

# TeMA

Journal of  
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

# INPUT 2014

papers selected

## Smart City

planning for energy, transportation  
and sustainability of the urban system

## SMART CITY

## PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

**Published by**

Laboratory of Land Use Mobility and Environment  
DICEA - Department of Civil, Architectural and Environmental Engineering  
University of Naples "Federico II"

TeMA is realised by CAB - Center for Libraries at "Federico II" University of Naples using Open Journal System

Editor-in-chief: Rocco Papa  
print ISSN 1970-9889 | on line ISSN 1970-9870  
Licence: Cancelleria del Tribunale di Napoli, n° 6 of 29/01/2008

**Editorial correspondence**

Laboratory of Land Use Mobility and Environment  
DICEA - Department of Civil, Architectural and Environmental Engineering  
University of Naples "Federico II"  
Piazzale Tecchio, 80  
80125 Naples  
web: [www.tema.unina.it](http://www.tema.unina.it)  
e-mail: [redazione.tema@unina.it](mailto:redazione.tema@unina.it)

# TeMA

Journal of  
Land Use, Mobility and  
Environment

TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

The Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR) classified TeMA as scientific journals in the Areas 08. TeMA has also received the Sparc Europe Seal for Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ). TeMA is published under a Creative Commons Attribution 3.0 License and is blind peer reviewed at least by two referees selected among high-profile scientists by their competences. TeMA has been published since 2007 and is indexed in the main bibliographical databases and it is present in the catalogues of hundreds of academic and research libraries worldwide.

## **EDITOR- IN-CHIEF**

Rocco Papa, Università degli Studi di Napoli Federico II, Italy

## **EDITORIAL ADVISORY BOARD**

Luca Bertolini, Universiteit van Amsterdam, Netherlands  
Virgilio Bettini, Università luav di Venezia, Italy  
Dino Borri, Politecnico di Bari, Italy  
Enrique Calderon, Universidad Politécnica de Madrid, Spain  
Roberto Camagni, Politecnico di Milano, Italy  
Robert Leonardi, London School of Economics and Political Science, United Kingdom  
Raffaella Nanetti, College of Urban Planning and Public Affairs, United States  
Agostino Nuzzolo, Università degli Studi di Roma Tor Vergata, Italy  
Rocco Papa, Università degli Studi di Napoli Federico II, Italy

## **EDITORS**

Agostino Nuzzolo, Università degli Studi di Roma Tor Vergata, Italy  
Enrique Calderon, Universidad Politécnica de Madrid, Spain  
Luca Bertolini, Universiteit van Amsterdam, Netherlands  
Romano Fistola, Dept. of Engineering - University of Sannio - Italy, Italy  
Adriana Galderisi, Università degli Studi di Napoli Federico II, Italy  
Carmela Gargiulo, Università degli Studi di Napoli Federico II, Italy  
Giuseppe Mazzeo, CNR - Istituto per gli Studi sulle Società del Mediterraneo, Italy

## **EDITORIAL SECRETARY**

Rosaria Battarra, CNR - Istituto per gli Studi sulle Società del Mediterraneo, Italy  
Andrea Ceudech, TeMALab, Università degli Studi di Napoli Federico II, Italy  
Rosa Anna La Rocca, TeMALab, Università degli Studi di Napoli Federico II, Italy  
Enrica Papa, University of Amsterdam, Netherlands

# TeMA

Journal of  
Land Use, Mobility and  
Environment

This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



## CONFERENCE COMMITTEE

Dino Borri, Polytechnic University of Bari, Italy  
Arnaldo Cecchini, University of Sassari, Italy  
Romano Fistola, University of Sannio, Italy  
Lilli Gargiulo, University of Naples Federico II, Italy  
Giuseppe B. Las Casas, University of Basilicata, Italy  
Agostino Nuzzolo, University of Rome, Italy  
Rocco Papa, University of Naples Federico II, Italy  
Giovanni Rabino, Polytechnic University of Milan, Italy  
Maurizio Tira, University of Brescia, Italy  
Corrado Zoppi, University of Cagliari, Italy

## SCIENTIFIC COMMITTEE

Emanuela Abis, University of Cagliari, Italy  
Nicola Bellini, Institute of Management, Scuola Superiore Sant'Anna Pisa, Italy  
Mariolina Besio Dominici, University of Genoa, Italy  
Ivan Blečić, University of Sassari, Italy  
Dino Borri, Polytechnic University of Bari, Italy  
Grazia Brunetta, Polytechnic University of Turin, Italy  
Roberto Busi, University of Brescia, Italy  
Domenico Camarda, Polytechnic University of Bari, Italy  
Michele Campagna, University of Cagliari, Italy  
Arnaldo Cecchini, University of Sassari, Italy  
Donatella Cialdea, University of Molise, Italy  
Valerio Cutini, University of Pisa, Italy, Italy  
Luciano De Bonis, University of Molise, Italy  
Andrea De Montis, University of Sassari, Italy  
Filippo de Rossi, University of Sannio (Dean of the University of Sannio), Italy  
Lidia Diappi, Polytechnic University of Milan, Italy  
Isidoro Fasolino, University of Salerno, Italy  
Mariano Gallo, University of Sannio, Italy  
Lilli Gargiulo, University of Naples Federico II, Italy  
Roberto Gerundo, University of Salerno, Italy  
Paolo La Greca, University of Catania, Italy  
Giuseppe B. Las Casas, University of Basilicata, Italy  
Robert Laurini, University of Lyon, France  
Antonio Leone, Tuscia University, Italy  
Anna Loffredo, Institute of Management, Scuola Superiore Sant'Anna Pisa, Italy  
Silvana Lombardo, University of Pisa, Italy  
Giovanni Maciocco, University of Sassari, Italy  
Giulio Maternini, University of Brescia, Italy

Francesco Domenico Moccia, University of Naples Federico II, Italy  
Bruno Montella, University of Naples "Federico II" (Director of DICEA), Italy  
Beniamino Murgante, University of Basilicata, Italy  
Agostino Nuzzolo, University of Rome, Italy  
Sylvie Occelli, IRES Turin, Italy  
Rocco Papa, University of Naples Federico II, Italy  
Maria Paradiso, University of Sannio, Italy  
Domenico Patassini, IUAV, Venice, Italy  
Michele Pezzagno, University of Brescia, Italy  
Fulvia Pinto, Polytechnic University of Milan, Italy  
Giovanni Rabino, Polytechnic University of Milan, Italy  
Giuseppe Roccasalva, Polytechnic University of Turin, Italy  
Bernardino Romano, University of L'Aquila, Italy  
Francesco Russo, Mediterranean University Reggio Calabria, Italy  
Michelangelo Russo, University of Naples Federico II, Italy  
Ferdinando Semboloni, University of Firenze, Italy  
Agata Spaziante, Polytechnic University of Turin, Italy  
Michela Tiboni, University of Brescia, Italy  
Maurizio Tira, University of Brescia, Italy  
Simona Tondelli, University of Bologna, Italy  
Umberto Villano, University of Sannio (Director of DING), Italy  
Ignazio Vinci, University of Palermo, Italy  
Corrado Zoppi, University of Cagliari, Italy

#### **LOCAL SCIENTIFIC COMMITTEE**

Rosaria Battarra, ISSM, National Research Council, Italy  
Romano Fistola, DING, University of Sannio, Italy  
Lilli Gargiulo, DICEA, University of Naples Federico II, Italy  
Adriana Galderisi, DICEA, University of Naples Federico II, Italy  
Rosa Anna La Rocca, DICEA, University of Naples Federico II, Italy  
Giuseppe Mazzeo, ISSM, National Research Council, Italy  
Enrica Papa, University of Amsterdam, Netherlands

#### **LOCAL ADMINISTRATIVE TEAM**

Gennaro Angiello, TeMA Lab, University of Naples Federico II, Italy  
Gerardo Carpentieri, TeMA Lab, University of Naples Federico II, Italy  
Stefano Franco, TeMA Lab, University of Naples Federico II, Italy  
Laura Russo, TeMA Lab, University of Naples Federico II, Italy  
Floriana Zucaro, TeMA Lab, University of Naples Federico II, Italy

## EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

### SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website [www.input2014.it](http://www.input2014.it) . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website ([www.tema.unina.it](http://www.tema.unina.it)). The codex is not present on the pdf version of the papers.

## SMART CITY PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM Special Issue, June 2014

### Contents

- 1. The Plan in Addressing the Post Shock Conflicts 2009-2014.  
A First Balance Sheet of the Reconstruction of L'Aquila** 1-13  
Fabio Andreassi, Pierluigi Properzi
- 2. Assessment on the Expansion of Basic Sanitation Infrastructure.  
In the Metropolitan Area of Belo Horizonte - 2000/2010** 15-26  
Grazielle Anjos Carvalho
- 3. Temporary Dwelling of Social Housing in Turin.  
New Responses to Housing Discomfort** 27-37  
Giulia Baù, Luisa Ingaramo
- 4. Smart Communities. Social Innovation at the Service of the Smart Cities** 39-51  
Massimiliano Bencardino, Ilaria Greco
- 5. Online Citizen Reporting on Urban Maintenance:  
A Collection, Evaluation and Decision Support System** 53-63  
Ivan Blečić, Dario Canu, Arnaldo Cecchini, Giuseppe Andrea Trunfio
- 6. Walkability Explorer. An Evaluation and Design Support Tool for Walkability** 65-76  
Ivan Blečić, Arnaldo Cecchini, Tanja Congiu, Giovanna Fancello, Giuseppe Andrea Trunfio
- 7. Diachronic Analysis of Parking Usage: The Case Study of Brescia** 77-85  
Riccardo Bonotti, Silvia Rossetti, Michela Tiboni, Maurizio Tira
- 8. Crowdsourcing. A Citizen Participation Challenge** 87-96  
Júnia Borges, Camila Zyngier
- 9. Spatial Perception and Cognition Review.  
Considering Geotechnologies as Urban Planning Strategy** 97-108  
Júnia Borges, Camila Zyngier, Karen Lourenço, Jonatha Santos

- 10. Dilemmas in the Analysis of Technological Change. A Cognitive Approach to Understand Innovation and Change in the Water Sector** 109-127  
Dino Borri, Laura Grassini
- 11. Learning and Sharing Technology in Informal Contexts. A Multiagent-Based Ontological Approach** 129-140  
Dino Borri, Domenico Camarda, Laura Grassini, Mauro Patano
- 12. Smartness and Italian Cities. A Cluster Analysis** 141-152  
Flavio Boscacci, Ila Maltese, Ilaria Mariotti
- 13. Beyond Defining the Smart City. Meeting Top-Down and Bottom-Up Approaches in the Middle** 153-164  
Jonas Breuer, Nils Walravens, Pieter Ballon
- 14. Resilience Through Ecological Network** 165-173  
Grazia Brunetta, Angioletta Voghera
- 15. ITS System to Manage Parking Supply: Considerations on Application to the “Ring” in the City of Brescia** 175-186  
Susanna Bulferetti, Francesca Ferrari, Stefano Riccardi
- 16. Formal Ontologies and Uncertainty. In Geographical Knowledge** 187-198  
Matteo Caglioni, Giovanni Fusco
- 17. Geodesign From Theory to Practice: In the Search for Geodesign Principles in Italian Planning Regulations** 199-210  
Michele Campagna, Elisabetta Anna Di Cesare
- 18. Geodesign from Theory to Practice: From Metaplanning to 2nd Generation of Planning Support Systems** 211-221  
Michele Campagna
- 19. The Energy Networks Landscape. Impacts on Rural Land in the Molise Region** 223-234  
Donatella Cialdea, Alessandra Maccarone
- 20. Marginality Phenomena and New Uses on the Agricultural Land. Diachronic and Spatial Analyses of the Molise Coastal Area** 235-245  
Donatella Cialdea, Luigi Mastronardi
- 21. Spatial Analysis of Urban Squares. ‘Siccome Umbellico al corpo dell’uomo’** 247-258  
Valerio Cutini



- 22. Co-Creative, Re-Generative Smart Cities.  
Smart Cities and Planning in a Living Lab Perspective 2** **259-270**  
Luciano De Bonis, Grazia Concilio, Eugenio Leanza, Jesse Marsh, Ferdinando Trapani
- 23. The Model of Voronoi's Polygons and Density:  
Diagnosis of Spatial Distribution of Education Services of EJA  
in Divinópolis, Minas Gerais, Brazil** **271-283**  
Diogo De Castro Guadalupe, Ana Clara Mourão Moura
- 24. Rural Architectural Intensification: A Multidisciplinary Planning Tool** **285-295**  
Roberto De Lotto, Tiziano Cattaneo, Cecilia Morelli Di Popolo, Sara Morettini,  
Susanna Sturla, Elisabetta Venco
- 25. Landscape Planning and Ecological Networks.  
Part A. A Rural System in Nuoro, Sardinia** **297-307**  
Andrea De Montis, Maria Antonietta Bardi, Amedeo Ganciu, Antonio Ledda,  
Simone Caschili, Maurizio Mulas, Leonarda Dessena, Giuseppe Modica,  
Luigi Laudari, Carmelo Riccardo Fichera
- 26. Landscape Planning and Ecological Networks.  
Part B. A Rural System in Nuoro, Sardinia** **309-320**  
Andrea De Montis, Maria Antonietta Bardi, Amedeo Ganciu, Antonio Ledda,  
Simone Caschili, Maurizio Mulas, Leonarda Dessena, Giuseppe Modica,  
Luigi Laudari, Carmelo Riccardo Fichera
- 27. Sea Guidelines. A Comparative Analysis: First Outcomes** **321-330**  
Andrea De Montis, Antonio Ledda, Simone Caschili, Amedeo Ganciu, Mario Barra,  
Gianluca Cocco, Agnese Marcus
- 28. Energy And Environment in Urban Regeneration.  
Studies for a Method of Analysis of Urban Periphery** **331-339**  
Paolo De Pascali, Valentina Alberti, Daniela De Ioris, Michele Reginaldi
- 29. Achieving Smart Energy Planning Objectives.  
The Approach of the Transform Project** **341-351**  
Ilaria Delponte
- 30. From a Smart City to a Smart Up-Country.  
The New City-Territory of L'Aquila** **353-364**  
Donato Di Ludovico, Pierluigi Properzi, Fabio Graziosi
- 31. Geovisualization Tool on Urban Quality.  
Interactive Tool for Urban Planning** **365-375**  
Enrico Eynard, Marco Santangelo, Matteo Tabasso

- 32. Visual Impact in the Urban Environment.  
The Case of Out-of-Scale Buildings** 377-388  
Enrico Fabrizio, Gabriele Garnerò
- 33. Smart Dialogue for Smart Citizens:  
Assertive Approaches for Strategic Planning** 389-401  
Isidoro Fasolino, Maria Veronica Izzo
- 34. Digital Social Networks and Urban Spaces** 403-415  
Pablo Vieira Florentino, Maria Célia Furtado Rocha, Gilberto Corso Pereira
- 35. Social Media Geographic Information in Tourism Planning** 417-430  
Roberta Floris, Michele Campagna
- 36. Re-Use/Re-Cycle Territories:  
A Retroactive Conceptualisation for East Naples** 431-440  
Enrico Formato, Michelangelo Russo
- 37. Urban Land Uses and Smart Mobility** 441-452  
Mauro Francini, Annunziata Palermo, Maria Francesca Viapiana
- 38. The Design of Signalised Intersections at Area Level.  
Models and Methods** 453-464  
Mariano Gallo, Giuseppina De Luca, Luca D'acierno
- 39. Piano dei Servizi. Proposal for Contents and Guidelines** 465-476  
Roberto Gerundo, Gabriella Graziuso
- 40. Social Housing in Urban Regeneration.  
Regeneration Heritage Existing Building: Methods and Strategies** 477-486  
Maria Antonia Giannino, Ferdinando Orabona
- 41. Using GIS to Record and Analyse Historical Urban Areas** 487-497  
Maria Giannopoulou, Athanasios P. Vavatsikos,  
Konstantinos Lykostratis, Anastasia Roukouni
- 42. Network Screening for Smarter Road Sites: A Regional Case** 499-509  
Attila Grieco, Chiara Montaldo, Sylvie Ocelli, Silvia Tarditi
- 43. Li-Fi for a Digital Urban Infrastructure:  
A Novel Technology for the Smart City** 511-522  
Corrado Iannucci, Fabrizio Pini
- 44. Open Spaces and Urban Ecosystem Services.  
Cooling Effect towards Urban Planning in South American Cities** 523-534  
Luis Inostroza

- 45. From RLP to SLP: Two Different Approaches to Landscape Planning** 535-543  
Federica Isola, Cheti Pira
- 46. Revitalization and its Impact on Public. Space Organization A Case Study of Manchester in UK, Lyon in France and Łódź in Poland** 545-556  
Jarosław Kazimierzczak
- 47. Geodesign for Urban Ecosystem Services** 557-565  
Daniele La Rosa
- 48. An Ontology of Implementation Plans of Historic Centers: A Case Study Concerning Sardinia, Italy** 567-579  
Sabrina Lai, Corrado Zoppi
- 49. Open Data for Territorial Specialization Assessment. Territorial Specialization in Attracting Local Development Funds: an Assessment. Procedure Based on Open Data and Open Tools** 581-595  
Giuseppe Las Casas, Silvana Lombardo, Beniamino Murgante, Piergiuseppe Pontrandolfi, Francesco Scorza
- 50. Sustainability And Planning. Thinking and Acting According to Thermodynamics Laws** 597-606  
Antonio Leone, Federica Gobattoni, Raffaele Pelorosso
- 51. Strategic Planning of Municipal Historic Centers. A Case Study Concerning Sardinia, Italy** 607-619  
Federica Leone, Corrado Zoppi
- 52. A GIS Approach to Supporting Nightlife Impact Management: The Case of Milan** 621-632  
Giorgio Limonta
- 53. Dealing with Resilience Conceptualisation. Formal Ontologies as a Tool for Implementation of Intelligent Geographic Information Systems** 633-644  
Giampiero Lombardini
- 54. Social Media Geographic Information: Recent Findings and Opportunities for Smart Spatial Planning** 645-658  
Pierangelo Massa, Michele Campagna
- 55. Zero Emission Mobility Systems in Cities. Inductive Recharge System Planning in Urban Areas** 659-669  
Giulio Maternini, Stefano Riccardi, Margherita Cadei

- 56. Urban Labelling: Resilience and Vulnerability as Key Concepts for a Sustainable Planning** 671-682  
Giuseppe Mazzeo
- 57. Defining Smart City. A Conceptual Framework Based on Keyword Analysis** 683-694  
Farnaz Mosannenzadeh, Daniele Vettorato
- 58. Parametric Modeling of Urban Landscape: Decoding the Brasilia of Lucio Costa from Modernism to Present Days** 695-708  
Ana Clara Moura, Suellen Ribeiro, Isadora Correa, Bruno Braga
- 59. Smart Mediterranean Logics. Old-New Dimensions and Transformations of Territories and Cites-Ports in Mediterranean** 709-718  
Emanuela Nan
- 60. Mapping Smart Regions. An Exploratory Approach** 719-728  
Sylvie Occelli, Alessandro Sciuolo
- 61. Planning Un-Sustainable Development of Mezzogiorno. Methods and Strategies for Planning Human Sustainable Development** 729-736  
Ferdinando Orabona, Maria Antonia Giannino
- 62. The Factors Influencing Transport Energy Consumption in Urban Areas: a Review** 737-747  
Rocco Papa, Carmela Gargiulo, Gennaro Angiello
- 63. Integrated Urban System and Energy Consumption Model: Residential Buildings** 749-758  
Rocco Papa, Carmela Gargiulo, Gerardo Carpentieri
- 64. Integrated Urban System and Energy Consumption Model: Public and Singular Buildings** 759-770  
Rocco Papa, Carmela Gargiulo, Mario Cristiano
- 65. Urban Smartness Vs Urban Competitiveness: A Comparison of Italian Cities Rankings** 771-782  
Rocco Papa, Carmela Gargiulo, Stefano Franco, Laura Russo
- 66. Urban Systems and Energy Consumptions: A Critical Approach** 783-792  
Rocco Papa, Carmela Gargiulo, Floriana Zucaro
- 67. Climate Change and Energy Sustainability. Which Innovations in European Strategies and Plans** 793-804  
Rocco Papa, Carmela Gargiulo, Floriana Zucaro

- 68. Bio-Energy Connectivity And Ecosystem Services.  
An Assessment by Pandora 3.0 Model for Land Use Decision Making** 805-816  
Raffaele Pelorosso, Federica Gobattoni, Francesco Geri,  
Roberto Monaco, Antonio Leone
- 69. Entropy and the City. GHG Emissions Inventory:  
a Common Baseline for the Design of Urban and Industrial Ecologies** 817-828  
Michele Pezzagno, Marco Rosini
- 70. Urban Planning and Climate Change: Adaptation and Mitigation Strategies** 829-840  
Fulvia Pinto
- 71. Urban Gaming Simulation for Enhancing Disaster Resilience.  
A Social Learning Tool for Modern Disaster Risk Management** 841-851  
Sarunwit Promsaka Na Sakonnakron, Pongpisit Huyakorn, Paola Rizzi
- 72. Visualisation as a Model. Overview on Communication Techniques  
in Transport and Urban Planning** 853-862  
Giovanni Rabino, Elena Masala
- 73. Ontologies and Methods of Qualitative Research in Urban Planning** 863-869  
Giovanni Rabino
- 74. City/Sea Searching for a New Connection.  
Regeneration Proposal for Naples Waterfront Like an Harbourscape:  
Comparing Three Case Studies** 871-882  
Michelangelo Russo, Enrico Formato
- 75. Sensitivity Assessment. Localization of Road Transport Infrastructures  
in the Province of Lucca** 883-895  
Luisa Santini, Serena Pecori
- 76. Creating Smart Urban Landscapes.  
A Multimedia Platform for Placemaking** 897-907  
Marichela Sepe
- 77. Virtual Power Plant. Environmental Technology Management Tools  
of The Settlement Processes** 909-920  
Maurizio Sibilla
- 78. Ecosystem Services and Border Regions.  
Case Study from Czech – Polish Borderland** 921-932  
Marcin Spyra
- 79. The Creative Side of the Reflective Planner. Updating the Schön's Findings** 933-940  
Maria Rosaria Stufano Melone, Giovanni Rabino

- 80. Achieving People Friendly Accessibility.  
Key Concepts and a Case Study Overview** 941-951  
Michela Tiboni, Silvia Rossetti
- 81. Planning Pharmacies: An Operational Method to Find the Best Location** 953-963  
Simona Tondelli, Stefano Fatone
- 82. Transportation Infrastructure Impacts Evaluation:  
The Case of Egnatia Motorway in Greece** 965-975  
Athanasios P. Vavatsikos, Maria Giannopoulou
- 83. Designing Mobility in a City in Transition.  
Challenges from the Case of Palermo** 977-988  
Ignazio Vinci, Salvatore Di Dio
- 84. Considerations on the Use of Visual Tools in Planning Processes:  
A Brazilian Experience** 989-998  
Camila Zyngier, Stefano Pensa, Elena Masala

# TeMA

Journal of  
Land Use, Mobility and Environment

TeMA INPUT 2014  
Print ISSN 1970-9889, e- ISSN 1970-9870

DOI available on the on-line version

Licensed under the Creative Commons Attribution  
Non Commercial License 3.0  
[www.tema.unina.it](http://www.tema.unina.it)

SPECIAL ISSUE

Eighth International Conference INPUT  
Smart City - Planning for Energy, Transportation and Sustainability  
of the Urban System

*Naples, 4-6 June 2014*

The logo for the INPUT 2014 conference. It features the word "input" in a lowercase, sans-serif font, with the "i" and "o" connected by a red line that forms a stylized shape. Below "input" is the year "2014" in a larger, bold, sans-serif font. The "0" in "2014" is also connected to the red line above it.

## PLANNING PHARMACIES AN OPERATIONAL METHOD TO FIND THE BEST LOCATION

SIMONA TONDELLI<sup>a</sup>, STEFANO FATONE<sup>b</sup>

<sup>a</sup> University of Bologna, Department of Architecture  
e-mail: [simona.tondelli@unibo.it](mailto:simona.tondelli@unibo.it)  
URL: [www.unibo.it/docenti/simona.tondelli](http://www.unibo.it/docenti/simona.tondelli)

<sup>b</sup> Freelance engineer within urban planning  
e-mail: [stefano.fatone@virgilio.it](mailto:stefano.fatone@virgilio.it)  
URL: [it.linkedin.com/in/stefanofatone/](http://it.linkedin.com/in/stefanofatone/)

### ABSTRACT

The theme of the spatial distribution of the pharmacies on the territory is closely connected to urban planning and to services supply. In Italy, the regulatory change that took place in 2012, triggered partly by the need to adhere more to a constantly changing economic system, has led to a revision of the existing situation, consisting both on the method to quantify the pharmacies distribution and on the efficiency of the service. If Law 27/2012 has effectively allowed municipalities to increase the number of pharmacies that they can settle on the municipal territory, it has also started a process of rethinking the logic of pharmacies location and of their catchment areas.

In this framework, the present paper aims to discuss the merits of a regulatory evolutions that sparked the process of liberalization of locations, integrating the law guidelines and goals with an operating logic process, usable and useful to translate goals into planning actions in a continuous dialogue between law and territory, constraints and opportunities, equity and accessibility of the care services.

Following this logic operations, we have investigated the urban context of Castelfranco Emilia, assuming the location of new offices on the basis of pharmaceutical analyzes.

### KEYWORDS

Pharmacy, spatial distribution, Law 27/2012, liberalization process, population density, equal care services, accessibility, GIS

## 1 URBAN AND REGULATORY CONTEXT

### 1.1 TERRITORIAL DISTRIBUTION OF PHARMACIES IN ITALY, BEFORE 2012

According to Article 32 of the Italian Constitution, the pharmaceutical service is intended as a public service preordained to health care and treatment of pain and it aims to ensure the proper dispensation of the means (drugs and services) used in its protection. This principle is laid down in Article 32 of Law no. 833 dated 23<sup>rd</sup> December 1978, which instituted the National Health Service; this law, in Article 25, includes pharmaceutical care (in the same way of medical-generic care, specialized nursing, hospital) in the care services borne by the Local Health Units (Giordani 2011).

For these reasons, the activity of pharmacies can be considered inside the aim of granting a public service. This approach can be basically traced to the Giolitti reform of 1913, which stated that *"pharmaceutical care to the population, and therefore the practice of pharmacy, is a primary task of the state, carried out directly through by the local authorities (municipalities), or delegated to private individuals to be carried out, under a government license"*.

Before that, the principle of the free leading of the pharmacy prevailed (also known as CRISPI Reform, law no. 5849 dated 22<sup>nd</sup> December 1888): it was considered as a private asset and could be started without territorial constraints and limitations, with the only obligation of the responsible leading of a pharmacist, which could not necessarily be the holder or the owner of the pharmacy.

With the law of 1913, the owner of the pharmacy, while remaining a private individual, was bound by a relationship of special subordination to the Public Health Authority that, in the prevailing public interest, called back the power to impose obligations, performances and restrictions on the activity. Starting a pharmacy was not discretionary, but it was made on the basis of a planned action, the "pharmacies district" (called "pianta organica") of the pharmaceutical location.

The tool of the pharmacies district was later confirmed in year '68 laws (Law 221/68 and Law 475/68), which, while making several major changes to the institute of pharmacy, maintained the public action in territorializing the service through the pharmacies district.

The pharmacies district is the outcome of the planning, at public level, of the equal distribution of pharmacies on the land, with the purpose of protecting the right to health, ensuring accessibility to the population in terms of equal and non-discriminating.

According to Article 1 of Law 457/68, the pharmacies districts the act in which "the number of the pharmacies, each individual location and the area of each of them are defined". The pharmacies map, then, was to be considered as an act that divided the municipal land into areas (defined as bordered areas of land), within which each pharmacy has to be set and work.

The criteria for the definition of pharmacies districts were then revised by Law 362/91 according to which:

- the number of authorizations is determined in order to have 1 pharmacy every 5,000 inhabitants in municipalities with a population of up to 12,500 inhabitants and 1 pharmacy every 4,000 residents in other municipalities (*quorum*, demographic criterion);
- every new pharmacy must be located no closer than 200 meters from the other pharmacies, and in order to satisfy the need of people in that area. That distance has to be measured on the shortest way between pharmacies' doorsteps (topographic criterion).

The usual procedure that was followed to determine where a pharmacy had to be established, met the following logic: proceeding hierarchically, first the main town was taken into consideration, then villages and then hamlets, excluding villages and hamlets that already had a pharmacy.



## 1.2 THE INTRODUCTION OF THE LEGISLATIVE DECREE 1/2012 (NAMED "CRESCITALIA"), AND THEN ITS CONVERSION INTO LAW 27/2012

Article 11 of Law no. 27 dated 24<sup>th</sup> march 2012, that has converted the Legislative Decree no. 1 dated 24<sup>th</sup> January 2012, the so-called "liberalizations decree", has introduced, among others, some measures to reform the pharmaceutical distribution by modifying Law no. 475 dated 2<sup>nd</sup> April 1968, as amended.

Through this reform the legislator has set the goal, as well as to facilitate access to ownership of pharmacies by a larger number of candidates, to facilitate the procedures for opening new pharmaceutical locations, while ensuring a more widespread presence in the municipal territory of pharmaceutical services (art. 11, c. 1), an equal spatial distribution of pharmacies (art. 11, c. 1, letter c) and the extension of the accessibility to pharmaceutical services also to people who live in sparsely populated areas (art. 11, c. 1, letter c).

So the Law has provided:

- the modification of the standard demographic baseline, established so that there will be 1 pharmacy every 3,300 inhabitants, referring to the registered population at 31.12.2010;
- the planning of the new pharmaceutical locations on the territory, inside areas that are identified and chosen by municipalities according to the 3 goals cited above;
- in addition to the pharmaceutical locations previously determined, and within the limit of 5 percent of the locations, including the new ones, it is possible to establish a pharmacy:
  - "a) in railway stations, in civil airports for international traffic, in maritime stations and in service areas, with hotel and restaurant services, on high traffic density motorways, provided that there is not already a pharmacy at a distance of less than 400 meters;
  - b) in shopping malls and in large retail outlets with a sales area of more than 10,000 square meters, provided that there is not already a pharmacy at a distance of less than 1,500 meters".<sup>1</sup>

The new demographic criterion is quite clear, as it plans to open 1 new pharmaceutical location every 3,300 inhabitants (*quorum*). This means that the number of pharmacies that are up to each municipality is obtained by dividing the total number of inhabitants by 3,300 and rounding up; the difference between the so-calculated theoretical number of locations and the existing ones shall consist of the new locations, placeable according to the goals of equal and widespread geographical distribution and accessibility of pharmacy services also to people living in sparsely populated areas.

In addition, the condition of proximity should be also taken into consideration, expressing the exclusion of the placement of a new pharmacy within certain metric radii, as follows:

	<b>Distance radius</b>	<b>Regulatory reference</b>
From another pharmacy	200 meters	ex L. 475/1968 (e s.m.i.)
From a pharmacy in railway stations, in civil airports for international traffic, in maritime stations and in service areas, with hotel and restaurant services, on high traffic density motorways	400 meters	ex L. 27/2012, derogating from the <i>quorum</i> , with a maximum number of additional openings equal to 5% on a regional basis
From a pharmacy in shopping malls and in large retail outlets ( $S_r > 10,000 \text{ m}^2$ )	1,500 meters	

<sup>1</sup> The law has given to Municipal Councils and no longer to the Regional Authority the responsibility for the siting new pharmaceutical locations, so the Councils were required to adopt a deliberation to establish the new locations within 30 days after the entry into force of the Law that converts the Liberalisation Decree.

The new law has introduced some critical elements in siting new pharmacies.

First, a criticality can be identified in the lowering of the minimum threshold for opening a new pharmacy at 3,300 inhabitants and assigning an additional one on the criterion of "rest for excess" (ie the surplus population, compared with 3,300 inhabitants, allows to open another pharmacy, if it exceeds 50 percent of the parameter itself, so equal to 1,650 inhabitants); in fact, since the experience of the operators, it should be noted that pharmacies located in villages with a population of less than 1,000 inhabitants did not survive and they closed, so the rounding up of the ratio by which a one more pharmacy is assigned, can be further considered risky for the survival of the pharmacies in the area.

Second, the generic nature of the location goals (equal and widespread distribution, accessibility to those who live in sparsely populated areas) has made some locations questionable and has given raise to many appeals to the Administrative Court by the actual owners of the already existing pharmacies, highlighting the need to support these proposals with spatial analysis tools, in order to guarantee the achievement of law objectives and the transparency of the choices.

In fact, if the operation of liberalization made by the Law, as it might be guessed, leads to a reduction in the potential catchment area of the existing pharmaceutical locations, to some extent eroded by new locations. Therefore, it will be necessary to compare multiple potential locations for the new seats, if any, building possible scenarios in an analytical and punctual way, in terms of users and territorial accessibility, as well as in terms of reduction of the adjoining catchment areas, with the aim of minimizing losses to the existing (and future) seats and sharing the benefits on the as widely as possible amount of population.

## 2 WORKING METHOD

### 2.1 MAPPING OF THE BASIC ELEMENTS

The location of a new pharmaceutical seat must take into account some elements that could result potentially conditioning or synergistic compared to the service itself, which must be geo-referenced and mapped in order to allow to undergo the subsequent spatial analysis:

1. Pharmacies, as point features
2. Pharmacy district of each seat, as polygon feature (relevance area, usually described with words only)
3. Medical facilities, as point features
4. Groups of doctors (or UTAP, Territorial Units for Primary Assistance), as point features
5. Shopping malls (with  $S_v > 10,000 \text{ m}^2$ ), as point features
6. Para-pharmacies, as point features without relevance areas.

Those elements become the subject of subsequent processing and evaluation as described below.

### 2.2 ANALYSIS AND LOCATIONAL CRITERIA

The evaluation of new pharmacies locations can't be divided from the analysis of the current situation, based on the existing catchment areas. Therefore, the analysis started from the configuration, both in form and essence, of the pharmacy maps of each different seat already present on the territory, also including the relevance areas ever assigned or already forecasted.

#### 2.2.1 POPULATION DENSITY

The law requires to determine the need for new pharmacies based on the residential population at 31.12.2010. However, although this data is available from the municipal registries as total number on the

main town and on villages, its spatial distribution for each house number on the whole territory is not always available.

To fill this gap in spatially geo-referenced information, data obtained from the last available census, at 2001, unbundled on census section, have been used (source: ISTAT). They have then been updated proportionally (on villages and hamlets) to the value of residential population in at 31.12.10. This operation could be addressed as an oversimplification; nevertheless it was necessary, in order to produce a geo-referenced database of the residential population also for those municipalities that are not able to provide this detailed information.

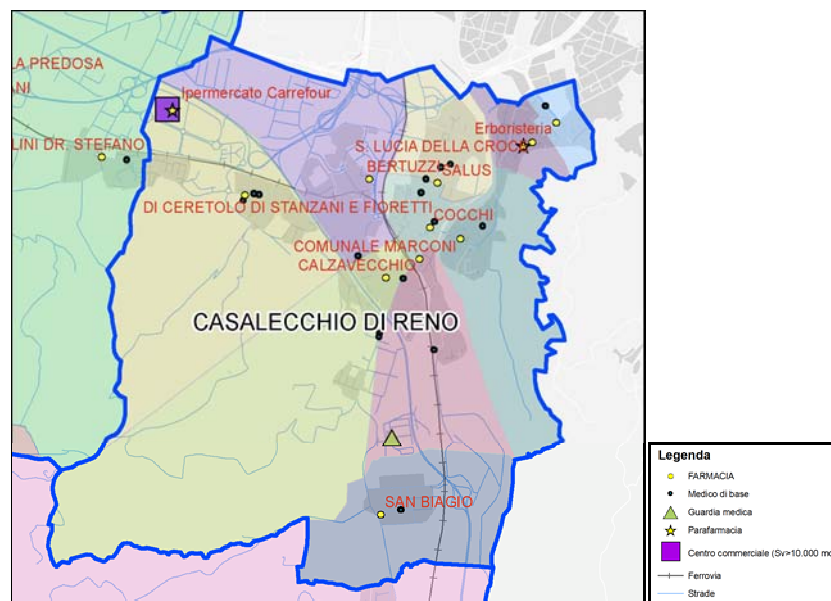


Fig. 1 The basic elements for the analysis: pharmacies, UTAP, medical facilities, para-pharmacies, shopping malls on the pharmacy map

In order to make these data more useful and targeted, using GIS software, the census sections have been crossed with the residential built-up ground cover (ie, excluding urbanized but not-built-up areas -green areas- and industrial and craft areas). The result is essentially the proportional allocation of the number of inhabitants, identified and referred to a large area (census section), only on urbanized and useful portions of the census section.

By doing so, we have tried to ensure a realistic distribution of the population on the urbanized territory, keeping the information on the age group, which is useful for the purposes of this study.

Through these steps, we obtained a map with the demographic distribution, in absolute terms, on the urbanized territory: this data, referring to different extents of land, does not give useful quantitative information in order to put two or more portions in competition; given the need to site new pharmaceutical locations that will serve the greater the more portion of the inhabitants, and then to plan the locations in an efficient and equal way, it is necessary to have data in relative terms, so referred to the portion of land on which they insist.

The total number of inhabitants of each portion of urbanized territory has then been divided by the area of the portion, in such a way to obtain a population density comparable on the entire municipal area (inhabitants/km<sup>2</sup>).

By mapping this variable, it is possible to assess the competition between the different areas that are potentially suitable to accommodate new pharmacies, in order to highlight the “Best Location” in accordance to this criterion.

### 2.2.2 URBAN ACCESSIBILITY

The criterion of accessibility to each pharmacy seat has been interpreted in order to intercept the higher number of inhabitants within 400 meters (6 minutes walk) and 2,000 meters (10 minutes by car) from its location, in order to compare some possible alternatives.

After having identified the possible locations based on the criterion of population density described above, some different future scenarios have been developed, verifying for each of the alternative locations the catchment areas served within 400 and 2,000 meters.

The best location is therefore sited inside the area that maximizes the number of served inhabitants.

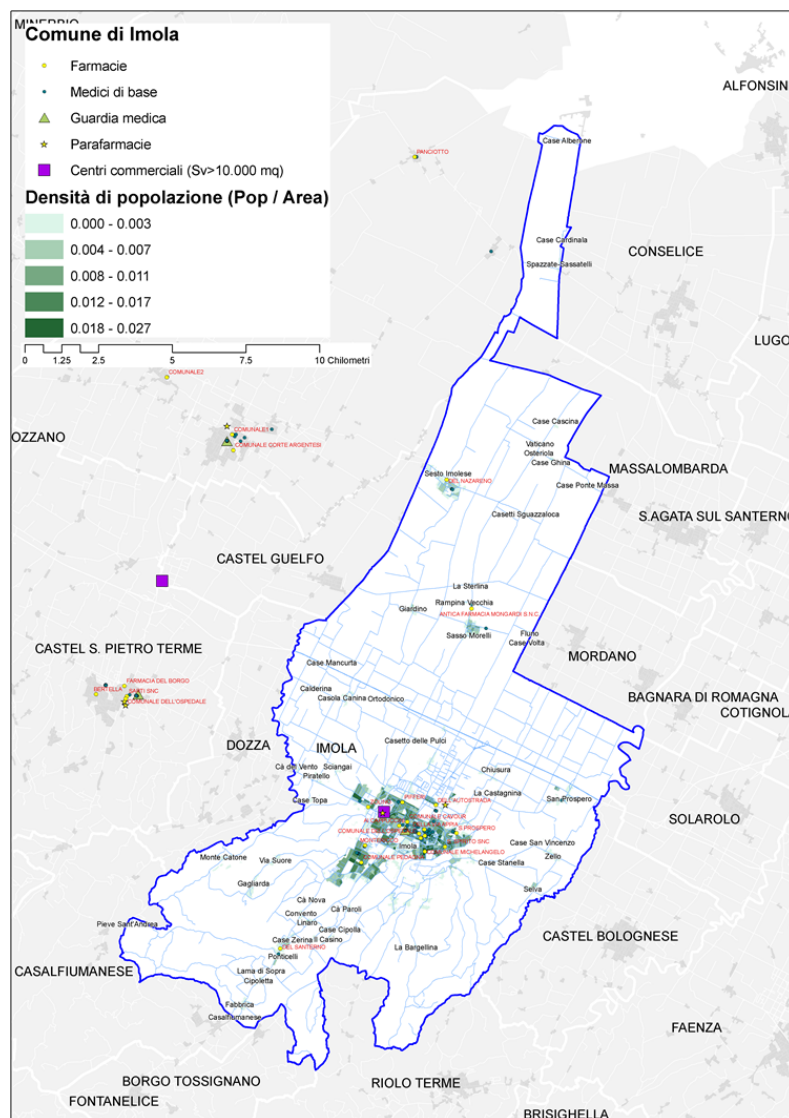


Fig. 2 An example: the distribution of population density in Imola territory

### 3 OPERATIONAL APPLICATIONS OF THE METHOD: THE CASE STUDY OF CASTELFRANCO EMILIA

The analysis and then the assessment of potential locations where to settle the new pharmacies is developed following the 3 goals of the Law and applying the criteria described in the previous paragraph; starting from the territorial level, we analyzed the hierarchy of settlements, ie their consistency in terms of inhabitants (in the catchment and in populated areas), proximity to other pharmacies and to UTAP, and, in some cases, possible street connections; once that some possible macro-areas where to site a new pharmacy have been identified, we have to come down to the urban level by analyzing in detail the catchment area of new and existing pharmacies within 400 meters and 2,000 meters, respectively corresponding to about 6 minutes walk and 10 minutes by car.

The result of the assessment could change if a more compact situation (thus with a capital center with a number of residents much more higher compared to the villages/hamlets) or a more widespread situation (so with towns of comparable consistency in terms of inhabitants) is examined.

#### 3.1 EQUAL E WIDESPREAD DISTRIBUTION ON THE TERRITORY (GOAL1 AND GOAL2)

The municipality of Castelfranco Emilia, a municipality located along the Via Emilia in the Emilia-Romagna Region, has an area of 102.47 km<sup>2</sup> and a population of 32,102 inhabitants (as before 31.12.2010), highly concentrated in the main center (20,600 residents). The average density is therefore of 313.3 inhabitants/km<sup>2</sup>. Using the demographic criterion (3,300 inhabitants per pharmacy + rest > 50%), Law 27/2012 allows 10 pharmacies to be opened in the municipality; on its territory there are already 7 pharmaceutical locations (fig. 3) to which it has to be added an eighth urban one, unassigned, already provided by the reform of the pharmacies districts completed in 2010, and located in the northwest quadrant of the municipality (fig. 3).

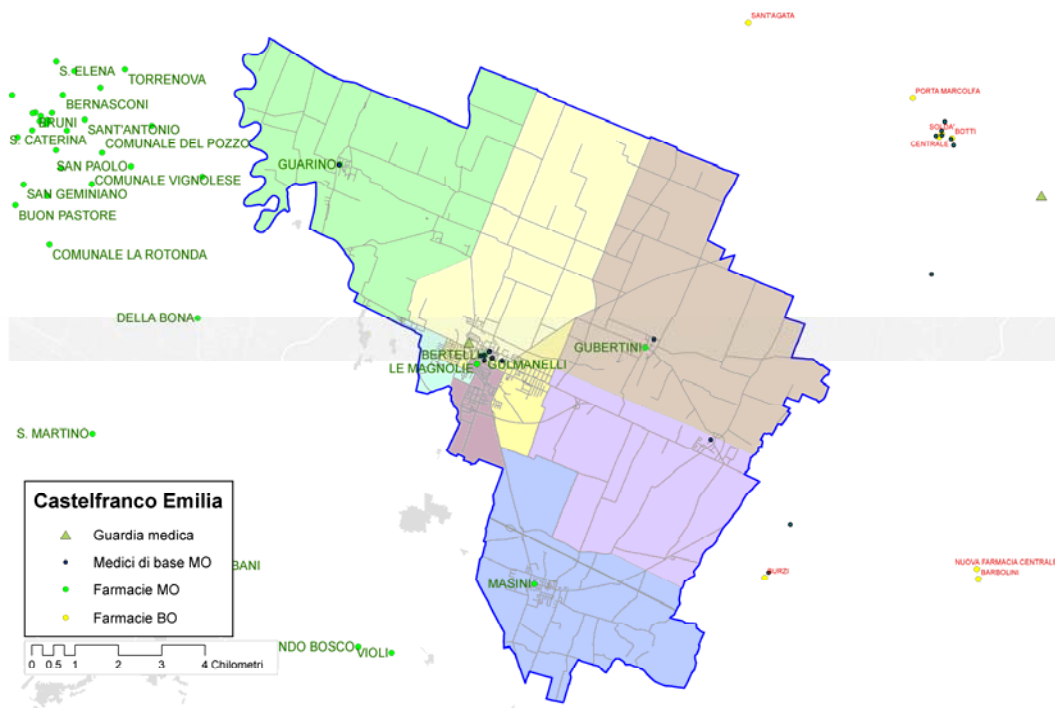


Fig. 3 The pharmacies district of Castelfranco Emilia

Assuming to settle only one of the two pharmacies still allowed, an equal distribution of the 9 pharmaceutical locations, existing or new, would mean, in a theoretical way, that each one would serve a catchment area of about 3,500 inhabitants, a value that would ensure fairness of service, both from the point of view of population (ie to ensure that only a small number of inhabitants is served by multiple locations pharmaceutical and that, on the contrary, a part of the population is not served), both from the point of view of competition between the different pharmaceutical locations, which could therefore count on homogeneous catchment area.

In detail, in Castelfranco Emilia there are 3 "urban" pharmacies located in the center of the main town, as well as a fourth location already planned but not yet assigned.

The three existing urban pharmacies, overall, serve a catchment area of about 17,500 inhabitants, of whom about 3,700 have more than 65 years, as follows:

- Bertelli pharmacy: 7.184 inhabitants (widespread houses included), 1.574 aged
- Gulmanelli pharmacy: 6.196 inhabitants (widespread houses included), 1.408 aged
- Le Magnolie pharmacy: 4.050 inhabitants (widespread houses included), 690 aged

The current situation potentially shows a larger catchment area for the first of these, while the fact that Le Magnolie pharmacy has a smaller number of residents related to their district is not really significant, since, being situated within a mall, actually it catches customers coming from other areas of the town and of the surrounding municipalities.

The other three existing pharmacies are located in the surrounding villages instead. The Masini pharmacy, located in Piumazzo, can count on a large catchment area inside its assigned district(it is about 4,900 inhabitants, widespread houses included, of whom more than 1,000 aged); Gubertini pharmacy, located in Manzolino, has a catchment area if nearly 2,700 inhabitants (widespread houses included), of whom about 470 aged; Guarino pharmacy in Gaggio di Piano village has a catchment area of about 2,700 inhabitants (widespread houses included), of whom about 550 aged.

Among the main remaining villages there's La Cavazzona, whose pharmaceutical location has recently been assigned (for a potential catchment area of 2,121 inhabitants, of whom 320 aged).

The other villages and towns in the municipal area are much smaller, and count up to a few hundred inhabitants. Pioppa and Panzano, neighboring villages placed north of the main town, and, if considered together, would arrive to cover about 550 inhabitants.

To fully comply with the goals of the Law, ie to ensure the widest accessibility of pharmacy services also to those citizens living in sparsely populated areas, a new location sited therein could have also been assessed; however, considering the small catchment area that this one would serve, a new pharmaceutical location in that position, would not probably survive.

Therefore, the assessment of a new location within the main town has been considered, however, taking into consideration both the need of the accessibility for these villages, and the need to expand the coverage of the service to outlying areas, rather than to offer alternatives to areas already served within the city center. The location of an additional pharmacy inside the main town has therefore to be carefully assessed in order to identify the most uncovered areas and to avoid, as far as possible, serve closely the central areas, that can already rely on the presence of 3 existing pharmaceutical locations.

Another issue to be analyzed deals with the distance between pharmacies that has not to be lower than 200 meters, that the Law requires to pursue in an equal and widespread distribution of new locations in the municipal area.



### 3.2 ACCESSIBILITY OF PHARMACY SERVICES (GOAL3)

Considering the accessibility of the 6 existing pharmaceutical locations, it appears that virtually almost the whole population (27,410 inhabitants) is served by at least one pharmacy within 2 kilometers, which is about 10 minutes by car, and about a third inhabitants has a pharmacy within 400 meters from home (11,621 inhabitants), ie by a pedestrian walking distance in 6 minutes on average (fig. 4).

In general, then, the municipal territory has a good coverage, but nevertheless it has significant imbalances from area to area. Within a radius of 400 meters from the existing pharmacies around 4,649 inhabitants are served by two pharmacies, reachable in about 6 minutes walking (which is in fact the average time required to complete a distance of 400 meters) and well 3,840 inhabitants have even 3 pharmacies within 400 meters. This redundancy of the service, concentrated in a very small area of the main town, goes instead to the detriment of the 20,481 inhabitants of the town who do not have any pharmaceutical location within walking distance (ie placed within a distance of 400 meters) and are therefore forced to use the car to reach one of the existing locations. The new location could be provided in the most suburban areas and not immediately in the center of the main town, where, besides being in conflict with the potential catching areas of existing pharmacies, it also provide an unnecessary service at the expense, however, of areas that would most benefit from the opening of a new pharmacy. Therefore, it is possible to identify alternative locations that better meet the requirements of the Law and thus ensure a better distribution of the service on the territory, highlighting the distribution of the density of the population in the municipality and in detail in the main town (fig. 4).

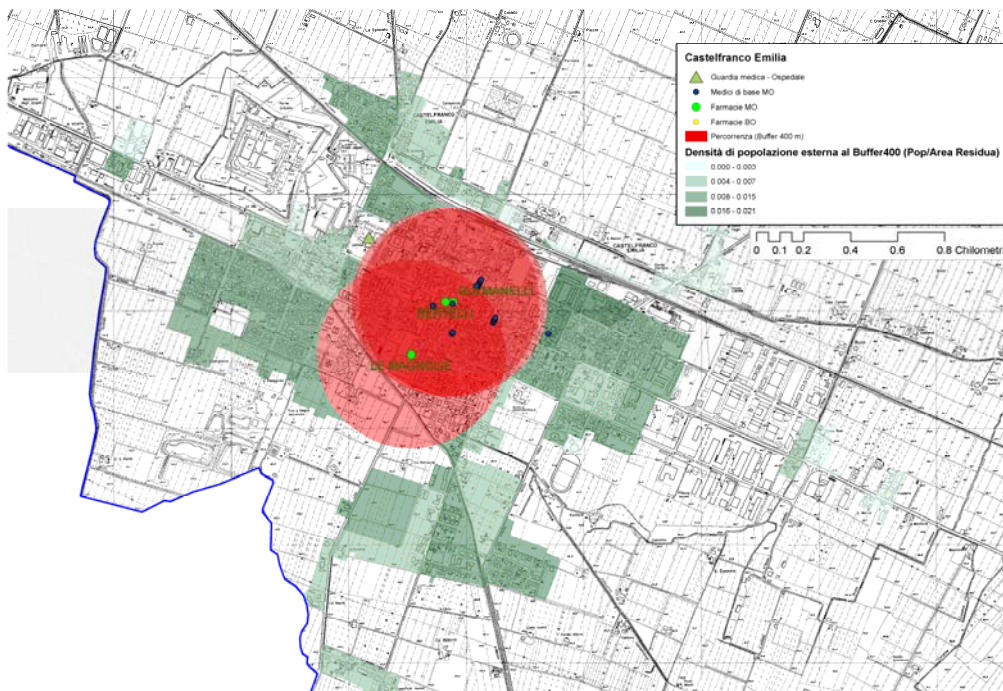
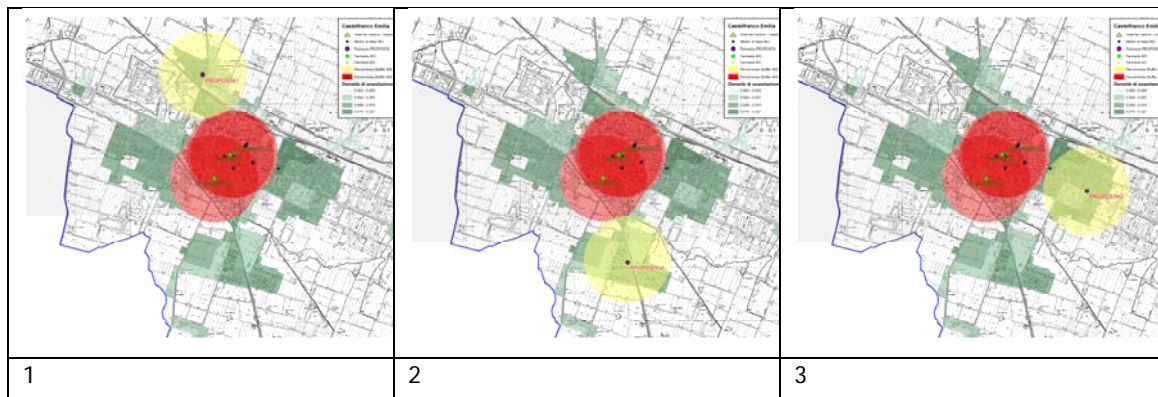


Fig. 4 The distribution of population density in the main town, and 400 meters buffers (red)

Due to the high service coverage in the center, there are also areas with a high population density that are "unserved" within pedestrian accessibility on the edge of the town: these are the east and west parts along the Via Emilia, but also in the northwest, where the Hospital is located, and to the south, where there is a recent urban development.

In summary, from the analysis of these "residual areas", the following 3 cases of location of a new pharmaceutical seat arise:



The 3 hypothesis intercept the following catchment areas:

	BUFFER 400 METERS		BUFFER 2.000 METERS	
	<b>Tot inhabitants</b>	<b>Over 65</b>	<b>Tot inhabitants</b>	<b>Over 65</b>
1	1.530	350	18.180	3.770
2	2.400	320	18.160	3.750
3	2.710	657	18.400	3.810

Numerically, the location to the east (hypothesis 3) seems the most useful and helpful; however, it should be noted that the criteria defined by the Law refer to a standard population only to identify the number of new pharmacies to be set up, while their location can not be separated from respect of equal geographical distribution and widespread accessibility to the pharmaceutical service even to those who live in sparsely populated areas.

Based on these criteria, the most suitable location would refer to the hypothesis 1 (north) because it could serve a portion of the main town, separated from the center by the railway line, and so with limited accessibility to the existing pharmacies, and, furthermore, it would intercept within about 2 km also some neighboring villages and widespread houses (Pioppa and Panzano), and then would fully satisfy the goal to provide a service even to sparsely populated areas.

#### 4 CONCLUSIONS

As is clear from the carried out analysis, placing a service, such as pharmaceuticals, in an area more than another of the city may significantly affect the potential catching area: it may shift territorial balances, in terms of mobility and utility, and, and the more or less equal distribution of the service, from the point of view of seller, could also generate economic competitiveness.

Thinking in terms of territorial dimensions, the efficiency of the service, seen as widespread distribution of the pharmaceutical locations, is much efficient when it manages to balance spatial and regulatory sustainability with the economic one, so as to obtain a partition of the land allowing just not to penalize anyone but, at the same time, to allow everyone to have a social payback.

The effectiveness of the service, instead intended as the effective reachability of the locations from the inhabitants, is greater if it takes into account both the stratification of age and the effective accessibility of each single pharmacy, considering both paths and physical limits of the territory on these routes. These



aspects obviously can not emerge from a only-regulatory approach, but need to be analyzed by means of spatial tools.

If the liberalization of pharmaceutical locations can lead to an increase in competitiveness for the pharmacies themselves, its territorialization can bring that competitiveness onto a spatial level/dimension and thus it requires the adoption of descriptive parameters, as the population density (from the user's perspective) and territorial/urban accessibility (from the point of view of the service).

#### REFERENCES

Giordani, L. (2011), "La concessione amministrativa per l'esercizio del servizio farmaceutico non può essere liberalizzata, ma semmai razionalizzata", *Giustizia Amministrativa*, 11.

Guidotti, M. (2013), *La pianta organica delle farmacie*, [www.galenotech.org/piantaorganica.htm](http://www.galenotech.org/piantaorganica.htm)

#### AUTHORS' PROFILE

Simona Tondelli, eng.

Researcher at the Department of Architecture, *Alma Mater Studiorum* University of Bologna, her main research activities concern the field of the methods and techniques supporting urban and land planning, with particular reference to the integration of sustainable development principles in the planning tools and to the environmental assessment of land use suitability.

Stefano Fatone, eng.

Master graduated in Building and Urban Systems Engineering in 2011, Stefano received his Professional master in Eco-sustainable Architecture in 2012 and now collaborates with the National Institute of Urban Planning (Emilia-Romagna section) and some technical offices within urban and land planning.