Tecnológico de Monterrey
Challenge – Based Research Funding Program

Call for Proposals 2023

Modality 3: Translational Grants

In collaboration with the Technology Transfer Department.

The call in its modality 3, invites the scientific-innovative community of the Tecnológico de Monterrey that have demonstrated disruptive solutions, either with physical prototypes or virtual prototypes (modeling/simulation) that are in TRL 4 stage, to submit their proposal and thus have the possibility of accessing the economic fund that allows the maturation of the technology and the development of the first MVP (Minimum Viable Product), in a period of 12 months.

1. OBJECTIVES OF THE CALL FOR PROPOSALS

The objectives of this call are:

1. Encourage the development of science and technology-based projects aimed at solving problems or taking advantage of opportunities that result in technologies with differentiated intellectual property, aimed at the market, with proofs of concept/prototypes with technical and market relevance.
2. Support project leaders to increase technological maturity, identify the market segment where it has more relevance, direct the development of the project, as well as generate a technological road map that integrates: Technological scaling, intellectual property, and business models for the creation of an **EBCT** (Empresa de Base Cientifico y Tecnológica: Science and Technology-Based New Venture).
3. Establish the basis for a potential technology transfer, or the generation of an EBCT in liaison with the Technology Transfer Department.
4. To educate project leaders about evidence-based entrepreneurship, technology scaling, and value and market discovery.

2. ELIGIBILITY CRITERIA

1. The proposer must be Research Model Professors from National Schools and Interdisciplinary Institutes can apply as Principal Investigators for this call.
   As mentioned above, PIs submitting a proposal to this call (2023) AND leading a proposal for the call (2022) should demonstrate **they have submitted proposals externally** during the last 12 months (external funding is expected).

   Team members may include:
   - T Full-time research professors (Research Models: 75%, 50%, 25%)

- Postdocs
- PhD students.
- Experts for specific tasks: Professors from Tec (Vitalidad Intelectual) and strategic universities.
- Research units from the Interdisciplinary Research Institutes can invite professors from school to develop specific tasks/products using their allocated time to do research.
- Research groups from the National Schools are allowed to invite professors from institutes to develop specific tasks/products using their allocated time to do research.
- Professor Researchers involvement in projects (2022) and new projects (2023) should be less than 100%

2. The challenges defined by Tec de Monterrey along with topics that can be chosen to outline a proposal. National Schools defined challenges shown in Annex I, Tables 1 to 5, and the challenges for Interdisciplinary Institutes are in Annex I, Tables 6 to 12.
   Researchers from the Interdisciplinary Institutes of Research and from the National Schools can integrate groups of professors in the models of research professor, postdoctoral fellows, and Ph. D. students to present proposals that unravel their respective challenges.
   Researchers from National Schools must apply to the Challenges defined for them (Annex I, Tables 1 to 5), and Researchers from Interdisciplinary Institutes must apply to Challenges in (Annex I, Tables 6 to 12). Collaborations between National Schools and Interdisciplinary Institutes can submit proposals through the special category Synergy Grants (Table 13).
3. The proposer must carry out scientific-technological research activities and/or innovations affiliated with the Institution (Tecnológico de Monterrey).
4. This call will support science-technology based projects (PBCT) aimed at solving problems or taking advantage of opportunities in the priority research areas of Tecnológico de Monterrey, including the area of education.
5. For the purposes of this call, a "science-technology based project" is defined as: "**a project that, through science, provides innovative solutions, and that is based on an invention/technology**".
6. PBCTs must have a minimum Technology Readiness Level (TRL) TRL4 determined with the TRL calculator defined in (ANNEX 1) **and virtual prototypes (modeling / simulation) are accepted**.
7. **Other requirements:** priority criteria for pre-selection of PBCT.
   Interdisciplinary work teams. The work team that makes up the PBCT, in addition to the proponent, should ideally be composed of the following profiles:
   - At least one teacher with experience in the technologies required by the project.
   - At least one member with business/commercial experience.

- Preferably a member with experience in technological innovation.
  Note: all members must be Tec de Monterrey professors or Collaborators.

8. Mandatory deliverables to participate:
   Structured summary of the PBCT containing the following (**Application Form.doc and annexes)**

   1. Description of the problem/opportunity
   2. Description of the proposed solution
   3. Analysis of the state of the art of the technology
   4. Summary of main competitors or "next best alternatives"
   5. Relevance of the project
   6. Description of the operating principle
   7. Solution requirements and specifications
   8. Technological risks
   9. Team members and contributions
   10. Detail and evidence of the implemented TRL3/4 prototype (TRL Calculator.xls)
   11. TRL 3/4 prototype test results and conclusions
   12. Plan for scaling up to next TRL's (including budget to be exercised)
       Budget (Budget template.xls): *the budget should be prepared based on the required elements, considering only what is needed to meet the proposed objectives and excluding unallowable expenses. Proposals that meet the requirements will be considered regardless of the amount of resources required, until the available funds are met. The committee may request adjustments to the budget if the proposal is selected.*

   NOTE: The **eligible items** for support are:
   - Travel and per diem strictly associated with the development of the project, trips to congresses, symposiums, etc. are not allowed.
   - Hiring of exclusively external personnel for professional services. In the case of fee-based contracts for specific services, they must be approved by the Evaluation Committee at the time of execution.
   - Materials and consumables.

9. The proponent and its work team, in case of being selected to receive the fund, commit to:
   - Use the funding to scale the proposal to TRL5 level or higher in a maximum of **12 months** according to the established work plan, with its respective iterations. In case of requiring more time, an extension may be requested to the Evaluation Committee justifying the reason, and the latter will determine

whether to provide the extension, as well as the conditions of the same for a maximum of **6 more months**.

- Participate in periodic progress meetings.
- Complete your work team.
- Generate relevant tests and/or prototypes according to the TRL level with results.
- Have results to notify your invention or have in process a patent application or registration of any intellectual property figure.
- Minimum deliverables
    - **Functional prototype verified under laboratory conditions (TRL 5 or higher).**
        - Validation test results and conclusions (at what level the original requirements were met, what worked, what needs to be optimized, what needs to be removed, what needs to be added)
        - Design and prototype update
        - Technology Risk Assessment (DFMEA)
        - Bill of materials (BOM) with respective unit cost and total documented cost
        - Solution Specification and Requirements Update.
        - Notification of invention
        - Analysis and plan of standards, regulations, certifications required for this innovation.
    - **MVP Documentation:**
        - Value Proposition Validation
        - Competitive analysis
        - Market validation (segments, size, etc.)
        - Business Model or Alternative Marketing Strategy Design
        - Business Case Documentation
        - Intellectual Property strategy proposal: Application of patents, application of copyright, distinctive signs, etc. (This is done in conjunction with the Technology Transfer Department).
        - Detailed plan for application of required standards, regulations, and certifications (time, cost, etc.)
        - It is desirable to have a signed MoU with potential stakeholders (Letters of Intent, etc.)

10. Points to consider:

Ineligible expenses:

- **Consultancy fees in areas such as entrepreneurship, intellectual property, commercialization, or technology transfer**: Resources may not be used to hire consultants in the aforementioned areas.
- **Bonuses of scientific personnel and/or the work team, as well as personnel with a contractual relationship with the Tec de Monterrey**: bonuses paid to scientific personnel or the team that postulates the solution are not eligible, whether they carry out direct or indirect activities aimed at within reach of the project objectives.
- **Infrastructure adjustments, as well as equipment purchases:** no investments may be made for the adjustment of laboratories and/or equipment that are directly and/or indirectly related to the purpose of the project.
- **Dissemination of results**: registration to congresses or publication expenses in specialized or other magazines, nor the design, preparation or distribution of technical documents, posters, advertising, among others.
- **Administrative expenses**: expenditures or expenses such as salaries or bonuses of administrative personnel, office materials and supplies, contingencies and general services are not part of the items to be financed by this call for proposals.
- **Software**: The acquisition of software licenses is not allowed.

Allowable expenses:

- **Specialized services:** subcontracting of national or international scientific and/or technological activities or services that are key for the validation and/or scaling of the solution, prototyping, technical-commercial validation of the product or prototype, field tests, technical data sheets to comply with industrial norms or standards, registrations, certifications, among others, making explicit the scope and objective of the service and the different tasks entrusted with their deliverables.
- **Technological services**: consists of the contracting of tests, analysis, laboratory tests, stability, safety and efficacy tests, simulations, or developments as long as Tec de Monterrey does not have the capacity to develop them, and they are necessary for the validation and/or compliance with market regulatory requirements necessary for the scaling of the solution. This point must be perfectly validated and justified, where its request and in its case approval, the applicant will commit to demonstrate the result.

- **Materials and supplies:** includes the cost of acquisition of materials, laboratory and/or field consumables and supplies necessary for the execution of tests and/or validations derived from the needs assessment based on the level of maturity of the technology and the regulatory requirements of the evaluation.

Contact: For any matter related to this call for proposals, please contact Carlos Téllez Martínez (carlos.tellez.martinez@tec.mx).

Annex I

Research Groups' Challenges and topics (National Schools)

Table 1. Challenge 1. Trigger Sustainability Actions to Respond to the Climate Emergency, reduce social gaps and economic lag			
Topic key	Topics	Topic key	Topics
A – T1	Regenerative Economy	A – T17	Climate Resilient Development
A – T2	Energy transition	A – T18	Management, Monitoring, Policy and Law for Sustainability
A – T3	Clean Technologies and Emerging Energy Sources	A – T19	Management, Monitoring, Policy and Law for Sustainability
A – T4	Zero-Net Technologies	A – T20	Geography, Planning and Development for Sustainability
A – T5	Energy and Water Security	A – T21	Philosophical Aspects of Sustainability
A – T6	Energy Storage	A – T22	Worldviews and alternative epistemologies
A – T7	Water-Energy-Food Nexus	A – T23	Ethics, equity, climate justice, and intersectionality
A – T8	Water Circularity	A – T24	Regenerative Design
A – T9	Emerging Pollutants	A – T25	Sustainable value chains
A – T10	Urban Resilience	A – T26	Education for Sustainable Development
A – T11	Circular Economy	A – T27	Gender studies around sustainability
A – T12	Circular Engineering	A – T28	Sustainable lifestyles
A – T13	Impactful entrepreneurship and innovation	A – T29	Culture's contributions to sustainable development
A – T14	Responsible/Sustainable production	A – T30	Big Data/Data Science for Sustainability
A – T15	Responsible/Sustainable consumption	A – T31	Communication strategies and Outreach
A – T16	Public Policy for Sustainability		

Table 1. Research Groups' Challenges and topics, Challenge 1. Triggering Sustainability Actions to Respond to Climate Change

Table 2. Challenge 2. Promote the transformation of cities and communities to make them more sustainable, inclusive and prosperous

Topic key	Topics
B – T1	Design for the vulnerable (gender, poverty, marginalized communities, access to technology, early childhood, etc.)
B – T2	Financial Inclusion
B – T3	Smart cities
B – T4	Urban Resilience: mobility, sustainable water management, air quality
B – T5	Public policy, Fiscal policy, and Legislation
B – T6	Foreign Direct Investment and its impact on the use of resources, mobility, and pollution in cities
B – T7	Affordable, renewable, and sustainable energies
B – T8	Healthy Cities
B – T9	Digital Agriculture and Precision Agriculture
B – T10	Biotechnology for health, food and environment
B – T11	Data Sciences, Artificial Intelligence & Quantum computing applications
B – T12	Nanotechnology for a better world
B – T13	Cities that attract talent and investment
B – T14	Cities migrating towards the knowledge economy

Table 2. Research Groups' Challenges and topics, Challenge 2. Changing the Cities' Paradigm towards Sustainable Communities with a Regenerative and Inclusive Culture

Table 3. Challenge 3. Transform and empower organizations towards digitalization the creation of shared value and responsible innovation	
Topic key	Topics
C – T1	New leadership models
C – T2	New company ownership models
C – T3	Managing relationships with stakeholders
C – T4	Social innovation and sustainability
C – T5	Business models innovation
C – T6	Strategy and Industry transformation

C – T7	Creative industries
C – T8	The future of work
C – T9	The future of talent
C – T8	The Gig Economy
C – T9	Family businesses
C – T10	Productivity and added value
C – T11	Digital transformation & smart factories
C – T12	Advanced manufacturing and intelligent logistics
C – T13	The future of value chain
C – T14	Models of sustainable organizations and circular economy: Responsible production, responsible consumption, innovative processes and co-design, transformation of new industries, zero-net circular economies: production and business
C – T15	Data analytics to understand the behavior of people's life and consumption patterns
C – T16	The impact of pandemics or generalized phenomena that promote social disruptions on youth unemployment

Table 3. Research Groups' Challenges and topics, Challenge 3. Transforming the Company towards responsible innovation and shared value creation

Table 4. Challenge 4. Promote environments for human flourishing	
Topic key	Topics
D – T1	Integral Wellness
D – T2	Diverse and Inclusive Communities
D – T3	Social and financial inclusion
D – T4	Arts as a platform for personal and social transformation
D – T5	Philanthropic culture and reciprocity
D – T6	A sustainable world as a foundation for human flourishing
D – T7	Spirituality
D – T8	Mental Health
D – T9	Financial health

D – T10	Purpose in life

Table 4. Research Groups' Challenges and topics, Challenge 4. Promoting Human-flourishing Environments

Table 5. Challenge 5. Construction of a new social contract	
Topic key	Topics
E – T1	Justice for all
E – T2	Socioeconomic equity
E – T3	Gender equity and equality
E – T4	Inclusive business
E – T5	Participation of women in leadership positions
E – T6	Fair trade
E – T7	Financial inclusion
E – T8	Public policy to promote equitable and access to quality education and services, and development opportunities
E – T9	Democracy, anti-corruption, and transparency
E – T10	Data analytics for the development of public policy
E – T11	Participation and active citizenship
E – T12	The Fourth Industrial Revolution impact in the future of work

Table 5. Research Groups' Challenges and topics, Challenge 5. The New Social Contract Construction

Table 6. Challenge 6. Development of new strategies to improve human health, through early diagnostic tools and innovative therapy	
Topic key	Topics
F – T1	Tolerance induction in allergic and autoimmune diseases
F – T2	Identification of biomarkers in cancer
F – T3	Protection of organ damage caused by ischemic and oxidative injury
F – T4	Identification of biomarkers in infectious diseases

Table 6. Research Groups' Challenges and topics, Challenge 6. Development of new strategies to improve human health, through early diagnostic tools and innovative therapy

Research Units' Challenges and topics (Interdisciplinary Institutes of Research)

Table 7. Challenge 1. Elevate learning outcomes by transforming teaching & learning to be engaging and motivating using active learning strategies and emerging technologies	
Topic key	Topic
C1-T1	Evaluate educational models with an interdisciplinary and active learning approach to improve engagement and motivation in the teaching-learning process.
C1–T2	Explore evidence-based enriched technology-mediated learning environments for engagement, motivation, skills development, or evaluation.
C1-T3	Assess learning outcomes improvement through equitable and inclusive learning environments that promote awareness of individual differences, justice, impartiality, equity, and settings in which everyone feels welcome.

Table 7. Research Units' Challenges and topics, Challenge 1. Elevate learning outcomes by transforming teaching & learning to be engaging and motivating using active learning strategies and emerging technologies

Table 8. Challenge 2. Design effective competency-based education and lifelong learning systems to elevate learning outcomes	
Topic key	Topic
C2-T1	Identify the characteristics for designing effective competency-based learning scenarios, addressing the requirements from international standards, accreditation organizations and the needs of the industry, business, and society.
C2-T2	Evaluate systems, policies, and strategies to scale skills development and lifelong learning opportunities for different population and workforce segments.
C2-T3	Explore the effectiveness of technological systems, using artificial intelligence and emulating real-world environments, to scale up techniques for skills development and competency assessment.

Table 8. Research Units' Challenges and topics, Challenge 2. Design effective competency-based education and lifelong learning systems to elevate learning outcomes

Table 9. Challenge 3. Design advanced materials for different applications to be net-zero emission and zero carbon footprint	
Topic key	Topic
C3-T1	Smart materials for food packaging and bio-sensors with eco-friendly characteristics.
C3-T2	Lightweight materials for the transportation industry.

C3-T3	CO^2 based materials for multiple applications
C3-T4	Biowaste products for industry and end-consumers (Circular Economy)
C3-T5	Technological platforms for rapid discovery and development of materials and manufacturing processes using artificial intelligence, data science, mathematical models, simulation and robotics.

Table 9. Research Units' Challenges and topics, Challenge 3. Design advanced materials for different applications to be net-zero emission and zero carbon footprint

Table 10. Challenge 4. Creation and development of high-tech manufacturing processes to accelerate and rapidly scale-up the production of advanced materials with minimum impact in the environment	
Topic key	Topic
C4-T1	CO^2 capture and mitigation to reduce emissions
C4–T2	Clean energy generation and management
C4–T3	Water recovery & reuse to ensure water resiliency
C4–T4	Creation of new manufacturing process to produce advanced materials with minimum energy consumption, waste, water usage, and greenhouse emissions.
C4–T5	Experimentation of synthetic techniques such as additive manufacturing and 3-D printing.
C4–T6	Transformation of Industry based on technological research and public policy initiatives to accelerate the advances of sustainable materials and manufacturing
C4–T7	Nearshoring for High-Tech Sustainable Manufacturing.

Table 10. Research Units' Challenges and topics, Challenge 4. Creation and development of high-tech manufacturing processes to accelerate and rapidly scale-up the production of advanced materials with minimum impact in the environment

Table 11. Challenge 5. Develop novel drugs, foods, advanced therapies, strategies and policies for early detection, prevention, and reduction of prevalence of metabolic disease and obesity in children	
Topic key	Topic
C5-T1	Sustainable food production.
C5-T2	Easy-to-use and cost-effective bioengineering platforms for early detection of metabolic diseases.
C5-T3	Analysis of Public Policy strategies to deal with childhood obesity.

Table 11. Research Units' Challenges and topics, Challenge 5. Develop novel drugs, foods, advanced therapies, strategies and policies for early detection, prevention, and reduction of prevalence of metabolic disease and obesity in children

Table 12. Challenge 6. Reduce the prevalence of excess weight and obesity in early childhood.	
Topic key	Topic
C6-T1	Effects at the multi-omics level of the usual diet and new foods in Mexican and Latin American populations with a focus on pregnancy and early childhood.
C6-T2	Evaluate in vitro and preclinical models' new experimental drugs and advanced therapeutics.
C6-T3	Explore the causes and impact of excess weight and obesity in early childhood and the development of prevention measures for childhood obesity.

Table 12. Research Units' Challenges and topics, Challenge 6. Reduce the prevalence of excess weight and obesity in early childhood

Table 13. Challenge 7. Propose public policy and entrepreneurship to combat excess weight and obesity	
Topic key	Topic
C7-T1	Accessibility and availability of nutrients and/or bioactive molecules.
C7-T2	Enhanced sensitivity of diagnosis for current platforms.
C7-T3	Generate clinical protocols and probe concepts for the use of novel therapeutics in a patient with metabolic diseases and obesity.
C7-T4	Special category - Synergy Grants. Interdisciplinary research projects between research groups associated with EIC and IOR to prove and demonstrate disruptive and multifaceted solutions to high-impact challenges tackling obesity.

Table 13. Research Units' Challenges and topics, Challenge 7. Propose public policy and entrepreneurship to combat excess weight and obesity

Table 14. Special category - Synergy Grants.	
Topic key	Topic
SG-T1	Interdisciplinary research projects between research groups associated with EIC and IOR to prove and demonstrate disruptive and multifaceted solutions to high-impact challenges tackling obesity.

Table 14. Special category - Synergy Grants