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UNIVERSIDAD PONTIFICIA

ICAI

MASTER'S IN ENVIRONMENT AND SMART ENERGY MANAGEMENT

MASTER'S THESIS

CONCEPTUALIZATION OF AN ECOSYSTEM OF CO-CREATION OF SOLUTIONS WITH SOCIAL OR ENVIRONMENTAL IMPACT FOR ITS IMPLEMENTATION IN THE FUNDACIÓN INGENIEROS ICAI

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Madrid

July 2021

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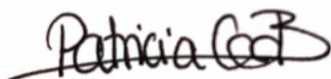### 6º. Fines y funcionamiento del Repositorio Institucional.

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I C A I

MASTER'S IN ENVIRONMENT AND SMART ENERGY MANAGEMENT

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CONCEPTUALIZATION OF AN ECOSYSTEM OF CO-CREATION OF SOLUTIONS WITH SOCIAL OR ENVIRONMENTAL IMPACT FOR ITS IMPLEMENTATION IN THE FUNDACIÓN INGENIEROS ICAI

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Madrid

July 2021

CONCEPTUALIZACIÓN DE UN ECOSISTEMA DE CO-CREACIÓN DE SOLUCIONES CON IMPACTO SOCIAL O AMBIENTAL PARA SU PUESTA EN MARCHA EN LA FUNDACIÓN INGENIEROS ICAI

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Director: Reina Álvarez de Sotomayor, Marta.

Entidad Colaboradora: Fundación Ingenieros ICAI para el Desarrollo

RESUMEN DEL PROYECTO

Introducción

La Fundación Ingenieros ICAI moviliza a estudiantes, profesionales, empresas, ONG para contribuir a la creación de un mundo más justo y sostenible, mediante el emprendimiento social, el voluntariado profesional y la sensibilización para dar sentido a la labor del ingeniero como ingeniero social.

El objetivo principal del proyecto es desarrollar fórmulas colaborativas con distintos formatos e implicando a los ingenieros ICAI para la solución de retos sociales. Las metas definidas al principio del proyecto son:
- Permitir ampliar el alcance de actuación y la red de actores de la Fundación.
- Constituir vías complementarias de acción a las actuales, con el fin de involucrar a la comunidad de ingenieros ICAI y captar su interés por las actividades de la Fundación y proyectos de impacto social y medioambiental.
- Ampliar y afianzar dicha comunidad, dando a conocer la Fundación y creando un sentimiento de pertenencia.
- Consolidar la colaboración con la escuela y fomentar la colaboración intergeneracional.
- Afianzar el rol de la Fundación como espacio que facilite la colaboración y la comunicación entre estudiantes, ingenieros, ONG o asociaciones y otros profesionales.
- Permitir extraer aprendizajes para asegurar la continuidad de estas actividades.

Aunque la Fundación Ingenieros ICAI tiene una estrategia definida, este proyecto tiene un aspecto de emprendimiento e innovación y se puede relacionar con el concepto de *feedback loop* expuesto por el americano Eric Ries en *The Lean Startup*. Su esquema de tres elementos (Construir, Medir, Aprender) permite identificar el éxito de un nuevo producto lanzado al mercado o un nuevo modelo de negocio, y se ha aplicado para cada solución.

Metodología

Partiendo del gran objetivo principal mencionado, se ha procedido por bloques:
- Bloque 1: Análisis (estado actual de la Fundación, actividades, presupuesto).
- Bloque 2: Propuesta de soluciones (listado, reflexión, valoración y selección).
- Bloque 3: Puesta en práctica (diseño de contenidos y realización de pruebas piloto) y extracción de aprendizajes.

A continuación, se exponen las tareas y el cronograma del proyecto.

1. Definición del contexto y de los objetivos del proyecto *(Octubre – Noviembre)*
2. Análisis de la Fundación e identificación de las líneas de acción actuales *(Octubre – Noviembre)*
3. Identificación, valoración y selección de nuevas oportunidades *(Octubre – Diciembre)*
4. Diseño de los nuevos formatos *(Octubre – Febrero)*
5. Reflexión económica *(Febrero – Mayo)*
6. Desarrollo de los contenidos de los nuevos formatos *(Noviembre – Mayo)*
7. Implementación práctica de pruebas piloto
   7.1 Taller Semana de la Ciencia *(Octubre – Noviembre)*
   7.2 Desarrollo de la estrategia de comunicación a través del canal de Instagram *(Febrero – Junio)*
   7.3 Podcast "Talento ICAI" *(Febrero – Junio)*
   7.4 *Hackathon (Marzo – Mayo)*
   7.5 Estrategia de *merchandising (Abril – Junio)*
8. Elaboración de un plan de futuro *(Mayo)*
9. Redacción de la memoria *(Abril – Junio)*

Resultados

En el bloque 1 o fase de análisis, se ha analizado la situación inicial de la Fundación (partes interesadas, perfil objetivo, presupuesto actual) y elaborado un *Business Model Canvas*. También se ha hecho un listado de las ventajas y desventajas de los tres tipos de formatos posibles (100% presencial, híbrido o 100% online), optando en principio por el formato virtual.

En el bloque 2, se ha aplicado la técnica de creatividad del "*brainstorming*", evaluado cada solución mediante la herramienta DAFO, y ha decidido llevar a cabo:

- Un taller práctico (tarea 7.1)
- El desarrollo de la estrategia de comunicación centrado en la red social Instagram (7.2)
- Un podcast (7.3)
- Un *Hackathon* (7.4)
- El desarrollo de una estrategia de *merchandising* (7.5) (esta última solución no se seleccionó en la primera fase, sino más tarde, a finales del mes de marzo).

Tanto el taller, el desarrollo de la estrategia de comunicación en Instagram y el podcast se han puesto en práctica. En cuanto al *hackathon* y la estrategia de *merchandising*, se dejan planteadas todas las pautas para ponerlos en marcha, pero no se han implementado directamente durante el proyecto.

Conclusiones

En conclusión, este proyecto ha permitido identificar 5 nuevos formatos o líneas de acción para la Fundación (talleres prácticos, el formato del podcast, el formato del *hackathon* o evento colaborativo por equipos, la comunicación mediante redes sociales desarrollando y adaptando contenidos para un público objetivo joven en la red social Instagram y el *merchandising* como instrumento generador de sentimiento de pertenencia y como nueva vía de ingresos), valorar su éxito y los puntos con margen de mejora y reflexionar sobre su sostenibilidad en el tiempo. Se volverán a llevar a cabo el taller, el podcast, se seguirá creando contenido en Instagram. La parte práctica del *hackathon* y la estrategia de *merchandising* aún tienen que ser implantadas.

Referencias

1. Fundación Ingenieros ICAI para el Desarrollo. Memoria Anual 2019. 2020, Madrid.
2. Fundación Ingenieros ICAI para el Desarrollo. Memoria Anual 2020. 2021, Madrid.
3. Ries, E. The Lean Startup; Publisher: Penguin, 2011.
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CONCEPTUALIZATION OF AN ECOSYSTEM OF CO-CREATION OF SOLUTIONS WITH SOCIAL OR ENVIRONMENTAL IMPACT FOR ITS IMPLEMENTATION IN THE FUNDACIÓN INGENIEROS ICAI

Author: Gómez de Olea Ballester, Patricia.

Director: Reina Álvarez de Sotomayor, Marta.

Collaborating Entity: Fundación Ingenieros ICAI para el Desarrollo

PROJECT OVERVIEW

Introduction

The Foundation of ICAI engineers focuses its activity on mobilizing students, professionals, companies and NGOs to contribute to the creation of a fairer and more sustainable world, through social entrepreneurship, professional volunteering and awareness-raising to give meaning to the work of engineers as a social engineers.

The main objective of the project is to develop collaborative formulas with different formats and involving ICAI engineers to solve social challenges. Here below are the goals defined at the beginning of the project.

- To extend the scope of action and the network of actors of the Foundation.
- To create channels of action complementary to the current ones, in order to involve the ICAI engineering community and capture their interest in the Foundation's activities and social and environmental impact projects.
- To expand and strengthen this community, giving more visibility to the Foundation and creating a sense of belonging.
- To consolidate the collaboration with the school and encourage intergenerational collaboration.
- To strengthen the role of the Foundation as a space that facilitates collaboration and communication between students, engineers, NGOs or associations and other professionals.
- To enable learning to be extracted to ensure the continuity of these activities.

Although the Foundation is a long-standing organization with a defined strategy, the project has an entrepreneurship and innovation aspect and can be related to the *feedback loop* concept put forward by the American Eric Ries in _The Lean Startup_. His three-element scheme (*Build, Measure, Learn*) allows to identify the success of a new product launched on the market or a new business model; and has been applied for each solution.

Methodology

Starting from the main objective mentioned above, the project was divided into three blocks:
- Block 1: Analysis (current state of the Foundation, activities, budget).
- Block 2: Proposal of solutions (list, reflection, evaluation and selection).
- Block 3: Implementation (design of contents and carrying out pilot tests) and lookback on lessons learned.

Here below is the list of activities defined at the start of the project.

1. Definition of the context and the objectives of the project *(October – November)*
2. Analysis of the Foundation and identification of the current lines of action *(October – November)*
3. Identification, assessment and selection of new opportunities *(October – December)*
4. Design of new formats *(October – February)*
5. Economic considerations *(February – May)*
6. Development of the contents of the new formats *(November – May)*
7. Practical implementation of pilot tests
   7.1 Science Week workshop *(October – November)*
   7.2 Development of the communication strategy through the Instagram channel. *(February – June)*
   7.3 Podcast "Talento ICAI" *(February – June)*
   7.4 Hackathon *(March – May)*
   7.5 Merchandising strategy *(April – June)*
8. Development of a plan for the future *(May)*
9. Writing of report *(April – June)*

Results

In the first block, the initial situation of the Foundation was analyzed (stakeholders, targeted profile, budget) and a Business Model Canvas was done in order to have a clear picture of the situation at the start of the project. Also, a list was made of the advantages and disadvantages of the three possible formats for the implementation of the new collaborative formulas (100% face-to-face, hybrid or 100% online), choosing the virtual format.

In block 2, the brainstorming technique was applied, and each solution was evaluated using the SWOT tool. It was finally decided to carry out:
- A practical workshop (task 7.1)
- The development of the communication strategy focusing on the social network Instagram (7.2)
- A podcast (7.3)
- A Hackathon (7.4)
- The development of a merchandising strategy (7.5) (this last solution was not selected in the first phase, but later, at the end of March).

The workshop, the development of the communication strategy on Instagram and the podcast were put into practice. As for the hackathon and the merchandising strategy, all the guidelines for implementing them have been set out, but they have not been directly implemented during the project.

Conclusions

In conclusion, this project has made it possible to identify 5 new formats or lines of action for the Foundation (practical workshops, the podcast format, the hackathon format or collaborative team event, communication through social networks by developing and adapting content for a young target audience on the Instagram social network and the merchandising line of action as an instrument for generating a sense of belonging and as a new means of income), as well as to assess their success and the points with room for improvement, and to reflect on their sustainability over time. The workshop, the podcast and the creation of content in Instagram formats will be kept. The first pilot of the hackathon can only be evaluated after the event, and the merchandising strategy has yet to be developed in detail.

References

1. Fundación Ingenieros ICAI para el Desarrollo. Memoria Anual 2019. 2020, Madrid.
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3. Ries, E. The Lean Startup; Publisher: Penguin, 2011.
4. Unimooc. Available online: https://www.youtube.com/watch?v=GVXYAwXHpvg&t=205s (Accessed in October 2020).

Conceptualization of an ecosystem of co-creation of solutions with social or environmental 2

impact for its implementation in the Fundación Ingenieros ICAI 3

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1   Affiliation 1; Escuela Técnica Superior de Ingeniería – ICAI, Universidad Pontifiia de Comillas 6
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Abstract: This project seeks to implement new collaborative formulas and lines of action to create a greater 8
impact through the *Fundación Ingenieros ICAI*. The common thread of the project is, therefore, to create an 9
ecosystem of new solutions with social or environmental impact following three key points: raising aware- 10
ness, building solutions and acting. The set of proposed solutions constitutes a model implemented in the 11
short term, and its viability within the framework of the Foundation's activity is evaluated after its imple- 12
mentation. The project is divided into three phases (analysis, ideation and proposal of solutions, implemen- 13
tation and extraction of lessons learned). Five new formats or lines of action have been identified for the 14
Foundation (practical workshops, a podcast, a hackathon format, communication through social networks 15
by developing and adapting content for a young target audience on the Instagram social network, and a 16
merchandising line of action as an instrument for generating a sense of belonging and as a new means of 17
income), their success and the points with room for improvement have been assessed and their sustainability 18
over time has been reflected on. 19

21

1. Introduction 22

In October 1999, after the 6th Congress of ICAI engineers, the group "Ingenieros de ICAI para el 23
Desarrollo" was launched for the first time, as an instrument of support and help at the service of the 24
most disadvantaged. In 2007, its statute changed and it officially became the Foundation of ICAI Engi- 25
neers for Development. Since then, all its initiatives have been aimed at putting technology and engi- 26
neering knowledge at the service of society. 27
28

In recent years, and particularly since 2019, the Foundation has wanted to diversify its activities 29
in order to strengthen the community of ICAI engineers involved in social and, increasingly, environ- 30
mental projects. It mobilizes students, professionals, companies, NGOs to contribute to a fairer and 31
more sustainable world through the lines of social entrepreneurship, the promotion of professional 32
volunteering and raising awareness to give meaning to the work of engineers as social engineers. 33
Among other things, in the last year, the socio-economic and sanitary crisis resulting from the COVID- 34
19 pandemic prevented carrying out several of the projects supported by the Foundation, and 35
the Foundation asked itself the following question: how to renew its strategy to implement 36
sustainable changes and broaden its scope of action. [1-2] 37
38

This is how the project was born, its main objective being to develop collaborative formulas with 39
different formats and involving ICAI engineers to solve social challenges in physical, hybrid or remote 40
spaces. The set of proposed solutions constitutes a model implemented in the short term and its via- 41
bility within the framework of the Foundation's activity has been evaluated after its implementation. 42

2. State of the Art 43

In the first block or analysis phase, several documents were used to understand and analyze the 44
starting point of the project and the initial situation of the Foundation. [1-4] 45

First, the stakeholders that are part of the community surrounding the Foundation were identi- 46
fied: mainly the Foundation's board, members and intern student, and most importantly its volunteers 47
and the NGOs they work with. 48

A buyer persona was defined for the targeted profile for the different initiatives. Without exclud- 49
ing other kinds of profiles that could be complementary, there was a strong desire to involve engineers, 50
younger generations in particular (students or recent graduates from 18 to 25 years old), interested in 51
getting involved in social causes and used to social networking. 52

Furthermore, the Foundation's budget (2020 data) was analyzed. The main conclusions were that 53
their economic situation is stable and their income equals their expenses, but there is no margin what- 54
soever to grow or allow more expenses. To complete this analysis a Business Model Canvas (*Figure 4*) 55
was made in order to have a clear picture of the situation at the start of the project. [5] 56
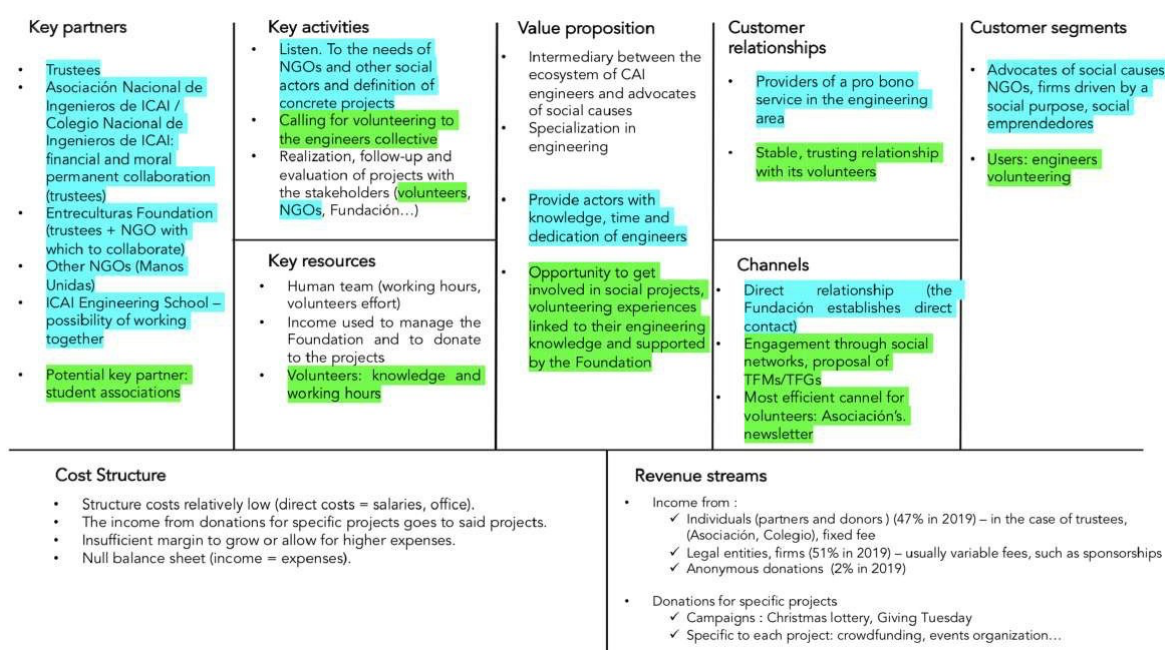

Figure 1. *Business Model Canvas of the Fundación Ingenieros ICAI.* 57
58

Finally, a list was made of the advantages and disadvantages of the three possible formats for the 59
implementation of the new collaborative formulas (100% face-to-face, hybrid or 100% online). This 60
brief analysis made it possible to determine that, adapting to the situation and health restrictions, the 61
solutions would be carried out in a virtual format, but considering a transition to the 100% physical 62
format in mind as soon as it becomes possible. The hybrid format was discarded, as it complicated 62
logistics and implied heterogeneous experiences for the participants in the initiatives. 64

3. Objectives 65

The goals defined at the beginning of the project were the following. 66

- To extend the scope of action and the network of actors of the Foundation. 67
- To create channels of action complementary to the current ones, in order to involve the ICAI 68
  engineering community and capture their interest in the Foundation's activities and social 69
  and environmental impact projects. 70
- To expand and strengthen this community, giving more visibility to the Foundation and cre- 71
  ating a sense of belonging. 72
- To consolidate the collaboration with the school and encourage intergenerational collabora- 73
  tion. 74
- To strengthen the role of the Foundation as a space that facilitates collaboration between 75
  students, engineers, NGOs, associations, professional engineers… 76
- To ensure the continuity of the developed solutions through the analysis of the obtained 77
  results. 78

4. Materials and Methods (Methodology)

The ICAI Engineers Foundation is a long-standing organization with a defined strategy. However, the creation of an ecosystem of collaborative solutions has an entrepreneurship and innovation aspect. Therefore, this project can be related to the *feedback loop* concept put forward by the American Eric Ries, author of the book _The Lean Startup_ [6]. His three-element scheme (Build, Measure, Learn) is a technique that is applied to identify the success of a new product launched on the market or a new business model. It allows a continuous development of value and to measure what is working well. This concept has been applied for each solution.

Therefore, starting from the main objective previously mentioned, the project has been divided into three blocks or work streams.

Block 1: Analysis (current state of the Foundation, activities, budget).

Block 2: Proposal of solutions (list, reflection, evaluation and selection).

Block 3: Implementation (design of contents, pilot tests) and lookback on lessons learned.

Management tools such as a business model canvas and the SWOT matrix have been used [5, 7]. Specific documentation has been used for the different initiatives carried out and is listed in the *References* section.

5. Results

Blocks 2 and 3 correspond to the project's practical phases (design, implementation, result analysis).

In block 2, for the identification, assessment and selection of new opportunities, the creativity technique of brainstorming was applied, and each solution was evaluated using the SWOT tool, allowing the identification of the strengths, weaknesses, opportunities and threats of each one. Five of the proposed collaborative formulas were selected:

- A practical workshop.
- The development of the communication strategy focusing on the social network Instagram.
- A podcast.
- A Hackathon.
- The development of a merchandising strategy.

5.1. Practical Workshop in Madrid's Science Week XX: *"Urban agriculture & How to create your own urban garden?"*

5.1.1. Organisation steps

This initiative was a collaboration with ICAI during Madrid's Science Week XX. Once the topic was chosen, the Foundation had to register for the event. Then the content was developed (structure elaboration, choice of format for the workshop) and a detailed communication plan was drawn up. There was a preparation phase (registration of participants, search of expert speakers, design of the workshop content) before carrying out the event. Afterwards a summary document and a survey were sent to the participants to collect their opinions and determine possible improvements for future editions.

5.1.2. Content

The content developed was [8,17]:
- The definition of urban agriculture and its integration in the Sustainable Development Goals.
- The presentation of the advantages and drawbacks of urban gardens and farms.

- Worldwide examples focused on the cities of Madrid, Paris, Tokyo, New York, Havana and Belo Horizonte.
- The different existing farming techniques (hydroponics, aquaponics, vertical farming).
- Steps, tips and practical examples to create one's own urban garden at home (companion planting, crop rotation, plagues and illnesses control, light and water needs).
- Intervention nº1: Félix Revilla, director of the agricultural engineering school INEA and president of the INEA Foundation, presented his experience and real life examples as an expert in urban gardens.
- Intervention nº2: Marc Grañén, landscape architect, talked about the integration of green spaces and vegetation in urban areas and about his initiative Phytokinetic (installation of green spaces on the roofs of public means of transport such as buses).
- Interview to Julián Briz, PhD in Agricultural Engineering at the UPM (Universidad Politécnica de Madrid), Emeritus Professor in the Department of Agricultural Economics and Social Sciences at the UPM (E.T.S.I. Agronomists) and Founder of PRONATUR. Member of the Boards of the European Green Cities Association (EFB) and the World Green Infrastructure Network.
- Conclusions.

5.1.3. Results

The workshop was successfully carried out on the 6th November 2020, with 76 people registered for the event and 50 final assistants [18]. Through the survey sent to the participants, the following aspects were evaluated. Those answering the survey assessed with a mark of 5/5 the following aspects:

- Duration (85,7% of the participants)
- Quality of the content (64,35% of the participants)
- Speakers' interventions (71,4% of the participants)
- Practical aspect (57,1% of the participants)

The key points obtained from the survey were:

- Only 14% of the public were students.
- The participants would have liked to take part in a real physical, interactive, practical event.
- Some general interest topics were identified (that could be used for future workshops, for social networks' content creation...), mainly recycling, circular economy, renewable energy.

5.1.4. Future development

The Foundation will keep this format, if possible maintaining the collaboration with the school and during the Science Week (which helps give more visibility to the event). The next workshop shall be an in-person event rather than online, to make it more interactive for everyone and attract more young people and ICAI students. The intergenerational aspect shall be kept (collaboration between individual students or student associations, expert speakers...).

5.2 Development of the communication strategy focusing on the social network Instagram.

5.2.1. Organisation steps

For the development of the communication strategy focused on the social network Instagram, the following steps were taken.

- Analysis of trends in the use of social networks in Spain.
- Analysis of the Foundation's presence in different social networks.
- Definition of the types of content and the topics on which the communication would be focused.
- Creation of content in different formats (photos, videos, surveys, infographics...) and publishing on networks according to the planned schedule.

- Follow up of the followers' response and the statistics of the Instagram account. 177
- Determination of the formats that work best with the target audience and establishment of 178
guidelines to be applied after the end of the project. 179

5.2.2. Content 180

After seeing that Generation Z's most used social network in Spain is Instagram [19], and focusing 181
the communication strategy on this specific network, the kind of content that was to be published was 182
defined, the main goal being to raise awareness on certain topics related to the environment or social 183
causes and gain followers as a way to expand the community involved in the Foundation's projects. 184

The published contents are structured in different categories: 185
- Educational content related to the areas of activity of the Foundation, mainly access to en- 186
ergy, energy poverty, access to water, NGO empowerment, promotion of women in the STEM 187
world... 188
- Stories or permanent publications related to: 189
  - *International Days of*: World Water Day, Climate Day, Earth Day, Africa Day, World 190
  Environment Day World Energy Saving Day, International Day of Women in Engi- 191
  neering... 192
  - Events: registration for a workshop, a hackathon, a webinar... 193
  - Publication of important articles, Extracts from episodes of the "Talento ICAI" pod- 194
  cast. 195
- Short videos related to the Sustainable Development Goals: 196
  - 2030 Agenda: Engineering for Development. 197
  - Access to Energy (SDG 7: Affordable and Clean Energy). 198
  - Other videos related to the SDGs the Foundation's core activity is focused on: Gen- 199
  der Equality (SDG 5), Clean Water and Sanitation (SDG 6), Industry, Innovation and 200
  Infrastructure (SDG 9), Partnerships for the goals (SDG 17). 201

5.2.3. Results 202

All the contents planned and mentioned above have been created and published throughout 203
the project [20-24], reaching for the most part a young public between 18 and 24 years old (43,3%) 204
and 25 to 34 years old (23,4%) according to Instagram statistics. The account has 257 followers cur- 205
rently and each published post gets an average of 10 likes and 129 visualizations. Some examples of 206
the published content are presented here below. 207

Figure 2. *Content developed for the Foundation's Instagram account.*   208

5.2.4. Future development   209

Now this communication channel has been developed, the Foundation will keep using it as a   210
means to spread educational content on social and environmental related matters as it has been done   211
during this project, as well as to get its young public and be able to propose projects, participation in   212
other initiatives such as a Hackathon or becoming an interviewer in the "Talento ICAI" podcast (*see   213
5.3)* , or even becoming the protagonists of the SDG related videoos themselves. Instagram has proved   214
to be an efficient means to the end of reaching more students and young people [25].   215

5.3 Podcast "Talento ICAI"   216

5.3.1. Organisation steps   217

The following steps were taken to launch the podcast: 218
- Analysis of different podcast platforms (both recording and publishing tools).   219
- List of speakers that correspond to the profile sought by the Foundation, i.e. engineers,   220
either students or professionals linked to social and/or environmental impact.   221
- Preparation of advice guides for speakers and interviewers.   222
- Creation a focus group to evaluate and give feedback on the podcast.   223
- Contact with the speakers, preparation of the interview scripts, share them with the   224
speakers.   225
- Recording of interviews through the Webex programme.   226
- Transmission to the communication and marketing department of the *Association and   227
the National College of ICAI Engineers* for its publication on the selected platforms   228
(Spotify, Ivoox, Apple Music, Youtube).   229

5.3.2. Content

Among the initiatives proposed at the beginning of the project, the creation and launch of a podcast was proposed [26]. This is how the "Talento ICAI" initiative was born. "Talento ICAI" has been created as a programme led by the Association of ICAI Engineers with the aim of making visible the achievements of the engineers who are part of the ICAI community. Within the podcast, a section called "Engineering with Purpose" has been created, which is managed by Foundation, and which has the particularity of focusing its interviews on stories of ICAI students and/or professionals who are linked both to engineering and also to social and/or environmental issues.

5.3.3. Results

The interviews prepared and carried out throughout the project by the author of this project for the Foundation (apart from those recorded by the Association itself) were the following [27]:

- **Catalina Parra** - ICAI engineer and founder of the Fundación Hazloposible. Topics: professional volunteering, entrepreneurship, impact investment.
- **Ignacio Pérez Arriaga** – reference on universal access to energy matters, winner of the Benjumea Prize of the National Association of ICAI Engineers in 2005. Topics: access to energy, cooperation for development, 2030 Agenda.
- **Reyes González-Montagut** – recently graduated from ICAI's Masters in 2020. Topics: Climate-KIC Journey initiative organized by the eit (European Institute for Technology), 4MOSST project, environmental challenges faced by engineers.
- **Carlos Rubio** – Masters student in ICAI and president of the student association ICAI 3D. Topics: 3D printing, maker movement, engineering initiatives during a pandemic, relation between 3D technology and social and environmental matters.
- **Misión Cebú** – round table with 3 members of the association "Misión Cebú", a cooperation project in Philippines. Topics: volunteering for social impact, creating an NGO, renewables and Access to wáter, solidary farms.
- **Beatriz Quiralte** – winner of the end-of-degree first prize 2018/2019 awarded by the National Association of ICAI Engineers. Topics: industrial innovation, social impact through the development of a low cost prosthesis for developing or in conflict countries.
- **ICAI's Poverty and Energy Chair** – double interview with José Carlos Romero, coordinator of the Chair, and María Asín, a Masters student at ICAI who is working on her Masters thesis in collaboration with the Chair's team. Topics: the chair activities, energy poverty, development of an indicator to measure hidden energy poverty in households.

5.3.4. Future development

In order to evaluate the public's response to the podcast, a focus group of 10 people (ICAI students, either industrial or telecommunications engineer from different years) was created and their role was to fill in a survey after listening to the podcast episodes (mostly done for the first episodes to decide the right track to follow and identify the strengths and weaknesses of "Talento ICAI"). The public reactions have been very positive and this initiative will also be kept. The variety of formats (double and individual interviews), the treated topics and the interviewees (students, teachers, field experts…) were very appreciated. The main points highlighted in the evaluation surveys that will be taken into account to improve the quality of the podcast are the technical aspect (sound quality can sometimes be low and is therefore one of the aspects with most room for improvement) and the duration (there is a tendency to rate the episodes as too short. Answers indicate that there are very interesting topics that they would like to hear in more detail even if the episode is longer).

5.4 Hackathon

5.4.1. Organisation steps

For the hackathon [28], the following steps were taken.

- Identification of trends and needs in third sector entities [29].
- Identification of actors in collaboration with the Foundation.
- Identification of a possible collaboration with Manos Unidas and a consultancy firm.
- Contact of the organisation and discussion/proposal of possible themes for the event.
- Creation of a detailed guide to follow for the organisation of the event: general guidelines, event structure, jury evaluation guide and other considerations.

5.4.2. Content

The aim of this event is to involve young ICAI students in a challenge proposed in collaboration with a third sector entity. The Foundation will propose this initiative to the NGO Manos Unidas, within the framework of the collaboration agreement that the Foundation has with them. A strategic consultancy firm with which this idea has been exchanged will accompany the Foundation in the process. In this way, the creation of innovative solutions will be encouraged, putting engineering at the service of social change and the third sector.

After identifying the biggest challenges in third sector organizations (lack of financial resources, lack of talent and digital knowledge, lack of awareness of the benefits of digitalization, deficiencies in ICT infrastructures) [29], it was decided that the hackathon would be focused on the digital transformation of the NGO (automatization of operations, improvement of marketing processes, virtualization of activities, social network or web development…).

5.4.3. Results and future development

The practical implementation could not be carried out during the project for several reasons (COVID restrictions, slow organization and communication with the NGO). Therefore a complete event guide has been written explaining all the details for its organization (inscriptions, teams, event development, event structure, indicative evaluation guide – *see Appendix B*).

The hackathon will be organized after the summer of 2021 and will imply the participation of members of the Foundation, of Manos Unidas, and of course of ICAI students (both Bachelor and Masters' students) to create a collaborative solution at the service of the NGO.

5.5 Merchandising strategy

5.5.1. Organisation steps

For the development of a merchandising strategy, the following steps were taken.

- Definition of a precise economic objective.
- Analysis of possible sales scenarios and sales methods.
- List of products and estimation of prices.
- Selection of products for the pilot test.
- Estimation of profits in different scenarios and selection of the most beneficial sales method in accordance with the set objectives.
- Consideration of logistics options.

5.5.2. Content

The purpose of this solution is to create a new source of income that brings in a certain amount of money that can be freely available to the Foundation, either to make investments for the Foundation itself (organization of an event, acquisition of a CRM software…) or to use it as financial support for the different projects it runs and/or supports.

Of course, it is important not to lose sight of the younger audience, but in the case of this initiative, the focus is on a wider audience, from current students to older generations. This project only includes a product proposal, as well as the estimation of the associated costs and benefits and the selection of the sales modality. It does not, however, include the practical implementation of this basic strategy, and the future plan will therefore present a guide to the next steps in implementing it (and not, as in the case of other initiatives, a guide to possible improvements).

In the design of this basic merchandising strategy, which is aligned with the general objectives of this project, three aspects are considered:

- Economic aspect: the aim is to generate income.
- Intangible aspect, which has to do with what we could call the "ICAI spirit", i.e. the feeling of belonging to the ICAI engineering community.
- Branding aspect, i.e., the process of building and managing one's own brand which, in this case, already exists, but the aim is to consolidate it. The aim is to extend the image not only of the Foundation, but also of the purpose-driven engineering movement that it promotes.

The target to be achieved with the launch of product sales has been set at 4,800 - 5,000 €. 3 sales methods were considered.

1. Sell the products directly from the Foundation, in this case basing the profits obtained on the margin between the cost of purchase by the Foundation and the cost of sale.
2. Sell merchandising products of the Association of ICAI Engineers through the Association, with a percentage of sales going to the Foundation (this is an existing model, which is used, for example, for the Christmas lottery). This could benefit both the Association (which currently sells some products, but whose sales are still relatively basic), as it would be integrated into its new website (which is currently being updated), and the Foundation, as it would bring them benefits.
3. A mixed model: the Foundation sells its own products independently, and the Association of ICAI Engineers sells its products too with a percentage of the profits going to the Foundation.

In order to assess the mixed model, two sub-scenarios are proposed based on the target of 4800 - 5000 €. The percentages given below refer to this target.

- *Sub-scenario 1*: 70% are products sold by the Foundation and the remaining 30% are products sold by the Association. Of the Association's products, 10, 15 or 20 % of the profits can be donated to the Foundation.
- *Sub-scenario 2*: Sell 50% of the Foundation's products and 50% of the Association/College of ICAI Engineers' products. Of the Association's products, 10%, 15% or 20% of the profits can go to the Foundation.

5.5.3. Results

In order to evaluate which of the three options is the most favorable from an economic point of view, the third step consisted of assessing which products could be sold and which will actually be sold (leaving the rest of the ideas as alternatives for the future, if the Foundation judges them attractive and once the first launch of the merchandising initiative has been set up and tested), as well as estimating the prices of these products [30]. The selected products and their prices can be seen in *Table 1*.

Table 1. Selected products for the merchandising strategy.   364

Product	Units	Total cost (€)	Cost per unit (€/unit)	Sales price (€/unit)
T-shirt (woman)	50	296,6	5,9	7
T-shirt (man)	50	387,8	7,8	9
Solar battery	50	599,5	12,0	14
USB key	50	376,0	7,5	9
Wireless headphones	50	1634,0	32,7	36
Bluetooth Loudspeakers	25	352,7	14,1	16
Bottle	50	464,6	9,3	11
Tote bag	100	369,1	3,7	5
Mug	50	143,7	2,9	4
Notebook	50	169,0	3,4	4
Pen	50	65,0	1,3	2
TOTAL	575	4858,0	-	-

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All the scenarios were evaluated and finally the benefits generated in each case were compared.   365

Table 2. List of evaluated sales scenarios.   366

Scenario 1	Foundation Model
Scenario 2.1	Association Model (10% to the Foundation)
Scenario 2.2	Association Model (15% to the Foundation)
Scenario 2.3	Association Model (20% to the Foundation)
Scenario 3.1.1	Mixed Model 70 Foundation / 30 Association (+10% to the Foundation)
Scenario 3.1.2	Mixed Model 70 Foundation / 30 Association (+15% to the Foundation)
Scenario 3.1.3	Mixed Model 70 Foundation / 30 Association (+20% to the Foundation)
Scenario 3.2.1	Mixed Model 50 Foundation / 50 Association (+10% to the Foundation)
Scenario 3.2.2	Mixed Model 50 Foundation / 50 Association (+15% to the Foundation)
Scenario 3.2.3	Mixed Model 50 Foundation / 50 Association (+20% to the Foundation)

Table 3. Range of benefits obtained in the different scenarios for different % of sales (from 20% to 100% of   367
the products sold).   368

% sold	100%	80%	70%	60%	50%	40%	30%	20%
Scenario 1	5 700 €	4 560 €	3 990 €	3 420 €	2 850 €	2280 €	1 710 €	1 140 €
Scenario 2.1	570 €	456 €	399 €	342 €	285 €	228 €	171 €	114 €
Scenario 2.2	855 €	684 €	599 €	513 €	428 €	342 €	257 €	171 €
Scenario 2.3	1 140 €	912 €	798 €	684 €	570 €	456 €	342 €	228 €
Scenario 3.1.1	4 161 €	3 329 €	2 913 €	2 497 €	2 081 €	1664 €	1 248 €	832 €
Scenario 3.1.2	4 247 €	3 397 €	2 973 €	2 548 €	2 123 €	1699 €	1 274 €	849 €
Scenario 3.1.3	4 332 €	3 466 €	3 032 €	2 599 €	2 166 €	1733 €	1 300 €	866 €
Scenario 3.2.1	3 135 €	2 508 €	2 195 €	1 881 €	1 568 €	1254 €	941 €	627 €
Scenario 3.2.2	0 €	2 622 €	2 294 €	1 967 €	1 639 €	1311 €	983 €	656 €
Scenario 3.2.3	0 €	2 736 €	2 394 €	2 052 €	1 710 €	1368 €	1 026 €	684 €

In terms of benefits, scenario 1 (only sales by the Foundation) is the one that would generate the most benefits (5700 €).

On the other hand, it should not be underestimated that launching this merchandising initiative in collaboration with the Association represents a great opportunity, as the community reached by the Association is more widespread both in number and geographically, i.e. its reach may be greater than that of the Foundation. This also contributes to strengthening the sense of belonging. In addition, there is an idea to launch the first merchandising campaign during the VIII Congress of ICAI Engineers in November 2021, which will celebrate 100 years of history of the Association, which is another argument in favor of choosing one of the scenarios that includes the Association as an actor. Therefore, after carrying out this analysis, the idea will finally be to implement scenario 3.1.3, i.e. the second option with the most income in which both the Foundation and the Association participate (profits = 4332 €).

5.5.4. Future development

A survey was carried out on Instagram to see which products were more appreciated by the followers, which were the tote bag, the loudspeakers and the T-shirts.

As a continuation of the project a new masters' thesis has been proposed for next year in collaboration with the Foundation, for the entrepreneurship track, consisting in the full development of the suggested merchandising strategy (practical implementation of a first pilot at the ICAI Congress, definition of a detailed business plan, creation of a website or online platform for sales).

6. Discussion

This project aimed to conceptualize an ecosystem for the co-creation of different initiatives and lines of action for the *Fundación Ingenieros ICAI*. The proposed and implemented solutions have given visibility to the Foundation, established links with members of the ICAI community and continued to raise awareness among engineers about current and future challenges. In summary, the results obtained were as follows. Both the workshop, the development of the communication strategy on Instagram and the podcast have been implemented. As for the hackathon and the merchandising strategy, all the guidelines for setting them up have been established, but they have not been directly implemented during the project.

All the initiatives that have been conceptualized have a collaborative aspect, which was considered essential from the beginning of the project. The model constituted by this set of initiatives has been conceived and implemented in the short term, but the question of its viability and sustainability over time has also been raised. The improvements and guidelines for the future set out in the previous sections define how this model will be implemented in the future. The project will continue, as mentioned, with a new one focused only on the merchandising strategy. The rest of initiatives will also continue counting with the support of the Foundation's network of volunteers.

7. Conclusions

As mentioned at the beginning of the report, the concept of a feedback loop (Build - Measure - Learn) has been applied for each initiative, designing several initiatives, implementing them and extracting lessons from the results obtained for each of them.

In view of the results, it has been decided to repeat the format of the practical workshop and to continue with the podcast initiative. As for the communication strategy, it has been seen that Instagram is indeed a social network that makes it easier to reach students and young people, so it will continue to be deployed and involve more people in the creation of content. The first pilot of the Hackathon can only be evaluated after the event is done, and the merchandising strategy has yet to be developed in detail.

The ecosystem of co-creation of solutions developed facilitates the involvement of students, ICAI professors and active engineers. It raises awareness and inspires the engineering community to put their knowledge and efforts at the service of society. And, when the health situation stabilizes, it will be possible to take advantage of this ecosystem to organize physical events, bring together and mobilize this community committed to creating social and environmental impact. Social engagement takes many forms. This project has allowed to explore some of them, and the Foundation will be able to continue exploring new formats of collaboration for development at different scales, creating impact and promoting purpose-driven engineering.

Appendix A – Alignment with the Sustainable Development Goals

As this is a project in which several initiatives have been implemented, it is not appropriate to draw up a list of general objectives related to all of them. As it is a development of the Foundation's strategy through the creation of a set of solutions related to social or environmental impact, this set of solutions can mainly be associated with SDG 17 (Partnerships to achieve the goals). Indeed, this goal aims to establish partnerships or relationships at all levels (global, regional, national and local) that reflect shared goals focused on people and the planet. In the case of this project, a series of relationships are established at the local level between the following actors.

- The Foundation and the ICAI school.
- The Foundation and the alumni community, both current and former students (e.g. those involved in initiatives such as the "Talento ICAI" podcast).
- The Foundation and other external actors (such as, for example, the speakers at the workshop held, or the NGO Manos Unidas and the consultancy firm in the case of the Hackathon).

The Foundation has always been a meeting point for engineers of different generations, companies, social entrepreneurs, NGOs, etc.... It mobilizes its resources (human and intellectual) to promote a purpose-driven engineering movement and involve engineers to help give visibility to what can be done from the engineering world to help both society and the environment (workshop, podcast, content published on communication channels such as Instagram) and to help solve social or environmental challenges (hackathon).

The Science Week XX workshop can be linked to more specific SDGs. The delivery of this workshop does not, in itself, have a direct impact on the following objectives, but its application can be linked to them.

- SDG 2: Zero Hunger (urban gardens make it possible to increase the amount of food available to urban areas inhabitants, contributing to food security).
- SDG 11: Sustainable Cities and Communities (livelihood method, allows savings in transport and production processes and creates new jobs).
- SDG 12: Responsible Consumption and Production (reduction of food waste and transition to a lifestyle more in harmony with nature, promotion of circular economy, energy savings).
- SDG 13: Climate Action (reducing the negative environmental impact per capita in cities, air-purifying action).

Finally, in relation to the content published on Instagram, as mentioned, the idea is to create and upload videos on the social network related to each of the SDGs, having already done so with SDG 7.

Appendix B

If more detail were needed to get the full detail of any of the developed initiatives, it can be found in the full report through this link: https://upcomillas-my.sharepoint.com/:b:/g/personal/201502204_alu_comillas_edu/EQFtyEEwnHpAt-isf1c9wiLcBj-TGcPrXZv_xTuS5xCiIfg?e=SlgzUm .

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