income and manage economic risk, inhabitants often rely on temporary jobs in various trades.

VII. THE AGENDA OF IDDS

Monday July 28th	Tuesday July 29th	Wednesday July 30th	Thursday July 31st	Friday August 1st	Saturday August 2nd	Sunday August 3th
- Arrival of national and international participants to Oaxaca City	- Transfer of participants to Tlahuitoltepec - Inauguration and welcome to the summit	- Design Challenge - Introduction to the design process - Skills Builders (Build-its)	- Empathy with the user - Field strategy: gathering information	- Design process: collecting information - Problem framing - Design requirements	- PATH Statement - Cultural Potluck	- Design process: Idea generation - Design process: Experimentation - Sketch Modelling session
Monday August 4th	**Tuesday August 5th**	**Wednesday August 6th**	**Thursday August 7th**	**Friday August 8th**	**Saturday August 9th**	**Sunday August 10th**
- Design process: Choosing the most appropriate idea - Design process: Solving details	- Shopping day for prototyping - Design process: Construction	- Design process: Construction	- Design process: Construction	- Design process: Construction	- Design process: Construction - Design process: Giving and receiving feedback	- Design process: Construction - Continuity Planning
Monday August 11th	**Tuesday August 12th**	**Wednesday August 13th**	**Thursday August 14th**			
- Refining Prototypes - Preparing Documentation of the projects	- Co-design session: Building the LATAM innovation network - Preparations for the Design Fair	- Design Fair	- Return to Oaxaca City			


diversa
CARINOGRAMA
IDDS 2025

VIII. THE PARTICIPANTS

Uriel Martínez Ramírez (Mexico)

G. Monserrat Núñez Torres (Mexico)

Claudia Vanessa Siesquen Deza (Peru)

Karen Itzel Antonio Vásquez (Tlahuitoltepec)

Ariana Olvera Sandoval (Mexico)

Carlos Velazquez Mayorga (Mexico)

Karina Poveda Coto (Costa Rica)

Maria Esther Vasquez Martínez (Tlahuitoltepec)

Abiael Alexis Illescas Cobos (Mexico)

Pamela Heister (Germany)

Agustín Jiménez Martínez (Tlahuitoltepec)

Itandehui Martínez Martínez (Mexico)

Cristiane Gomes Barreto (Brazil)

Miguel Angel Martinez Gutierrez (Tlahuitoltepec)

Laeilani Denisse Ruíz Figueroa (Mexico)

VIII. THE PARTICIPANTS

Gabriela García Mariscal (Mexico)

Ilvan Medeiros Lustosa Junior (Brazil)

Luis Vásquez Martínez (Tlahuitoltepec)

Felipe Pulido Gónzalez (Mexico)

Ana Milena Trujillo Castro (Colombia)

Virgen Yaneli Vasquez Gonzalez (Tlahuitoltepec)

María Alejandra Alarcón Bolívar (Colombia)

Felipe Vásquez Hernández (Tlahuitoltepec)

Rudy Eduardo Iboy Ramírez (Guatemala)

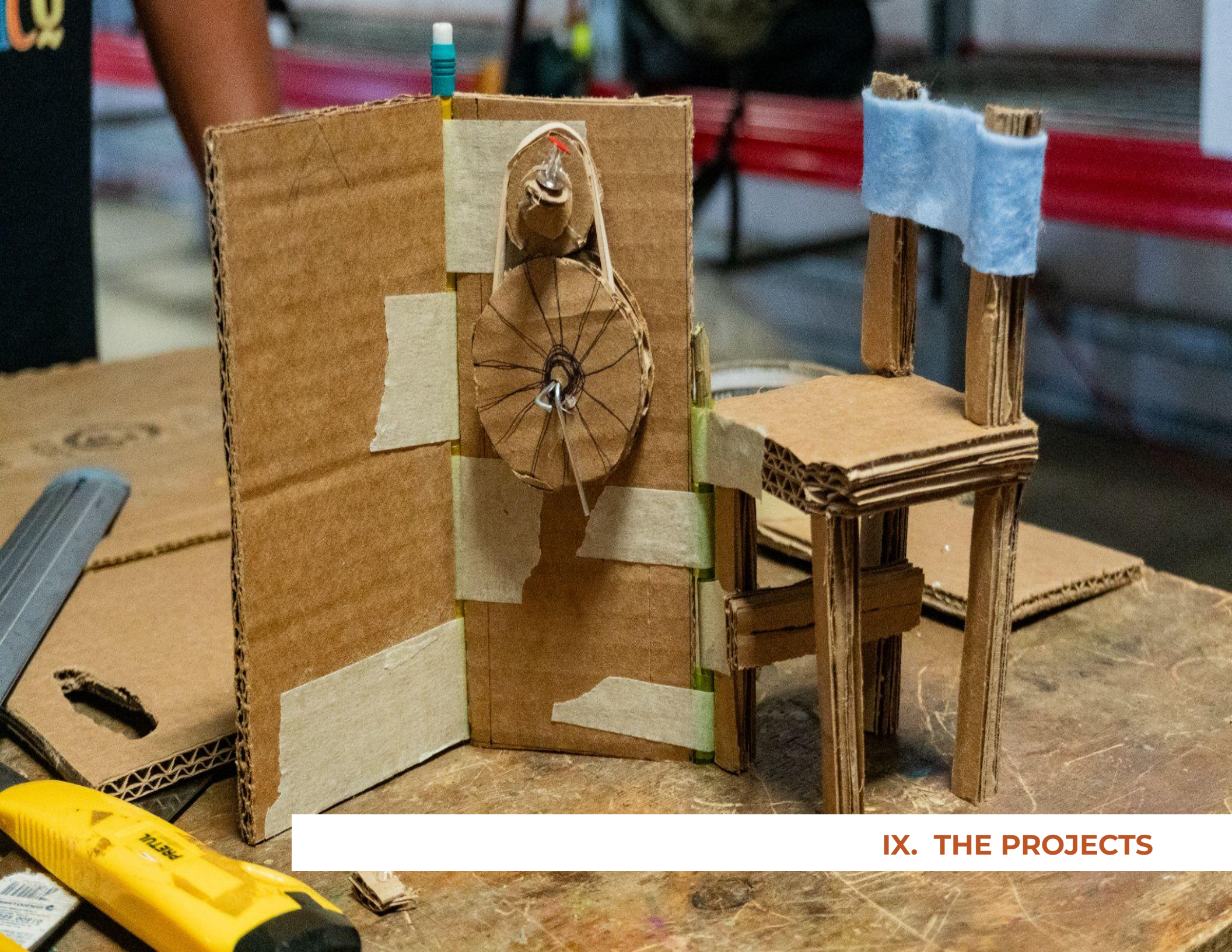
Villulfo Vásquez Reyes (Tlahuitoltepec)

Eishna Ranganathan (U.S.A)

Dalia Gallardo Martínez (Tlahuitoltepec)

Jemy Ramírez Castellanos (Mexico)

Isaí Ramírez Castellanos (Mexico)



IX. THE PROJECTS

xäbrata

Xäbrata/ Agave fiber extractor

Team: Felipe Vásquez (Tlahuitoltepec), Yanelly Vasquez (Tlahuitoltepec), Damián Martínez (Tlahuitoltepec), Monserrat Núñez (Mexico), Ana Trujillo (Colombia) and Cristiane Barreto (Brazil).

Design facilitators: Pamela Silva (Puerto Rico) and Tempei Borba (Brazil).

About the project: Xäbrata is a low-cost version of an ixtle fiber decorticator that reduces the time and physical effort required to extract fiber from the agave plant. This results in a more comfortable and faster process, allows for increased income, and enables the Tlahuitoltepec community to aspire to recover its tradition of ixtle spinning.

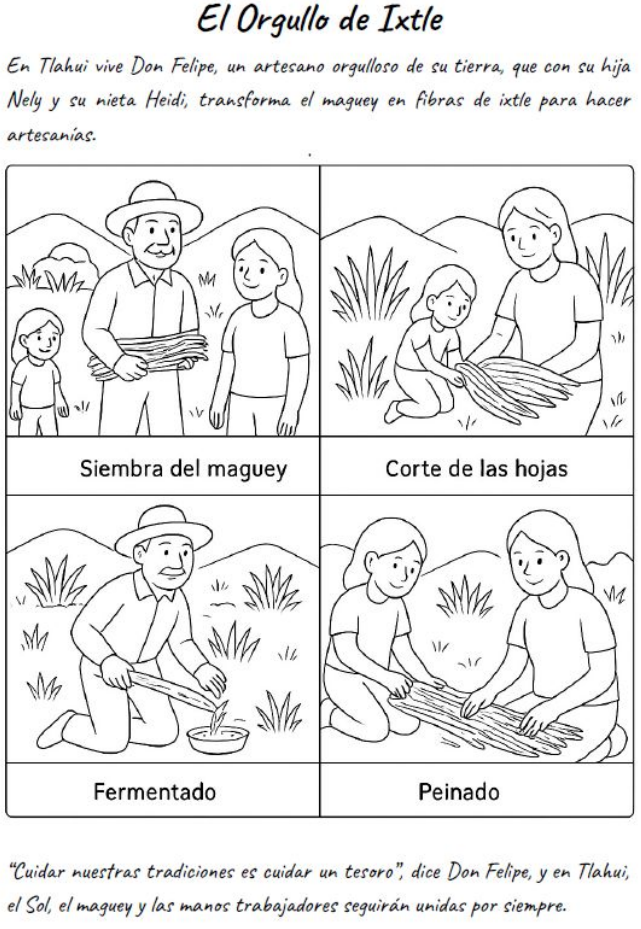
The Challenge: Ixtle, a valuable natural agave fiber, is essential for creating products the community still uses, ranging from clothing to decorative items. Currently, extracting this fiber is a laborious process. This project focuses on researching and developing methods to obtain ixtle directly from green agave leaves, which are the source of the highest quality fiber.

Design requirements:

- Reduce the extraction process time to less than 30 days per 60 kg of ixtle.
- Maintain a cost of less than 5,000 pesos.
- Achieve high fiber quality (light color, soft texture, resistance).
- Reduce the required physical effort.
- Must not require electricity (although the final prototype was motorized).
- Ensure portability and safety.

Construction process: Xäbrata focused on reusing materials and adapting existing machinery. The team acquired a used corn mill from a local scrap yard to utilize its motor and main structure. The structure was disassembled and cleaned, cutting and adapting unnecessary parts. The motor's arrangement was modified to improve the belt adjustment, and an electrical system with a thermomagnetic switch was implemented. The central decorticating element was a discarded metal cylinder (approximately 35 cm in diameter and 15 cm wide) onto which smooth carbon steel nails were welded. The protective casing was fabricated from a washer structure that was cut and assembled with POP rivets. Finally, PVC pipe guards were added for safety.

Additionally: To counteract the loss of the cultural tradition, the team created a coloring sheet and, later, a children's book that narrates the cultural tradition. This effort is part of the feedback process to improve the project.



Next steps:

- The machine will be tested with different leaf sizes, pre-processing techniques (roasting or soaking in vinegar), and adjustments will be made to the prototype.
- The overall mission is to promote and rescue the ixtle tradition by facilitating its extraction , with the goal of speeding up the extraction process and meeting the demand for handicrafts.
- If there is enough interest, the objective is to replicate and sell the machines, including creating a more portable version.
- Plans include seeking funding, researching the use of waste (such as dye or biofertilizer), developing a product catalog, and conducting tests for fiber resistance and quality.
- Furthermore, technical improvements are planned, such as changing the position of the nails, using lighter materials, and incorporating an emergency stop system.

Prototyping cost: **$3,907.00 MXN.**

Mojk mi maíz / Corn seed planter

Team: Abiael Illescas (Mexico), Ilvan Medeiros Lustosa (Brazil), Karina Poveda (Costa Rica), Luis Vasquez (Tlahuitoltepec), Karen Antonio (Tlahuitoltepec) y Efrain Pacheco (Tlahuitoltepec)

Design facilitators: Ana Castellanos (Mexico) y Sergio Sánchez (Mexico).

About the project: The main objective of “MOJK mi maíz" is to improve the corn planting process within the Milpa cultivation system, by designing an integrated, single-handle tool. This innovation facilitates penetration into compacted hillside soil and features an integrated seed dispersal system. The project arose from the critical need to replace unsuitable, non-contextualized planting tools, such as the traditional "matraca"

The Challenge: The project addresses a critical vulnerability in the milpa planting process for family farming communities. Specifically, the Nuj collective, which has been implementing a zero-tillage system since 2020, faces heavily compacted soil with low organic matter for its twelve families. This environment requires a tool that is not only comfortable but also efficient for planting and effective at accurately dispensing the correct amount of seeds, given the minimal tillage condition of the soil.

Design requirements:

- Efficacy: Reduce the number of movements required compared to the current planting process.
- Efficiency: Allow for planting a greater quantity of seed clusters (mats) per minute.
- Comfort: The weight, handle circumference, and height must be comfortable for various users.
- Accessibility: Must utilize local materials and have an accessible price point for the local farmers.

Construction process: The prototype construction prioritized two aspects: the soil-penetrating tip and the seeding system. Tip A was selected after field testing, as Tip B was deemed inefficient for loosening and de-compacting the hillside soil. The external seed dispensing system was chosen as the most practical to build within the program's timeframe.

While the final prototype successfully facilitates soil penetration , areas for improvement were identified, such as the need to change the location of the seed exit opening, as it tends to get clogged with dirt in the field.

Next steps:

- The team suggests further iterations with diverse expertise, including individuals experienced in blacksmithing, industrial design, mechanical engineering, as well as more participants from the Nuj collective.
- Gathering more targeted feedback from potential users, segmented by gender and age, is recommended, as is the formal dissemination and documentation of the tool.
- Plans include systematizing user perception data and seeking alliances with experts to generate further improvements and launch a new design cycle.
- The ultimate goal is to evolve the prototype into an appropriate and accessible technology that adjusts to different users, soils, and cultivation systems, potentially by creating a kit with three interchangeable tip types

Prototyping cost: **$1,500.00 MXN**

ALMATSO'OK
Sana tu alma

Almat'sook/ Deshidratador de plantas medicinales

Team: Itandehui Martínez (Mexico), Esther Vasquez (Tlahuitoltepec), Dalia Gallardo (Tlahuitoltepec), Carlos Mayorga (Mexico).

Design facilitators: Athala Carreño (Mexico), Oda Scatolini (Brazil) y Estrella Soto (Mexico).

About the project: ALMATSO'OK is a wooden drying system for medicinal plants that harnesses heat generated by an efficient, wood-saving cookstove (fogón). Its core mission is to provide high-quality input for medicinal products, thereby strengthening the economic autonomy of local women and contributing to the preservation of indigenous Ayuujk medicinal knowledge.

The Challenge: Women from the Poj Kääj collective in Tlahuitoltepec cultivate and utilize medicinal plants but face significant inefficiency in traditional drying methods (hanging them on ropes). The local climate characterized by high humidity, frequent rain, and fog prevents complete drying, compromising the quality of the plants, their annual availability, and their market potential. The design challenge was to develop an affordable, contextually-adapted drying system that preserves critical medicinal properties and empowers women's self-sufficiency.

Design requirements:

- Drying Efficacy: Achieve a 90% drying (toasting) level, a significant improvement over the current method's 80%.
- Time Efficiency: Reduce the drying time to a range of 1 to 7 days, substantially improving on the current 15 to 30 days.
- Footprint: The unit must occupy a defined space of approximately $2m^2$.
- Local Sourcing: Utilize common, cost-effective community materials and fuels such as wood, firewood, and agave bagasse.
- Resilience: Avoid reliance on solar energy, directly addressing Tlahuitoltepec's humid, foggy climate conditions.
- Cost Efficiency: Maintain an energy cost of $0, aligning with current user spending

Construction process: The dehydrator was constructed using a plywood box (120 cm high x 50 cm wide). Inside, this container features 7 hexagonal mesh shelving units (estantes) to hold the plants. The heat source is a rocket-type stove connected to a chimney that channels heat through a 2mm galvanized metal sheet.

The dryer features a wooden door to help retain the heat efficiently.

Next steps: The vision for the coming years focuses on active implementation and improvement of the prototype. Key goals include broadening the product variety, drying larger quantities of plants, and collectively designing other toasting or drying mechanisms with the women's collective.

- Continue testing drying times for various plants and meticulously record results, including creating a standardized drying time chart for each species.
- Technical Optimization: Enhance the sealing of the chamber and rigorously monitor the functionality, durability, and heat response of the construction materials.
- Efficiency Analysis: Catalog the most efficient fuel source for the stove to meet the required heat and flame standards.
- Process Standardization: Plan the systematic use of the prototype and prepare a simple log scheme to facilitate data recording by the primary user, Virginia.

Prototyping cost: **$2,000.00 MXN**

URDIMÄX
hilando historias

Urdimäx/ Non-Electric Wool Spinner

Team: Villulfo Vásquez (Tlahuitoltepec), Gabriela Mariscal (Mexico), Eduardo Iboy (Guatemala) and Pamela Heister (Germany).

Design facilitators: Carolina Luna (Mexico) and Enoc Ramírez (Mexico)

About the project: Urdimäx is a spinning and warping technology designed to rescue the community's wool textile tradition. The design has an ergonomic focus and seeks to increase the efficiency of transforming raw material into garments.

The Challenge: The wool textile tradition in Tlahuitoltepec is diminishing due to two main problems:

- Shortage of local wool: A prohibition on native sheep farming in the 1990s (implemented to address deforestation and land misuse) led to a severe scarcity of local wool. This has diminished the number of artisans and compelled them to rely on lower-quality external materials.
- Complexity of spinning and twisting: The lack of contextualized machinery, particularly equipment that does not require electricity, makes the spinning and tensioning processes highly demanding. Chronic failures in the local electrical grid render existing electric machinery unreliable, creating a reliance on strenuous manual methods.

Design requirements:

- The technology must be entirely independent of electrical power.
- It must integrate two essential functions: spinning and thread twisting.
- The mechanism must be capable of bidirectional rotation.
- The design must be ergonomic to mitigate the user's stooped working posture.
- Spools must be easily interchangeable.
- Construction must rely on durable, locally-sourced materials and supplies

Construction process: The technology was built as a workbench incorporating a double pulley mechanism and a bicycle rim, adjusted to ergonomic measurements for the user. The process began with assembling the support frame and legs. The drive mechanism was based on a size 24 bicycle rim and connected to the pedal using a band, a bike chain, and a flat bar (solera). For the spinning component, four circles were cut from plywood (triplay) to form two detachable spools, utilizing ¾-inch PVC shafts. Two pulleys were lathe-turned from wood: one with a 12 cm diameter for the pedal transmission belt and another with a 5 cm diameter for the twisting system. Finally, a spinning distribution frame was manufactured with 14 eye screws (armellas), separated by 5 cm each. The overall prototype dimensions are 84 cm in height, 57 cm in width (side view), and 35 cm in width (upper work area).

Next steps:

- Improve the pedal functionality, exploring the possibility of replacing it with a sewing machine pedal and seeking specialized technical advice.
- Revisit the requirement for the technology to have a hybrid function (electric and mechanical).
- Recommend financial advisory and the development of a business model and entrepreneurial capacities for Villulfo.
- Seek the development of technical capacities (dyeing, spinning) to foster the rescue of the wool textile tradition.
- Initiate a Cultural Rescue project for wool handicrafts in Tlahuitoltepec.

Prototyping cost: **$1,820.00 MXN**

nopalitostäät

Nopalitos täät / Kit pelador de nopales

Team: Ariana Olvera (Tlahuitoltepec), Eishna Ranganathan (USA), Leilani Ruíz (Mexico) y María Alejandra Alarcón (Colombia) y Miguel Martínez (Tlahuitoltepec).

Design facilitators: Aura Estella Mora (Colombia) y Daniel Moreno (Colombia).

About the project: Este proyecto busca mejorar el proceso tradicional de limpieza del nopal en Tlahuitoltepec, mediante el diseño de un kit herramientas más ergonómicas, seguras y eficientes para el uso diario. El kit final, adaptado a las curvas de la penca de nopal, está compuesto por cucharas y soportes de cuchillas modificados, un guante protector, una tabla de corte, un banco de apoyo y una cubeta para residuos.

The Challenge: ENopal is a staple food in the community, but its preparation is arduous and hazardous. The current manual process of peeling the sharp spines and residual thorns is time-consuming and involves a high risk of injury. The lack of efficient, small-scale processing technology limits the potential for local women entrepreneurs to commercialize peeled nopal, thus affecting the local economy and nutrition. The challenge was to design a tool that radically reduces preparation time, eliminates injury risk, and is financially accessible to local families

Design requirements:

- Must eliminate the risk of injury from thorns.
- Significantly reduce the preparation time (goal: less than 1 minute per nopal pad).
- The cost of the final project must be accessible to local producers ($15.00 MXN per piece)
- The project should be capable of processing small batches for family use, as well as slightly larger batches for micro-commercialization.
- Must be easy to operate and maintain without specialized knowledge.

Construction process: The team developed a prototype using a repurposed metal base and a manual crank system. The mechanism relies on two opposing rollers lined with wire brushes or abrasive material. When the nopal pad is fed between the rollers, the rotation strips the spines and peel efficiently. The design was focused on ensuring the gap between the rollers was adjustable to accommodate various sizes of nopal pads while optimizing the cleaning action without damaging the food.

Next steps:

Future efforts are concentrated on rigorous field testing and scaling the impact:

- Conducting controlled tests to accurately measure peeling time per unit and the amount of food waste generated compared to manual peeling.
- Identifying the most effective and durable material for the rollers (e.g., specific type of wire brush or synthetic abrasive) to reduce maintenance.
- Developing a simple user manual and conducting training workshops to ensure the technology is widely adopted by women in the community.
- Exploring a micro-business model for the fabrication and local sale of the machine to promote its widespread diffusion within the region.
- Integrating a collection bin for the peeled nopal and the waste material for a cleaner process.

Kit cost: **$1,000.00 MXN**

Muu’tspëte/ Revolvedor de mezcla para adobe

Team: Felipe Pulido (Mexico), Claudia Siesquién (Peru), Uriel Martínez (Mexico) y Agustín Jiménez (Tlahuitoltepec).

Design facilitator: Alexander Freese (Colombia)

About the project: Muu´tspëtë is a portable, mechanically powered mixer for adobe composite materials, engineered to optimize construction efficiency and preserve an ancestral, sustainable building tradition in Tlahuitoltepec. The core objective of this technological intervention is to significantly reduce the intensive human labor currently required in adobe production, thereby making the craft economically viable for a new generation of local builders.

The Challenge: The traditional practice of building with adobe in Tlahuitoltepec faces an imminent risk of extinction. This is primarily due to competition from cheaper, less physically demanding modern materials and, critically, the extreme physical effort demanded by the traditional method of mixing the mud composite. This strenuous work has negatively affected the health of producers and led to a severe decline in the available workforce, compelling the remaining entrepreneurs to consider closing their businesses

Design requirements:

- The prototype must double the production efficiency of the adobe mixture, escalating output from 3.5 m^3 to 7 m^3 per 8-hour workday.
- The technology must reduce the required human effort by enabling the mixing process to be performed by a single laborer instead of two.
- The machine is designed to be portable, easily assembled and disassembled for transport, and engineered to allow a wheelbarrow to pass directly under the drum for effortless mixture transfer.
- The design mandates low maintenance and requires minimal water for cleaning.
- The prototype relies exclusively on local and accessible materials to ensure affordability and community ownership.

Next steps:

The final prototype is a drum-type mixer, prioritizing the reuse and adaptation of locally available industrial components:

- Structure: Constructed with square structural tubing (PTR) and features "A"-shaped legs for stable support of the mixing shaft bearings.
- Mixing System: The central rotating shaft is a 2" structural pipe. Mixing blades were ingeniously created by welding repurposed auto brake shoe supports onto the shaft, with additional orthogonal supports welded for maximum mixing reach within the drum.
- Power and Transmission: A 1 HP single-phase SIEMENS motor recovered from a local nixtamal corn mill provides the drive power. A 60:1 reduction was achieved using a system of pulleys and belts (adapted from motorcycle rims) to yield a highly efficient mixing shaft speed of 30 to 35 RPM. The motor's polarity was reversed to ensure the desired rotation direction.
- Future Direction and Scalability: Future efforts will focus on optimizing durability and establishing a diffusion strategy. This includes completing the final engineering detail of welding a support plate to the drum (not achieved in the initial prototyping phase) to better distribute force. The primary long-term goal is to successfully transition this prototype into a viable, replicable technology that protects a critical piece of local cultural heritage while simultaneously boosting the economic capacity of small-scale builders

Prototyping cost: **$4,500.00 MXN**

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Photo gallery of IDDS