

# COTEC Portugal Industry 4.0 Programme



# 01.

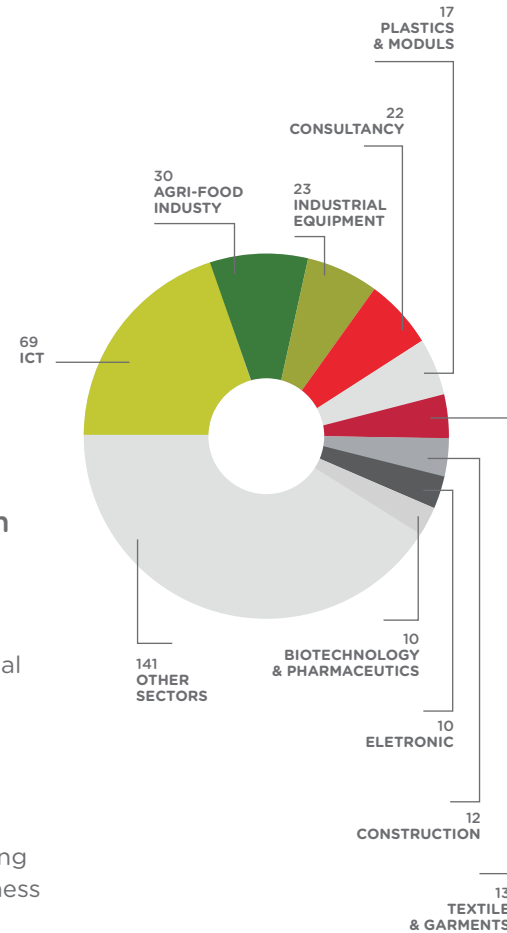
## Introduction to COTEC

COTEC Portugal is a leading innovation broker focused on accelerating innovation processes, business cooperation and advancing technology diffusion.

A private association that encompasses multinational companies, major national corporations and SMEs, operating in most sectors of activity, it represents more than 16% of national GDP and 8% of private employment.

Its main activities include **Anticipating** and discussing issues on innovation trends with an impact on business competitiveness, **Activating** business networks and partnerships and, **Advocating** public policy improvements on innovation issues.

In 2017, the Portuguese Government signed a protocol with COTEC to monitor and supervise the national **Industry 4.0 Programme**. This public-private partnership has been signalled as a good practice for its bottom-up approach by the European Commission.



COTEC has been a pioneer in the development of a structured approach to innovation management through an array of free online tools, including:



Online tool that allows national organizations to self-diagnose their innovation capabilities and performance.

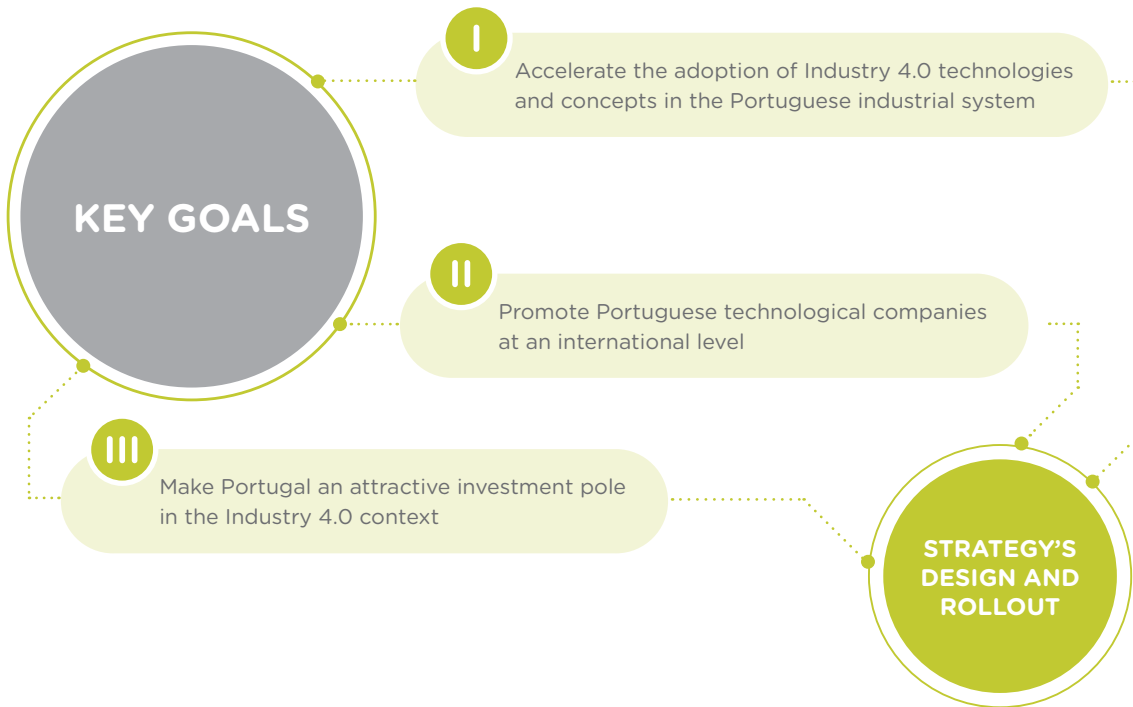
Since its launch, the first Innovation Scoring platform has been systematically used by more than 700 companies in Portugal, to assess their innovation performance and access a range of advantages offered by COTEC. Almost a decade later, in 2017, a study was conducted to evaluate the Innovation Scoring® 1.0 model, which would support the design of the new generation of Innovation Scoring® (Innovation Scoring® 2.0).

# 02.

## Industry 4.0 Programme

### PHASE I (2017-2019)

Portugal's Programme "Indústria 4.0" aims to identify Portuguese's industry needs in the i4.0 context and guide actions (public and private) to foster its acceleration.



Online tool that allows companies to map their needs in digital innovation processes and support the definition of actions to reach envisioned digital maturity levels.

The development of the underlying digital maturity assessment model involved data collected by survey from 300 companies from various sectors and dimensions, drawn from a universe of 30 thousand companies. NOVA University supported in the development of the model.



Online maturity analysis and certification tool that enables companies to create roadmaps for adoption of standards, an essential condition for integration in digital platforms.

The development of the underlying certification and normalization maturity model was based on a survey of a sample of 219 companies (drawn from a universe of 300 thousand national companies) in 2018 and 2019. NOVA University supported in the development of the model.



## Phase I – COTEC Portugal Initiatives

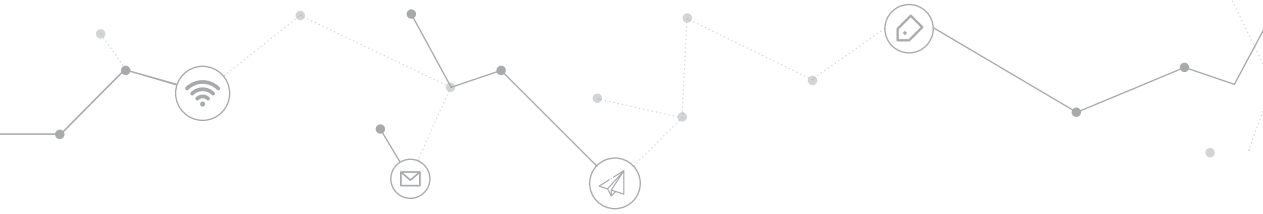
### I. HUMAN RESOURCES DEVELOPMENT



PROJECTS AND INITIATIVES	RESULTS AND OUTPUTS	PARTNERS
<p><b>WORKING GROUP   WORK 4.0</b></p> <p>Discussion of the main implications of economy's digitalization on the labour market, focusing on aspects such as the interaction between people and intelligent machines, and demographic and cultural changes</p>	<p><i>Work 4.0 - Hypothesis towards a new modernity Report</i></p> <p>Summarizes the research carried out by COTEC Portugal on human / machine interaction</p>	
<p><b>EVENT   WORK 4.0: RETHINKING THE HUMAN-TECHNOLOGY ALLIANCE</b></p> <p>Discussion of the challenges, risks and opportunities of the labour market inherent to the transition in a context of new forms of collaboration and connections between people and intelligent machines</p>	<p><i>Work 4.0 - Rethinking the Human-Technology Alliance synthetic report</i></p> <p>Systematizes COTEC's contributions from three countries: Italy, Portugal and Spain and presents conclusions on how to accelerate the transition to a work 4.0 era</p>	<p>Representatives from the academic, social and political spheres</p>
<p><b>EVENT   8TH SME INNOVATION CONFERENCE: "TO KNOW, TO DO, KNOW-HOW - THE NEW SKILLS, JOB TRANSITION AND THE WORKPLACE OF THE FUTURE"</b></p> <p>Discussion of the impact of digital technologies and automation on job profiles and the role of education and training institutions in preparing skills for a market characterized by increasing competitiveness, scarcity and demands</p>	<p>Event organised in Alcobaca before an audience of more than 350 business leaders, members of the Academy and public decision-makers</p>	

II. COLLABORATIVE ECOSYSTEM

III. AND I4.0 START-UP



PROJECTS AND INITIATIVES

RESULTS AND OUTPUTS

PARTNERS

OPEN SHOP FLOOR SESSIONS

Demonstration of how companies can adopt the different i4.0 concepts and promote the experiences' sharing among the several parties involved in the value chain

Organization of 9 sessions since 2018



EVENT | 15TH NATIONAL INNOVATION MEETING "THRIVING IN THE PERFECT STORM"

Discussion of how to manage the present and create the future, move from 3.0 to 4.0 to explore new advantages of data and automation platforms, manage and lead organizations, and recombine business experience with new knowledge.



- ▶ Event held in Évora in partnership with Embraer, with around 400 guests
- ▶ Draft of the report "A new architecture of business innovation in Portugal", in collaboration with EY



EVENT | CONFERENCE "RE-DESIGN FOR PERFORMANCE"

Learning about the transition from the classic industrial model to a 'Performance Economy', using cases illustrated by the practice of companies and specialists.



- ▶ International partnership with the Solar Impulse Foundation under the 1000 Efficient Solutions initiative
- ▶ Creation of a Design for Performance working group which seeks solutions for an industrial design functionality-oriented, performance and longevity of "smart" products



EUROPEAN INDUSTRIAL EXCELLENCE AWARD

Identification and dissemination of industrial processes and management of excellence in industrial value chains, with expressive and demonstrable results and significant impact on the competitiveness of companies



- ▶ Projecting on the European stage the image of the Portuguese industrial management
- ▶ Strengthening the link to reputable international universities of management



EVENT | 16TH NATIONAL INNOVATION SUMMIT "LEADING 4.0: HIGHWAY TO MANUFACTURE VALUE WITH PEOPLE AND INTELLIGENT MACHINES"

Learning the latest trends in I4.0 and how to take advantage of its potential to leverage business and the economy.



Conference held at Vila Nova de Famalicão with international speakers before a registered audience of more than 650 business leaders and managers



IV. FINANCING/

INVESTMENT



PROJECTS AND INITIATIVES

WORKING GROUP | EIB / COTEC PROTOCOL

Identification of financing solutions to facilitate the implementation of digitisation processes in Portuguese SMEs

RESULTS AND OUTPUTS

- ▶ Study of good practices and cross-country comparative analysis of programs to support SME digitisation processes
- ▶ “The Digitalisation of small and medium-sized enterprises in Portugal: models for financing digital projects” - a joint project of the European Investment Bank and COTEC, which aimed to assess the current status of business digitalisation in Portugal, identifying barriers and suggesting targeted solutions
- ▶ Proposal of financing instruments to support the digitisation of SMEs, accompanied by soft complementary measures, validated by the business community, public actors and other national stakeholders

PARTNERS



V. INTERNATIONALISATION



PROJECTS AND INITIATIVES

EVENT | HANNOVER MESSE

Provide visibility to national innovation capacity and identify opportunities for transnational collaboration



RESULTS AND OUTPUTS

- PARTICIPATION IN THE 2018 & 2019 EDITIONS
- ▶ 100 m<sup>2</sup> institutional hub to showcase Portuguese innovation competences.
  - ▶ 25 COTEC networking events and pitch sessions (on-site) Access to 6500 exhibitions and more than 210.000 visitors.
  - ▶ More than 1.000 direct contacts made.


PARTNERS



VI. LEGAL AND REGULATORY

ADAPTATION



PROJECTS AND INITIATIVES	RESULTS AND OUTPUTS	PARTNERS
<p><b>WORKING GROUP   NORMALIZATION</b></p> <p>Discussion on the adoption of standards and the assessment of business standardization to ensure that Portuguese companies are standardized in line with European peers.</p>	<ul style="list-style-type: none"> <li>▶ Online tool to measure the level of management processes, standards knowledge and certification.</li> <li>▶ Report “Adoption of a certification system and business competitiveness”</li> </ul>	
<p><b>EVENT   CONFERENCE “INNOVATION MEETS CYBERSECURITY”</b></p> <p>Discussion and sharing experiences on how to combine innovation and resilience in an increasingly digital world.</p> 	<ul style="list-style-type: none"> <li>▶ Conference in November of 2017 with international speakers and institutional representatives</li> <li>▶ Debate focused on the compatibility between business innovation, business risk management</li> </ul>	
<p><b>WORKING GROUP   INNOVATION MEETS CYBERSECURITY</b></p> <p>Raising awareness and mobilizing companies for the compatibility between growth, business risk management strategies and technological innovation.</p>	<ul style="list-style-type: none"> <li>▶ Members’ Participation in the National Exercise of Cybersecurity</li> <li>▶ Digital maturity model development, combining innovation and connectivity with risk management</li> </ul>	

TRANSVERSAL TO THE I4.0 PROGRAMME'S AXES



PROJECTS AND INITIATIVES

**WORKING GROUP | CONNECTED HEALTHCARE**

Identification of the impact of digitisation on the ecosystem of health care delivery

**WORKING GROUP | CONSTRUCTION DIGITISATION - BUILDING INFORMATION MODEL ("BIM")**

Identification of BIM application opportunities in the construction value chain / Identify case studies of the use of BIM

**EVENT | CONFERENCE "CONSTRUCTION 4.0: FROM THE DESIGNER TO THE BUILDER AND TO THE JURIST"**

Mobilization for an integrated and coordinated approach

**I4.0 SCOREBOARD**



RESULTS AND OUTPUTS

Report "Connected Healthcare - Impact Analysis". Report grouping the aggregate impact of digitisation on the health care ecosystem, taking as a starting point case studies shared by the members of the working group.

Report "BIM and the Digitalisation of construction and infrastructures"

- ▶ Legal implications of using the BIM methodology
- ▶ Identification of areas and recommendations for the improvement of the legal framework for the application of BIM in the public and private sector

Measuring the basic conditions and competitiveness of national SMEs in the context of industry 4.0, enabling the:

- ▶ Characterization of the reality and monitoring of Portugal's evolution at the industry 4.0 level
- ▶ Comparison with European peers' positioning
- ▶ Identification of areas for improvement, supporting the design of appropriate strategies and measures by business leaders and policy makers
- ▶ Translation of the digitalisation in its impacts to the economy and society (at a macro level) in terms of economic growth and increased competitiveness

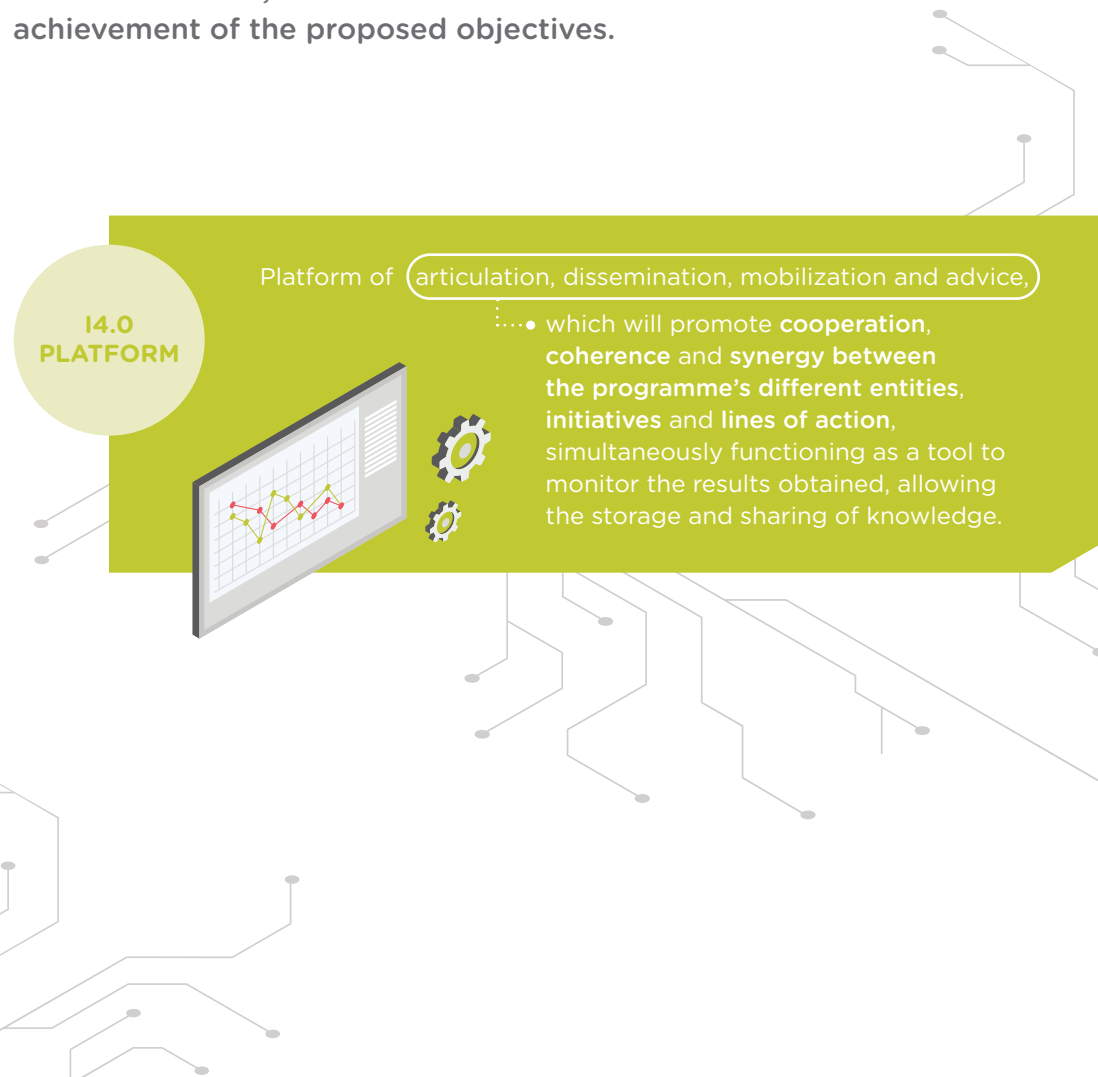
PARTNERS





## Programme Governance

The coordination and supervision of i4.0 Programme's implementation is supported by the i4.0 Platform, which aims to ensure the achievement of the proposed objectives.



## OBJECTIVES

The Platform's development is settled on a set of objectives, oriented according to 3 different purposes:

### EXTERNAL

Promotion and dissemination of trends and initiatives of the 4.0 Industry and of the activity developed in the platform

- › **Promotion** of the concepts and opportunities of the 4.0 Industry, placing digital transformation in the agenda of the economy and society in general
- › Construction of relevant **knowledge repository** and information sharing with all agents
- › **Promotion of cooperation** between the agents involved and guarantee of articulation between the different measures and working groups
- › **Articulation** of the Portugal i4.0 program with similar initiatives and structures at European and world level
- › **Monitoring and evaluation** of proposed and implemented initiatives' effectiveness
- › **Promotion** at an international level of Portugal i4.0

### INTERNAL

Intrinsic to platform operation

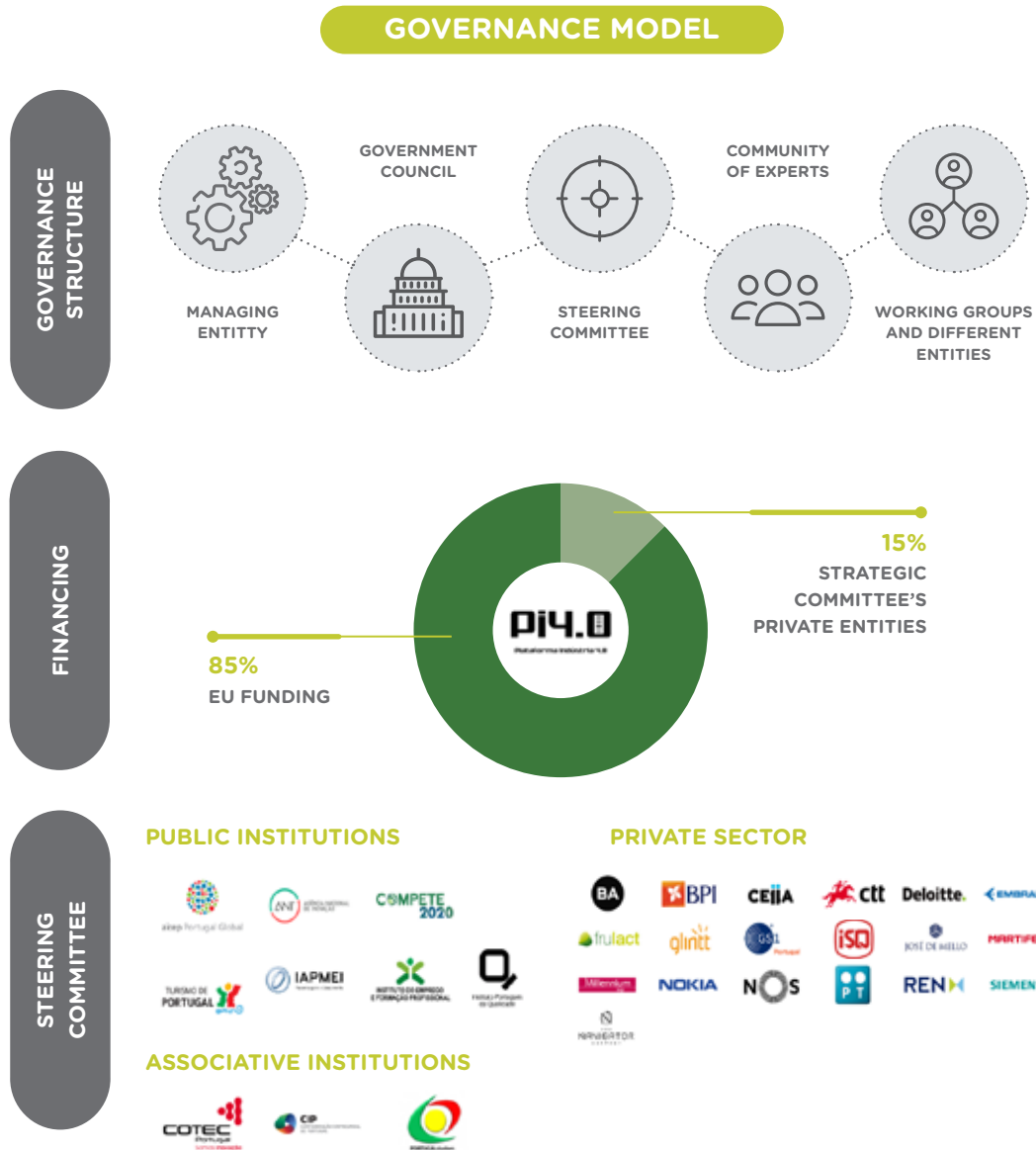
- › **Operational management of i4.0 Platform**, ensuring the operation of the established governance model

### FUTURE GUIDANCE

To ensure i4.0 strategy's continuity

- › **Creation of working groups** in line with the objectives of the program
- › **Development of new measures** in line with the objectives of the program

The Programme's governance model aims to ensure the articulation and integration of efforts and resilience in the face of political cycles.



The governance structures' actions are guided by its internal functioning model and a set of associated responsibilities.



## Examples of Portugal-led R&D and Innovation Projects



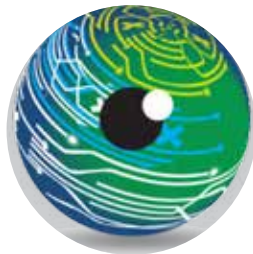
### ACTICIPATE



*“Action understanding in human and robot dyadic interaction”*

**ACTICIPATE** addresses the challenge of designing robots that can share workspaces and co-work with humans. In ACTICIPATE, three capabilities are built in robot design: a motion generation mechanism, with a built-in capacity for instant reaction to changes in dynamic environments; a framework to execute coordinated movements of head, eyes, arm and hand, in a way similar (thus predictable) to human movements, and model the action/movement coupling between co-workers in dyadic interaction tasks; and the ability to understand and anticipate human actions, based on a common motor system/model that is also used to synthesize the robot’s goal-directed actions in a natural way.

### EOT



*“Eyes of Things”*

**Vision, our richest sensor, allows inferring big data from reality.** Arguably, to be “smart everywhere” we will need to have “eyes everywhere”. The **“Eyes of Things”** project builds an optimized core vision platform that can work independently and also embedded into all types of artefacts. A ground-breaking platform was developed that combines: **a)** a need for more intelligence in future embedded systems, **b)** computer vision moving rapidly beyond academic research and factory automation and **c)** the phenomenal technological advances in mobile processing power.

HIJIFFY



*“Connecting guests to hotels through Messaging Apps”*

**HiJiffy** provides hotels an automatized service where consumers access an hotel’s Facebook Messenger to check prices and availability. Then they are able to complete all booking process within Messenger. HiJiffy then offers mobile check-in and check-out. While at the property, the solution provides a medium to request services, be informed of daily events taking place in the building or seek advice to sightsee the city by texting the hotel at their preferred messaging app. All of this is possible by using artificial intelligence and machine learning to help guests book their stays in a quicker way.

IN.NAV



*“Advanced Intra-Operative Navigation in Arthroscopy Surgery”*

**in.nav** software technology is applied for arthroscopic procedures of the knee and hip, providing the first effective solution for Computer-Assisted Orthopedic Surgery (CAOS) in arthroscopy. Software applications are developed for aiding the surgeon throughout the procedures of ACL reconstruction (nav4ACL) and FAI resection (nav4FAI).

OPTIMUM



*“Multi-source Big Data Fusion Driven Proactivity for Intelligent Mobility”*

**OPTIMUM** vision is to provide the required interoperability, adaptability and dynamicity in modern transport systems for a proactive and problem-free transportation system. OPTIMUM establishes a largely scalable, distributed architecture for the management and processing of multisource big-data, enabling continuous monitoring of transportation systems needs and proposing proactive decisions and actions in an (semi-) automatic way.

Z-FACTOR



*“Zero-defect manufacturing strategies towards on-line production management for European factories”*

The **Z-Factor** consortium conducted an extensive state-of-the-art research and realised that there is a vast business opportunity for innovative, high-ROI solutions to ensure higher productivity in the European manufacturing industries. The Z-Factor solution comprises the introduction of five (5) multi-stage production-based strategies targeting (i) the early detection of the defect (Z-DETECT), (ii) the prediction of the defect generation (Z-PREDICT), (iii) the prevention of defect generation by recalibrating the production line (multi-stage), as well as defect propagation in later stages of the production (Z-PREVENT), (iv) the reworking/ remanufacturing of the product, if this is possible, using additive and subtractive manufacturing techniques (Z-REPAIR) and (v) the management of the aforementioned strategies through event modelling, KPI (key performance indicators) monitoring and real-time decision support (Z-MANAGE).

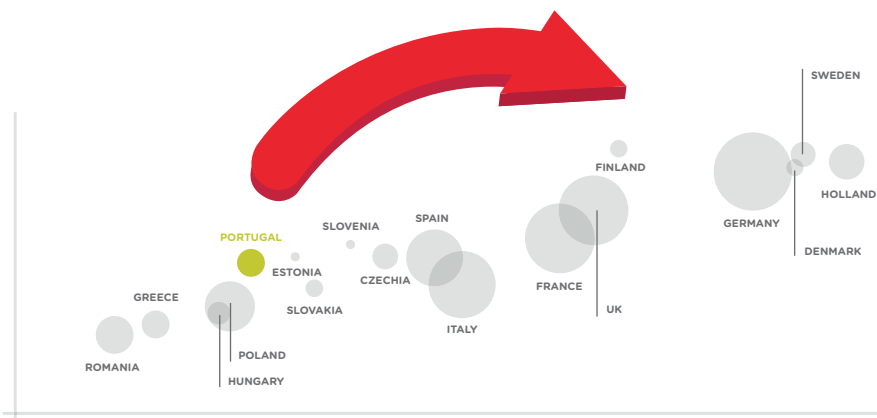
# 03.

## Industry 4.0 Programme PHASE II (2020-2021)

The objective of Phase II of the Programme is to boost and generalise economic growth through digitalisation.

In the context of the I4.0 Scoreboard, achieving this goal means that Portugal should modernise, reinforce and increase its businesses, workforce and related ecosystem's competitiveness, reflected in macroeconomic benefits that amount to a GDP annual increase of 1,8%.

To this end, it shall be necessary to reach and involve over 20.000 businesses operating in Portugal, re-skill and up-skill over 200.000 workers, addressing a challenge of a workforce that is still lagging behind as far as digital skills are concerned, and finance up to 350 transformative projects.



Stimulating social and economic growth through massive digital transformation of businesses requires an inclusive approach, underpinned in multiple public and private entities, focused on three guiding lines:

01

### GENERALIZING I4.0

Boost knowledge, experiences and benefits sharing as a way to stimulate massive transitioning to I4.0.

**Examples of actions**

- Dissemination of self-diagnosis tools of digital maturity
- Reinforcement of Open days I4.0 Programme.

**MILESTONE**

Reach and involve 20.000 companies in Portugal

**MILESTONE**

Retrain and reskill 200.000 workers

### CAPACITY BUILDING I4.0

Adapt workers knowledge to allow companies a I4.0 soft landing, ensuring it is done in an inclusive manner and based workforce.

**Examples of actions**

- Action-Training Programme
- Learning Factories development

02

**MILESTONE**

Fund up to 350 transformative projects

03

### ASSIMILATING I4.0

Promote, facilitate and fund business access to I4.0 methods and technologies experimentation, as well as leveraging their scale-up and transformation.

**Examples of actions**

- DIH network development
- Incentive schemes for business R&D
- Credit line "Capitalise - Industry 4.0. Support to Digitisation"
- "Industry 4.0" vouchers

24

25

## THE 3 GUIDING LINES WILL BE DELIVERED THROUGH THE FOLLOWING 11 ACCELERATING INITIATIVES

01

### Digital Maturity Appraisals

Promote self-diagnosis of digital maturity and support roadmap definition for I4.0 transformation

02

### Experience I4.0

Share and disseminate knowledge generated from experimentation and delivery of I4.0 technologies and practices

03

### Innovation Stimulus

Trigger in university students of scientific and business areas technological and industrial based entrepreneurship

04

### Digital and sectorial training

Deliver sectorial training plans to SME managers and technicians in I4.0 relevant skills

05

### Learning Factories

Make available training schemes oriented to the specific needs and in compatible formats with everyday issues of SMEs

06

### Experimentation and Learning

Develop a balanced and collaborative national network of Digital Innovation Hubs that act as I4.0 one-stop-shops for SMEs

07

### Digital Linkages

Foster digitisation and value chain integration of suppliers and partners of big companies and leading SMEs in I4.0, as well as the relation Start-up and Corporate

08

### I4.0 Coaching

Underpin the integration of technological investment, build capacity in the organisations and facilitate organisational transformation

09

### Risk and Innovation Management

Develop a supporting infrastructure to cybersecurity challenges in SMEs

10

### Access to Funding

Disseminate and facilitate access to investment and funding instruments and mechanisms designed for I4.0 projects.

11

### Funding and Transformation

Create and adapt funding and support lines to the typology and diversity of I4.0 projects, to incentivise scaling-up and digital transformation

## INVOLVED ORGANISATIONS





#### HEADQUARTERS

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