Factories of the Future

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The Italian Flagship Initiative

Springer Open

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ISBN 978-3-319-94357-2 ISBN 978-3-319-94358-9 (eBook)
https://doi.org/10.1007/978-3-319-94358-9

Library of Congress Control Number: 2018960237

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Manufacturing plays a key role both in advanced economies and developing countries because of the large contribution to the overall employment, value added, gross domestic product (GDP) and social welfare. Manufacturing is also a pillar for the tertiary sector, since manufacturing activities generate the need for services and in turn manufacturing provides products and technologies for the operation of the service sector. Furthermore, manufacturing is fundamental to guarantee national independence and security and to design the future of our societies. Continuously evolving grand challenges compel the manufacturing sector to innovate its processes, technologies and business models to continue sustaining the national economies and progress.

This book presents the philosophy and the findings of the Italian Flagship Project *Factories of the Future* (*La fabbrica del futuro 2012–2018*). This flagship project was a major national research program promoted by the Italian Ministry of University, Innovation and Research (MIUR) and coordinated by the National Research Council of Italy (CNR) to innovate the manufacturing sector and address global challenges. Starting from an analysis of research policies, Chap. 1 outlines the main ongoing research programs and initiatives both at international and Italian level. Among these initiatives, the Italian Flagship Project *Factories of the Future* is presented in details. The roadmap for research and innovation implemented by the flagship project is based on five research priorities that can be seen as different views of the same factory of the future: *Evolutionary and Reconfigurable Factory*, *Sustainable Factory*, *Factory for the People*, *Factory for Customised and Personalised Products*, *Advanced-Performance Factory*.

On the basis of the five research priorities, the flagship project funded 18 research projects and 14 demonstrators. The findings of the specific scientific and technological research projects and demonstrators are reported in Chaps. 2–19.

Chapter 20 proposes seven future *missions* resulting from the flagship project that can be set ahead for the manufacturing industry. Missions are of vital importance to guarantee the evolution of our societies by means of new systemic solutions. Missions will also foster the important role of manufacturing as a backbone for the employment and wealth of our national and European economies. Indeed

missions such as *Circular Economy*, *Rapid and Sustainable Industrialisation*, *Robotic Assistant*, *Factories for Personalised Medicine*, *Internet of Actions*, *Factories close to the People*, and *Turning Ideas into Products* will have a relevant societal impact and at the same time will require to address significant scientific and technological challenges which will be particularly important in view of the next strategic initiatives at national and European level, including *Horizon Europe*. Moreover, the demonstration and exploitation of results related to missions require proper research infrastructures. Therefore, Chap. 21 analyzes and gives examples of different types of pilot plant together with a discussion about funding mechanisms needed to support industrial research and make pilot plants sustainable.

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Acknowledgements

The Director of the Italian Flagship Project *Factories of the Future* (*La fabbrica del futuro*) gratefully thanks Prof. Francesco Jovane for his visionary approach to manufacturing research that triggered the launch of the flagship project Factories of the Future in the context of the National Research Plan (PNR 2011–2013). Many thanks also to Prof. Quirico Semeraro and Prof. Vincenzo Nicolò for the scientific supervision and guidance of the activities of the two main streams of the flagship project. A special appreciation goes to Dott.ssa Federica Rossi, Vice-director of the flagship project. Finally, warm thanks to the present and past members of the Implementation Support Group (ISG) of the Flagship Project *Factories of the Future*: Walter Terkaj, Giacomo Copani, Eleonora Schiariti, Emanuela Alfieri, Daniele Dalmiglio, Davide Ceresa, and Anna Valente.

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