

CRAFTING A SUSTAINABLE ENGINEERING VISION THROUGH A CONSULTATION PROCESS

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Abstract – A wide-ranging consultation process was conducted by Polytechnique Montréal between 2022 and 2023 explores the impact of environmental, technological and societal transformation on the work of engineers and competencies needed, as well as on engineering education. This study highlights a mobilization approach aimed at co-creating a competency profile of the engineer of tomorrow. The methodology includes interviews, internal and external surveys, and a forum bringing together over 250 stakeholders in May 2023. The results provide a better understanding of the global, national and local issues engineers are facing, as well as the competencies required to support the engineer's global development from a sustainable engineering perspective. This vision captures the essence of the engineer's future role, focusing on collaborative efforts to define and implement an updated engineer profile, integrate it into educational pathways, and streamline accreditation processes. This vision aligns with a transformative epistemology and UNESCO's sustainable development goals, offering a blueprint for institutions to mobilize their ecosystem towards common goals.

Keywords: competency, experiential learning, engineering curriculum, institutional transformation.

1. INTRODUCTION

Globalization makes the world more interconnected by creating international networks and boosting global trade. This happens because transportation and communication become easier, allowing people and goods to move more freely across borders. This trend brings new societal issues that are internationally recognized by those involved in engineering education [5, 10, 16]. Engineering education programs have to prepare future engineers to face these challenges. In the context of a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environment, the vision for engineering education and student experience entails preparing students to thrive amidst rapid change and uncertainty [4, 13, 16].

This vision emphasizes adaptability, resilience, and interdisciplinary thinking to navigate complex challenges. It involves providing students with practical skills, critical

thinking abilities, and ethical decision-making frameworks to address dynamic and multifaceted problems [4, 11]. Additionally, fostering innovation, collaboration, and lifelong learning are integral aspects of this vision to ensure that engineers can continuously evolve and contribute positively to society despite the unpredictable nature of the environment [4].

The complexity of the challenges we are facing therefore raises questions about our curriculum's impact on future engineers' competencies and their development. It challenges our vision of tomorrow's engineer and our capacity to develop skills adapted to this constantly shifting and evolving context. To extend the reach of our programs, experts recommend developing students' skills with professionalization, lifelong learning and transdisciplinary education perspective with sustainable development goals [4, 5, 6, 13, 14, 15].

The development of skills and competencies adapted to a changing and constantly evolving context are fundamental to engineering education. This vision is pivotal in shaping the future of engineering education within universities. The implementation of this vision requires joining forces, by partnering with all stakeholders, to establish a collective discourse and action around the role of engineers in creating a sustainable world.

As the first Francophone engineering university in North America, Polytechnique Montréal has trained over 60 000 engineers and researchers since its inception. As part of its 150th anniversary celebrations, Polytechnique Montréal has undertaken a wide-ranging internal and external consultation process to reflect on and engage in dialogue with its stakeholders, and to imagine a new vision of tomorrow's engineer.

This consultation process aims to redefine our institution's educational role in solving some of society's most complex issues. This is why Polytechnique wanted to bring together our stakeholders to imagine the future of engineering educational practices through a consultation process over a six-month period. This article aims to: 1) describe key factors of our consultation process and the methodology used, and 2) describe the results obtained towards our vision of the engineer of tomorrow, in terms of graduate attributes and competencies.

2. CONSULTATION PROCESS KEY STRATEGIES

The consultation process refers to the systematic approach taken by our institution to gather input, feedback, and insights from stakeholders regarding the future of engineering. It has involved various steps such as identifying stakeholders, designing engagement methods, outreaching, collecting and analyzing data, and incorporating feedback into decision-making every step of the way. The goal of the consultation process was to foster inclusivity, transparency, and collaboration in decision-making by soliciting input from those affected by or interested in envisioning the future of Polytechnique Montréal's engineer education.

To some extent, our consultation process could be transferable to another university or engineering faculty wishing to conduct a similar consultation initiative. To do so, it is proposed to adopt four key success strategies emerging from our approach: 1) strong leadership support, 2) a strategic working group and coordination committee, 3) stakeholders' mobilization, 4) a transparent communication plan.

2.1. Strong leadership support

Maud Cohen, a leading figure of our institution, marked a significant milestone in 2022 when she became the first woman to be appointed president. With her appointment came a commitment to pursue a compelling vision: "I was drawn to Polytechnique's mission, and the societal role that this university must play," emphasizes Ms. Cohen. She persuasively made a call to collaborate around a commitment to progress towards responsible and sustainable engineering education.

This shift created a need to enhance and enrich the student experience, which implied undergoing a revision of our programs. Defining Polytechnique's common vision for the Engineer of Tomorrow became a central step in this process, which aimed to be open, inclusive, and focused on the needs and major challenges of society. The 150th anniversary provided an opportunity to reflect on how the richness of our traditions lays the groundwork for envisioning our future. To achieve this, a large consultation process, conducted in collaboration with all relevant stakeholders, was undertaken.

2.2. Strategic Working Group and Coordination Committee

Starting in October 2022, a strategic working group was tasked with preparing this major consultation, which would include, among other things, a day-long Forum event in May 2023. This working group was composed of the Director of the Pedagogical Support and Innovation Office,

a representative of her Office, the Director of Engineering Studies, a program advisor and a pedagogical counselor. The working group selected an external consultant, Laurent Simon, from HEC Montréal to support the development and implementation of this major consultation.

In January 2023, a coordination committee joined the working group to operationalize the consultation process. The committee oversaw the implementation of an internal and external communication plan led by an expert from the Communications and Public Relations Department, as well as the logistics of the events.

2.3. Stakeholders' Inclusion

Rethinking the role of future engineers and its impact on the curriculum cannot be done without involving faculty. Engineers in the industry and other professionals working closely with students also have a valuable contribution to bring to the table. That is why we invited them to the Forum to reflect and shape our vision for the Engineer of Tomorrow. Stakeholders also included prospective and current students, recent and older graduates, teaching support staff or researchers, other staff with a perspective on the student experience, and alumni in various engineering domains and different types of organizations (entrepreneurs, small and medium-sized enterprises, multinational corporations, public companies, etc.), who are employers of engineers or collaborate with engineers.

Ms. Cohen launch an invitation on behalf of the Board of Directors was designed to engage our stakeholders in the consultation process. "I hope that this major consultation will bring together a variety of audiences who are passionate about engineering education. Members of the student and faculty community at Polytechnique, college-level students, teaching and research support staff, and staff members who feel connected to this issue will have a prominent place at this extraordinary gathering. I also hope to welcome individuals working in small, medium, or large companies that employ engineers who undoubtedly have ideas to share. Together, we will build a common vision of the engineer of tomorrow. This reflection will be propelled by inspiring lectures highlighting the skills that the next generation of engineers will need to tackle future challenges. This will be an opportunity to look towards the future by bringing together the entire Polytechnique community for this significant strategic reflection."

2.4. Communication Strategy of the consultation process

A well-designed communication strategy involving our leaders in promotional, informational, and consultative endeavours increased stakeholders' participation. Our

communication plan had five main objectives: informing, involving, mobilizing, engaging, and disseminating. As we proceeded with the plan, we used a combined top-down and bottom-up approach to communication.

At the beginning of our consultation process in January 2023, our goals were to inform our community and involve the key actors in our strategic plan to launch a reflection process around the societal issues of concern. We introduced the intentions of the consultation process, aligning them with the institutional strategic plan. Before inviting our community to "Save the date" for the Forum, we introduced the Forum's intentions to the department heads at the Directors' Assembly because chairs have a crucial role in rallying their faculty members. We sought to engage them by emphasizing how this joint effort would help shape a collective vision of the future of engineering. We emphasized the importance of their input and participation.

In February, our efforts focused on disseminating our initial reflections to our extended community through a thematic article in our institutional. In an interview, Sophie Brochu, former president and CEO of Hydro-Quebec, expressed her support to our community: "To invent and build the world of tomorrow. In a nutshell, that is the mission of the engineer. In the evolution of this new world, the profession of engineers will require more than ever a precious combination: that of emotional intelligence and industrial intelligence."

Put simply, to be able to build a bridge between two shores, one must first know how to build bridges between people: "In a world that has no choice but to embark on its ecological transition, the role of the engineer must naturally evolve. The engineer, once an agent of development and growth, is now called to become a craftsman of change." Yves Boudreault, former Director of Engineering Studies, further emphasizes that "engineers must confront challenges of unprecedented complexity." In its desire to train engineers that can adapt to the future needs of society, Polytechnique also intends to consider the aspirations of its students. According to Boudreault, "the younger generations, extremely concerned about the planet, want to innovate and demonstrate their ability to make a change. They want to participate in debates on the evolution of society."

Also, in February, we used a bottom-up strategy to initiate mobilization and engagement with our stakeholders. Our goal was to gain a deeper understanding of our community members' perceptions regarding the major societal challenges our future graduates will face. We based this reflection around the key skills and attributes of our engineers to sketch the contours of the exit profile of the Engineer of Tomorrow. Our coordinator for the

student's experience met with the various student associations to promote the Forum and identify five students who would participate in filmed interviews. We ask key actors to help us recruit 12 faculty members and three alumni.

Starting in March, we gained further insight from our stakeholders through two surveys. This reflection on the attributes that our students need to develop to address the challenges of a changing society will inform the strategic plan we aim to develop for the period 2024-2028. Therefore, beyond the participants in the event, we want to involve the entire Polytechnique community in this discussion. One survey targeted our internal community, while the other sought input from external stakeholders. Using the same questions, the leaders of the working group visited the various departments to initiate a reflection around the challenges their respective engineering fields are facing. Additionally, they discussed the key skills that their students must develop.

In April, an email containing three promotional videos selected from the 20 filmed interviews was sent to our community members, encouraging them to visit the website "Forum sur l'ingénierie et l'ingénieur de demain" and register for the Forum. It was another method to involve everyone in sharing their perspectives regarding the vision of the Engineer of Tomorrow: What challenges and issues will the engineers face tomorrow? How can they support the emergence of a sustainable world and increase their role in society? What are the best engineering practices to develop to maximize the impact of each innovation? Additionally, we promoted the event via our website to further engage our community. The president of Polytechnique reiterated her full commitment to the consultation process: "Initiated and supported by the leadership of Polytechnique, the Forum on the Engineer of Tomorrow is a great opportunity to initiate a strategic reflection on the attributes that students at Polytechnique Montréal need to develop to address the major challenges of an ever-changing society."

In May, our internal community and external partners were contacted directly through personalized communications or meetings aimed at addressing their questions, facilitating registration, and encouraging their engagement in our mobilization efforts. Following the Forum, we made dedicated efforts to express gratitude to our stakeholders for their involvement in participating in interviews, completing the two surveys, and preparing for the Forum.

In June, we had a closure meeting with the coordination committee to debrief the Forum event. We presented our debriefing to the president. From June to September, the Pedagogical Support and Innovation Office analyzed the

data from the two surveys and collaborative notes from the Forum to prepare a report. The methodology used for analysis is described below. The preliminary results have been presented to the president and the head of the Strategic Plan.

In September, we presented the report first to the president and then to the Board of Directors for approbation. In October, we used a similar strategy to disseminate the results of our consultation to our internal and external partners. Our communication at the annual CEEA conference and this proceeding paper are part of this strategy.

The following section outlines the three main methodologies employed to gather data on essential themes. The insights from these data further guided our consultation process to shape the profile of the Engineer of Tomorrow.

3. METHODOLOGY

3.1. Interviews and surveys

Before the Forum, we conducted 20 recorded interviews with 12 faculty members, five students, and three alumni and employers. We wanted to gather their vision of the Engineer of Tomorrow and start documenting the various perspectives within our community to guide our consultation process, design our surveys and plan the Forum. As mentioned previously, some of these interviews were used when inviting the community to promote and engage in a wide reflection leading to the Forum. Drawing from existing literature and the results of interviews, we designed and administered two surveys: one targeting external stakeholders and the other aimed at our internal community. These surveys aimed to collect insights regarding their concerns, aspirations, and motivations in reshaping engineering education, addressing global challenges, transforming the role of engineers, and identifying the competencies and attributes required to further contribute to the evolving society.

3.2. The Forum on the Engineer of Tomorrow

The vast consultation process culminated at the Forum on the Engineer of Tomorrow, which took place on May 15th at the Montréal Science Centre. It was attended by 250 stakeholders, representing teaching staff (44%), other staff (27%), the student community (15%), and industrial partners or alumni (14%). The Forum had two main objectives: 1) engage with the Polytechnique community to discuss the contexts, challenges, and societal issues of the future and 2) develop a shared vision of the Engineer of Tomorrow while also defining the identity of a

Polytechnique Engineer as a motivated and fulfilled individual. In line with the themes addressed during the spring interviews and consultations, four questions were discussed:

1. *What challenges will the engineering community face tomorrow?*
2. *What are the aspirations of the younger generation, and how does it aim to make a positive difference in its community and the world?*
3. *What is the profile of the Engineer of Tomorrow? What are the key skills and attributes these professionals should possess to address these challenges?*
4. *Finally, what are Polytechnique's strengths in supporting its students' capacity to address tomorrow's societal challenges?*

To discuss these questions, a seating arrangement was planned to ensure an equal representation of the various stakeholders at each one of the 35 tables. These discussions were facilitated by a designated faculty member at each table, while a student had the responsibility of taking notes and summarizing the takeaways. These notes were saved in a collaborative online document. At the end of the Forum, the responses to each question were merged into a single document.

The morning discussions (Questions 1 and 2) aimed to establish a shared representation and comprehension of the global context and a vision for the Engineer of Tomorrow. This was achieved by incorporating insights from three speakers with international, national, and provincial viewpoints, respectively Aldert Kamp, formerly Director of Education at the Faculty of Aerospace Engineering at TU Delft University, and now an international engineering education consultant; Kathy Baig, former president of Engineers Canada; and Sophie Larivière-Mantha, president of the Ordre des ingénieurs du Québec.

Following the afternoon discussion on the competency profile and attributes (Question 3), a synthesis process culminated in a clear and inspiring vision of the Engineer of Tomorrow. This vision was accompanied by forward-looking recommendations that leverage Polytechnique's strengths within our network (Question 4). The day concluded with a reception, allowing for informal yet insightful conversations that fostered a renewed sense of energy and optimism.

3.3. Inductive Thematic Analysis

Ideas on the training needs of future engineers emerged from the analysis of the qualitative data we gathered. To ensure the credibility and validity of the results, data were drawn from three instruments: filmed interviews, the two surveys (internal and external partners), and notes from the Forum. Over the summer, Polytechnique's Pedagogical Support and Innovation Office analyzed and synthesized

these qualitative data using NVivo software [17]. This involved an inductive thematic analysis to identify prevailing ideas [7, 8, 9].

An inductive thematic analysis encompasses the following eight steps: 1) data preparation entails the compilation of relevant qualitative data in NVivo; 2) data familiarization requires a meticulous examination and immersion in the data to understand the context; 3) theme identification involves discerning recurring ideas, concepts, or topics within the dataset; 4) labelling data is required to facilitate organization and categorization; 5) category construction refers to the aggregation of similar themes to establish broader and cohesive categories; 6) development of explanatory frameworks involves investigating the connections between different categories and uncovering patterns or explanatory structures. 7) results interpretation demands a comprehensive analysis of the findings to extract significant implications and draw pertinent conclusions and, last, 8) validation involves verifying the validity of conclusions through comparison with raw data and alignment with existing literature.

In broad terms, after reviewing the transcripts of all responses entered in NVivo, each sentence or part of a sentence was associated with a "label" or theme summarizing the expressed idea. Some themes were reformulated or grouped together because they had similar meanings. Qualitative comments from the surveys were integrated with Forum data and coded with the same themes. The recurrence of certain themes allowed more unanimous ideas to emerge. We also reported other ideas that appeared in lower frequencies but might potentially help us move forward.

In the first stage of our analysis, we focused on the first five steps of the inductive thematic analysis to share the main findings to our community using the wording used by the participants. The second stage of analysis in 2024 will focus on steps 6 to 8, aiming to discuss the conceptualization of our competency profile based on literature. This approach allowed everyone to share a common language, which in turn fosters inclusion and a sense of ownership rooted in experience. This method also enabled us to directly link the transcripts to the identified themes, categories and theoretical concepts.

4. FINDINGS

Through the inductive thematic analysis [7, 8, 9], we gained a deeper comprehension of the data. We drew new insights about the challenges of greater concern for our community, the aspirations of the new generation, and the skills and mindset future engineers need to develop. The analysis also highlighted Polytechnique's strengths in addressing these challenges and leading the transformation process of its programs and student experience.

In October, we documented and shared these findings with our community in the form of a [Report of the Forum](#)

[on the Engineer of Tomorrow](#). Three main sections are presented next: 1) the societal and institutional challenges, 2) the aspirations of the next generation to co-create a sustainable world, and 3) the profile of the Engineer of Tomorrow.

4.1 Challenges of the Engineering Community

Based on a literature review and interviews with our stakeholders, we identified ten major societal challenges. These main challenges have been prioritized by our internal and external stakeholders at the national and provincial levels, and then at the international level. Following the presentations by invited expert speakers at the Forum, these societal challenges which must be considered in the context of our changing society were discussed in the light of the evolving role of engineers and their influence on society. Three of the societal challenges identified at the Forum matched those from the internal survey conducted a few weeks before the event. The top three societal challenges at the national and provincial levels, as shown in Table 1, are climate change (74%), artificial intelligence (AI) and big data processing (47%), and energy transition (46%).

Table 1: Prioritization of issues in Canada and Quebec

Issues	%
Climate change	74%
AI and big data processing	47%
Energy transition	46%
Renewal and public infrastructure projects	27%
The aging population and its health	26%
Cybersecurity	20%
Robotization and Industry 4.0	18%
Mass migration (workforce shortage)	17%
Electrification of transportation	15%
Food security - Soil food production capacity	12%

The top three societal challenges at the international level, as shown in Table 2, have similar rates: climate change (76%), AI and big data processing (48%), and energy transition (47%). Facing these societal challenges, some members of the new generation interviewed perceive a dark future, where humanity evolves in a consumption-based economy and an individualistic culture. They may experience eco-anxiety, even anger, and feel an urgent need to act within tight deadlines. Participants say: "to repair the carelessness of past generations (environmental, social, ethical awareness): consumption patterns, individualism." While members of the new generation are motivated to face these challenges, they are reluctant to doing it alone.

Table 2: Prioritization of issues on the international stage

Issues	%
Climate change	76%
AI and big data processing	48%
Energy transition	47%
Renewal and public infrastructure projects	26%
The aging population and its health	24%
Cybersecurity	24%
Robotization and Industry 4.0	18%
Mass migration (workforce shortage)	17%
Electrification of transportation	11%
Food security - Soil food production capacity	11%

4.2. Aspirations of the Next Generation

A key finding from the analysis is the environmental and social consciousness among future engineers. Choosing to become an engineer is a concrete way to positively change the world. This profession gives meaning to one's existence. As a participant mentions: "It is through a heightened social conscience and engineers' responsibility that we can accomplish this."

We observed that students are eager to address topics like sustainable development, environmental protection, and climate change adaptation. Several statements, such as the following, emphasize that the engineer not only has a high-level technical role but also has the responsibility to consider how their actions can affect systems: "The engineer focuses on ways to achieve a goal, but students are not trained to reflect on the purpose of the goal (macroeconomic context, ethics, sustainable development). This may be risky (requires social sciences, ethics, interdisciplinary skills)." The Engineer of Tomorrow should also play a greater role in influencing and informing society by "helping citizens better understand so that they can make informed choices (lots of information, understanding why money is allocated to certain areas, how it will benefit them)."

Our students have a strong desire to be engaged, act, imagine a sustainable world and contribute to its implementation. Our institution must therefore listen to this aspiration and support this transformation of the engineer's role. Students emphasized the need to integrate societal issues into the curriculum and develop skills to navigate in a complex world. The Engineer of Tomorrow should also engage with individuals from diverse disciplines during their academic career. This multidisciplinary collaboration is important because it fosters values such as inclusivity, respect, empathy and authenticity, and ultimately leads to the development of solutions that consider the perspectives of all stakeholders [2, 3, 12].

Future engineers envision a training program where they can enhance their engineering and interdisciplinary

skills while exploring the profession and developing their professional identity. In their transition towards becoming professionals, we should "help students envision what the engineering profession entails concretely, promote internships, and identify what students do not enjoy."

4.3. Profile for the Engineer of Tomorrow

To align with student aspirations, the findings suggest that Polytechnique Montréal should enhance opportunities for developing multidisciplinary collaboration. Indeed, the new generation prefers interdisciplinary teamwork and wants the flexibility to address a diverse array of challenges. Therefore, they will need to develop the flexibility, leadership, communication and collaboration skills required to work in interdisciplinary teams and with members of communities that will be directly or indirectly affected by their work. Diversity emerges as an essential variable in engineering teams [1]. This observation is also a consensus in the report of the National Academy of Engineering: "This transformation must begin with a deliberate effort to build an inclusive and collaborative engineering community that spans disciplines, gender, ethnicity, race, and sexual orientation." [14]

In this context, we reiterate the need for our future engineers to have a strong scientific foundation, be able to reconcile fundamental and applied sciences, and make informed decisions based on incomplete data while demonstrating judgment and critical thinking. They will also need to demonstrate creativity and adaptability. Above all, they must adopt a global and systemic perspective as closed systems and disciplinary silos will no longer exist for them.

The results also highlight the importance for engineering students to develop self-directed learning skills so they can adapt to evolving realities throughout their careers. We must foster the intellectual curiosity of prospective engineers by emphasizing the value of extracurricular activities and the development of interdisciplinary skills across various fields to expand their outlooks. "We must adequately support our student community in acquiring this knowledge and developing these skills," explains Pierre Langlois, director of Academic Affairs and Student Experience at Polytechnique. Engineers are more than problem solvers. They are compassionate individuals who work collaboratively to address societal challenges.

It follows that adapting our teaching methodologies is key to accommodate these evolving needs. To ease the transition into the professional world, our institution aims to promote experiential learning both inside and outside the classroom, for example through engagement in student clubs. We seek to offer a diverse range of experiences, whether through activities, projects, or community engagements, so that students can apply their skills. This orientation is supported by Winberg et al. [16] who found

that the best engineering knowledge and strongest professional skills are acquired by integrating professional skills into core engineering subjects, for example by incorporating tasks and problem-solving projects into the engineering curriculum.

4. CONCLUSION

An engineering faculty or institution could draw from the strategies and means used in our consultation process to update their own competency profiles, programs or pedagogical initiatives. By building on an institutional perspective and framework, one can engage stakeholders in building a narrative and capacity for action toward an inspiring future. Davis, Key and Newcomer [2] argue that most transformational processes are limited to top-down strategies: “An element lacking in these frameworks is the active engagement and the integration of stakeholder perspectives as real actors and contributors in the strategy process” (p. 71).

Integrating such processes in day-to-day activities is a major challenge. Hence, a strategic working group is essential to guide and facilitate the consultation process and harmonize the bottom-up and top-down strategies towards a common goal. For top-down strategies, the support and commitment of senior management is essential, as it gives credibility and importance to the process and provides the human and financial resources for its development and implementation. The results of such an approach also need to be integrated into the strategic plan and put into practice by means of well-defined, concrete, and realistic development and action plans. To make bottom-up strategies successful, employees should be involved from the start. This ensures that their needs, concerns, and ideas are part of the decision-making process. In turn, this generates the energy, support and commitment needed to drive the initiatives and actions required to move from a common vision to a reality.

The strategic working group played a key role in initiating reflection among a small, gradually expanding, strategic working group. Its members helped spread ideas across various departments, services, and communities, both internally and externally. The milestones of the working group involved: 1) identifying and mobilizing diverse stakeholders, 2) designing engagement methods, 3) collecting and analyzing data and 4) incorporating feedback through decision-making processes.

Various means and modes of communication can support continuous organizational dialogue among diverse stakeholders [2]. For instance, a review of the literature on the trends and challenges that influence the role of engineers allowed us to formulate questions for the filmed interviews and the two surveys for our internal and external partners. Furthermore, this enabled the working group to ground departmental discussions in the literature and consider the best practices in engineering education.

Throughout the consultation process, internal and external communications allowed us to inform, involve, mobilize and engage our stakeholders and disseminate the results. Data analysis allowed us to compare our findings with the literature and define our strategic position. To evolve, we believe a faculty or institution can legitimately ground itself in the results of their consultation process leading to the construction of a shared vision.

However, this requires effort and time investment from individuals involved within the strategic working group and the coordination committee. Furthermore, developing a systemic vision that considers the perspectives of various stakeholders or interest groups is not an easy task and requires multiple ad hoc communications and informal exchanges to facilitate continuous adjustments. Additionally, elaborating a vision is only the beginning of a rigorous strategic planning process. Its implementation requires sustained efforts over time for the envisioned changes to materialize.

Although our consultation process allows us to explore promising courses of action for practice, it would be relevant to consider other research-based experiments, such as those undertaken at Queen's University by Frank et al. [3] to guide the various transformations we wish to undertake in the field of engineering education. By examining different strategic transformational models, we can gain insights into how to effectively implement large-scale changes in education to adapt to global shifts while ensuring sustainability. This approach allows for a more holistic and informed approach to addressing the evolving needs of education systems worldwide.

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CALENDAR	PROCESS & KEY STRATEGIES	STRATEGIC WORKING GROUP ACTIVITIES	COORDINATION COMMITTEE ACTIVITIES
January	Identifying stakeholders and defining strategies for inclusion / Informing staff / Involving Board of Directors and Department Heads for leadership support	Meeting with the Board of Directors / Department Head Assembly	Kick-off meeting: Designing roles and responsibilities / Designing a communication plan / Email invitation to staff "save the date"
February	Analyzing data and literature / Designing engagement methods / Collecting data and information	Literature review on trends, challenges, competencies & attributes / Filmed interviews with stakeholders	Magazine Poly: Article on the Engineer of Tomorrow
March	Analyzing data and literature / Designing engagement methods / Collecting data and information / Mobilizing and engaging	Identifying key themes based on interviews and literature review / Designing and conducting two surveys (internal and external stakeholders) / Department meetings	Promoting surveys / Production of the website and stakeholder videos
April	Designing engagement methods / Mobilizing and engaging /	Planning and designing the Forum event	Logistics of Forum event / Website and promotional videos
May	Collecting data and information / Mobilizing and engaging	Rehearsing / Facilitating the Forum event	Personalized communications / Logistics of Forum event / Forum event / Personalized email for expressing our gratitude
June to August	Analyzing data and literature interpretation	Presentation of preliminary results / Writing up the report on context, vision, competencies & attributes, and our strengths	Closure meeting with coordination committee / Debriefing Forum event
September	Involving Board of Directors and Department Heads for leadership support	Presentation of the Report to the President and the Board of Directors / Department Head Assembly	Invitation to our faculty for the presentation of the report & next steps
October	Identifying stakeholders and defining strategies for inclusion / Informing staff / Involving Board of Directors and Department Heads for leadership support	Meeting with the Board of Directors / Department Head Assembly	Kick-off meeting: Designing roles and responsibilities / Designing a communication plan / Email invitation to staff "save the date"