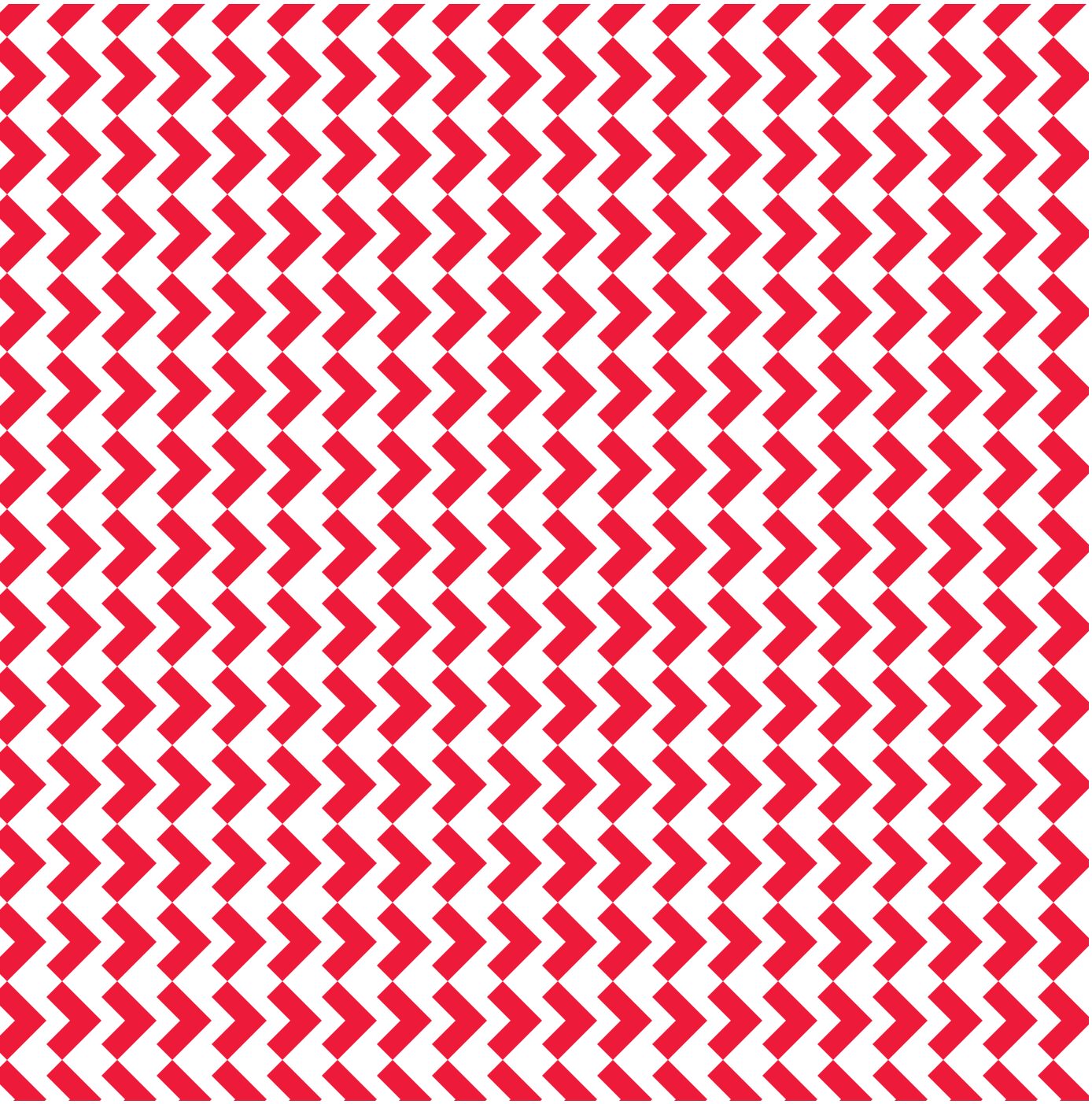
The Innovative Technologies Enabling the Process of Re(New)Industrialization



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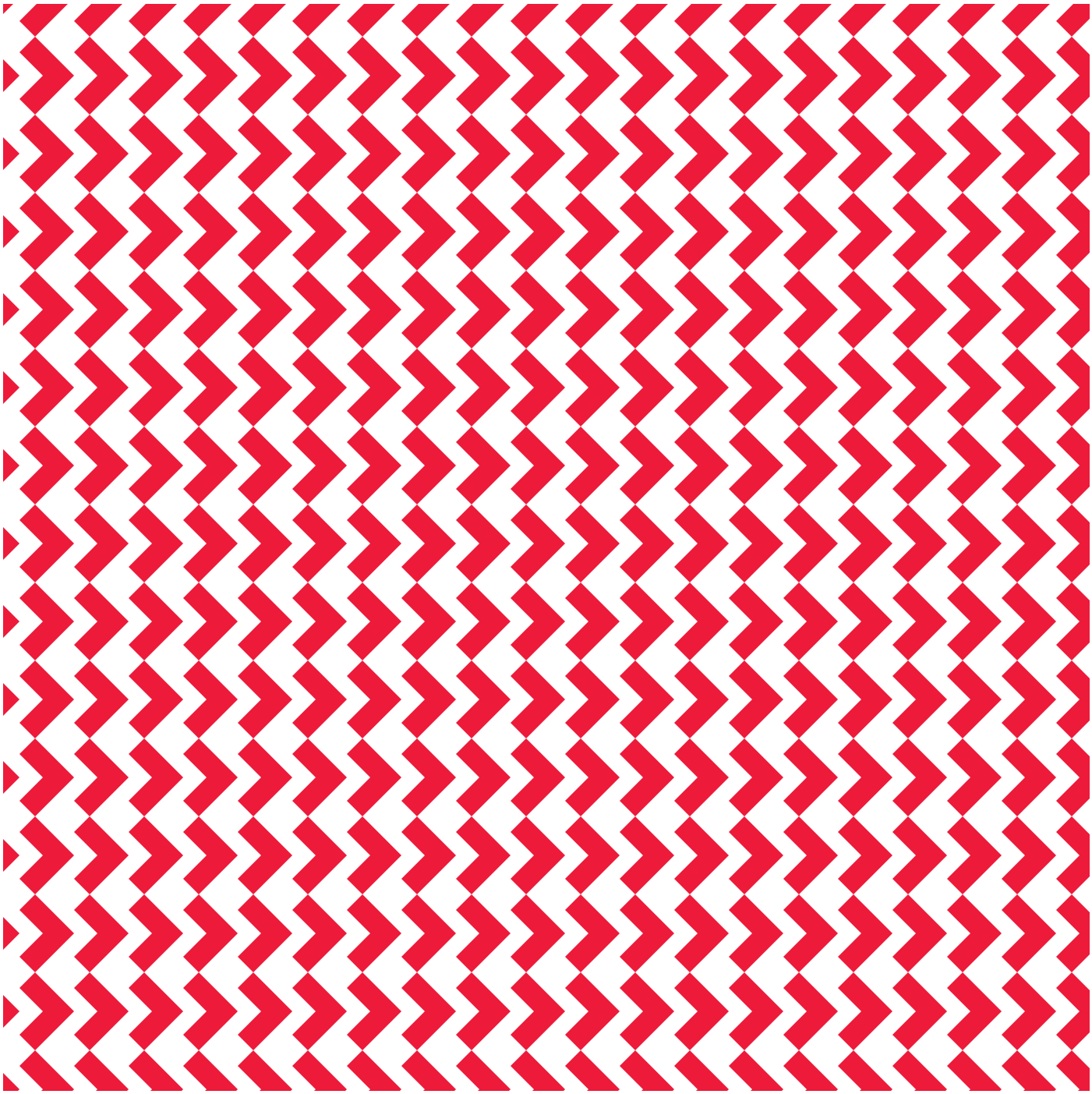

THE INNOVATIVE TECHNOLOGIES ENABLING THE PROCESS OF RE(NEW)INDUSTRIALIZATION

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INDEX

1. Introduction 03

2. Key Enabling Technologies (KETs) 05
   - 2.1. Definition 05
   - 2.2. The six identified KETs 05
   - 2.3. Characteristics 06
   - 2.4. Situation in the EU, Italy, Portugal and Spain 07

3. Positioning of the EU regarding these Technologies and these Industries 09

4. What to do 11
   - 4.1. The need to combine Top-Down and Bottom-Up Approaches 11

5. Main tools of the Community Policy 13
   - 5.1. Horizon 2020 13
   - 5.2. Structural Funds 14
   - 5.3. EIB and EIF 15
   - 5.4. COSME 2014-2020 16
   - 5.5. PPPs and JTIs 17
   - 5.6. EIT 18

6. The relevance of other factors in addition to Technology 19
   - 6.1. The case of Industrial Design and the Designed-Based Consumer Products 19
   - 6.2. PROsumer.net Initiative 19
   - 6.3 Opportunities to Further Develop this Line of Work in Italy, Portugal and Spain .. 20

7. References 22

1. Introduction

The subject of this 9th COTEC Europe Meeting is Re-industrialization.

This means industry – production of goods, by contrast to the production of services.

Industry has declined in importance in the European Union, with a decreasing weight of industrial production in the EU's GDP, and of industrial employment in total employment in the EU. This loss of significance occurs, in the EU, at a faster pace than that observed in other regions of the world, including the most developed. The same is true in our three countries.

Feeling the need to counter this sense of evolution, it is necessary to industrialize - enhance the production of industrial goods.

On the one hand, it is necessary to regain lost positions - and, therefore, we speak of Re-industrialization.

On the other hand, we have to create a New Industry, since the industrial production we need to intensify is totally different from the industrial productions of the past, which weight has declined so rapidly, both in the European Union and in the more developed areas of the world.

All combined, we are faced with a goal that can be best characterized as Re (New) Industrialization.

Already presented in this meeting, a vision ("The Vision of Future Manufacturing Industry in the EU") and a strategy ("Re-Industrialization Strategy"), it is time we turn to the means which will enable us to implement this strategy, and accomplish such vision. We will highlight the importance of technology ("The Innovative Technologies Enabling the Process of Re (New) Industrialization"), notwithstanding a brief reminder of the importance of other factors, such as industrial design.

The matter has been discussed by various bodies of the European Union, based on founding document: "Preparing for Our Future: Developing a Common Strategy for Key Enabling Technologies in the EU", Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (European Commission, Brussels, 30.09.2009 COM (2009) 512 Final). It helps us clarifying this vision, better balancing the objectives of goods production and service production, contributing both to the achievement of the greater objective of increasing skilled labour:

«The shape and potential of industries worldwide will be transformed over the next 5 to 10 years. New goods and services will be created. A significant part of the goods and services that will be available in the market in 2020 are as yet unknown, but the main driving force behind their development will be the deployment of key enabling technologies (KETs). Those nations and regions mastering these technologies will be at the forefront of managing the shift to a low carbon, knowledge-based economy, which is a precondition for ensuring welfare, prosperity and security of its citizens. Hence the deployment of KETs in the EU is not only of

strategic importance but is indispensible.
Indeed, the EU needs a strong innovative performance in order to equip itself with all the means needed to address major societal challenges ahead, such as fighting climate change, overcoming poverty, fostering social cohesion and improving resource and energy efficiency. Following this path will enable the EU to grasp global opportunities, while at the same time offering sustainable employment opportunities with high quality job».

After finding the beginning of an answer to the problem we are facing, the European Union, led by the European Commission, has been developing, since 2009, an intense line of work on the subject of KETs - Key Enabling Technologies, both in terms of study and of policy and action programmes.

2. Key Enabling Technologies (KETs)

2.1. Definition

The work started in 2009 has a second "major moment" when, in 2012, in a new Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, the European Commission presents "A European Strategy for Key Enabling Technologies – A Bridge to Growth and Jobs" (European Commission, Brussels, 26.06.2012 COM (2012) 341 Final):

«The Commission defines KETs as 'knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly skilled employment. They enable process, goods and service innovation throughout the economy and are of systemic relevance. They are multidisciplinary, cutting across many technology areas with a trend towards convergence and integration. KETs can assist technology leaders in other fields to capitalise on their research efforts'».

2.2. The six identified KETs

Based on current research, economic analyses of market trends and their contribution to solving societal challenges, the EU came to identify six "cross-cutting" Key Enabling Technologies:

- Micro/nanoelectronics;
- Nanotechnology;
- Industrial biotechnology;
- Photonics;
- Advanced materials;
- Advanced manufacturing technologies.

Presented in different manners, in the plethora of works already performed on the subject, the publication "Key Enabling Technologies: Their Role in the Priority Technologies for the Italian Industry", a working document published by AIRI - Associazione Italiana per la Ricerca Industriale, in April 2013, has the best description of each of these six technologies (having itself gathered the best definitions in other publications):

«Micro and nanoelectronics, including semiconductors, are essential for all goods and services which need intelligent control in sectors as diverse as automotive and transportation, aeronautics

and

space. Smart industrial control systems permit more efficient management of electricity generation, storage, transport and consumption through intelligent electrical grids and devices.

***Nanotechnology** is the application of scientific knowledge to control and utilize matter in the size range 1 nm to 100 nm, where entirely new physical and chemical, size-related properties*

and phenomena can emerge. This often results in new, exciting and different characteristics that can generate a vast array of novel products. Nanotechnology holds the promise of leading to the development of smart nano and micro devices and systems and to radical breakthroughs in vital fields such as healthcare, energy, environment and manufacturing.

***Industrial biotechnology** – also known as white biotechnology – uses enzymes and micro-organisms to make bio-based products in sectors as diverse as chemicals, food and feed, healthcare, detergents, paper and pulp, textiles and bioenergy.*

Photonics *is a multidisciplinary domain dealing with light, encompassing its generation,*

detection

and management. Among other things it provides the technological basis for the economical conversion of sunlight to electricity which is important for the production of renewable energy, and a variety of electronic components and equipment such as photodiodes, LEDs and lasers.

Advanced

materials

offer

major improvements in a wide variety of different fields, e.g. in aerospace, transport, building and health care. They facilitate recycling, lowering the carbon footprint and energy demand as well as limiting the need for raw materials that are scarce in Europe.

***Advanced Manufacturing Systems** (AMS) comprise production systems and associated services, processes, plants and equipment, including automation, robotics, measurement systems,*

cognitive information processing, signal processing and production control by high-speed information

and

communication systems. AMS are essential for productivity gains across sectors such as the aerospace, automotive, consumer products, electronics, engineering, energy-intensive, food and agricultural as well as optical industries».

2.3. Characteristics

Technologies (or better saying, the major technological areas) just presented share a set of characteristics that provide them with their relevance. Generally, they are characterized as:

- Pervasive, enabling processes and innovation throughout the economy;
- Knowledge-intensive;
- High R&D intensity;

- Rapid and integrated innovation cycles;
- High capital expenditure;
- Highly skilled employment;
- They are, in brief, multidisciplinary, cutting across many technology areas with a trend towards convergence and integration.

2.4. Situation in the EU, Italy, Portugal and Spain

In the above-mentioned document from the European Commission (COM (2012) 341 Final), the European Union seems to be satisfied with its performance regarding these six major technological areas, both in terms of the already evident development, and in terms of the conditions for continuing such development:

«The European Union is a global leader in KETs development. It has all the necessary attributes to remain in this position. Based on patent data, the 2010 European Competitiveness Report and the report of the HLG KETs confirmed that the EU holds a strong competitive advantage: it is the only region to master all six KETs. Over the years, Europe's strong R&D base has championed all six KETs, maintaining a leading position with 32% of the global patent applications between 1991 and 2008. However, despite these strengths, the EU is not capitalising on its knowledge base».

The existing problem lies more in the application rather than the development of such technologies.

In what concerns our three countries, it is worth mentioning the results of the report "Exchange of Good Policy Practices Promoting the Industrial Uptake and Deployment of Key Enabling Technologies", by Else Van de Velde and others – with complete information, albeit a bit delayed, on patent performance, important actors and trade, for each KET, for all the 27 Member-States of the EU and in seven other countries selected for their high performance in terms of technology (China, South Korea, India, Israel, Japan, Switzerland and United States).

Without wanting to compare what cannot be compared, we can retain:

- The higher dynamism of patenting activity in Italy, with 769 patents EPO / PCT on an annual average in each of the years 2006-2008 in the six major technology areas; that number drops to 250 in Spain and 21 in Portugal;
- The high levels of patenting, in Italy, in the areas of Advanced Materials and Advanced Manufacturing, areas also prevalent in Spain and Portugal; we should also highlight, in Portugal, the proximity between Biotechnology and the two large areas aforesaid;
- Still on the registration of patents, quotas (among the 34 countries surveyed, including all major technology producers) that in Italy will be around 3% (4% in Advanced Materials), Spain 1%, and with lower levels in Portugal (except for Nanotechnology, which will be approximately 1%);
- The relatively low weight in Italian exports of industrial activities linked to a greater use of these technologies, at around 1% to 2% maximum in Advanced Materials and Advanced Manufacturing;

- Quotas of around 4% for Italy, regarding exports of these products among the 34 countries surveyed, only reaching 6% (Italy's quota in total goods exports) in the case of Advanced Manufacturing, the only area that also presents in Italy a positive trade balance;
- Very small quotas of these products in total Portuguese exports, with the exception of Advanced Materials and Micro / Nanoelectronics that reached both quotas of around 2% of the exports of the country (in the meantime, the second suffered a very sharp drop). In all cases, in Portugal, the trade balance is negative, and the quota in total exports of the 34 surveyed countries is inferior to that achieved by Portugal in total exports of goods;
- Finally, in Spain, also very low quotas in total exports of goods, at around 1%, with the exception of Advanced Materials, where the quota reaches values of approximately 3-4%. The trade balance is always negative, with the exception of Nanotechnology and Advanced Materials (close to zero in both cases) and quotas also below Spain's quota in total goods exports of the 34 countries, at approx. 3%, except, again, in the cases of Advanced Materials and Nanotechnology (slightly above 3% in both cases).

3. Positioning of the EU regarding these Technologies and these Industries

We have already established that the European Union is relatively satisfied with its performance on these six Key Enabling Technologies, both in terms of technology and technological development. The problem, and dissatisfaction, resides in the results regarding industrial application - products, exports and employment, as, indeed, it was possible to identify above when we presented some results for Italy, Portugal and Spain.

Returning to the document "European Strategy for Key Enabling Technologies – A Bridge to Growth and Jobs" (European Commission, Brussels, 26.06.2012 COM (2012) 341 Final), one can read:

«As highlighted by the 2009 KETs Communication and confirmed by the HLG KETs, the EU's major weakness lies in translating its knowledge base into goods and services. KETs-related manufacturing is decreasing and EU patents are, more and more, exploited outside the EU. The 2011 Innovation Scoreboard indicates similar trends and the negative impact on SMEs. The HLG KETs termed this gap between basic knowledge generation and its subsequent commercialisation into goods and services as the 'Valley of Death'. The urgency to act quickly is further demonstrated by recent developments in the machine tool industry, one of the key KETs application sectors: the European share in global production dropped from 44% in 2008 to 33% in 2010, to the advantage of Asian competitors, namely China (including Taiwan) and Korea. This lack of KETs-related manufacturing is all the more detrimental to the EU for two reasons. Firstly, in the short term, opportunities for growth and job creation will be missed; secondly, in the long term, there may also be a loss of knowledge generation, because R&D and manufacturing are intrinsically linked, mutually reinforcing and, thus, often take place in close proximity to each other».

A diagnosis follows (stating the reasons for the poor performance observed) and a set of guidelines (to improve such performance):

- *«Until recently, the EU had no common definition and understanding of KETs. The 2009 KETs Communication defined the EU's key enabling technologies for the first time and advocated for a common understanding also at Member States level. It also identified the key policies, which would need to be addressed, in order to accelerate the industrial deployment of KETs. Insufficient policies were in place that aimed at (1) tapping into the synergistic impact of KETs and (2) accelerating their "time to market»;*
- *«Most innovative products nowadays, whether it is the smart phone or electric car, incorporate several KETs simultaneously, as single or integrated parts. Thus, combining KETs to ensure maximisation of synergistic impact is important. Although collaborative efforts, in particular with industry in the scope of public-private partnerships (PPPs) and the SET-Plan, already take place today, the interdisciplinary character of individual KETs throughout the value-chain has to be further strengthened and an integrated approach to supporting KETs is therefore required»:*
- *«The timely commercialisation of KETs requires the development of high-risk product demonstration and proof-of–concept projects. The Commission's flagship initiative "Innovation Union"17 confirmed this approach and the proposals under Horizon 202018 envisage increased product demonstration activities under this framework. The size,*

scope and costs of these industrial research and experimental development activities, often an order of magnitude higher than fundamental research activities, require a more effective use and coordination of public resources. In addition, these innovation projects are closer to the market and, where constitutive of State aid, public support is subject to State aid rules»;

- *«KETs-based products are very capital intensive. Their research and innovation development periods are lengthy and production processes include complex assembly methods. For private investors, therefore, KETs are associated with extremely high risks. This coupled with the insufficient access to appropriate sources of risk capital in the EU, of which start-ups and SMEs are particularly dependent, leads to the fact that many innovations never enter the market. With the economic crisis, the situation has become even more critical. As an example, in 2000 EUR 22 billion of venture capital was raised in Europe. In 2010, the amount raised fell to only EUR 3 billion. Again, considering current public finance constraints, it is essential to pool and coordinate public resources across different EU instruments and to allow for their most effective and target-oriented use»;*
- *«The fragmentation of the EU internal market, coordination failures and other obstacles to effective competition in the KETs markets (e.g. entry barriers) diminish the growth potential of KETs (…) A more efficient and transparent flow of information and data on KETs development and deployment activities in the EU is therefore needed. Overcoming regulatory differences across Member States, discriminatory enforcement and other forms of arbitrage can further help to reach the potential offered by the internal market. As such, cooperation between different regions and Member States will need to be reinforced»;*
- *«The shortage of sufficient skilled labour and entrepreneurs capable of handling the highly multi-disciplinary nature of KETs remains a major problem in the EU»;*
- *«A coherent European strategy is hence necessary to overcome the issues identified in order to fully tap into the relative strengths of the European Union in favour of growth and jobs».*

4. What to do

4.1. The need to combine Top-Down and Bottom-Up Approaches

The work we are trying to perform is directed essentially to companies, entrepreneurs who own and lead these companies, and managers that also lead them and manage their operating activities on a daily basis. To an audience with these characteristics, a presentation as the one just made, although interesting, will always be deemed as of very little practical interest.

What to do with the knowledge we have just acquired?

Each company being a case of its own, not to say that each area of activity, each product line or even each product within the same company is also a case of its own, the issues have to be analyzed and resolved with a much higher degree of detail and implementation. From this point of view, the knowledge just obtained, more typical of academics (such as those found in universities, and polytechnics), or of politicians and senior officials that always accompany them, are of little use.

More than a conclusion that closes a meeting and a dialogue, for obvious lack of interest in giving it continuity, we are faced with a conclusion that will constitute the starting point for many and intense lines of work.

The six newly identified technology areas organize the world of knowledge, and of basic research, often forming the name of departments, or large groups of research in the Schools of Engineering, Biotechnology and, further upstream, of Sciences. They are also the starting point for the way politics came to be organized, which by being always closer to subjects such as law or economics, lives of much more general and abstract categories than those that characterize the daily life of companies.

But in fact, companies regardless of how exact, defined and particular their problems are, cannot be prevented from relating with these two worlds, that of science and scientific research (where they can find or develop the knowledge and the technologies they need) and that of politics and public administration (where they can find the lines of action, namely the financing programmes, they also need).

We cannot find any other way to solve this problem but to combine, inter-penetrate, the more abstract, top-down approaches that characterize both the University and Sciences and Public Administration and Politics, with more exact, bottom-up approaches that characterize the companies' daily life.

The action is now on the companies side if, as it is expected, they intend to achieve access to either University and knowledge, or to politics and financing lines. In many cases, companies have probably already carried out this task, simultaneously or even before what was done by Universities (structuring their teaching and research areas) or by Public Administrations (structuring their intervention and financing areas).

Regardless of what may have been done in the past, in practical terms, in the near future, the bets are made: Universities and Politics are structured and companies now have to find the best organization and operating methods for accessing them.

In addition, both the selected Key Enabling Technologies and the policies and vision underlying such selection call for higher cross-sectionality levels; they require, in order to make sense and be efficient, high levels of integration by the companies. None of the selected Key Enabling Technologies was selected for its relevance regarding any particular company or even any particular activity sector. It is also certain that, for activity sectors, including competitiveness pools and clusters that today organize the entrepreneurial activity, no sector will be able to solve its competitiveness problems without accessing the already provided knowledge and the knowledge that may come to be developed by one or more Key Enabling Technology. The same is true for each individual company, in an economy as demanding as companies face nowadays.

These reflections show the work companies now face and which will eventually influence the way the action of Universities and Administrations will be operationalised and the way such actions will eventually benefit one, or more, companies.

In order to have an idea of the very high number of technologies that, in fact, fit the six Key Enabling Technologies identified, I recommend the reading of Schedule 1 (pages 29 to 38) of the working document “Key Enabling Technologies: Their Role in the Priority Technologies for the Italian Industry”, published by AIRI - Associazione Italiana per la Ricerca Industriale in April 2013.

This work is, in fact, a very good example.

In a bottom-up approach, and starting with the surveying of the companies, AIRI identified 84 Priority Technologies in relation to 8 industrial sectors: Aeronautics (12 PT), Chemistry (13), Energy (7), ICT (9), Manufacturing (10), Microelectronics-Semiconductors (6), Pharma & Bio (8), Transport (ground, rail, marine: 19). When the European Commission started publishing the first results of their work on Key Enabling Technologies, following a more top-down approach, AIRI decided to cross results obtained from the two approaches. The conclusions are clear:

- *KETs contribute to all the 8 Priority Technologies for the industrial sectors;*
- *More than 80% of the Priority Technologies includes at least one KET;*
- *More than 50% of the Priority Technologies includes at least 3 KETs*

Finally, a reference to the level of expertise evidenced by a work of this type at a time when companies in a given country will have to organize to apply for R&D financing that will be released, by KET, giving priority to projects that propose to evidence, and benefit from, the cross-sectionality of the technologies to be researched.

As an example, we have enclosed the result of the work carried out for the Pharma & Bio industry.

5. Main tools of Community Policy

This brief chapter aims at organizing the information on the main policy tools of the European Union through which companies may apply for obtaining support, namely financial, for research and development of new technologies. Application for support is not excluded, under certain circumstances, and even for companies, for funding more basic research or closer to basic research.

This information becomes more relevant at this present time, when the European Union is starting a new financial programming cycle, with some considerable changes in its policies and support tools.

5.1. Horizon 2020

"Horizon 2020", "the EU Framework Programme for Research and Innovation" is the new and main financing tool for applied research and technological development. it will replace, for the next seven years, the former "7th Framework Programme", the short name usually given to the "Seventh Framework Programme for Research and Technological Development".

With a budget of approximately 90 billion Euros, for a period of seven years, it materializes, in terms of research and development, the growth strategy of the European Union for the next decades, known as "Europa 2020" – with five major goals, particularly in what matters here, Research and Development (R&D) and Climate Changes and Energy Sustainability (Climate and Energy). "Innovation Union" is one of the flagships of "Europa 2020", with "Horizon 2020" being its main tool. So, it comes as no surprise that it largely integrates the vision of technological development inspired by the KETs - Key Enabling Technologies, mentioned earlier.

"Horizon 2020" is divided into three large areas, being added in brackets the foreseen investment amounts, in billion Euros:

- Excellent Science (27.8)
- Industrial Leadership (20.2)
- Societal Challenges (35.8).

"The Innovative Technologies Enabling the Process of Re(New)Industrialization" will be financed by "Horizon 2020" basically through the Industrial Leadership and Societal Challenges areas.

LEIT - "Leadership in Enabling and Industrial Technologies" is the initiative that, in "Horizon 2020", materializes the vision of the KETs - Key Enabling Technologies, focusing on five major technological areas, in addition to a very specific area of the European policy, Space, also with a very high technological component:

- ICT - Information and Communication Technologies (at the position assigned by KETs to Micro/nanoelectronics and Photonics);
- Nanotechnologies;
- Advanced Materials;

- Biotechnology;
- Advanced Manufacturing and Processing;
- Space.

"Societal Challenges" operationalises the prosecution of the main goal expressed in the "Europa 2020" strategy linked to Climate Changes and Energy Sustainability, being divided into the following main areas (only the ones with greater technological intensity will be referred herein):

- Bioeconomy (including food security, sustainable agriculture and forestry, maritime and inland water research);
- Energy (secure, clean and efficient energy);
- Transport (smart, green and integrated transport);
- Climate action, resource efficiency and raw materials;
- Health, demographic changes and well-being (this includes areas that already exceed the simple technological area).

Most of these "Societal Challenges" is a field for application of LEIT - Leading Enabling Industrial Technologies identified earlier.

In line with the diagnosis stating that the main problem of the European Union, in terms of technological development, lies in the industrial application, more than in science and basic research, "Horizon 2020" states a concern for encompassing the entire innovation chain in a more integrated manner:

- Basic research;
- Applied research;
- Technological development, Prototyping and Demonstration (where the greatest advances have been evidenced within the scope of "Horizon 2020");
- Financing and Market (major concerns listed only by "Horizon 2020", being allocated to other entities and other European policy areas, particularly EIB - European Investment Bank and the European Commission's DG Enterprise and Industry).

Still in line with another major priority of the European policy, "Horizon 2020" refers an added concern with SME that must now allocate at least 15% of the available funds, including through the dedicated financing lines, in an exclusive manner.

A first integrated idea on the main available financing lines for the next two years, in the technological area that matters to us, can be obtained with the document "Draft Horizon 2020 Work Programme 2014-2015 – 5. Leadership in Enabling and Industrial Technologies" (European Commission, Brussels, 23.11.2013).

5.2. Structural Funds

With intervention within the scope of regional politics, from which only less developed regions and States can benefit, the Structural Funds are another source where "The

Innovative Technologies Enabling the Process of Re(New)Industrialization" may find financing.

The "Partnership Agreements" by which each benefiting Member-State governs the application of structural funds during the next programming cycle is now more conditioned to the implementation of a European strategy, namely "Europa 2020". All, with no exceptions, will be subjected to the completion of 57 "Investment priorities" through which 11 "Thematic goals" will be achieved – with investment complying with predefined proportions.

Without detailing the 57 "Investment priorities", it should be highlighted that the first seven of the 11 "Investment priorities" where financing opportunities can be found for research and development of "Innovative Technologies Enabling the Process of Re(New)Industrialization", and their application, namely through the SME innovation processes, are as follows:

- Reinforcing research, technological development and innovation;
- Improving access to information and communication technologies, as well as their use and quality;
- Reinforcing competitiveness of small and medium sized enterprises;
- Supporting the transition to an economy with low carbon emissions in all sectors;
- Promoting adaptation to climate changes and prevention and management of risks;
- Protecting the environment and promoting resources efficiency;
- Promoting sustainable transports and eliminating constraints in main infrastructure networks.

It seems obvious the benefit deriving from coordinating as much as possible, by the different stakeholders involved, the initiatives addressed to the financing lines implemented by "Horizon 2020" and the financing lines within the scope of the "Partnership Agreements" that will govern the application of the Structural Funds – where the purpose of a "Smart Specialization", with high technological intensity and regionally differentiated stands out.

It also seems obvious the benefit deriving from the highest possible coordination between the policies of the different regions involved, namely those that are closer (in a not necessarily particular or geographical proximity).

5.3. EIB and EIF

EIB - European Investment Bank has an additional role intervening only in the financing area (loans, guarantees and venture capital) but in an integrated manner, complying with the major priorities listed both in the strategy "Europa 2020" as in the lines of action of "Horizon 2020" and the Structural Funds.

The EIB intervention priorities are as follows, as defined in its Operational Plan:

- Small and Medium Sized Enterprises and Mid Caps;
- Regional Development;
- Environmental Sustainability, including both Climate Action and investment in the Urban and Natural Environment;
- Innovation;

- Trans-European Networks;
- Energy.

EIF - European Investment Fund is the EIB Group's specialist provider of risk finance to enhance SMEs access to finance. As mentioned earlier, the EIF's action is in line with the "Europa 2020" strategy, granting priority to objectives such as entrepreneurship, growth, innovation, research and development (and employment).

5.4. COSME 2014-2020

COSME is the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (SMEs) running from 2014 to 2020 with a planned budget of 2.3 billion Euros. Managed by the DG Enterprise and Industry, is stands in the position formerly occupied by CIP - Competitiveness and Innovation Framework Programme.

COSME will support SMEs in the following area

- Better access to finance for small and medium-sized enterprises;
- Access to markets;
- Supporting entrepreneurs;
- More favourable conditions for business creation and growth.

In terms of companies and investment in new technologies, COSME will facilitate and improve access to finance for SMEs through two different financial instruments, available from 2014: the Loan Guarantee Facility and the Equity Facility for Growth.

Concerning the Loan Guarantee Facility, COSME budget will fund guarantees and counter-guarantees for financial intermediaries (e.g. guarantee organisations, banks, leasing companies) to help them provide more loan and lease finance to SMEs. This facility will also include securitisation of SME debt finance portfolios. By sharing the risk, the COSME guarantees will allow the financial intermediaries to expand the range of SMEs they can finance.

Concerning the Equity Facility for Growth, COSME budget will be invested in funds that provide venture capital and mezzanine finance to expansion and growth-stage SMEs in particular those operating across borders. The fund managers will operate on a commercial basis, to ensure that investments are focused on SMEs with the greatest growth potential.

COSME, and the DR Enterprise and Industry, operate in terms of financing as an anteroom of EIB - European Investment Bank, open to more innovative and experimental actions.

In more commercial than financial terms, one cannot overlook the intervention capacity of DG Enterprise and Industry in approaching new external markets - seeming the only entity that, within the scope of the institutional architecture of the European Union is able to take this role (also referred in "Horizon 2020" but totally outside the intervention capacity of this programme).

5.5. PPPS and JTIS

Public-private partnerships (PPPs) are vehicles to implement technological roadmaps in particular areas and achieve leverage of private funding. They are implemented either through Joint Technology Initiatives (JTIs) or through dedicated calls for proposals and topics (contractual PPPs).

This area is currently under review, with the beginning of the new financial programming cycle. We have PPPs and JTIs, PPPs that will remain, with updating of their goals, and JTIs that are deemed as completed.

There are six contractual PPPs - Public-Private Partnership (subject to the signature of the corresponding contractual arrangements) hosted up to this moment by "Horizon 2020":

- Robotics;
- Photonics;
- Future Internet (Advanced 5G Network Infrastructures);
- Factories of the Future;
- Energy-efficient Buildings;
- Sustainable Process Industries (SPIRE).

The "Draft Horizon 2020 Work Programme 2014-2015 – 5. Leadership in Enabling and Industrial Technologies" (European Commission, Brussels, 23.11.2013) also refers actions related to, at least, two other PPPs:

- High Performance Computing, implemented under the excellent science part of "Horizon 202O";
- Green Vehicles.

JTI - Joint Technology Initiatives are long-term Public-Private Partnerships managed within dedicated structures based on Article 187 TFEU - Treaty on the Funding of the European Union ("The Union may set up joint undertakings or any other structure necessary for the efficient execution of Union research, technological development and demonstration programmes). JTIs support large-scale multinational research activities in areas of major interest to European industrial competitiveness and issues of high societal relevance and they are subject to the adoption of the corresponding Council regulations.

The LEIT - Leading Enabling Industrial Technologies part of "Horizon 2020" includes two JTIs:

- the Joint Technology Initiative on Electronic Components and Systems for European Leadership (ECSEL). It will replace the two existing Joint Undertakings on embedded computing systems (ARTEMIS) and nano-electronics (ENIAC), and it will also cover activities from the technology platform EPoSS (European technology Platform on Smart Systems integration).
- a new Joint Technology Initiative on Bio-based Industries.

There are, at least, three more JTIs, from the previous 7th Framework Programme that will remain active:

- Innovative Medicines Initiative (IMI);
- Aeronautics and Air Transportation (Clean Sky);
- Fuel Cells and Hydrogen (FCH).

5.6. EIT

We end this presentation with a reference to the EIT - European Institute of Innovation and Technology, under which the KICs - Knowledge and Innovation Communities were developed and through which "knowledge triangles" were tried to be implemented, which are expected to be virtuous, combining higher education, research and business).

Approved by the end of 2009, three KICs have been operating since 2010:

- Climate KIC;
- EIT ICT Labs;
- KIC Innoenergy (on sustainable energy).

Calls for two new KCIs are currently ongoing for approval in 2014:

- Innovation for healthy living and active ageing;
- Raw materials: sustainable exploration, extraction, processing, recycling and substitution.

6. Relevance of other factors in addition to Technology

The "Innovative Technologies" is the factor that will best and most contribute to the materialization of the Re(New)Industrialization goal for out three countries. But it is not the only factor.

In this chapter, we will focus on the relevance of Industrial Design and Designed-Based Consumer Products – which can also serve as support for re(new)industrialization of a group of sectors with large tradition in Italy, Portugal and Spain where SMEs have a significant weight.

6.1. The case of Industrial Design and the Designed-Based Consumer Products

The design-based consumer products have been becoming increasingly important, mainly in the most developed countries or in social classes with higher purchasing power in many developing countries. Due to their high levels of quality and differentiation, competition is not so much focused on price – thus an opportunity for the World regions with higher costs, as it is the case of Eurozone countries.

In an overview picture, final consumption is the largest component of the European economy, representing 56.4% of EU GDP. In this context, design-based consumer goods represent a large share, with annual turnover of approx. € 500 billion and economic value added of € 150 billion while employing some 5 million people in more than 500,000 companies across the EU-27.

Italy, Portugal and Spain have a long tradition in these sectors, in the three main stages: design and branding (with a leading position of Italy), production (with strong competences to deal with flexible production systems, aptitude to small-series production, namely in Portugal) and distribution (with examples like ZARA, in Spain).

6.2. PROsumer.net Initiative

The very important role played by these sectors in the European industry and economy, has justified several EU supported projects and initiatives, addressing research, innovation, standardisation, etc. The most important of these initiatives is PROsumer.Net - Networking of five European Technology Platforms addressing Design-based Consumer Goods Industries and Related Research.

PROsumer.NET has developed a project, aiming at developing an R&D roadmap to the design-based consumer goods industries, and consequently align further European funding with the real needs of these industries. This project also aims at contributing to more effective policy making concerning design-based consumer goods industries. In this sense, it targets to answer several key questions that can promote a better collaboration between relevant stakeholders:

industry, policy makers, and the scientific and technological organizations:

- How does the EU Commission support research and innovation in this field today and how could this be improved in the future?
- How can a joint research and technology roadmap support a more strategic development of these industries in Europe?
- How can a widespread adoption of disruptive business models and technologies change the face of the industry and alter the competitive dynamics prevailing today including a renaissance of high added value manufacturing of consumer goods in Europe"?

6.3. Opportunities to Further Develop this Line of Work in Italy, Portugal and Spain

The potential of the "Three COTEC Europe Countries" and their complementarities in this product area, as well as the characteristics of their productive systems, recommend that the work that has been being developed at European level should be replicated and deepened in these three countries. In fact, this possibility for further work has already been discussed among several potential partners.

In these consumer goods sectors, while design and functionality are key factors for success, several research and technology challenges are also essential drivers for business. As a result, four main strategic themes have been defined as cornerstone for technological research and development in such sectors:

- Advanced (multi)functionality of products for specific end applications and use scenarios;
- Intelligent manufacturing and the smart value chain;
- New design and product life cycle concepts;
- Consumer empowerment and advanced consumer interaction in the value creation process

Despite past effort and investment in technological R&D, it is commonly recognized that Europe needs to improve its efficiency when it comes to translate scientific knowledge into economic value and industrial leadership. The reasons for that current situation have been identified, and vary from the missing competences of projects' consortia, to inefficient dissemination and demonstration of project results, or lack of financial resources to cover the last mile in the innovation process and access to the market.

Consequently, actions can and should be taken to solve or minimize these challenges, starting by improving the dissemination and demonstration of project knowledge and results, leading to new exploitation opportunities and therefore enabling the creation of the anticipated economic value:

- Disseminate the available knowledge and its existing applications, namely via examples, case studies and demonstrators;

- Identify new opportunities for further exploitation and reutilization of R&D results, namely involving cross sectorial fertilization;
- Identify opportunities and partnerships to create new European demonstrators and pilot lines, namely both in lab settings, as well as embedded in (real) production environment.

As portrayed above, under the design-based consumer goods umbrella, numerous sectors are included along with their own diversity. However, as can be regarded, they also share many challenges and needs, many of them can be answered and satisfied by production technologies, as these play enabling and supporting roles to every manufacturing industrial sector, especially the consumer goods ones.

Moreover, the production technologies developers are frequently themselves inducers of new innovations in the user sectors due to their horizontal manufacturing knowledge. They should naturally be regarded as strategic partners not only during the R&D stages, but also during dissemination, demonstration, and exploitation in order to improve these activities' effectiveness and outcomes.

The development and integration of new materials, innovative business models and consumer integration (co-creation, etc.) and interaction are just some complementary examples of areas with a strong horizontal interest and impact.

It is also relevant to refer the existence of cluster initiatives at national and regional level, several of them part of or aligned with the related European Platforms, thus with a potential to create a strong operation network for implementation.

7. REFERENCES

AIRI - Associazione Italiana per la Ricerca Industriale, "Key Enabling Technologies: Their Role in the Priority Technologies for the Italian Industry", working document, 1st edition, April 2013.

Doris Schrocker, DG Research and Innovation, Directorate Industrial Technologies, "Key Enabling Technologies and European RDI Policy and Instruments", EuroNanoForum, 20 June 2013, Dublin.

E-MRS, The European Materials Research Society, "Materials for Key Enabling Technologies", Strasbourg, April, 2011.

Eduardo Maldonado, "Horizon 2020 (2014-2020) – Desafios e Oportunidades para a Comunidade Nacional de I&D&I", GPPQ – Gabinete de Promoção do 7.º Programa-Quadro de I&DT, Lisbon, 2012.

Els Van de Velde (IDEA), Christian Rammer (ZEW), Pierre Padilla (IDEA), Paula Schliessler (ZEW), Olga Slivko (ZEW), Birgit Gehrke (NIW - Niedersächsisches Institut für Wirtschaftsforschung, Hannover), Valentijn Bilsen (IDEA) and Ruslan Luckach (IDEA), " Exchange of Good Policy Practices Promoting the Industrial Uptake and Deployment of Key Enabling Technologies", report prepared in 2011-2012 for the European Commission, DG Enterprise and Industry by IDEA Consult, Brussels, Belgium, ZEW - Center for European Economic Research, Mannheim, Germany, and WIFO - Austrian Institute of Economic Research, Vienna, Austria.

Els Van de Velde (IDEA), Christian Rammer (ZEW), Marcel de Heide (TNO), Fabien Pinaud (CEA), Arnold Verbeek (IDEA), Birgit Gehrke (NIW - Niedersächsisches Institut für Wirtschaftsforschung, Hannover), Kristof Mertens (IDEA), Pieterjan Debergh (IDEA), Paula Schliessler (ZEW), Frans van der Zee (TNO), Maurits Butter (TNO), "Feasibility Study for an EU Monitoring Mechanism on Key Enabling Technolgies", report prepared in 2011-2012 for the European Commission, DG Enterprise and Industry by IDEA Consult, Brussels, Belgium, ZEW - Center for European Economic Research, Mannheim, Germany, TNO, Delft, Netherlands, and CEA, Grenoble, France.

European Commission, Brussels, 30.09.2009 COM (2009) 512 Final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "Preparing for Our Future: Developing a Common Strategy for Key Enabling Technologies in the EU".

European Commission, Brussels, 30.09.2009 SEC (2009) 1257 Final, "Current Situation of Key Enabling Technologies in Europe", Commission Staff Working Document accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "Preparing for Our Future: Developing a Common Strategy for Key Enabling Technologies in the EU".

European Commission, "High-Level Expert Group on Key Enabling Technologies, Final Report", June 2011.

European Commission, Directorate-Generale Research and Innovation, “Horizon 2020 - The EU Framework Programme for Research and Innovation 2014-2020”, June 2011.

European Commission, Brussels, 30.11.2011 COM (2011) 808 Final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, “Horizon 2020 - The Framework Programme for Research and Innovation”.

European Commission, Brussels, 26.06.2012 COM (2012) 341 Final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, “A European Strategy for Key Enabling Technologies – A Bridge to Growth and Jobs”.

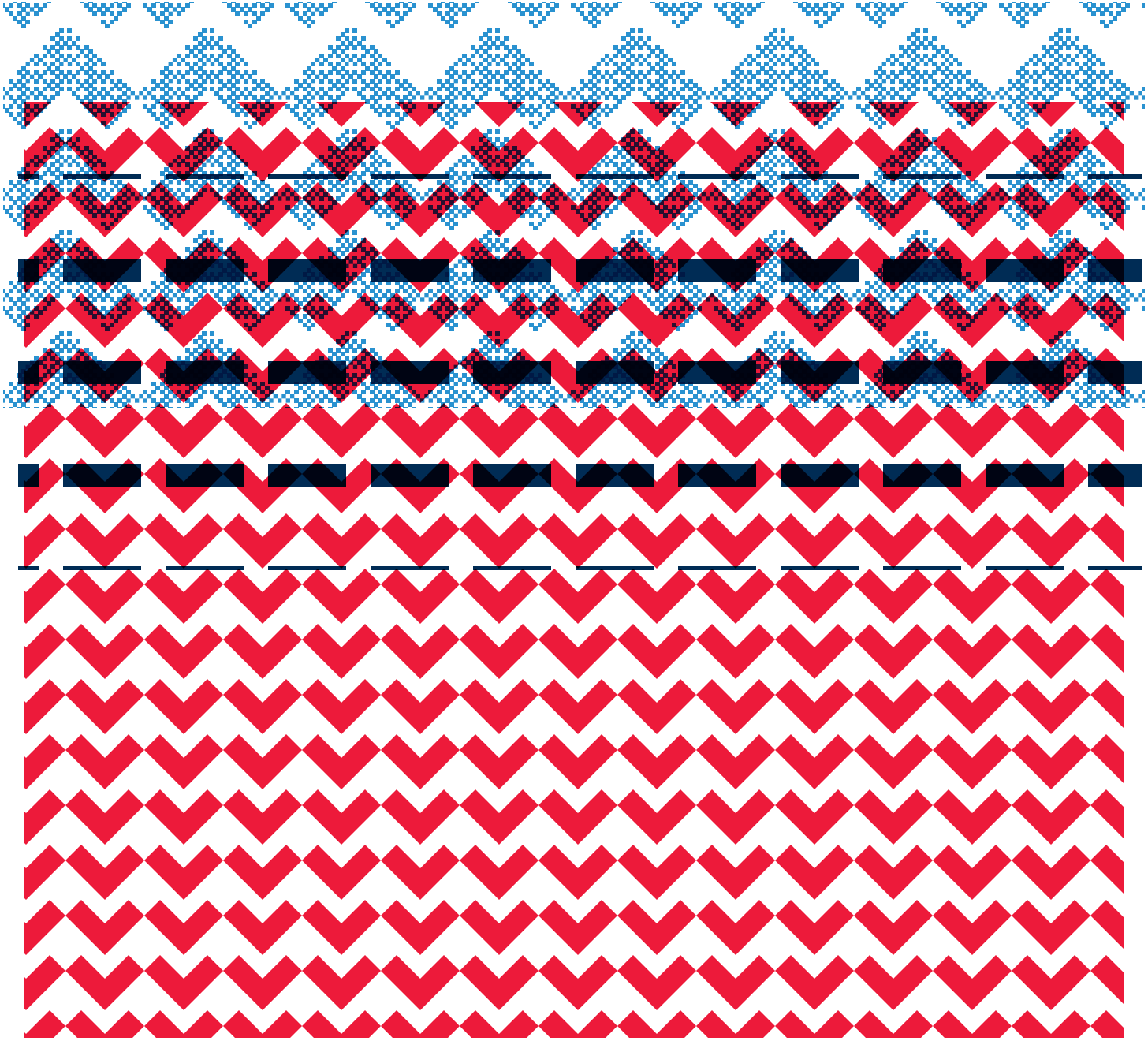
European Commission, Brussels, 23.11.2013, “Draft Horizon 2020 Work Programme 2014-2015 – 5. Leadership in Enabling and Industrial Technologies”.

Gianluigi Di Bello, FP7 National Contact Point R&I Regional Dimension-APRE, in collaboration with Ezio Andreta, President-APRE, “’Industrial Competitiveness’ in Horizon 2020: ‘Towards an Intehrated Planning Framework for Key Enabling Technologies’”, APRE - Agency for the Promotion of European Research, January 2013.

PROSUMER’NET, “The Joint Research Roadmap”, final outcome of the PROsumer.NET Market/Innovation Trends and Technology Foresight activities serving as outlook on research and technology development priorities in the design-based consumer goods sector up to 2020, May 2013.

Rudolf Strohmeier, Deputy Director-General DG Research and Innovation, and Zoran Stancic, Deputy Director-General DG Information Society and Media, “Enabling and Industrial Technologies in Horizon 2020 – The Framework Programme for Research and Innovation”, European Commission.

Pharma and biotechnology	Nanotech	Micro-nano	Biotech	Photonics	Advanced Materials	AMS
1. Genomics, proteomics and metabolomics	x	x	x			x
Molecular biology technologies and their application in diagnosis and therapy (e.g DNA microarrays and Protein arrays)	x	x	x			
2. Technologies for pharmaceutical chemistry	x	x				
High Throughput Screening (HTS) and High Content Screening (HCS) technologies	x	x				
3. Personalized medicine – biomarkers			x			
Predictive biomarkers			x			
Surrogate endpoint			x			
4. Delivery Systems	x	x			x	
New nanomaterials development	x	x			x	
Novel nanosystems for selected targeted delivery	x	x			x	
5. Biomolecular production			x			
6. Technologies and methods for the Molecular Imaging	x	x		x		
7. Minimally invasive technologies	x	x	x	x	x	x
New materials for orthopedics	x	x	x	x	x	x
New materials for cardiovascular diseases	x	x	x	x	x	x
Transcatheter Aortic Valve Implant (TAVI) and other artificial heart valve technologies	x	x	x	x	x	x
8. Advanced therapies technologies			x			
Tissue engineering and cellular therapy			x			
Gene therapy			x			



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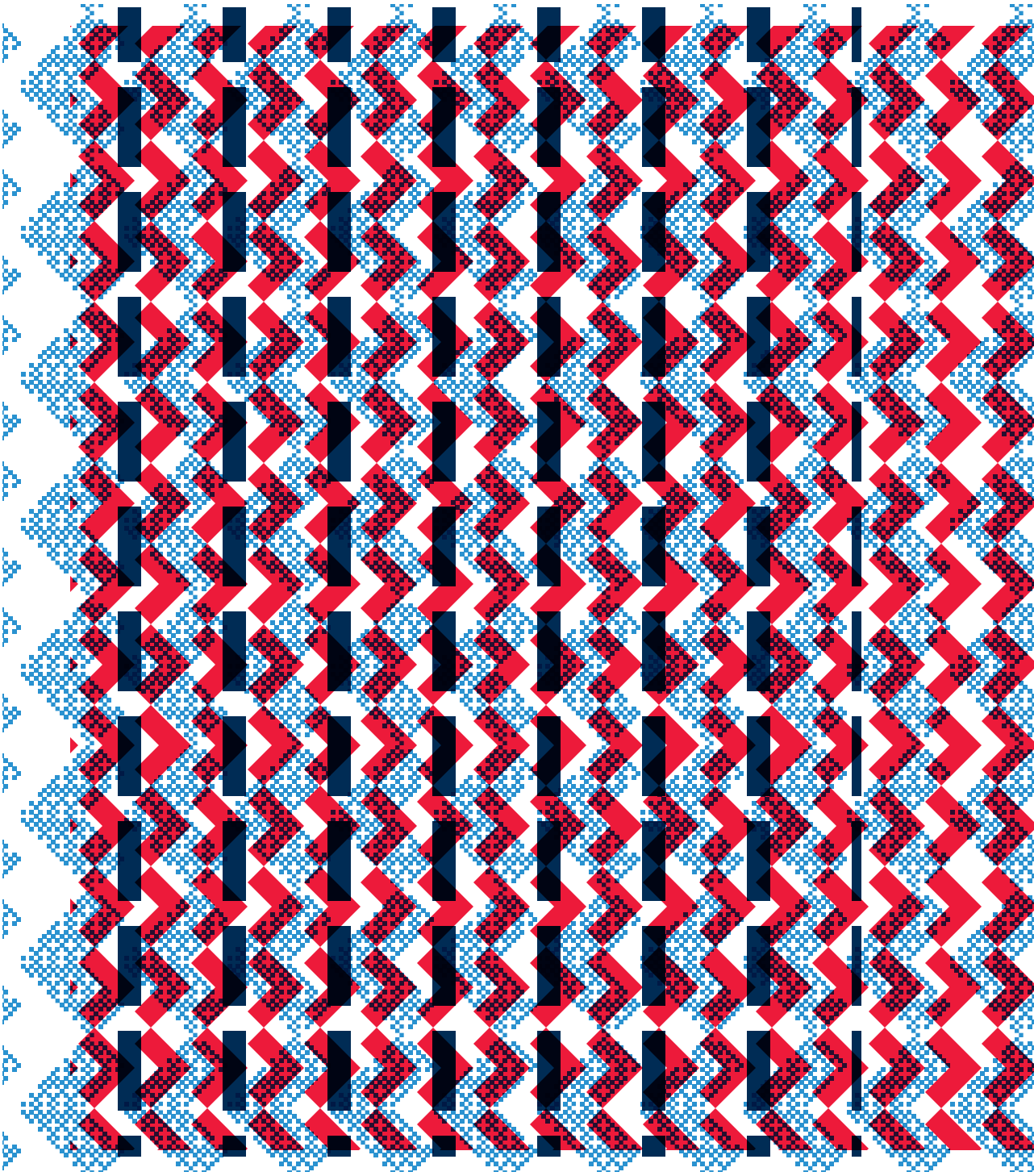

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