

How to face the scientific communication today

International challenge and digital technology impact on research outputs dissemination

edited by

Marco Medici

Valentina Modugno

Alessandro Pracucci

dottorato di ricerca

tecnologie dell'architettura



Financed design research made by Universities: some considerations about the protection of results

GIUSEPPE MINCOLELLI

Associate Professor

Department of Architecture, University of Ferrara

Ferrara, Italy

Abstract

The gradual decrease of the public funding of research, is counterbalanced by an increasing interest by part of the politic power to foster collaboration between universities and industry for development of competitive innovation. In the United States the Bayh–Dole Act of 1980 allowed university patenting, by granting ownership and copyrights of inventions to universities and changing the way public organizations conceive the applied research. The patent has become an increasingly significant indicator of scientific productivity, and seems to be able to grant the kind of protection required by the Industry to cooperate with the University in funding research aimed to innovation. Through an analysis of literature concerning this scenario, the author provides some reflections about the protection of the result of a specific kind of applied research: the Design Research.

Keywords

Financed research, Design research, Public research, Patenting

According to L. B. Archer, a British theorist of design studies and methods, when we discuss research, we are referring to a systematic enquiry that is directed to achieve a goal that is to develop or build knowledge that is communicable. And the reasons for this statement are the following:

- “
- *Systematic, because its pursued according to some plan;*
 - *An enquiry, because it seeks to find answers to questions;*
 - *Goal-oriented, because the objects of the enquiry are posed by the task description;*
 - *Knowledge-oriented, because the findings of the enquiry must go beyond providing mere information;*
 - *And Communicable because the findings must be intelligible too, and located within some framework of understanding for an appropriate audience”¹*

Research has been pursued in different fields, methods and approaches during human history, that Archer summarizes as follows:

- “
- *Fundamental Research: Systematic enquiry directed towards the acquisition of new knowledge, without any particular useful application in view.*
 - *Strategic Research: Systematic enquiry calculated to fill gaps in Fundamental Research and/or to narrow the gap between Fundamental Research and possible useful applications.*
 - *Applied Research: Systematic enquiry directed towards the acquisition, conversion or extension of knowledge for use in particular applications.*
 - *Action Research: Systematic investigation through practical action calculated to devise or test new information, ideas, forms or procedures and to produce communicable knowledge.*
 - *Option Research: Systematic enquiry directed towards the acquisition of information, calculated to provide grounds for decision or action.”¹*

In recent times, specifically starting from the early 60's in the past century, a new kind of applied research has started to be practiced and theorized. The same Archer was one of the founders of this discipline, that is a consequence of the cross contamination between the practice of developing industrially viable solutions for human needs and the theoretical approach of scientific research.

“Design research is systematic enquiry whose goal is knowledge of, or in, the embodiment of configuration, composition, structure, purpose, value, and meaning in man-made things and systems (...).” Design research tries to answer the obligations of design to the humanities:

- *Design research is concerned with the physical embodiment of man-made things, how these things perform their jobs, and how they work.*
- *Design research is concerned with construction as a human activity, how*

designers work, how they think, and how they carry out design activity.

- *Design research is concerned with what is achieved at the end of a purposeful design activity, how an artificial thing appears, and what it means.*
- *Design research is concerned with the embodiment of configurations.*
- *Design research is a systematic search and acquisition of knowledge related to design and design activity”.*²

The term “Design research” brings together two concepts that have evolved at different times and in very different ways, opening a new perspective on the investigation and construction of knowledge through the proposal and testing of new configurations of the object of study.

The design-research dualism is still far from being solved: The meaning of “design research” itself may be very different if it is being expressed by a professional designer or by an academic researcher. In the first case the research results, generally, may consist of solutions and experiments concerning configurations, processes, and designs related to tangible and concrete problems, in the second it may consist of something closer to traditional research results, i.e. theories, experiments, publications etc.

Design Research has evolved and spread in the last sixty years or so, contaminating and being contaminated by other fields of studies, sharing with them its own theories and methods, extending to areas like economics, sociology, pedagogy, didactics, etc.

Design Research was in the beginning a type of eminently qualitative research, oriented to the study of issues related to the concept of quality and to the proposal and testing of solutions qualitatively evaluated.

While maintaining a qualitative nature, it gradually opened itself to the use of quantitative techniques and assessment tools. It is now possible to do research projects oriented or based on design methods and apply a design approach based on qualitative analysis to traditionally hard fields. It’s also possible to bring human-centred methods into such research to design products or process solutions aimed at human problem solving, validating it with methods of analysis and quantitative assessment that are scientifically rigorous.

We can observe several symptoms that the concept of research about human issues is deeply changing, such as:

- progressive cross-fertilization between hard and soft sciences;
- application of new technologies that allow the collection, management and interpretation of large amounts of data for quantitative assessment;
- demand for transdisciplinary practices for interpretation of

complexity;

- application of design methods in fields not belonging to Design-related areas of studies.

The above-mentioned classification found in the description made by Archer in 1995, which distinguishes five kinds of Research: “Fundamental, Strategic, Applied, Action, Option,” seems to be in jeopardy owing to these new approaches.

Another symptom that points to the evolution of methodological boundaries and typological definitions in research is the fact that the differences and distances between Public and Private research and those between University research and Industry research are fading.

Design Research and the cooperation between University and Industry.

The University has traditionally claimed its independence from contingent needs of industry and commerce, reserving for itself the right of free investigation and the role of autonomous scientific knowledge construction. In traditional view of the academy’s role, innovation produced by scientific research does not depend on external entities: it becomes usable by the society, if necessary, at a later stage.

This attitude was possible thanks to the availability of liberal funding sources, that were not subordinated to the obtaining of specific usable results, making the Academies, de facto, a sort of economically autonomous reality.

A “science push” model of innovation has been, until last century, the base of the production of the knowledge usable by the society, making basic researchers the key players of the process.

In the last period, funding patterns have changed their sources, from Academia to Government and more recently to Industry, a fact that puts researchers in a position of moral obligation to listening to the needs of the Society, and pushes them to provide results whose social and economic implications must be of real relevance.

If, at a global level, the recent decades have seen a gradual decrease of the public funding of research, they also witnessed a significant interest by part of the politic power to foster collaboration between universities and industry for development of competitive innovation. We can recall, for example, the American Bayh-Dole Act or the European Community policies that, since 1984, through the design and implementation of the first “Research and Technology Development (RTD)” programme, until the contemporary launch of “Horizon 2020” programme, try to increase connections and cooperation between

University and Industry to produce significant economic, cultural, social innovation.³

Gulbrandsen and Smeby highlight how the availability of private funds creates an incentive for scientific production, without affecting its potential for disclosure. ⁴ Though focused on the Norwegian cases, the study of Gulbrandsen and Smeby highlights some interesting points, which we can consider of general interest for European Countries. The authors present the results of a survey conducted on university professors of their country, which can be summarized as follows:

- Industrial funding goes in large part to applied research, but not towards development work.
- Contract research may introduce new and interesting research topics and is prodromic to larger projects.
- Industrial funding fosters collaborative research.
- Industrial funding fosters publication productivity.
- There is no direct relation between academic publishing and commercial outputs.
- Industrial funding fosters commercial products, spin-off creation and patents.

Design Research is a type of research that has in its DNA the ability to respond to the needs that motivate the financing on part of governments or industries, for the development of innovation aimed to the solution of problems or the satisfaction of the needs of the society. The research teams that are oriented towards multidisciplinary processes, that apply design-driven and design-oriented research methods, have more chances of attracting this kind of financing or to succeed in the competitive tenders for the development of research on social complex problems.

A characteristic of applied research, in particular design research is that it is supposed to produce configurations, solutions, original and innovative applications regarding social problems of high relevance.

Somehow it is supposed to be able to produce something similar to an invention. When an invention is produced by a set of people who have cooperated to the various phases of the research and of the project, three main questions must be answered:

Who is the author of the invention?

Who owns the rights?

How to protect these rights of authorship and ownership?

The protection and disclosure of design research results.

In the United States the already mentioned Bayh–Dole Act of 1980 allowed university patenting, by granting ownership and copyrights of inventions to universities and other kinds of public and private organizations.⁵ This incentive has led, in the United States and later, in nations like China, Korea and Japan, to an exponential increase in the production of patents by Universities that continues today except for a period that occurred between 1998 and 2008.

The patent has become an increasingly significant indicator of scientific productivity of universities and especially their ability to impact society.

The protection of intellectual property of the scientific production by universities, especially public ones, has produced a division in the academic world between those for and against. The opposition fears a reduction of freedom for the researcher, about the choice of themes and research fields and a reduction of the potential for the circulation and dissemination of knowledge, which could also affect the production of publications.

Breschi, Lissoni and Montobbio⁶, starting from an analysis of the Italian patents production between 1978 and 1999, demonstrate how it is possible to find a direct proportionality between the number of publications and the chances of patenting the results of a research. In other words the researchers who share more with the scientific community their research progress are those that have higher chances to get to the registration of patents. Also, the same study shows that the university researchers most prolific in terms of patents are not less than their colleagues in terms of publications: this fact should cancel the doubts about the compatibility of the applied research with the university sphere. Patenting of research results does not necessarily reduce the possibility of divulging, not compromising in-fact the fulfillment of the so-called “third mission”.

On the contrary, for university research, the chance of reaching results that are economically interesting for the private sector, while protecting its ownership, has increased the possibilities of funding and the opportunities of dissemination of its results through diffusion on the market.

It should be noted that activities related to the patenting are very time-consuming and expensive, and can hardly be supported by the universities in the absence of an external contribution. On the other hand also the commercial exploitation of a patent without adequate

specific organization is very difficult. We could assert that university patenting is necessarily linked to the involvement of the industry or other concerned entities, or aimed to the immediate sale of the patent, since even the maintenance of a patent implies costs that might be very difficult to bear.

Patent, Design Research and the Italian University.

In Italy, pursuant to Legislative Decree 10 February 2005, art. 45, “ may be the subject of an invention patent the new inventions, which involve an inventive activity and are capable of industrial application.”⁷

It is worth noting that the results of a research can aspire to patentability only if they contain innovative solutions that can be made available to the society, and the only single solution and not the research as a whole is supposed to be the subject of protection. In this sense, it is easier to demonstrate the suitability for the patent of a research conducted in collaboration with industry. The originality of the results of a search is not sufficient to ensure patenting: it must be accompanied by the demonstration of its usefulness and manufacturability. A research developed through the application of design methods has the advantage of being oriented “ab ovo” to satisfying the needs and demands of the society and designed for a specific application and thus, implicitly useful and producible.

To be eligible to patent, also, a solution should not be yet been disclosed. Divulging or publicly revealing an invention in its original and innovative parts will void the patentability. It is possible to publicise the state of development and the progressive results of a research work, but all the features, details, the discoveries that are described can no longer be part of a patent. After the filing of the patent application it is possible to disseminate the content without losing protection.

The same Decree, at art. 65, governs the patenting activities of the University. One of the most interesting features is the exception from the requirements on the ownership of the rights of exploitation of inventions made in the performance or fulfilment of a contract or an employment relationship, in which the inventive activities are the object of the contract or relationship, for which the inventor is paid for.

In all such cases, the employer assumes ownership of the rights, but when the employment relationship is with universities or with a public research institution, the researcher is the exclusive owner of the rights deriving from the patentable invention of which he is author.

In Italy, the University has a right to a portion of the proceeds from

the exploitation of these rights, and also acquires the property if the author did not begin the industrial exploitation within five years from the filing. In the case of funded research, like the research conducted on behalf of a private company, the ownership of invention rights is instead determined by the contractual rules agreed between University and the private company.

Therefore, in the case of Design Research, if it is independently conducted by a university research group, all members of the research team involved in the development of patented solutions are considered authors and holders of exploitation rights, and the University is entitled to a share of any income as established by its rules. If the research is funded by an external entity, not belonging to the public administration, commercial rights are allocated as it is established by the contract between universities and the funder, while the authorship belongs to the researchers.

Design research can produce a substantial variety of patentable results, as original designs, configurations, technological solutions, inventions etc. The opportunity of patenting should be considered carefully, because it is rather costly in terms of time, human and economic resources. It is true, however, that the application of Design Methods within university research can be valuable on many fronts, not least the possibility of patent protection of its results, the economic exploitation of the rights and the opportunity of a direct application of its results in the real world, a form of divulgation that goes beyond the effects of a traditional publication.

Notes

1. L. B. ARCHER (1995), Co-design, interdisciplinary journal of design, January 1995, pp 6-13
2. L. B. ARCHER (1981), "A View of the Nature of the Design Research" in *Design: Science: Method*, R. Jacques, J. A. Powell, eds. Guilford, Surrey: IPC Business Press Ltd., 1981, 30-47.
3. CUNNINGHAM, J.A. & LINK, A.N. *INT' ENTREP MANAG J* (2015) 11: 849. doi:10.1007/s11365-014-0317-
4. GULBRANDSEN, M., & SMEBY, J. C. (2005). Industry funding and university professors' research performance. *Research policy*, 34(6), 932-950.
5. LEYDESDORFF, L., ETZKOWITZ, H., & KUSHNIR, D. (2016). Globalization and growth of US university patenting

- (2009–2014). *Industry and Higher Education*, 30(4), 257-266.
6. BRESCHI, S., LISSONI, F., MONTOBBIO F. (2005). From Publishing to Patenting : do Productive Scientists Turn into Academi Inventors ? . In: *Revue d'économie industrielle*, vol. 110, 2e trimestre 2005. pp. 75-102; doi : 10.3406/rei.2005.3073
 7. DECRETO LEGISLATIVO 10 febbraio 2005, n.30 (translation by author)

SCUOLE DI DOTTORATO

DOTTA

SCIENTIFIC COMMITTEE

- Marcello Balzani - Università di Ferrara
Giacomo Bizzarri - Università di Ferrara
Paola Boarin - The University of Auckland, New Zealand
Daniela Bosia - Università di Torino
Luljeta Bozo - Polis University, Tirana, Albania
Giovanni Corbellini - Università di Trieste
Luciano Cupelloni - Università di Roma Sapienza
Pietromaria Davoli - Università di Ferrara
Roberto Di Giulio - Università di Ferrara
Maria Antonietta Esposito (coordinator) - Università degli Studi di Firenze
Daniel Forgues - École de technologie supérieure, Canada
João Miranda Guedes - Faculty of Engineering of University of Porto, Portugal
Ignacio Enrique Guillén Guillamón - Universitat Politècnica de València, Spain
Merita Guri - Polis University, Tirana, Albania
Karen Kensek - University of Southern California, USA
Arto Kiviniemi - University of Liverpool, UK
Paola Leardini - The University of Queensland, Australia
Federica Maietti - Università di Ferrara
Vincenzo Mallardo - Università di Ferrara
Alessandro Melis - The University of Auckland, New Zealand
Paulo Mendonça - University of Minho School of Architecture, Portugal
Giuseppe Mincoelli - Università di Ferrara
Vincenzo Riso - University of Minho School of Architecture, Portugal
Rafael Sacks - Israel Institute of Technology
Massimo Santarelli - Università di Torino
Rizal Sebastian - Director of Research at DEMO Consultants, Netherlands
Apolonia Begoña Serrano Lanzarote - Universitat Politècnica de València, Spain
Arben Shtylla - Polis University, Tirana, Albania
Andreas Sickinger - German University in Cairo
Antonello Stella - Università di Ferrara
Loris Rossi - Polis University, Tirana, Albania
Theo Zaffagnini - Università di Ferrara

How to face
the scientific communication today.
International challenge and digital technology
impact on research outputs dissemination

edited by

MARCO MEDICI

VALENTINA MODUGNO

ALESSANDRO PRACUCCI

Firenze University Press

2017

How to face the scientific communication today. International challenge and digital technology impact on research outputs dissemination / edited by Marco Medici, Valentina Modugno, Alessandro Pracucci. – Firenze : Firenze University Press, 2017. (Scuole di dottorato ; 42)

<http://digital.casalini.it/9788864534978>

ISBN 978-88-6453-497-8 (online)

Peer Review Process

All publications are submitted to an external refereeing process under the responsibility of the FUP Editorial Board and the Scientific Committees of the individual series. The works published in the FUP catalogue are evaluated and approved by the Editorial Board of the publishing house. For a more detailed description of the refereeing process we refer to the official documents published on the website and in the online catalogue of the FUP (www.fupress.com).

Firenze University Press Editorial Board

A. Dolfi (Editor-in-Chief), M. Boddi, A. Bucelli, R. Casalbuoni, M. Garzaniti, M.C. Grisolia, P. Guarnieri, R. Lanfredini, A. Lenzi, P. Lo Nostro, G. Mari, A. Mariani, P.M. Mariano, S. Marinai, R. Minuti, P. Nanni, G. Nigro, A. Perulli, M.C. Torricelli.

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0: <http://creativecommons.org/licenses/by/4.0/legalcode>)

CC 2017 Firenze University Press
Università degli Studi di Firenze
Firenze University Press
via Cittadella, 7, 50144 Firenze, Italy
www.fupress.com

Contents

PREFACE	12
PART I – CRITICAL CONTRIBUTIONS	
<i>edited by Valentina Modugno</i>	
Architectural Design Research and Scientific Evaluation: two or three things I know about <i>Vincenzo Riso</i>	17
The challenge for a new doctoral research assessment: research and dissemination quality <i>Daniela Bosia</i>	23
The Importance of PhD Networking during training phase for scientific research <i>Valentina Modugno</i>	35
PART II – SCHOLARLY RESEARCH	
<i>edited by Marco Medici</i>	
Design for people affected by Duchenne Muscular Dystrophy. Proposal of a new type of Ankle Foot Orthosis [AFO] based on 3D indirect survey and 3D printing <i>Alessandra Tursi</i>	43
New forms of expression of Former Industrial Archeology in Albania <i>Egla Luca</i>	53
Residential Timber-based Architecture Opportunities for Kosovo <i>Arta Januqi-Cana</i>	69
Thirteen principles for Airport Lean Design <i>Filippo Bosi</i>	81

Evaluation of architectural membranes potentialities for functional rehabilitation of buildings	91
<i>Mónica Macieira</i>	
Integration of passive systems to improve the environmental comfort in historic buildings: the natural ventilation.	
Definition of operational and design models	
<i>Gaia Turchetti</i>	99
Malaysian residential housing for the smart grid: identifying optimization attributes for design and energy performance improvements	
<i>Abdul-Razak, Ahmad Haqqi Nazali</i>	109
Achieving Positive Tourism Development in Small Islands through Tourism-Related Design and Planning	
<i>Yuxi Wang</i>	132
Liminal environments	
<i>Mario Benedetto Assisi</i>	147
A proposal for a flexible tool for inclusive design of Primary School to reduce the causes of exclusion of children affected by DMD	
<i>Alessandra Galletti</i>	157
Smart Innovation Systems and Technologies for Indoor Environmental Quality (IEQ) Based on User Behavior	
<i>Shabryar Habibi</i>	167
The digital workflow of the Smart Swap Building: validation of information-representation methods and tools for the housing renewal process innovation	
<i>Marco Medici</i>	179
Smart biogas grid: biogas utilization to operate diffused micro-generation solutions in urban area through the bio-waste exploitation	
<i>Alessandro Pracucci</i>	193

PART III – CONCLUSIONS

edited by Alessandro Pracucci

- The importance of architectural technology background
and originality in an effective scientific research process
Theo Zaffagnini 207
- Financed design research made by Universities:
some considerations about the protection of results
Giuseppe Mincoelli 217
- Type or byte? Publishing opportunities toward digital
and open access models
Maria Antonietta Esposito 227
- Publishing research, what interests researchers in architecture
and what they should do
Maria Chiara Torricelli 239

In ricordo di Romano Del Nord

Primo fra i pari Romano Del Nord ha avviato gli allievi alla comprensione sistemica della Tecnologia dell'Architettura, alla padronanza del metodo della ricerca, li ha incoraggiati nel concepire e progettare i loro studi, a sintetizzare idee nuove e complesse, a comunicarle alla comunità scientifica ed alla società, per promuovere nei diversi contesti i risultati ottenuti. Ha fatto di loro dei ricercatori.

In memory of Romano Del Nord

First among his peers, Romano Del Nord initiated generations of doctoral students to methodical and comprehensive understanding of Tecnologia dell'Architettura, he introduced them to the mastery of the research process, he empowered them to conceive and design ideas, to systematize new complex concepts in order to present them to the scientific community. From each of his students he created a researcher.

Acknowledgements

The editors would like to thank two anonymous referees for their valuable comments on earlier versions of this volume.

All the authors would like to thank the several referees of the international scientific committee.

PREFACE

The present book *“How to face the scientific communication today. International challenge and digital technology impact on research outputs dissemination”*, a volume of DOTTA series edited by Firenze University Press – FUP, is a collection of critical essays developed and discussed inside the OSDOTTA network. The book is the final work of a systematic collection and synthesis of ideas and feedbacks, that the authors have worked on since the 11th Seminar of the network OSDOTTA *“Publishing strategies and scientific investigations: how to face them today?”*, took place in November 2015 at the Department of Architecture of the University of Ferrara. Consequently, the present volume goes deep inside the issue of communication of research results and its instruments, in particular, focusing on the issues of publications and evaluation of the final products.

Starting from reflections on the research of PhD students of the disciplines of Architectural Technology (Academic Disciplines ICAR/12) and Design (Academic Disciplines ICAR/13), part of the macro area 08/C1, the curators have created a path of essays to contribute in the current debate on the communication and dissemination of scientific results, in particular in relation to doctoral thesis and ongoing scientific activities carried on at national and international level, developing a work addressed to PhD students and the whole scientific community.

The book gathers contributions of national and international PhD candidates, PhDs and Professors, in three different sections of the volume. The aim is to investigate the topics of communication and dissemination of research activities and results into appropriate and high-quality products evaluable by the scientific community of reference.

In the first section, edited by Valentina Modugno, the topic is introduced with three essays which investigate the scientific assessment of architecture (Vincenzo Riso), the role of dissemination of research activities (Daniela Bosia) and the importance of network and associations in publication strategies (Valentina Modugno).

The second section, edited by Marco Medici, collects essays by different PhD candidates and new PhD, mainly in relation to their individual researches carried on during their PhD programmes. The

section shows differences and similarities of how dissemination strategies depend on the specific area of study and investigation, which asks for peculiar solutions based on the characteristics of single research. This part of the book aims at offering a scenario of how PhD candidates are aware and prepared to meet the challenges of publication and dissemination requested by scientific community.

The third section, edited by Alessandro Pracucci, collect final considerations emerged by essays and the ongoing discussion, deepening elements of current debate in scientific community. At this aim, the discussion on the issue is enriched by contributions on the central role of architectural technology in anticipating future research scenarios in order to achieve the highest level of originality and competence in PhD programs and in the scientific evaluation of their products (Theo Zaffagnini), the importance of the protection of research results (Giuseppe Mincoelli), the digitalization developments in publication (Maria Antonietta Esposito) and the characteristics of excellence in scientific products (Maria Chiara Torricelli).

The book aims to offer information and helpful comparison for PhD candidates, but not only, to improve doctoral research training and awareness on these issue. Indeed, insight and promotion of a suitable models and tools of dissemination of research works into the scientific community, is fundamental in PhD programme activities to acquire communication skills as expected by the Dublin Descriptors. Nowadays more than in the past, in PhD training is crucial a preparation work to acquire skills on dissemination and publication strategies with the goal to spread our own research in the academic world and to final user, as well as to allow the research to be checked and scientific evaluated for quality and scientific validity of its outcomes.

The book is a contribute in the current opened debate in the national and international scientific and academic community on the most effective tools to design specific dissemination strategies, defining detailed and reasoned ways able to highlight and improve qualities and disciplines of each single research.

Marco Medici
Valentina Modugno
Alessandro Pracucci

