

EURO-PLATFORMS:
SCIENCE, TECHNOLOGY AND ECONOMY
A crucial connection for Italy

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Excerpt of the book:

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SCIENZA, TECNOLOGIA ED ECONOMIA
Una connessione cruciale per l'Italia

a cura di
Alberto Quadrio Curzio
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il Mulino

EURO-PLATFORMS:
SCIENCE, TECHNOLOGY AND ECONOMY
A CRUCIAL CONNECTION FOR ITALY

EXCERPT AND SUMMARY

This booklet reprints some parts of the book «Euro-piattaforme: scienza, tecnologia ed economia. Una connessione cruciale per l'Italia». That is the Foreword by Mariya Gabriel and Patrizia Toia, the Presentation «Fondazione Edison and structural economic innovation» by Alberto Quadrio Curzio and Marco Fortis, the Conclusions «*Next generation EU and the euro-platforms*» by Marco Fortis, Alberto Silvani and Alberto Quadrio Curzio. Finally, the index of the book and the list of authors.

The editors of the Italian version of the book, with this excerpt, hope to spread the circulation of the main information on the book itself.

The book «Euro-piattaforme: scienza, tecnologia ed economia. Una connessione cruciale per l'Italia» (Euro-platforms: science, technology and economy. A crucial connection for Italy) stems also from the conference «Piattaforme delle tecnoscienze: Italia ed Europa» (Techno-scientific platforms: Italy and Europe), organized in October 2019 at the Accademia Nazionale dei Lincei in collaboration with Fondazione Edison. The conference focused on large European and Italian techno-scientific infrastructure with the purpose of evaluating its ongoing and potential effects for applied research on the European economic system.

The volume (the 31st in Fondazione Edison's series) takes up and significantly broadens the conference themes also with contributions from experts who did not attend the event. The approach is that of structural economic analysis, typical of Fondazione Edison, which continuously interfaces with institutions and techno-science, always from an Italo-European perspective.

Thus, the role of specific EU programmes for research and innovation takes on great importance, as well as the more general EU programmes aimed at European recovery and development, which will increase with the *Next Generation EU*.

This theme takes on particular significance from the points of views of European Institutions with the foreword to the volume written by Mariya Gabriel (European Commissioner for Innovation, Research, Culture, Education and Youth) and Patrizia Toia (Vice President of the Commission for Industry, Research and Energy of the European Parliament).

The book can be interpreted in two ways: one is from the perspective of Italo-European analysis, always taking into account Italy as a member of the EU; another is through the viewpoints of a variety of authors, ranging in expertise from the «hard sciences» (mainly in the fields of physics and bio-medicine) to those specialized in economics and organizational science.

In the first part of the volume, the current situation of the *European platforms and infrastructure* or «state of the art» is presented with contributions by various authors who in some cases are experts who participated in the construction of these platforms and infrastructure, in other cases in their management, and still others were involved in detailed studies of them. Each individual platform and/or example of infrastructure is contextualized both historically, as well as by referring to actual successful cases, at the same time not overlooking critical and problematic aspects.

In the second part, «the new», i.e. *Italo-European progress and projects*, is analyzed: not only studying new cases but also pointing out their capacity to enhancing existing competences into the European system.

The third part focuses on *Techno-science within European infrastructure* and deals with an observatory, that by means of a collaboration among a wide-ranging team of researchers from various European countries, led to the production of a European outlook for infrastructure investment. In this outlook there is also an essay on research, which sums up

the many ideas contained in the preceding contributions.

This outline and the relative division of the book into three parts echoes Fondazione Edison's approach. That is, an analysis within the framework of «structural economic dynamics», with a focus on the real economy and its interdependencies. This approach might be useful to public policy decision-makers and innovators, involved in activities ranging from the corporate world to scientific research.

Jel-Classification: O3, O2, E6

MARIYA GABRIEL AND PATRIZIA TOIA

FOREWORD

The Covid-19 pandemic is unprecedented, and so is our common response to the virus outbreak. When governments and societies around the world have been struggling to contain the global pandemic, when our economies have been suffering like never before, and our personal and professional lives have been massively disrupted, research and innovation turned out to be the most impactful and powerful tools to start bringing us back to a «new normal».

Researchers and innovators are working around the clock to better understand the novel virus, as this is the only way we can develop effective treatments and diagnostics and deliver a globally awaited vaccine.

Faced with economic uncertainty and the impossibility to assess long-term effects of the pandemic, research and innovation will guide Europe in its green and digital transitions. It is more important than ever to develop a European area where the knowledge from the universities together with the research results are turned into innovations for the benefit of the society as this book clearly explains.

In the context of the pandemic and economic crisis this book provides evidence for the need to move from infrastructures to platforms, from science to innovations in the society. European innovation platforms that foster interaction among people to think, innovate and build together. A new generation of regional and European platforms (2.0 platforms) for territorial innovation that will be the basis for a true European Innovation Area.

Mariya Gabriel, European Commissioner for Innovation, Research, Culture, Education and Youth.

Patrizia Toia, Vice President of the Commission for Industry, Research and Energy of the European Parliament.

Research and Innovation have not lost their power to drive growth, to create jobs and boost competitiveness. The new *Horizon Europe* and the *Next Generation EU Programme* will provide the budget for a strong research and innovation in Europe that will become the backbone of Europe's recovery.

The European Union created the biggest research and innovation programme in the world: *Horizon 2020*. Research & Innovation are the most important engine of growth. 400 to 600 billion euro by 2030 is the estimated GDP gain from *Horizon 2020*. It drives the development of knowledge-intensive activities, which make up over 33% of total employment in Europe.

In view of a very demanding future, we are now in the final stages of preparing its even more ambitious successor: *Horizon Europe*. It has powerful tools and novel approaches such as new public-private partnerships, large-scale missions and the new European Innovation Council to help us to achieve climate-neutrality by 2050. Europe's aptitude to address decarbonisation and digital transformation relies on the development and update on new technologies and innovation. If we are to reach the potential target of 50% reduction of CO₂ emissions by 2030, which is of transformative nature for all industrial sectors in Europe, we will need coordinated efforts and a strong *Horizon Europe*.

In May 2020 the Commission proposed an unprecedented and innovative recovery package, called *Next Generation EU*, with research and innovation as key driver. *Horizon Europe* is endowed with substantial additional funding of 5 billion euros. The programme will reach more than 95 billion euros in total. Additional money will allow for greater focus and will facilitate vital research in health, resilience and the green and digital transitions.

In collaboration with Member States, *Horizon Europe* will give Europe the chance for a recovery based on scientific and innovation achievements. *Horizon Europe* will not only mean the creation of up to 100,000 jobs in Research & Innovation activities by 2027 but also a massive investment shot into our economies.

The start of *Horizon Europe Programme* will help us to combat the long-term impact of this pandemic, and better prepare us for a sustainable recovery based on research and innovation. It will help to combat cancer, to discover new solutions for climate-neutral cities, to provide energy and food security, to take better care of the quality of our oceans, and to prepare us for inevitable social and economic changes.

This book makes a strong case on the need to move beyond infrastructures and science into platforms and innovation. It presents a clear blueprint to transform research into valuable innovations that will support EU economy and society's recovery. The insights of the book combined with the new *Next Generation EU* and *Horizon Europe* programmes are the ingredients for a recipe to ensure Europe will become the most innovative region of the world.

ALBERTO QUADRIO CURZIO AND MARCO FORTIS

PRESENTATION.
FONDAZIONE EDISON
AND STRUCTURAL ECONOMIC INNOVATION

1. *Fondazione Edison: from the last twenty years to the present and for the future*

One could say that this volume concludes the initiatives with which Fondazione Edison has illustrated (mainly in 2019) its first 20 years of activity, and in continuity, opens up a new phase which we hope will be as positive as the previous one.

Therefore it brings us great pleasure that the foreword to this volume has been written by Mariya Gabriel (European Commissioner for Innovation, Research, Culture, Education and Youth) and Patrizia Toia (Vice President of the Commission for Industry, Research and Energy of the European Parliament). Through their various European roles, these distinguished officials have expressed and supported the crucial role of research and innovation and are now engaged in the complex phases of configuring the Multiannual Financial Framework 2021-2027. We express our heartfelt thanks to them for having accepted our invitation, which is also a result of their evident attention to interdisciplinary aspects, for which economy counts not only at the beginning in terms of financing research, but also down the line in terms of its effects on innovation.

We are particularly pleased that the two above-cited officials conclude their foreword by renewing the urgency with which, as a result of Covid-19, more should be invested in research and development. They express their appreciation for this collection of essays as follows:

This book makes a strong case on the need to move beyond infrastructures and science into platforms and innovation. It presents a clear blueprint to transform research into valuable

innovations that will support EU economy and society's recovery. The insights of the book combined with the new *Next Generation EU* and *Horizon Europe* programmes are the ingredients for a recipe to ensure Europe will become the most innovative region of the world.

Before entering into the merit of this volume, we feel it is useful to recall the past 20 years of Fondazione Edison, which were celebrated in 2019 with numerous initiatives to document the past but also with a view to future prospects. An overview of the past can be found in the volume *Fondazione Edison. Venti anni per l'economia italiana in Europa. 1999-2019* (*Fondazione Edison. Twenty years for the Italian economy in Europe. 1999-2019*). Reflections on the present, along with projections for the future have been addressed mainly (but not exclusively) in two conferences.

One conference was held in September, 2019 at the headquarters of Fondazione Edison in Milan, on the topic «L'Unione europea e l'Italia tra passato, presente e futuro» (The European Union and Italy: past, present and future). Speakers included Romano Prodi and Mario Monti, Pier Carlo Padoan and Enzo Moavero Milanesi, and Marco Buti and Maria Chiara Carrozza. All of them have been university professors but also holders of institutional responsibility in Italy, Europe and internationally.

Another conference was held in October, 2019 at the headquarters of the National Academy of Linceans in collaboration with Fondazione Edison on the topic «Piattaforme delle tecnoscienze: Italia ed Europa» (Platforms of techno-science: Italy and Europe).

Clearly, having chosen this as one of the many topics with which to celebrate the Fondazione's first twenty years, reflects its importance. The focus of the conference was on large European and Italian techno-scientific infrastructure, analysed mainly from the perspective of Italian experts, also to assess the impact on the progress of applied economic research in that country's context. Speakers at the conference included Patrizio Bianchi, Giorgio Metta, Sergio Bertolucci, Fabio Pammolli, Nicolò D'Amico, Rosario Corrado Spinella,

Andrea Ferrari, Andrea Bairati, Philip Avner and Mauro Ferrari. The two sessions of the conference were moderated by Maria Cristina Messa and Alessandra Faggian. Conference organizers were Marco Fortis and Alberto Quadrio Curzio.

This volume takes up and broadens the topics of the above conference with contributions from experts who did not attend the event, while unfortunately others who provided important insights at the conference were not able to contribute to this volume. The title of the book *Euro-piattaforme: scienza, tecnologia ed economia* (*Euro-platforms: science, technology and economy*) demonstrates Fondazione Edison's approach, which we will focus on below.

2. *Science and technology for economic development*

In presenting this volume it is useful to focus, among Fondazione Edison's many initiatives, on two aspects. One is more of a background nature, while the other concerns Euro-Italian development policy.

The background aspect regards the science of economics and places the topic of this volume within the analysis of «structural economic dynamics» including the dynamics of scientific and technological systems, cultivated for many years by a group of Italian economists including Quadrio Curzio and Fortis. This current of research has long been side-lined in Italy for many reasons, including the fact that it is not «micro-marketist» or «meta-financial», i.e. part of that approach that in the end considers the real economy and economic policy secondary if not «ancillary» compared to market dynamics. The structuralist approach is based on a «matrix system of rows and columns» to which one can assign different types and functions, but which always emphasizes interdependence.

Starting from Quadrio Curzio's historical studies as applied to the current day by others including Marco Fortis, Fondazione Edison has addressed the topics of «techno-science» and «techno-economy» as these themes were also being developed in the company Edison. Indeed, its

founder, Giuseppe Colombo, was also a Lincean, and along with others represented that current in Italy of «economist engineers» who gave a formidable impulse to Italian industrialization and the application of science to technology, and the latter to the economy.

The development policy aspect is evidently topical. It has to do with the EU's strong imprint on the «Euro-Italian system» and is therefore located within the «institutional space» of the EU and the EMU. In its twenty years of existence Fondazione Edison has never ceased to focus on this approach, albeit dealing with many more sector-oriented aspects. But the sectors have always been treated as the production chains of a system. Time after time the Fondazione has concentrated on institutions, companies, international trade, infrastructure, regional development, etc. It has developed statistical handbooks to explain the Italian economy. Its commitment to explain, communicate and propose, has engaged public policy decision-makers and innovators in fields ranging from the corporate world to scientific research. This is because the Fondazione has always maintained that without innovation, especially in the 21st century, there is no development with equity and equal opportunity. This also explains why the Fondazione always has medium to long-term intertemporal analysis profiles.

3. *European programmes towards «Horizon Europe»*

The approach of this volume is briefly explained in the introduction by Alberto Quadrio Curzio and Alberto Silvani whereas here we indicate some of the aspects more inherent to «science policy» for innovation, technology and the economy with reference to the EU.

We have already mentioned the foreword to this book by Mariya Gabriel and Patrizia Toia. We feel it is necessary to recall it again because of the importance of the common conviction that development in Europe – in the widest sense and also in the fight against Covid-19 – depends on innovation. Their position on this was well enunciated in

synthesis in the article published in the newspaper «Corriere della Sera» on June 19, 2020 where we are reminded that with *Horizon 2020* the EU created the largest research and development programme in the world, with crucial effects for European development, while *Horizon Europe*, taking over from 2021, should relaunch it.

We know that this topic is now in limbo due to the fact that at the European Council meeting in mid-July 2020, which was actually very successful, funding for research and innovation as part of *Horizon Europe* was called into question. This is a topic that Quadrio Curzio has often written about for the *Huffington Post*, also in order not to forget the proposals of the European Parliament as well as the European Commission. Starting from the first proposal of the Juncker Commission (in 2018) complex negotiations began with the European Parliament and the Council. The Parliament proposed a budget of 120 billion euros, but it was only able to reach partial political agreement with the Council (in 2019). In May, 2020, in response to the global coronavirus pandemic, the von der Leyen Commission presented a revised budget proposal (2021-2027) and for *Horizon Europe*, with Commissioner Gabriel, sought a compromise that was higher than the Council's position, proposing 94.4 billion euros (also thanks to support of the *Next Generation EU* plan). The amount settled on after the long European Council meeting in July, 2020 was actually 80.9 billion euros. Negotiations are still ongoing and they will be difficult, but Parliament and the Commission immediately demonstrated their determination to increase the resources available for *Horizon Europe*. The reaction of many scientific institutions on the one hand, and the European Parliament on the other, are grounds for hope of an increase. To his credit, David Sassoli, President of the European Parliament, has taken a firm stance with the European Council on hopefully getting the amount back up to 100 billion euros without damaging the conclusions of the Council.

In this context of the science policy, we trust, as in the past, that EU programmes will also give ample space to basic or fundamental research, avoiding concentrating all

the resources in a single area. Over the long-term, without basic research there is no radical innovation.

4. *The tone of this volume: science and organization, economics and politics*

Without anticipating the introduction *Euro-infrastrutture tecnoscientifiche: casi, politiche e strategie* (*Techno-scientific Euro-infrastructure: cases, policies and strategies*), we would like to highlight here the nexus between the authors and parts of the book, around some significant concepts.

We have mainly chosen Italo-European authors, that is, experts who have this type of vision and who in many cases have had (or have) leading roles in high profile organizations. We then invited experts, many of whom we are in frequent contact with, and who in addition to their evident sectoral expertise, also have a broad vision of the topics of innovation and development. Due to lack of space we will not go into detail in these aspects but will limit ourselves to two points.

One regards the first two parts of the volume. The part entitled *Piattaforme e infrastrutture europee. Un sistema dinamico* (*European platforms and infrastructure. A dynamic system*) begins with an essay by Luciano Maiani who had a pivotal role as president first of the National Institute of Nuclear Physics (INFN) and then of the National Research Council (CNR) and, between these two presidencies, as director general of the European Organization for Nuclear Research (CERN). Thus he clearly carried out scientific, organizational, economic and technological functions that also interfaced with politics and institutions. The second part on *Progressi e progetti italo-europei* (*Italo-European progress and projects*) opens with an essay by Massimo Inguscio who has participated in many Fondazione Edison conferences and, as president of CNR has had a broad vision of science policy. Importantly, he was also president of the association of six of the principal European research organizations (CNR, CNRS, CSIC, the Helmholtz Association, the Leibniz

Association and the Max Planck Society). In this role, on July 16, 2020 he directly appealed to the president of the European Council to ensure adequate financing for *Horizon Europe* and other related R&D organizations such as the European Research Council, Marie Curie initiatives and the platforms for pan-European research.

The second point regards Fondazione Edison's long-term trajectory of economics and structural political economy mentioned in the previous paragraph 2. This approach is especially evident in the essay by Patrizio Bianchi who has more or less continuously participated in Fondazione Edison conferences, providing a significant contribution. Apart from this, he is one of the most outstanding scholars of economics and industrial and structural policy, with one of their original bases at the University of Bologna. This economic-structuralist approach is also accentuated in part III in the essays by Palma, Silvani, Stilo and Cerniglia, Saraceno. These essays are re-elaborations of articles contained in the European Observatory of infrastructure edited by Floriana Cerniglia and Francesco Saraceno.

With this volume Fondazione Edison reiterates its twenty-year focus on structural economic analysis, which continuously interfaces with institutions and techno-science, never losing sight of the Italo-European horizon.

MARCO FORTIS, ALBERTO SILVANI
AND ALBERTO QUADRIO CURZIO

CONCLUSIONS.
NEXT GENERATION EU
AND THE EURO-PLATFORMS

1. *Preface: Covid-19 and long term trends*

In our Presentation, we outlined the path that led to this book, beginning with two events that represented significant milestones for the twentieth anniversary of the Fondazione Edison. If the participants of these two occasions (a conference at the Fondazione Edison in Milan and a workshop at the Accademia Nazionale dei Lincei in Rome) had been asked to describe the scenario of the locations where the events were to take place, certainly no one would have been able to depict what in effect took place in the first months of 2020. The matter of emergency and the required responses needed to face the pandemic on a worldwide scale created a sort of non desired, but nonetheless effective, «stress test» for the European project, for the role of research and for the links between science and the economy.

All of the themes of the contributions in this volume, many of which were written before the Spring of 2020, are just as valid at present and they have not been surpassed by circumstance. They are contained within the «guiding principles» of Fondazione Edison's mission as confirmed by the abovementioned twentieth anniversary events.

This compendium of essays traces Europe's path, beginning with the lessons from the past, from different historical experiences and objectives, to a shared result: techno-science for the economy is actually a reality today and it will continue to have an ever growing role in the future European dimension, notwithstanding its accelerations or decelerations. Understanding how this came about and assessing future perspectives represent the two main objectives that are addressed in the works here represented.

2. *European Research: programmes, projects, structures*

The book opens with a Foreword by two women who have significant roles in the European institutions: the messages they convey are a reminder that assigning more resources to research and innovation must not lead back to the traditional roles played by governments, the European Parliament and Commission. It is not about «flinging a blanket» that has trouble covering all the requests. Investing in research and innovation is in fact strategic. Not doing so to the best of our abilities, given the current conditions, will generate multiple consequences. In fact, problems will be amplified with respect to unforeseen circumstances, the «tool box» available for constructing a future will become weaker, with lags in the ability to intervene on the big development issues such as the environment, green economy, quality of life, safety, and health. Furthermore, to ensure that resources are utilized, and moreover, aimed in the right direction, coordinated intervention is needed, guided by vision and the contribution of all those who, in their varied positions along the «value chain», work together to ensure innovation results in success.

This is what everyone in their field of intervention is trying to accomplish within the «Euro-infrastructure of techno-science». It is especially the challenge «platforms» must face, hopefully in a more thought out and, possibly, coordinated manner.

We have tried, to create in this book a sort of «relay», both for the transition from existing to new organizations, and for the new tasks some of these entities have decided to carry out, with renewed attention given to economic aspects, necessary requirements, and a search for a consensus beyond the individual scientific communities. All this is done without weakening the attention given to research themes and a long term perspective.

3. *The crucial role of human resources: competence, skills, relations*

Investment in research and innovation is characterized by a prerogative: the need for it to pivot on human resources (succinctly defined as «human capital»). Thus, for our purposes we will combine this current term with a substantially broader concept and henceforth discuss about *human capital-resources*.

This concept exercises a considerable impact on the degree of relations in terms of cooperation and of scientific groupings as well as in terms of the existing socio-economic conditions. This conceptualization surpasses the Nineteen hundreds sequentiality model of research and production, and of science and technology. It has been replaced with human-capital resource, which by the way is trained with considerable time and difficulty and is exposed to risks or reductive «incursions», that can impoverish quality and quantity. The notion of human capital as a factor of production and not as a factor for development, limits its potential. Human resources can be made singular, but take on greater relevance when in relation (as a plural) to others and within the system.

The techno-science platforms (which we did not squeeze into the «logic of definitions», to allow each author to provide his own typification) provide a concrete example of how it is possible to obtain or plan scientific achievements, thanks to systematic competition among different «entities», which differ in competence, role, origin, expectations and interests, while they maintain links through their ability to plan and implement, submitted for evaluation, as regards the achieved «internal» results and generated «external» benefits.

This approach is typical of the «European project» and has been accentuated further in *Next Generation EU*.

4. *Are we ready for the challenge?*

What has been described above, finds a clear application in the recent *White Paper 2020* published by ESFRI (Euro-

pean Science Forum for Research and Innovation) with the meaningful title *Making Science Happen*. It was published at the end of April and contains an ambitious plan for reconfirming the role of research infrastructures within the ERA (European Research Area) framework. Its main message is the creation of a system in support of scientific excellence, capable of success by providing services for the economy, higher education and developing the skills and know-how of the relevant human capital-resources.

Investing in these entities is therefore strategic for their ability to face problems with a cross-sector approach, like the *innovation hub* and favours the convergence of priorities and policies at the regional and national level. In addition, their role in support of open science by supplying FAIR (findability, accessibility, interpretability, and reusability) data, constitutes increasingly added value for the knowledge and innovation communities.

Within these few concepts is contained the motivation of the considerations that we have gathered in this volume and that characterize the techno-scientific platforms as a paradigm around which to build and reconsider the interventions needed to redefine the research and technological development policies.

These platforms are a variegated universe, some are not completely acknowledged, others are considered too highly or are simply branded with reference to their objectives and the interests they represent. Platforms do not always make use of *hard* infrastructures and their ability to operate in a distributive fashion at times does not facilitate their ability to be identified or perceived. Consider for example the network model of EU interventions used with ERC or EIT.

Furthermore, the dynamics that have been created by the Covid-19 pandemic have increased the uncertainties surrounding the hypothesized path for *Horizon Europe*, which contains a chapter dedicated to research infrastructures within its first pillar, as well as various references to other actions such as missions and a complementary strategies. While the so-called «technological infrastructures», testing

activities and validation procedures, which are an important complement to those actions, are not considered.

Challenges and uncertainties must thus find a coherent answer in the definitive approval of the Framework Programme in terms of budget, content and constructive opportunities.

5. *More resources, greater organization and a unique relationship with the economy and society*

Regarding this aspect, the relation with infrastructures is the same as the one that characterizes the overall approach to investments in research: the proportion directly allocated by the EU budget is a fraction (less than 10%) of what Member States apportion for its functioning.

Nonetheless, the fact that it is concentrated and the result of a selection and evaluation process is what determines its significant impact in favour of a policy orientation approach, and influences the choices made at the national and regional levels. If cuts were to be made to the existing, already not well-off 2018 Commission budget proposal, it would incur even graver consequences, since among the effects that will be certainly produced over the next months, is a decrease in mobility for researchers who will have to be compensated on at least two fronts.

On the one hand technology must be upgraded to guarantee remote access, as has been the case in other fields over the past months, and provide guarantees for the related issues of privacy and quality of service. This will specifically require a hefty investment in human capital-resources to allow them to work in stable employment conditions at the same entities. In fact, currently entities are only partially supported by «local» human capital-resources. For the most part they are *scientists* who have been transferred or posted or are there *pro tempore* as the need requires. Those categories will need to be replaced, at least in part, by dedicated, active and qualified permanent personnel to be recruited and in most cases trained in the specific requirements of

the individual entity, in order to avoid a drop in operations and efficiency.

If these requirements exist at the European level, they are increasingly prevalent for those infrastructures/platforms born on a smaller territorial scale which aim to grow and become a point of reference on a grander dimension. The presence of a more diffuse demand, that often needs to be «conquered», once the relevant entity is operational and has taken hold at the «local» level, at one time could have provided the motivation for a jump in size, today it is used as an immediate justification. This aspect should be addressed by the governance at the project stage, without indiscriminately substituting the core of the *stakeholders* who need to be responsible for the feasibility planning phase. The essays provided in this volume address the following elements: governance, stakeholder involvement, relations between local and general providers.

6. *New platforms: learning from the past, planning for the future*

The experiences we have presented in part of this volume, regarding what is «new», both in terms of scientific platforms within a European context and in terms of the local, theme specific, ones with «their eyes fixed» on Europe, as in the case of Human Technopole, can be considered paradigmatic even though they cannot yet be depicted in a model.

A contribution to defining such a model, which has not yet been consolidated, has been provided by industrial figures, specifically CEOs, signatories of an open letter which was sent to the representatives of the European Union (Council, Parliament and Commission) at the end of June 2020. It contains suggestions and requests for planning together the future of Europe. An excerpt of this letter is here provided:

We, the CEO Initiative for Europe's Recovery, Reform and Resilience, represent multinational companies across different

sectors that employ a total of 1.7 million people generating more than 600 billion euros in revenue. Our companies are staying committed to the Paris Climate Change Agreement and have adopted own decarbonisation plans.

While Europe is facing an unprecedented challenge, the CEOs declare they are ready to support «Next Generation EU» to build a more resilient, digitalized, prosperous and sustainable Europe. While other CEOs from other multinationals signed an open letter in August 2020 asking for global leadership in facing the Covid pandemic that can be summarized with the following slogan «rather than simply build it back, we are choosing to build it better».

These «open letters», can be inserted within the widespread request for an economy, that can be concisely defined as the «fourth sector» based on sustainability and a rational and not deregulated use of the available resources. The background of this reference, which in its articulated construct is known as Agenda 2030, comes from the *Human and Sustainable Development Goals* of the United Nations. It is very important that such initiatives become widespread, as can be seen from the World Economic Forum in Davos, which addressed these issues in February 2020, right before the outbreak of the global pandemic. The sequence of events from the February considerations, interpretable as declarations of intent, to the more explicit content of the open letters by the CEOs, could indicate a further confirmation and push of «European infrastructures for science and technology», i.e. platforms, that are capable of providing an important contribution.

In summary, science and technology play a central role in the construction of a cohesive Europe capable of creating the necessary change and development for generating integration processes respectful of diversity and the plurality of origins and cultures. Platforms are the natural «backbone» of such a process.

7. Five key words: the code «suggested» by ESFRI

In conclusion, the vision that comes closest to the substance and mission of the scientific platforms is that of ESFRI's already mentioned *White Paper*, which can be summarized in five key words.

Research: platforms must have at their core a vision for research capable of advancing human knowledge guided by explorative approaches inspired by a socially relevant query. It must be within an international scenario aimed at growth and development contained by a sense of cooperation and competition, which characterizes research, through the use of scientific methods.

Innovation: platforms represent, or should increasingly constitute *innovation hubs*, i.e. tanks filled with human knowledge, frequented by producers and users, that become the reference point not only for applications by the relevant sectors, but more in general for a transversal approach across themes such as the environment, health, social organization, process governance.

Higher education: the platforms can either directly or in cooperating with selected institutions such as universities, foundations, or other entities, guide and organize training courses for undergraduate/graduate/post graduate students, young researchers or industrial researches on new technologies, cross-curricular methodologies and data processing.

Policies: the search for coherence and convergence between various policies cannot be derived from a hierarchical approach, nor from a merely technological or financial one. It must come from synergy and the interaction of actors and subjects. The synergy and interaction can take place within platforms, a natural but not exclusive setting, which can be strengthened if the governance is such that it consolidates the obtained results.

Data: as the essays in this volume have documented in multiple contexts, data represent a new richness which can be accessed only when the conditions exist for their use. A dual avenue is thus proposed. On the one hand the use of *open science* for the data produced when financed

by public resources and on the other hand, the control of market data, in particular when they are in relation to public policies. Since platforms already receive both public and private funding, they once again represent the natural setting for tackling and contribute to resolving the issue of bidirectional circulation of data, i.e. from the generation of data to its more efficient use and vice versa.

8. *A future for science and the EU economy*

The future, that is *Next Generation EU*, cannot but be based on a renewed relation between science, economic growth and society. It is within this framework that European infrastructures are called to play a central role, acquiring a new degree of visibility rather than being confined, as is currently the case, to the importance of the single scientific result and much less on the process that generated it. But, is it too optimistic to consider that this process, which is currently underway, will not present hindrances or criticalities. The obstacles and criticalities, that rotate around the few concepts that have been mentioned on various occasions, are: first, of all resources, including human resources. The operating conditions at the administrative, technical and organizational level. The governance of entities and their implemented know-how, and last, but not least in importance, the ability to learn from mistakes by subsequently introducing the adequate corrective measures. This is what many authors have testified to in the essays contained in this book, all of which are characterized by a positive outlook for the future and the challenges that await us. The industrial foundations, in their variegated realities, can thus become candidates for becoming important «travel companions» for the success of this challenge and assist in overcoming hindrances.

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Fondazione Edison

The Fondazione Edison was established in 1999 with the objective of supporting initiatives in culture and scientific research for the dissemination of human knowledge and for promoting socio-economic, cultural and civic issues with regard to local and district systems of production and economic extensions such as training, research and innovation.

Specific attention is given to the relations between SMEs and large companies; the community and territorial development; and to particular themes such as infrastructures and services provided for civil society and the phenomenon of internationalization. These are fundamental areas for Italy and its industrial competitiveness, for maintaining employment, and for the balance of trade to which districts of SMEs provide a decisive contribution.

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Alberto Quadrio Curzio and Marco Fortis

The Fondazione Edison Series, coordinated by Alberto Quadrio Curzio and Marco Fortis and published by Il Mulino, began in 2000 and currently is comprised of more than 30 books, two of which are historical (one is an overview of the Edison Group from 1883 to 2003, the other is a review of Italy's industrial system in the 150 years of Italian unity). Other works cover the following themes: Made in Italy and industrial districts examined under various profiles including innovation, local communities, their complexity, internationalization, globalization and competitiveness; local public services especially in connection to liberalization and privatization; network infrastructures; the international economic and financial crises; the Southern Italian economy (Mezzogiorno); techno-sciences in Europe. In other series, edited by Springer and the Accademia Nazionale dei Lincei, the Fondazione Edison has published works, in line with its own publications, on districts, relations between districts, pillars, labs and scientific-technological research often from an Italo-European outlook. The Fondazione Edison's publications and the national and international conferences it organizes are distinguished for their consistent coherence on themes related to the Italian manufacturing industry, its size, and especially its districts, and highlighting areas of excellence, which contribute to fostering the debate on the strengths and weaknesses of the Italian industrial system.

Techno-scientific platforms are a mode of interaction between different actors within a common scientific area and with shared technological interests related to the economy and society. Grouping together these relations, not always formally or institutionally, has generated a «system» of cases that are difficult to put within a framework, but are of growing importance and require an analysis of the connections between political economy and techno-science in consolidating profiles and perspectives for the future of Europe. If we take CERN as an example, its technological infrastructure, its governance and the support of its multi-statutory scientific community, we find an evident need for clarifying what economic-organizational model should be implemented to provide the project paradigms. The same holds true for the European Molecular Biology Laboratory, the European Space Agency and for lesser known, but no less important entities like the hub for data science and artificial intelligence. «Horizon Europe», the new framework programme of the European Commission and European Parliament, provides a perspective which is crucial in defining new initiatives.

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