CHANGE DRIVERS AS KEY SUCCESS FACTORS IN EUROPEAN RESEARCH AND INNOVATION PROJECTS

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ABSTRACT.
Background: Change management involves the communication and implementation of organizational changes, focusing on managing both people and processes to ensure smooth transitions. **Aims:** This study aims to identify key change drivers within European research and innovation projects under Horizon Europe and to evaluate the level of project commitment to change and transformation. **Methodology:** We analysed project data from the Community Research and Development Information Service (CORDIS), covering projects from 2021 to 2024. Our analysis included keyword density calculations for terms such as "change" and "transformation" in project objectives. **Results:** Our findings indicate that the European Research Council; Digital, Industry and Space; and Health sectors are the top recipients of funding, highlighting research as a significant change motivator. Notably, European Research Council projects have yielded substantial intellectual property, start-ups, and publications. The Marie Skłodowska-Curie Actions programme, with the highest number of projects and partners, accentuates its role in enhancing the European Research Area's visibility. Approximately 23.4% of the 8,800 analysed projects explicitly mention "change" or "transformation" in their objectives. The highest commitment ratios were found in "Careers and universities" and "Promote and co-fund innovation programmes," while some priorities, like "Promoting Public Outreach," showed no such commitment. This variation suggests differing focal points across thematic priorities, warranting further investigation into the factors influencing these disparities.

Keywords: leadership, change management, project management, transformation, Horizon Europe, organizational behavior, Cordis

JEL Classification*:* D23, O20, O30

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Introduction

In today's fast-paced global environment, both individuals and organizations face changes of high complexity and impact, often happening simultaneously and faster than in the past. The need to react immediately, make decisions, and address problems has become more urgent than in previous eras. Organizational leaders who anticipate and invent the future are even more successful because those who invent the game are the leaders in the industry. (Pryor et al., 2008). Recent events such as the war in Ukraine, the COVID-19 pandemic, and the global financial crisis in 2008 considerably transformed the world. COVID-19 for for example changed the way society communicates, works, or educates our children, but also caused a dramatic loss of employment all over the globe. Managing planned change has become essential to achieve resilience since it brings a systematic approach to deal with the transition or transformation of an organization's goals, processes, or technologies. Change management (CM) helps organizations adapt and achieve business objectives while minimizing resistance from employees and reducing the costs associated with unsuccessful change. It applies a structured process and set of tools for leading the people's side of change to achieve a desired outcome, it also involves the application of behavioral science knowledge and practices to help bring about successful change. In essence, CM enables the transformation of strategy, processes, technology, and people to enhance performance and ensure continuous improvement in an ever-changing environment. A robust change management process fosters employee engagement, and higher productivity, and ultimately leads to the achievement of organizational goals in a cost-effective manner. From a technical-process point of view, CM is a well-established term in the field of engineering too (e.g., configuration management - a system engineering process for establishing consistency of a product's attributes throughout its life). The aviation industry, for example, delivers complex products, services, and solutions to customers on a worldwide scale, with lifecycles spreading over several decades. Every aircraft is constantly evolving and undergoing continuous change during its lifetime - as a matter of fact, there exist no two equal jets in the world, as well no airplane remains unchanged after it leaves the final assembly line. Each product adaptation, whether requested by a customer or regulation must be carefully managed to ensure safety, and airworthiness to name a few. European manufacturer Airbus, who has built more than 13,500 commercial aircraft during the company's 50-plus year history, is undertaking a major transformation called Digital Design Manufacturing & Services (DDMS). The mission of DDMS is also to respond to major global changes such as the increasingly competitive marketplace. While preparing for the next generation of aircraft Airbus particularly tries to meet the company's goal of being the first major manufacturer to offer climate-neutral commercial aircraft by 2035. The company's major change projects are the development of the A321XLR (A320 family plane with 30% less fuel burn) and Future Combat Air System (FCAS) - a key instrument in ensuring future European autonomy and sovereignty in defense & security. Source: https://www.airbus.com

The main motivation of this work is to extend the change management perspective on research and innovation projects by analyzing change drivers. Here we identify a gap, as most of the research on change management is written from the industry perspective resp. very little is known in the research & innovation project management context. For the purpose of this analysis, change drivers will be considered equal to project success criteria. The main objective will be to provide a summary of key change drivers in the context of European research and innovation. Furthermore, this work summarizes the breakdown of the most important EU programmes, their main goals, and achievements. Finally, insights on the level of commitment to change through the optics of project objectives have been analyzed. This paper is organized into the following chapters: introduction, literature review, data and methods, findings, discussion, and conclusions.

Horizon Europe as the European Commission's largest framework programme for research and innovation holds a total budget of around 95.5 billion euros with a duration from 2021-2027. It follows up on the previous era of Horizon 2020, FP7 to FP1. Its main goals are tackling changes in climate, the UN's Sustainable Development Goals, and also EU's competitiveness and growth through facilitating collaboration and strengthening the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges. Furthermore, it supports the creation and better dispersing of excellent knowledge and technologies, creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness, and optimizes investment impact within a strengthened European Research Area. Legal entities from the EU and associated countries can participate. One of the goals of Horizon Europe is to foster open science, and set new standards for the dissemination of knowledge and new skills across European societies. Source: *https://research-and-innovation.ec.europa.eu/*

Theoretical background

In terms of the type of change, the key difference is between a planned one and a change that happens to organizations. Organization development is directed at bringing about planned change to increase an organization's effectiveness and capability to change itself. It is generally initiated and implemented by managers, often with the help of an OD practitioner from either inside or outside of the organization (Cummings & Worley, 2005). Major frameworks dealing with organization change, that received considerable attention in the field, describe activities that must take place to initiate and carry on successful organizational change (Wanner, 2013). Kurt Lewin's model (1951) was pivotal in developing the concept of planned change and represents a simple framework. Sometimes called also *3-Step Model of Planned Change* divided the process of change into three major steps:

1. Unfreezing: reducing forces maintaining organizational behavior at the present level.
2. Restructuring: moving the organizational behavior to a new level.
3. Refreezing i.e., stabilizing the organization at a new state of equilibrium such as new organizational structure, culture, rewards, benefits, etc.)

Several variations of Levin's model have evolved over time such as Havelock's model, Kotter's model, Lippitt, Watson, and Westley's model, etc. From the mentioned, Kotter's model has gained substantial attention in the industry. He defined Change Management as a systematic approach to dealing with change, both from the perspective of an organization and on the individual level. (Kotter, 1996) His study focused on understanding lessons learned by analyzing the success of 100 companies trying to remake themselves into better competitors. In every case, the basic goal was to make fundamental changes in business where the general lesson learned from the successful companies was the presence of a change process consisting of several phases usually requiring a considerable length of time. Another significant finding was that critical mistakes in every project phase can have a devastating impact. The model involves the following eight steps to transforming organizations:

1. Establishing a sense of urgency
2. Forming a powerful guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering others to act on the vision
6. Planning for and creating short-term wins
7. Consolidating improvements and producing still more change
8. Institutionalizing new approaches

The Action Research model represents another planned change method which is based on an iterative cycle of research and action with a high level of data gathering and collaboration among organizational members and organizational development practitioners involved. This model uses multiple cycles of research and implementation and usually also consists of eight steps:

1. Problem identification
2. Consultation with behavioral science expert
3. Data gathering and preliminary diagnosis
4. Feedback to a key client or group
5. Joint diagnosis of the problem
6. Joint action planning
7. Action
8. Data gathering after action

The positive model of planned change focuses on understanding and reinforcing the organization's strengths, while the previous models can be described as deficit-based. This method also emphasizes creating excitement about the future and a shared vision in an organization. It typically involves the following five steps:

1. Initiation of inquiry
2. Inquire into best practices
3. Discover the themes

4. Envision a preferred future
5. Design and deliver ways to create the future

In every planned change model, effective change depends on a careful diagnosis of how the organization is functioning. Diagnosis identifies the underlying causes of organizational problems, such as poor product quality and employee dissatisfaction, or determines the positive opportunities that need to be promoted. (Cummings, Worley, 2005) The idea of Integrated Change Management is to achieve the desired target state by integration of the organizational and individual change processes on the one hand and by the integration of project and change management on the other hand. A systematic application of the knowledge, tools, and resources of change that provides organizations with a key process to achieve their business strategy. Change projects take place on an organizational and an individual level. Both levels are considered within the model of Integrated Change Management (Wanner, 2013).

Pryor et al. conducted valuable research that has been dedicated to the study of major differences in changes today and those of previous eras. The following can be named conclusions:
- the simultaneous nature of the changes
- the speed at which the different types of change occur
- the complexity of changes
- the immediate communication and impact of the changes throughout the world; and
- the need for individuals as well as leaders of organizations and nations to step up and immediately make decisions and address problems, issues, and resolutions. (Pryor et al., 2008)

The concept of Change Management has evolved over time, but one of the early definitions comes from research work led by IBM corporation. IBM's definition of change management describes it as a method that an organization uses to communicate and implement change, including the management of people and processes. A change management process helps ensure that employees are equipped and supported for the entirety of the transition. Several reasons constitute a need for change management. Mergers and acquisitions, leadership adjustments and implementation of new technology are common change management drivers. The organizational development needed to compete with rapid digital transformation across the industry leads companies to implement new products and new processes. However, these innovations often disrupt workflows, presenting a need for effective change management. Successful transformational change goes beyond a communication plan; it involves implementing change throughout the company culture. A change management strategy can help stakeholders to adopt proposed changes more readily than in situations where such a strategy is not employed. By activating employees as change agents by involving them in the workflow, business milestones can be achieved. Leaders can and should establish the benefits of change through developing a comprehensive change management plan. Source: https://www.ibm.com/ McKinsey company has also left a footprint in this field. They emphasize the strategic role of communication and influencing, by suggesting that leaders develop a change story that helps all stakeholders understand where the company is headed, why it is changing, and why this change is important. Building a feedback loop to sense how the story is being received is also useful. These change stories not only help get out the message but also, recent research finds, serve as an effective influencing tool. Stories are particularly effective in selling brands. Source: https://www.mckinsey.com/ Other popular models dealing with change are McKinsey 7-S, Bridges Transition Model, IT Infrastructure Library (ITIL), or Prosci methodology.

Methodology

The primary objective of this work is to understand change drivers in the context of European research & innovation projects. For this purpose, Horizon Europe's thematic priorities will be used to approximate change drivers. The secondary objective was to conclude the level of project commitment towards "change" and "transformation". This has been achieved by calculating the density of keywords like change, transformation, etc. in project objective statements. Our data contains results of empirical research conducted on project databases retrieved from The Community Research and Development Information Service. CORDIS is the European Commission's primary source of results from the projects funded by the EU's framework programmes for research and innovation, from FP1 to Horizon Europe.

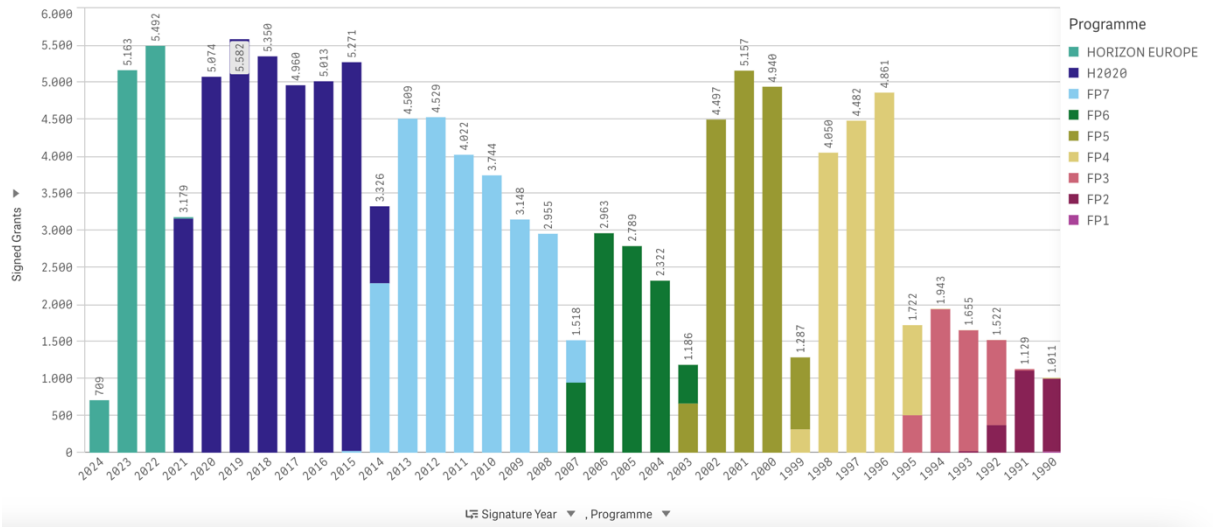

Figure 1. EU Funding programs evolution over time

Source: *https://cordis.europa.eu/about*

Horizon Europe as the European Union's key funding programme for research and innovation runs from 2021 to 2027. The main goals of Horizon Europe are: Promoting Open Strategic Autonomy:

1. Leading the development of key digital, enabling, and emerging technologies, sectors, and value chains.
2. Restoring Europe's Ecosystems and Biodiversity: Managing natural resources sustainably.
3. Making Europe a Digitally Enabled Circular, Climate-Neutral, and Sustainable Economy: This involves tackling climate change and helping to achieve the UN's Sustainable Development Goals.
4. Creating a More Resilient, Inclusive, and Democratic European Society: This includes creating jobs, fully engaging the EU's talent pool, boosting economic growth, promoting industrial competitiveness, and optimizing investment impact within a strengthened European Research Area.

Horizon Europe's changes priorities exist in the following areas:

1. Innovation and Collaboration: The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges.
2. Geographical Expansion: Horizon Europe has introduced a groundbreaking change, offering the opportunity for association to countries with robust science, innovation, and technology profiles, regardless of their geographic location.
3. Economic Impact: According to the impact assessment, Horizon Europe has the potential to deliver up to €11 in Gross Domestic Product (GDP) gains for every euro invested, create up to 320,000 new highly skilled jobs by 2040, and consolidate Europe's leadership in research and innovation.

The dataset used in this research consists of finished and ongoing EU-funded projects. For the time period, years 2021 – 2024 have been selected to focus on the current Horizon Europe framework programme. The following dimensions have been considered:

- projects: legal basis, project name, project ID, start date, end date, project status, EU contribution, objective, thematic priority, number of partners, etc. (76.593 projects)
- project participants: organization name and ID, homepage, address, type of organization, project role, EU contribution amount, etc. (22.452 total organizations, 12.165 distinct organizations)

Results

Table 1 and Figure 2 provide a detailed overview of key change drivers represented as various European funding programs, their contribution amounts, the count of projects they support, and the count of partners involved in consortia. Some key takeaways are:

- The European Research Council (ERC) has the highest contribution at over 5.5 billion EUR making research the main change motivator for Horizon Europe.
- The Marie Skłodowska-Curie Actions (MSCA) have the highest count of projects at 3,675 and partners at 12,250.
- The programme with the lowest contribution is Promoting Public Outreach with 150,000 EUR.
- The total contribution across all programs is 31.4 billion EUR, supporting 11,484 projects and 71,255 partners.

Table 1. Horizon Europe: Top 10 change drivers

Thematic Priority	Sum of EC Contribution (EUR)	Count of Projects	Count of Partners
European Research Council (ERC)	5.580.793.809	3.236	3.918
Digital, Industry and Space	3.278.729.456	565	8.161
Health	3.170.786.138	428	6.287
Climate, Energy and Mobility	2.367.681.547	356	5.986
Clean, Safe and Accessible Transport, Mobility	1.947.489.410	210	3.654
The European Innovation Council (EIC)	1.782.074.949	686	2.188
Marie Skłodowska-Curie Actions (MSCA)	1.667.142.134	3.675	12.250
Culture, creativity and inclusive society	1.552.016.157	328	5.093
Food, Bioeconomy Natural Resources, Agriculture, Environment	1.478.423.587	285	4.500
Energy Supply	1.126.086.422	185	2.406

Table 1 provides a general overview of the top 10 Horizon thematic priorities, their grant contributions, and a number of funded projects and is organized into three columns:

1. Thematic Priority: This column lists our change drivers i.e., different sectors or initiatives that are receiving funding. These range from research councils, health, climate, and energy to education and training programs.
2. Sum of EC Contribution (EUR): This column shows the total amount of EUR funding that each sector or initiative has received from the EC.
3. Count of Projects: This column indicates the number of projects that have been funded in each sector or initiative.
4. Count of Partners: This column represents the total amount of partners involved in consortia

Thematic priorities that scored lower than the top 10 are displayed in Figure 2.

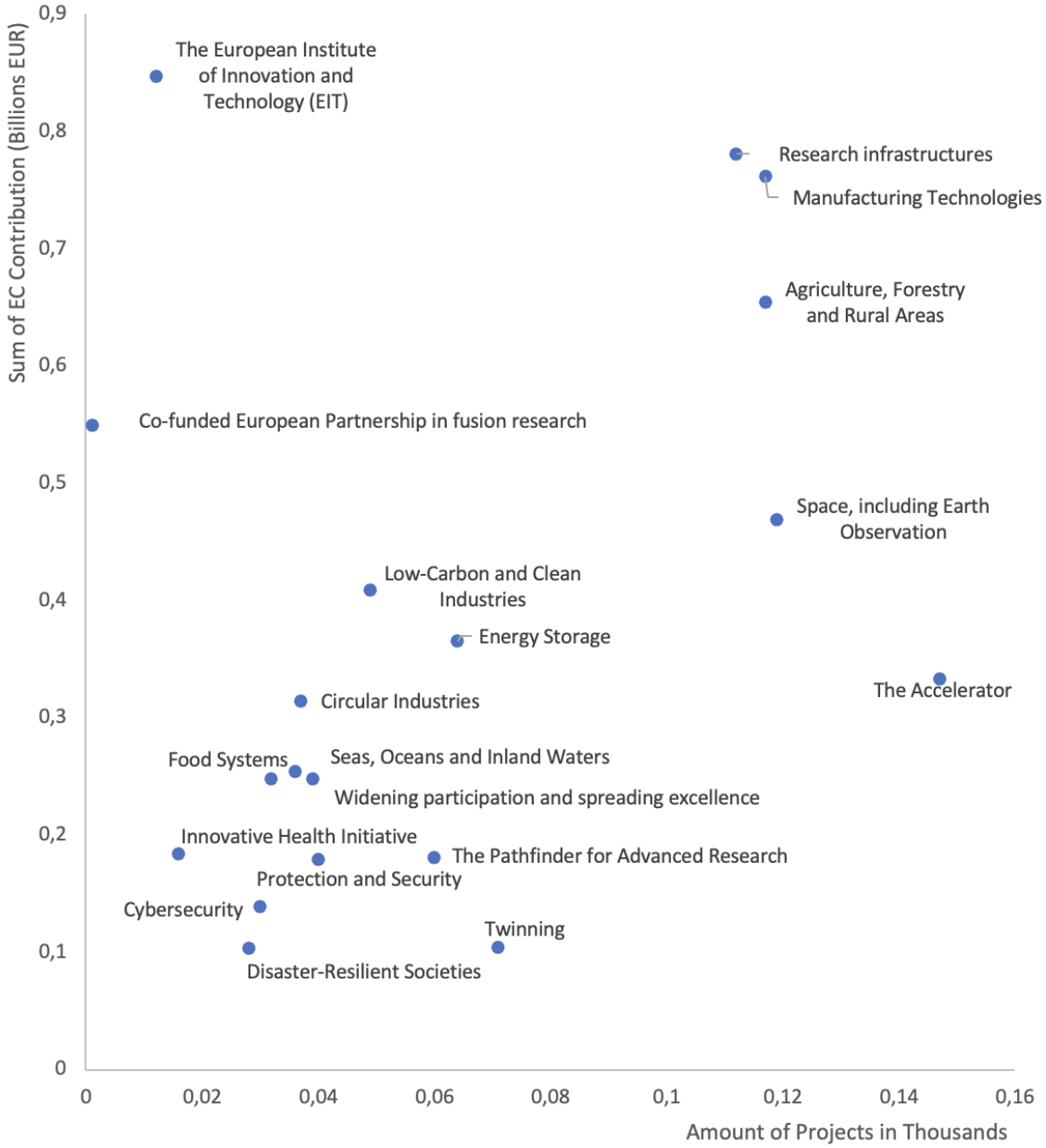

Figure 2. Horizon Europe: Key change drivers (rest)
Source: *https://cordis.europa.eu/*

As per the secondary objective, the goal was to understand the project's level of commitment to change based on project objective analysis. Table 2 shows the thematic priorities of various projects and the prevalence of the keywords "change" and/or "transformation" in their objectives. Here are some key findings:

1. Highest Ratio: The thematic priorities "Careers and universities" and "Promote and co-fund innovation programmes" have the highest ratio (100%) of projects with the keywords "change" and/or "transformation" in their objectives.
2. Most Projects: The "Marie Skłodowska-Curie Actions (MSCA)" has the greatest number of projects (2,636 without keywords and 1,039 with keywords). However, the ratio of projects with keywords to all projects is only 28.3%.
3. Lowest Ratio: Several thematic priorities such as "Promoting Public Outreach", "Euratom Research and Training Programme (EURATOM)", "Co-funded European Partnership in fusion research", "Civil Security for Society", "Education, training and mobility, including education and training schemes such as Marie Skłodowska-Curie Actions (MSCA)", and "Foster the development of fusion

energy and contribute to the implementation of the European fusion roadmap" have no projects with the keywords "change" and/or "transformation" in their objectives, resulting in a ratio of 0%.

4. Overall: Looking at the grand total, out of 8,800 projects, 2,684 projects have the keywords "change" and/or "transformation" in their objectives, which is a ratio of 23.4%.

This data provides a useful overview of how themes related to change and transformation are prioritized within different project objectives. It's interesting to see the variation across different thematic priorities. It could be beneficial to further investigate why certain themes have higher ratios than others and what this implies about the focus of these projects.

Table 2. Commitment level to change in Horizon

Thematic Priority	Projects without commitment	Committed projects	Commitment score
Careers and Universities	0	2	100,0%
Promote and co-fund innovation programmes	0	1	100,0%
The European Institute of Innovation and Technology (EIT)	4	8	66,7%
Safe spent fuel and radioactive waste management	1	1	50,0%
Widening participation and spreading excellence	21	18	46,2%
Seas, Oceans and Inland Waters	20	16	44,4%
Food, Bioeconomy Natural Resources, Agriculture and Environment	160	125	43,9%
Agriculture, Forestry and Rural Areas	67	50	42,7%
Circular Industries	23	14	37,8%
Culture, creativity and inclusive society	210	118	36,0%
Disaster-Resilient Societies	18	10	35,7%

Note: Listed are thematic priorities with a commitment score of 35% and higher.

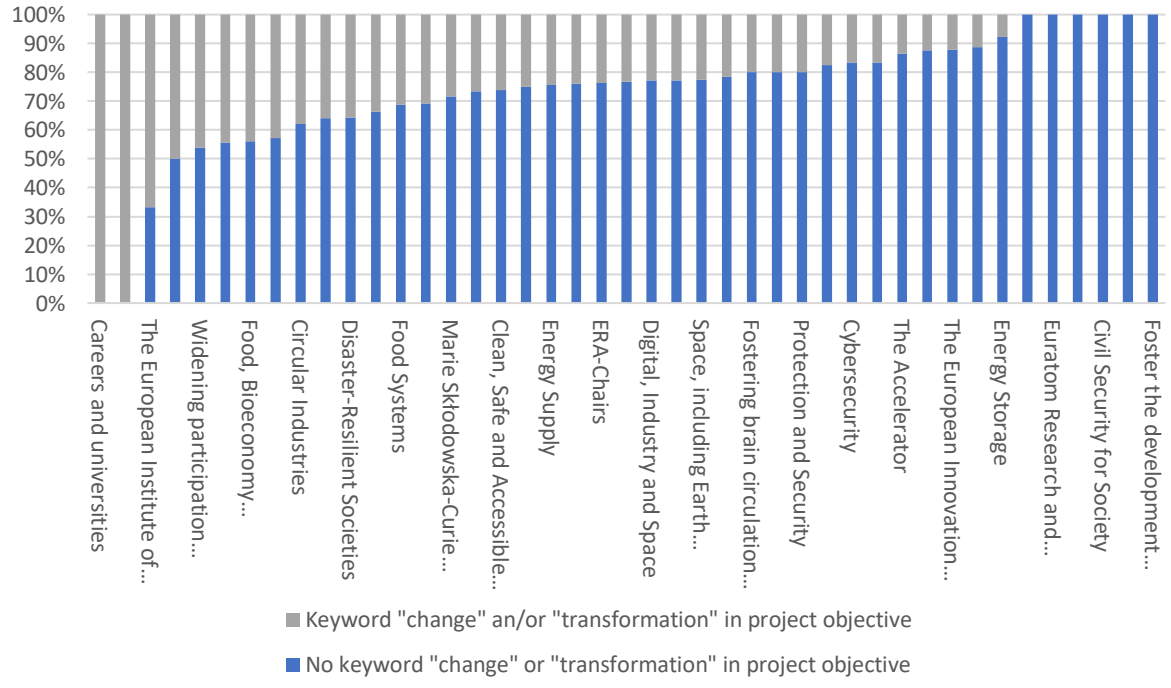

Figure 3. Horizon Europe: Commitment ratio for all thematic priorities

Discussion

Change management is fundamentally centered on the human aspect of change, recognizing that the success of any project or initiative hinges on effectively managing the impact on people. This emphasis on the human element aligns with the broader academic discourse on change management, which underscores the importance of resilience and leadership in navigating organizational transformations (Hiatt, 2006; Kotter, 2007). Various models have been proposed in the literature to provide structured approaches to managing change, with Kotter's 8-step model being particularly prominent. Kotter's model emphasizes the need for a clear vision, strong leadership, and consistent communication, which are critical in ensuring that change initiatives are not only implemented but also sustained over time (Kotter, 1996).

In our study, we explored the most prevalent drivers of change within the context of Horizon Europe and assessed the level of commitment to "change" or "transformation" through a text analysis of project objectives. This method aligns with recent academic efforts to quantify and analyse the thematic focus of large-scale research initiatives (Bryson, Ackermann, & Eden, 2007). Our analysis of 8,800 projects revealed that 2,684 projects (23.4%) explicitly mentioned "change" or "transformation" in their objectives, highlighting a significant focus on these themes.

The achievements of the European Research Council (ERC), Marie Skłodowska-Curie Actions (MSCA), and European Innovation Council (EIC) provide concrete examples of how strategic funding and support can drive significant advancements in research, innovation, and societal impact. ERC-funded projects, for instance, have not only contributed to scientific knowledge but have also led to numerous patents, start-ups, and prestigious awards, reflecting the high impact of targeted research funding (European Research Council, 2021).

Similarly, the MSCA has played a crucial role in enhancing researcher mobility, skills, and career development, fostering excellence across the European Research Area (ERA) (European Commission, 2021). The focus on international, inter-sectoral, and interdisciplinary mobility aligns with academic findings that highlight the benefits of diverse research experiences and collaboration in driving innovation and research quality (Scerri & James, 2010).

The EIC's support for startups and SMEs, promotion of gender equality, and contributions to addressing global challenges further underscore the importance of targeted innovation support in fostering a vibrant and inclusive innovation ecosystem (European Commission, 2021). The significant follow-on investments and valuations of EIC-supported companies illustrate the potential for public funding to catalyse private-sector investment and economic growth, a theme well-documented in innovation literature (Mazzucato, 2013).

As for the most funded thematic priorities (ERC, MSCA, and EIC), our findings are summarized as follows.

1. The European Research Council (ERC) has funded numerous notable projects across various fields, below listed are some achievements that have resulted from ERC-funded projects:

- ERC projects have led to over 2,200 patents and other Intellectual Property Rights (IPR) applications
- ERC grantees have founded or co-founded over 400 start-ups.
- More than 200,000 articles have been published in scientific journals as a result of these projects.
- ERC grantees have been awarded 14 Nobel Prizes, 6 Fields Medals, 11 Wolf Prizes, and dozens of other important prizes. Source: https://erc.europa.eu/

2. The Marie Skłodowska-Curie Actions (MSCA) is a flagship program of the European Union for doctoral and postdoctoral training. It is considered to have enhanced the visibility and attractiveness of these organizations across the European Research Area (ERA), but also worldwide Marie Skłodowska-Curie Actions - European Commission. Source: https://research-and-innovation.ec.europa.eu/ Following are considered key achievements in Horizon Europe:

- Promoting Researcher Mobility and Skills: The MSCA aims to equip researchers with new knowledge and skills through mobility across the European Research Area and exposure to different

sectors and disciplines. They have strengthened researchers' skills and international mobility, and the circulation of talent and knowledge across the European Research Area.
- Enhancing Research Quality: The MSCA is funding the development of excellent doctoral and postdoctoral training programs and collaborative research projects while fostering excellence through the implementation of research projects
- Boosting Career Development: The MSCA have enhanced the creative and innovative potential of researchers holding a PhD, providing training on transferable skills and career development
- Increasing International, Inter-sectoral, and Interdisciplinary Mobility: The MSCA is focusing on international, inter-sectoral, and interdisciplinary mobility, and building bridges and exposure to the non-academic sector.
- Structuring Impact on Institutions: The MSCA have achieved a structuring impact on higher education institutions, research centers, and other organizations way beyond academia by widely spreading excellence and setting standards for high-quality researcher education and training
- Contributing to Horizon Europe's Strategic Plan: The MSCA is also contributing to the orientations identified in the Horizon Europe strategic plan.

3. The European Innovation Council (EIC) on the other hand has considerably contributed to fostering innovation and supporting startups and SMEs. European Innovation Council Impact Report 2021 lists some key achievements that demonstrate the EIC's commitment to fostering innovation, promoting gender equality, and addressing global challenges. Source: https://eic.ec.europa.eu/

- Support of Startups and SMEs: The European Innovation Council (EIC) has supported 5500 startups and SMEs, which have accumulated €9.6 billion in follow-on investments. These companies have reached a valuation of around €50 billion, including 91 "centaurs" (company valuation over €100m) and 2 "unicorns" (company valuation over €1 billion)
- Promoting Gender Equality: The EIC has seen an increasing number of women-led startups. Of those awarded funding in 2020, over 20 percent have a female CEO, a doubling of the previous level
- EIC Fund Investments: The EIC Fund, established in 2020, took investment decisions on 137 companies worth €600 million in the first six months of 2021. The first 24 direct equity investments by the EIC Fund attracted co-investments by VC funds and others of €395 million (2.7 times the EIC Fund investment).
- Generating Scientific Breakthroughs: EIC-supported research projects have generated over 800 innovations. The EIC is also generating scientific breakthroughs as a basis for future innovations.
- Addressing Global Challenges: As of 2020, 90.5% of the portfolio of EIC Accelerator companies are developing innovations that address at least one Sustainable Development Goal (SDG). The 218 startups awarded EIC funding in 2020, including 72 developing innovative solutions for COVID, at least 64 for Green Deal, and at least 40 for digital technologies. Source: https://commission.europa.eu

Conclusion

Our analysis of Horizon Europe projects demonstrates a significant commitment to change and transformation, with a notable proportion of projects explicitly focusing on these themes. The achievements of the European Research Council, Marie Skłodowska-Curie Actions, and European Innovation Council highlight the impact of strategic funding and support in driving research excellence, innovation, and societal impact. These findings point to the importance of continued investment in structured change management approaches and support mechanisms to foster resilience, leadership, and sustainable innovation in the face of ongoing challenges. Future research should continue to explore the relationship between funding mechanisms, researcher mobility, and innovation outcomes to inform policy and practice in the context of large-scale research and innovation programs.

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