



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

## FLORE

# Repository istituzionale dell'Università degli Studi di Firenze

### **Traditional Wooden Architecture in Northern Europe: methods and digital systems for the documentation of the Karelian Heritage**

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

*Original Citation:*

Traditional Wooden Architecture in Northern Europe: methods and digital systems for the documentation of the Karelian Heritage / Sara Porzilli. - STAMPA. - (2016), pp. 583-588. ( Le ragioni del Disegno. Pensiero, Forma e Modello nella Gestione della Complessità / The reason of Drawing. Though, Shape and Model in the Complexity Management Firenze 15-16-17 Settembre 2016).

*Availability:*

The webpage <https://hdl.handle.net/2158/1115243> of the repository was last updated on 2018-04-04T14:38:44Z

*Publisher:*

Gangemi Editore International Publishing

*Terms of use:*

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (<https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf>)

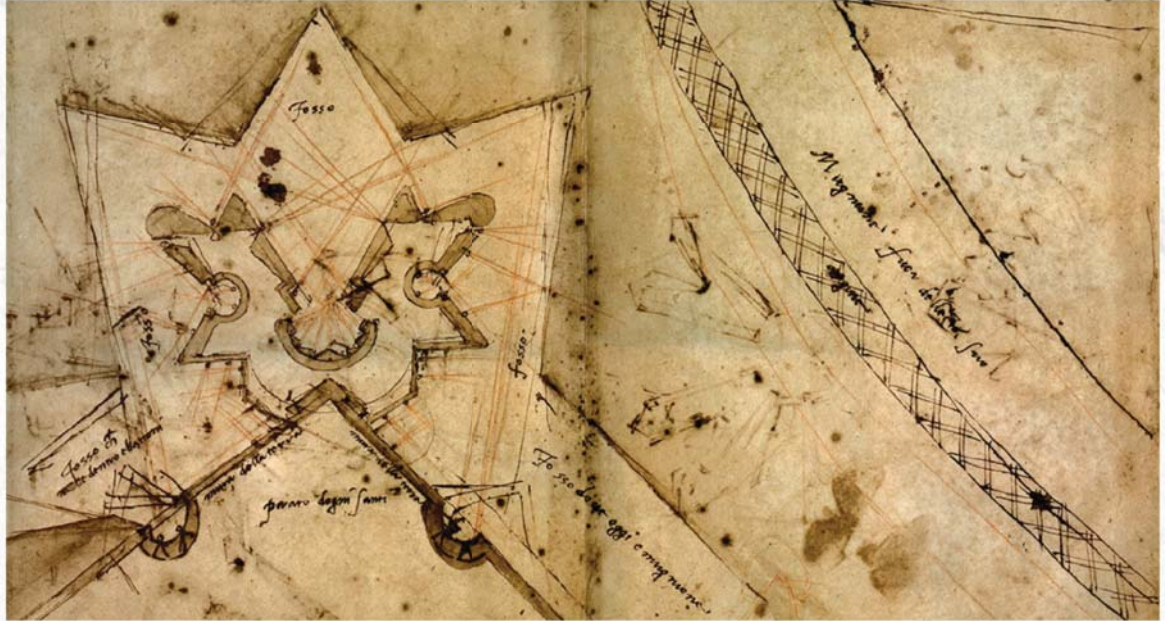
*Publisher copyright claim:*

La data sopra indicata si riferisce all'ultimo aggiornamento della scheda del Repository FloRe - The above-mentioned date refers to the last update of the record in the Institutional Repository FloRe

(Article begins on next page)

# LE **R**AGIONI DEL **D**ISEGNO THE REASONS OF **D**RAWING

Pensiero, **F**orma e **M**odello nella **G**estione della **C**omplessità  
Thought, **S**hape and **M**odel in the **C**omplexity **M**anagement



**38°** CONVEGNO  
INTERNAZIONALE  
DEI DOCENTI DELLE DISCIPLINE  
DELLA RAPPRESENTAZIONE



**UID** UNIONE ITALIANA PER IL DISEGNO  
**DIDA** Dipartimento di Architettura



**UNIVERSITÀ  
DEGLI STUDI  
FIRENZE**  
**DIDA**  
DIPARTIMENTO DI  
ARCHITETTURA

38° CONVEGNO INTERNAZIONALE  
 DEI DOCENTI DELLE DISCIPLINE DELLA RAPPRESENTAZIONE  
 TREDICESIMO CONGRESSO UID – FIRENZE 15 • 16 • 17 SETTEMBRE 2016  
 UNIVERSITÀ DEGLI STUDI DI FIRENZE – AULA MAGNA DEL Rettorato Piazza San Marco, 4  
 AUDITORIUM DI SANTA APOLLONIA Via XXVII aprile, 25A

**Comitato Scientifico internazionale / International Scientific Committee**

Caroline Astrid Bruzelius, *Duke University, North Carolina, USA – member of the American Academy of Arts and Sciences*  
 Pedro Cabesos, *Universidade da Coruña, Spagna*  
 Fabiana Andrea Carbonari, *La Universidad Nacional de La Plata, Argentina*  
 Arivaldo Leao De Amorim, *Universidade Federal da Bahia, Brasile*  
 Livio De Luca, *Direttore di Ricerca del CNRS MAP-Gamsau, Marsiglia, Francia*  
 Juan José Fernandez Martin, *Universidad de Valladolid, Spagna*  
 Roberto Ferraris, *Universidad Nacional de Cordoba, Argentina*  
 José Antonio Franco Carlos de San Antonio Gomez, *Universidad Politécnica de Madrid, Spagna*  
 José Antonio Franco Taboada, *Universidade da Coruña, Spagna*  
 Ángela García Codoñer, *Universitat Politècnica de Valencia, Spagna*  
 Pedro Antonio Janeiro, *Universidade de Lisboa, Portogallo*  
 Walsh Michael John Kir, *School of Art, Design and Media - College of Humanities, Arts, & Social Sciences of the Nanyang Technological University, Singapore*  
 Cornelia Leopold, *University of Kaiserslautern, Germania*  
 Juan Samuel Lladó, *Universidad de Extremadura, Spagna*  
 Francisco Martinez Mindeguia, *Universitat Politècnica de Catalunya, Spagna*  
 Carlos Montes, *Universidad de Valladolid, Spagna*  
 Javier Mosteiro, *Universitat Politècnica de Catalunya, Spagna*  
 Pablo José Navarro Esteve, *Universitat Politècnica de Valencia, Spagna*  
 Fang Yibing, *Accademia nazionale delle scienze Pechino, Repubblica Popolare Cinese*

**Comitato Scientifico Nazionale / National Scientific Committee**

Piero Albinis, *"Sapienza" Università di Roma*  
 Fabrizio Ivan Apollonio, *Università di Bologna*  
 Paolo Belardi, *Università di Perugia*  
 Stefano Bertocci, *Università di Firenze*  
 Carlo Bianchini, *"Sapienza" Università di Roma*  
 Marco Bini, *Università di Firenze*  
 Vito Cardone, *Università di Salerno*  
 Mario Centofanti, *Università dell'Aquila*  
 Emanuela Chiavoni, *"Sapienza" Università di Roma*  
 Michela Cigola, *Università di Cassino e del Lazio Meridionale*  
 Antonio Conte, *Università della Basilicata*  
 Antonella Di Luggo, *Università di Napoli Federico II*  
 Mario Docci, *"Sapienza" Università di Roma*



Proprietà letteraria riservata  
**Gangemi Editore spa**  
 Piazza San Pantaleo 4, Roma  
 www.gangemieditore.it

Nessuna parte di questa pubblicazione può essere memorizzata, fotocopiata o comunque riprodotta senza le dovute autorizzazioni.

Le nostre edizioni sono disponibili in Italia e all'estero anche in versione ebook.  
 Our publications, both as books and ebooks, are available in Italy and abroad.

**GANGEMI EDITORE**<sup>®</sup>  
 INTERNATIONAL PUBLISHING

FINITO DI STAMPARE NEL MESE DI SETTEMBRE 2016  
 www.gangemieditore.it

ISBN 978-88-492-3295-0

Francesca Fatta, *Università Mediterranea della Calabria*  
 Paolo Giandebiaggi, *Università di Perna*  
 Andrea Giordano, *Università di Padova*  
 Elena Ippoliti, *"Sapienza" Università di Roma*  
 Francesco Maggio, *Università di Palermo*  
 Anna Marotta, *Politecnico di Torino*  
 Arturo Livio Sacchi, *Università Chieti-Pescara*  
 Rossella Salerno, *Politecnico di Milano*  
 Alberto Sdegno, *Università di Trieste*  
 Ornella Zerlenga, *Seconda Università di Napoli*

**Peer reviewer internazionali / International peer reviewers**

Pedro Cabesos, *Universidade da Coruña, Spagna*  
 Andrea Fabiana Carbonari, *La Universidad de La Plata, Argentina*  
 Arivaldo Leao De Amorim, *Universidade Federal da Bahia, Brasile*  
 Roberto Ferraris, *Universidad Nacional de Cordoba, Argentina*  
 José Antonio Franco Carlos de San Antonio Gomez, *Universidad Politécnica de Madrid, Spagna*  
 José Antonio Franco Taboada, *Universidade da Coruña, Spagna*  
 Pedro Antonio Janeiro, *Universidade de Lisboa, Portogallo*  
 Juan Samuel Lladó, *Universidad de Extremadura, Spagna*  
 Francisco Martinez Mindeguia, *Universitat Politècnica de Catalunya, Spagna*  
 Carlos Montes, *Universidad de Valladolid, Spagna*  
 Javier Mosteiro, *Universitat Politècnica de Catalunya, Spagna*  
 Pablo José Navarro Esteve, *Universitat Politècnica de Valencia, Spagna*

**Peer reviewer nazionali / National peer reviewers**

Fabrizio Agnello, *Università degli Studi di Palermo*  
 Giuseppe Amoruso, *Politecnico di Milano*  
 Marinella Arena, *Università Mediterranea Reggio Calabria*  
 Marcello Balzani, *Università di Ferrara*  
 Laura Baratin, *Università di Urbino Carlo Bo*  
 Salvatore Barba, *Università di Salerno*  
 Cristiana Bedoni, *Università degli Studi Roma Tre*  
 Marco Giorgio Bevilacqua, *Università di Pisa*  
 Fabio Bianconi, *Università di Perugia*  
 Enrica Bistagnino, *Università di Genova*  
 Antonio Bixio, *Università degli Studi della Basilicata*  
 Stefano Brusaporci, *Università degli Studi dell'Aquila*  
 Adele Carla Buratti, *Politecnico di Milano*  
 Massimiliano Campi, *Università degli Studi di Napoli Federico II*  
 Marco Canciani, *Università degli Studi Roma Tre*  
 Mara Capone, *Università degli Studi di Napoli Federico II*  
 Laura Carlevaris, *"Sapienza" Università di Roma*  
 Laura Carnevali, *"Sapienza" Università di Roma*  
 Marco Carpicci, *"Sapienza" Università di Roma*  
 Andrea Casale, *"Sapienza" Università di Roma*  
 Francesco Cervellini, *Università di Camerino*  
 Luca Cipriani, *Università di Bologna*  
 Paolo Cini, *Università, Politecnica delle Marche*  
 Luigi Cocchiarella, *Politecnico di Milano*  
 Luisa Chiara Cogorno, *Università di Genova*  
 Daniele Colistra, *Università Mediterranea Reggio Calabria*  
 Romolo Continenza, *Università degli Studi dell'Aquila*  
 Secondino Coppo, *Politecnico di Torino*  
 Cesare Cundari, *"Sapienza" Università di Roma*  
 Laura De Carlo, *"Sapienza" Università di Roma*  
 Francesco Paolo De Mattia, *Politecnico di Bari*  
 Roberto De Rubertis, *"Sapienza" Università di Roma*  
 Aldo De Sanctis, *Università Mediterranea Reggio Calabria*  
 Edoardo Dotto, *Università di Catania*

Fabio Fabbrizzi, *Università degli Studi di Firenze*  
 Maria Linda Falcidieno, *Università di Genova*  
 Federico Fallavolita, *Università di Bologna*  
 Patrizia Falzone, *Università di Genova*  
 Marco Fasolo, *"Sapienza" Università di Roma*  
 Riccardo Florio, *Università degli Studi di Napoli Federico II*  
 Giorgio Garzino, *Politecnico di Torino*  
 Fabrizio Gay, *Università IUAV di Venezia*  
 Gaetano Ginex, *Università Mediterranea Reggio Calabria*  
 Massimo Giovannini, *Università Mediterranea Reggio Calabria*  
 Guido Guidano, *Università di Genova*  
 Manuela Incerti, *Università di Ferrara*  
 Sereno Marco Innocenti, *Università di Brescia*  
 Mariangela Liuzzo, *Università di Emma*  
 Massimiliano Lo Turco, *Politecnico di Torino*  
 Giovanna Angela Massari, *Università di Trento*  
 Giampiero Mele, *Università telematica eCampus*  
 Barbara Messina, *Università di Salerno*  
 Riccardo Migliari, *"Sapienza" Università di Roma*  
 Giuseppa Novello, *Politecnico di Torino*  
 Anna Osello, *Politecnico di Torino*  
 Caterina Palestini, *Università di Chieti-Pescara "G. d'Annunzio"*  
 Lia Maria Papa, *Università degli Studi di Napoli Federico II*  
 Leonardo Paris, *"Sapienza" Università di Roma*  
 Sandro Parrinello, *Università di Pavia*  
 Paolo Piumatti, *Politecnico di Torino*  
 Fabio Quici, *"Sapienza" Università di Roma*  
 Luca Ribichini, *"Sapienza" Università di Roma*  
 Andrea Ricci, *Università degli Studi di Firenze*  
 Andrea Rolando, *Politecnico di Milano*  
 Michela Rossi, *Politecnico di Milano*  
 Daniele Rossi, *Università di Camerino*  
 Salvatore Santuccio, *Università di Camerino*  
 Roberta Spallone, *Politecnico di Torino*  
 Giacinto Taibi, *Università di Catania*  
 Camillo Trevisan, *Università IUAV di Venezia*  
 Pasquale Tunzi, *Università di Chieti-Pescara "G. d'Annunzio"*  
 Maurizio Unali, *Università di Chieti-Pescara "G. d'Annunzio"*  
 Graziano Mario Valenti, *"Sapienza" Università di Roma*  
 Rita Maria Valenti, *Università di Catania*  
 Cesare Verdoscia, *Politecnico di Bari*  
 Chiara Vernizzi, *Università di Parma*  
 Andrea Zerbi, *Università di Parma*

**Comitato Organizzatore / Organizing Committee**

Giovanni Anzani, Barbara Aterini, Maria Teresa Bartoli, Stefano Bertocci, Carlo Biagini, Marco Bini, Carmela Crescenzi, Cecilia Luschi, Emma Mandelli, Alessandro Merlo, Paola Puma, Marcello Scalzo, Giorgio Verdiani

**Staff Tecnico - Operativo / Staff - Operative**

Laura Aiello, Francesco Algotino, Andrea Aliperta, Eleonora Ceconi, Paolo Formaglini, Filippo Giansanti, Gaia Lavoratti, Giancarlo Littera, Andrea Pasquali, Francesca Picchio, Francesco Tioli

**Coordinamento Scientifico / Scientific Coordination**

Stefano Bertocci  
 Marco Bini

**I testi e le relative traduzioni oltre che tutte le immagini pubblicate sono state fornite dai singoli autori per la pubblicazione con copyright e responsabilità scientifica e verso terzi. La revisione e redazione dei testi è stata dei curatori del volume.**

In copertina: Michelangelo Buonarroti - *Studi di fortificazione per la Porta al Prato d'Ognissanti* - Firenze, Casa Buonarroti. (per gentile concessione della Dott.ssa Pina Ragonieri direttrice del museo "Casa Buonarroti")

# LE RAGIONI DEL DISEGNO THE REASONS OF DRAWING

*Pensiero, Forma e Modello nella Gestione della Complessità  
Thought, Shape and Model in the Complexity Management*

A CURA DI  
STEFANO BERTOCCI  
MARCO BINI

GANGEMI EDITORE®  
INTERNATIONAL PUBLISHING



- 13 **Introduzione**  
Introduction  
*Luigi Dei, Rettore dell'Università degli Studi di Firenze*
- 15 **Presentazione**  
Presentation  
*Saverio Mecca, Direttore DIDA Dipartimento di Architettura*
- 17 **Prefazione**  
Preface  
*Vito Cardone, Presidente UID*
- 29 **Perché la regione del disegno**  
The Reasons of Drawing  
*Stefano Bertocci, Marco Bini*
- 1. LE RAGIONI DEL DISEGNO COME STRUMENTO  
DI STUDIO E APPROCCIO ALLA CONOSCENZA**  
**THE REASONS OF DRAWING AS AN INSTRUMENT  
OF STUDY AND APPROACH TO KNOWLEDGE**
- 35 The tree of life in the southern porch of the Cathedral of Palermo: survey and geometric analysis  
*Fabrizio Agnello, Mirco Cannella*
- 41 **Il disegno per comprendere i manufatti architettonici. Il caso di Le Castella**  
The drawing for understanding the architectural artifacts. Le Castella case  
*Laura Aiello*
- 49 **El relevamiento digital como instrumento para conocer e interpretar la arquitectura: levantamiento gráfico del Colegio Nacional de Monserrat en Córdoba.**  
The digital survey as a tool to understand and interpret the architecture  
*Maria Clara Amoedo*
- 57 Digital reconstruction of Piazza delle Erbe in Verona at XIV<sup>th</sup> century  
*Fabrizio I. Apollonio, Marco Gaiani, Federico Fallavollita, Elisabetta C. Giovannini, Riccardo Foschi*
- 63 **Il disegno di rilievo come strumento di indagine. Il caso della Certosa monumentale di Calci**  
The architectural survey drawing as an investigation instrument. The case of the Calci Charterhouse  
*Alessandro Bandinelli, Marco Giorgio Bevilacqua, Ewa Karwacka*
- 69 Infographic techniques for the representation of marginal buildings of Salerno coast  
*Daide Barbato, Sara Morena*
- 73 **Levantamiento métrico digitalizado con tres metodologías distintas de los laboratorios del Sanatorio de Fontilles**  
Digitalised metric survey of the laboratories building at Fontilles Sanatorium using three different technologies  
*Eduardo María Baviera López, José Luis Denia Ríos, Jorge Llopis Verdú, Jorge Francisco Martínez Piqueras*
- 83 **Integración de tres metodologías para la obtención de un modelo completo de los Laboratorios de Fontilles**  
Integration of three methodologies in order to obtain a complete model of the laboratories building of Fontilles  
*Eduardo María Baviera López, Jorge Llopis Verdú, José Luis Denia Ríos, Rafael Emilio Marín Tolosa*
- 91 **Progetto di documentazione per la valorizzazione dell'altopiano di Masada: il disegno tridimensionale come strumento di conoscenza per il quartier generale del Palazzo di Erode**  
Documentation Project for the enhancement plateau of Masada: the three-dimensional design as a knowledge tool for the headquarters of Herod's Palace  
*Monica Bercigli*
- 99 **Disegno e rappresentazioni digitali: modelli e mappe di un mondo inquieto**  
Drawing and digital representations: models and maps for a restless world  
*Francesco Bergamo*
- 107 **Alle radici di Venezia: il disegno e la ricostruzione grafica della basilica di Equilio**  
At the roots of Venice: drawing and graphical reconstruction of the basilica of Equilibrium  
*Otello Bergamo*
- 115 **Al di là della comunicazione: modelli 3D euristici nello studio dell'Architettura**  
Beyond communication: 3D heuristic models in architectural research  
*Carlo Bianchini*
- 125 The parameterization of complex surfaces for engineering solutions  
*Fabio Bianconi, Marco Filippucci*
- 131 **La Cattedrale di Santa Maria La Real a Sasamón, dal rilievo laser scanner 3D alla restituzione architettonica e strutturale per la conservazione del complesso religioso**  
The Cathedral of Santa Maria La Real in Sasamón, from 3D laser scanner survey to the architectural and structural design for the preservation of the religious complex  
*Matteo Bigongiari*
- 137 **Modelli prospettici nella divulgazione della conoscenza. Un ingegnere, un religioso e la rappresentazione della magia naturalis**  
Perspective models in the dissemination of knowledge. An engineer, a religious and the *magia naturalis* representation  
*Alessio Bortot, Stefano Zoerle*
- 145 **Obras realizadas por los "constructores" italianos en La Plata entre 1918 y 1945. Arquitectura, análisis y dibujo**  
Works by Italian "constructores" in La Plata between 1918 and 1945. Architecture, analysis and drawing  
*Fabiana Carbonari, Emanuela Chiavoni, Mario Docci, Fernando Gandolfi, Eduardo Gentile, Ana Ottavianelli*
- 151 **Pavia, capitale longobarda: nuovi studi e approcci alla conoscenza per la conservazione e la valorizzazione dell'architettura altomedievale**  
Pavia, longobard capital: new studies and knowledge approaches for the conservation and valorisation of early medieval architecture  
*Alessio Cardaci, Antonella Versaci, Luca Renato Fauzia*
- 159 **Il rilievo quale sistema di indagine di una struttura complessa: l'esedra dell'Open Air Museum di Goreme**  
Survey as a system of investigation of a complex structure: the exedra of the Open Air Museum in Goreme  
*Marco Carpicci, Carlo Inglese, Fabio Colonnese, Andrea Angelini*
- 165 **Esperimento prospettiva. Relazioni particolari tra immagine e mente**  
Experimenting with Perspective. Particular Relationships between the Image and the Mind  
*Andrea Casale*
- 173 The (secret) reasons of survey: the drawings of Prosper Morey (1805-1886)  
*Camilla Casonato*
- 179 **"La casa della scuola": architetture per l'istruzione nella prima metà del Novecento. Rilievo e conoscenza**  
"The House of the School": architectures for education in the first half of the XX Century. Survey and knowledge  
*Mario Centofanti, Stefano Brusaporci, Pamela Maiezza*
- 187 **Conocimiento y difusión de los paisajes y territorios históricos: la Sierra de Guadarrama y los bosques reales en torno a Madrid**  
Knowledge and Diffusion of Historical Landscapes and Territories: The Guadarrama Mountains and the Royal Woods around Madrid  
*Pilar Chías Navarro, Tomás Abad*
- 195 **Analisi di un'opera di Bramante attraverso il disegno: dalla lettura del frammento alla genesi progettuale**  
Using drawing to analyse a Bramante building: from interpretation of a fragment to the design genesis  
*Emanuela Chiavoni, Francesca Porfiri, Gaia Lisa Tacchi*

- 201 **L'area archeologica della *casinum* romana. Le ragioni di un percorso di studio e conoscenza tra contesto urbano e archeologico**  
The archaeological site of *casinum* in Roman era. The reasons for a course of study and knowledge among an urban and archaeological context  
*Michela Cigola, Saverio D'Auria, Arturo Gallozzi, Leonardo Paris, Rodolfo Maria Strollo*
- 209 **Il disegno scenografico della scala di Palazzo D'Afflitto a Napoli**  
The D'Afflitto Palace staircase scenographic drawing  
*Vincenzo Cirillo*
- 217 **Il Disegno dell'architettura antica. Nuovi codici per la comprensione e la fruizione. Tecniche di SFM per il rilievo de "La Pianta di Mausoleo con giardino" collocata al *Lapidarium* del Palazzo Ducale di Urbino**  
The drawing of ancient architecture. New codes for the understanding and enjoyment. SFM techniques for the digitization of "The Drawing of Mausoleum with garden" located at the *Lapidarium* of Ducal Palace in Urbino  
*Paolo Clini, Ludovico Ruggeri, Antonio Corso, Gianni Plescia*
- 225 **La ragione delle ragioni: immagine e conoscenza**  
The reason of the reasons: image and knowledge  
*Luigi Cocchiarella*
- 231 **Solid Perspective and digital modeling. Bernini's perspectival sacellum for the statue of Felipe II in Santa Maria Maggiore in Rome**  
*Fabio Colonnese, Marcello Fagiolo*
- 237 **Il disegno per l'uomo: i progetti e i piani per la città d'Ivrea**  
Drawings for mankind: projects and plans for Ivrea  
*Sara Conte*
- 245 **La geometria non è poi ... troppo sconosciuta**  
Geometry is not ... too much unknown  
*Roberto Corazzi*
- 253 **Il disegno delle strutture religiose tra Montenegro e Grecia settentrionale**  
The drawing of the religious structures between Montenegro and northern Greece  
*Luigi Corniello, Andrea Maliqari, Vito Maria Benito Voza*
- 261 **Villa Farnesina in Rome. A contribution to its history**  
*Cesare Cundari, Gian Maria Bagordo, Gian Carlo Cundari, Maria Rosaria Cundari, Giuseppe Antuono*
- 265 **Il codice nell'era digitale. Riflessioni su nuovi bisogni e necessità della rappresentazione grafica a carattere tecnico**  
Codex in the digital era. Thoughts on the new needs and requirements of graphic technical representation  
*Pierpaolo D'Agostino*
- 271 **Le plastiche murarie nelle architetture di Gio Ponti e José Antonio Coderch. Rappresentazione e costruzione della facciata ceramica**  
The articulation of facade wall in the Gio Ponti and José Antonio Coderch architectures. Drawing and construction of ceramic facade  
*Filomena De Robertis*
- 279 **Variazioni figurative della modernità**  
Figurative variations on modernity  
*Antonella di Luggo*
- 287 **La rappresentazione del patrimonio architettonico in dismissione: il caso del Forte Boccea in Roma**  
The representation of the architectural heritage in dismission: the study of Forte Boccea in Rome  
*Paolo Di Pietro Martinelli*
- 295 **Pensiero, conoscenza, rappresentazione di un oggetto architettonico: il Maso Anten della Valle di Anterselva in Alto Adige**  
Thought, Knowledge, and Representation of an Architectural Object: Maso Anten of the Antholz Valley in South Tyrol  
*Andrea Donelli*
- 303 **Il disegno come strumento di lettura e individuazione delle matrici progettuali e di riferimento nelle attribuzioni. Il caso della Villa Pallavicini "delle Peschiere" a Genova**  
The drawing as a tool for reading and identification of design matrices and reference within the attributions. The case of Villa Pallavicini "delle Peschiere" in Genoa  
*Patrizia Falzone*
- 311 **L'analisi grafica come strumento di conoscenza: studio della geometria della voluta ionica nei trattati di architettura dal XV al XVII secolo**  
Graphic analysis as instrument of knowledge: study of the geometry of the ionic voluta in architectural treatises from XV to XVII century  
*Veronica Fazzina*
- 319 **Dialogue between water and architecture: an architectural survey of the Vadue Nymphaeum**  
*Giuseppe Fortunato*
- 325 **Los dibujos de viaje como *storytelling* del proceso de concepción del proyecto. El ejemplo de Álvaro Siza**  
Travel sketches that tell the story of a project's conception process. The example of Álvaro Siza  
*José Antonio Franco Taboada*
- 331 **Drawing for understanding architecture: interpreting project matter and measure**  
*Mariateresa Galizia, Cettina Santagati, Nuccio Giuffrida*
- 337 **Il disegno dell'indiscernibile: morfogenesi & morfografia degli artefatti**  
Drawing the indiscernible: morphogenesis & morphography of the artefacts  
*Fabrizio Gay, Irene Cazzaro*
- 345 ***Cum corde*: le ragioni del disegno dell'ultima cinta muraria di Siena**  
*Cum corde*: the reasoning underpinning the design of Siena's final city wall  
*Stefano Giannetti*
- 353 **L'Architettura Picta e la realizzazione della chiesa ideale a pianta centrale: il ruolo della rappresentazione per la conoscenza, l'elaborazione e la comunicazione tra ricerca e fruizione turistico-culturale**  
The representation for knowledge, elaboration and communication between research and touristic-cultural enjoyment: the central-plan ideal church, painted and built in the second half of the fifteenth century in Italy  
*Andrea Giordano, Chiara Nichele*
- 359 **Il giardino inglese della Reggia di Caserta**  
The *English Garden* of the Royal Palace of Caserta  
*Paolo Giordano*
- 367 **Escribiendo las imágenes, dibujando las ideas. Acerca del valor del las representaciones en el proceso de estudio de la arquitectura**  
Writing Images, Drawing Ideas. About the value of representations in the process of studying architecture  
*Horacio José Gnemmi Bohogú*
- 373 **Vedere/trasporre: esercizi di pittura e calligrafia con la camera lucida**  
Watching/transposing: painting and calligraphy exercises with the camera lucida  
*Renata Guadalupi*
- 381 **Tradizione ed innovazione nel disegno di rilievo per la conoscenza del costruito. Il caso studio della Chiesa di S. Agostino della Cella, Genova**  
Tradition and innovation in the design of relief for the knowledge of the building. The case study of the Church of S. Agostino della Cella, Genoa  
*Guido Guidano, Carlo Battini*
- 389 **All'origine della forma: misura e numero nel Mausoleo di Teodorico a Ravenna**  
The origins of form: measurement and numbers in Theodoric's Mausoleum in Ravenna  
*Manuela Incerti, Gaia Lavoratti*
- 395 **Ἐκφρασις (ekphrasis): un problema di rappresentazione**  
Ἐκφρασις (ekphrasis): a problem of representation  
*Alfonso Ippolito, Martina Attenni*
- 403 **The consecution of uncertain knowledge, hypotheses and the design of abstraction**  
*Dominik Lengyel, Catherine Toulouse*
- 409 **Modus e Modellus per l'analisi multisemantica di un frammento architettonico**  
*Modus and Modellus* for the multi-semantic analysis of an architectonic fragment  
*Mariangela Liuzzo, Sebastiano Giuliano, Egidio Di Maggio*
- 415 **Space and Landscape: landscape representation and interpretation**  
*Gabriella Liva*

- 419 Estudio de piezas industriales para el reconocimiento de la intención proyectual plasmada en la forma. Aplicación de técnicas de relevamiento digitales  
Study of industrial parts for recognition of intent of design. Application of digital survey techniques  
*Laura A. Lopresti, Marianela Lara, Laura L. Fuertes, Sergio J. Gavino, Gabriel H. De Franco*
- 425 Signum supra Lapidem  
*Signum supra Lapidem*  
*Cecilia Maria Roberta Luschi*
- 431 De Stijl e l'architettura. L'Hôtel particulier, trascrizioni grafiche  
*De Stijl and architecture. Hôtel particulier, graphic transcriptions*  
*Francesco Maggio*
- 439 Il disegno del sottosuolo. Le Cisterne Romane di Fermo  
The design of the subsoil. The Roman cisterns of Fermo  
*Alessia Maiolatesi*
- 447 La profondità apparente nell'illusionismo prospettico. Analisi sperimentali sulla Gloria di Sant'Ignazio a Roma di Andrea Pozzo  
The illusory depth of perspective illusionism. Experimental analysis on Andrea Pozzo's Glory of St. Ignatius in Rome  
*Matteo Flavio Mancini*
- 455 Lo skyline nella interpretazione del paesaggio come applicazione di analisi conoscitive  
The skyline in the interpretation of the landscape as application of cognitive analysis  
*Maria Martone*
- 461 Il rilievo con laser scanner 3D del patrimonio architettonico bizantino in Calabria  
The 3D laser scanner survey of the Byzantine architectural heritage in Calabria  
*Giuseppe Mazzacava*
- 469 Il teatro all'italiana di Ferrara dal rilievo all'analisi geometrica  
The Italian theater of Ferrara, from the survey to the geometric analysis  
*Giampiero Mele, Roberta Ziosi*
- 477 Fotomodellazione di resti ossei in archeologia. Un'opportunità di documentazione e conoscenza  
Photomodelling of osseous remains in archaeology. A chance to documentation and knowledge  
*Barbara Messina, Giuseppe Damone, Salvatore Barba*
- 483 The reconstruction project: the district Villarsosa  
*Manuela Milone*
- 487 La stazione centrale di Stoccarda di Paul Bonatz: disegno di un'evoluzione  
Stuttgart main station by Paul Bonatz: drawing an evolution  
*Letizia Musio Somma*
- 495 Rilievo digitale e virtual heritage: il Castellum Aquarum di Poggio Murelle a Manciano (GR)  
Digital Surveying and Virtual Heritage: the Castellum Aquarum of Poggio Murelle in Manciano (Grosseto - Italy)  
*Giuseppe Nicastro*
- 501 Disegnare con arte e misura: una lezione ispirata dai disegni di Giuseppe Mosca redatti per illustrare i Sommari di spesa e Piani di situazione dei lavori per il ponte sulla Dora a Torino  
Drawing with art and measurement: a lesson inspired by Giuseppe Mosca's drawings prepared to show quantity take off and building site management for the construction of the bridge over Dora river, in Turin  
*Giuseppa Novello*
- 507 Disegno e misura come strumenti di rivelamento e interpretazione delle trasformazioni: Castel Masegra a Sondrio, tra progetto e storia  
Drawing and measuring as reveal and interpretation instrument of transformations: Castel Masegra in Sondrio, between design and history  
*Daniela Oreni*
- 515 Origine, rappresentazione e visualizzazione della forma  
Origins, representation and shape's visualisation  
*Daniela Palomba*
- 523 La scala elicoidale a Caprarola di Jacopo Barozzi da Vignola. Innovazione formale tra teoria e prassi  
The helicoidal staircase at Caprarola by Jacopo Barozzi da Vignola. Formal innovation between theory and practice  
*Leonardo Paris*
- 531 Disegno in Terra Santa: esperienze di rilievo e di analisi per la documentazione ed il recupero di siti in Medio Oriente  
Drawing in the Holy Land: significant experience and analysis for the documentation and the recovery of Middle East sites  
*Sandro Parrinello*
- 539 Il disegno iconico per comunicare le relazioni e le ragioni dell'architettura  
Iconic drawing to communicate the connections and the reasons of architecture  
*Ivana Passamani*
- 547 Cognitive analysis for historical towns: digital representation and computational simulation to investigate the effects of solar radiation and wind exposure  
*Assunta Pelliccio*
- 553 Parametric Design and Geometric Optimization of Architectural Complex Shapes  
*Davide Pellis*
- 557 Attuali orizzonti del Rilievo e della Rappresentazione  
Current Horizons of Surveying and Representation  
*Paolo Perfido*
- 563 Configuration of virtual landscape of historical centre of Pavia. The drawing for the abstraction of urban complexity  
*Francesca Picchio*
- 569 De lo analogico a lo digital  
Analog to digital  
*Renata Pinedo Valdiviezo*
- 577 L'esagono nel progetto dell'architettura militare. Il Castello di Milano  
The hexagon in the design of military architecture. The Castle of Milan  
*Andrea Pirinu*
- 583 Traditional Wooden Architecture in Northern Europe: methods and digital systems for the documentation of the Karelian Heritage  
*Sara Porzilli*
- 589 Surveying and communicating for the virtual archaeological exhibitions: 3D low cost modeling of finds from the tomb of a Faliscan princess, the project "The Faliscan princess's grave goods in 3D"  
*Paola Puma*
- 593 Dal bozzetto al disegno esecutivo tra trattatistica e prassi. Percorsi creativi del quadraturismo  
From bozzetto towards quadratura between treatises and praxis. Creative processes of quadraturism  
*Nevena Radojevic*
- 601 Il processo di mutazione dell'architettura genera la nuova immagine della città  
Architecture mutation produces new city image  
*Paola Raffa*
- 607 3D Survey for analysis and comprehension of Hiite hieroglyphic through new forms of representation  
*Leopoldo Repola*
- 613 La rappresentazione di facciate complesse come strumento di analisi compositiva e materica: il caso del Duomo di Monza  
The complex façades representation for constructive schema generation and matter analysis: the case study of Duomo in Monza  
*Michele Russo*
- 619 Survey and restoration of the Imperial Compound of Menelik II in Addis Ababa, Ethiopia  
*Livio Sacchi*
- 623 Influenze di Andrea Pozzo nella Gloria di S. Ignazio a Gorizia e analisi prospettica  
Influences of Andrea Pozzo in the Glory of St. Ignatius in Gorizia and perspective analysis  
*Alberto Sdegno, Silvia Masserano, Veronica Riavis*
- 631 A historiographical study of the urban landscape to integrate buildings that visually impact on the Torres de Serranos in Valencia  
*Juan Serra, Pedro Cabezos, Javier Cortina, Susana Iñarra*

- 635 **Disegnare per divulgare: i processi de-costruttivi dell'effimero**  
Drawing promotes culture: the de-constructive processes of ephemeral architecture  
*Giacinto Taibi, Rita Valenti, Simona Gatto, Emanuela Paternò*
- 643 **La idea en el dibujo arquitectónico**  
The idea in architectural drawing  
*Aurelio Vallespín Muniesa, Luis Agustín Hernández, Ignacio Cabodevilla-Artieda*
- 651 **Project interpretation and "inverse design": an architectural approach to digital reconstruction**  
*Giorgio Verdiani*
- 655 **Costruzione e fruizione della realtà urbana virtuale**  
Virtual urban reality's construction and fruition  
*Cesare Verdoscia, Anna Christiana Maiorano, Mario di Puppo, Riccardo Tavolare, Angela dell'Acqua*
- 661 **Lecture geometriche sul costruito: paradigmi di progetto e androni voltati in Torino tra Sei e Settecento**  
Geometric readings on built architecture: design paradigms and atria in Turin between Seventeenth and Eighteenth centuries  
*Marco Vitali*
- 667 **Disegnare le ragioni dello spazio costruito. Le scale aperte del '700 napoletano**  
The reasons of drawing. Open eighteenth-century Neapolitan staircases  
*Ornella Zerlenga*

## 2. LE RAGIONI DEL DISEGNO COME ESPRESSIONE DELLA CREATIVITÀ E TRACCIA DEL PENSIERO PROGETTUALE

### THE REASONS OF DRAWING AS EXPRESSION OF CREATIVITY AND TRACE OF DESIGN THINKING

- 675 **Disegno vs Progetto. Pensieri e immagini**  
Drawing vs Design. Ideas and images  
*Piero Albisinni*
- 685 **Il pensiero di Paolo Soleri attraverso la Rappresentazione della creatività**  
The Soleri thinking as creativity Representation  
*Alessandro Basso*
- 691 **Il disegno come elemento base dell'espressione artistica e progettuale delle opere di Giambattista Tiepolo**  
Drawing as an essential expressive tool in the art and design of giambattista Giambattista Tiepolo  
*Otello Bergamo*
- 697 **Il Disegno del Logotipo**  
The logo's drawing  
*Antonio Bixio*
- 703 **Genius memoriae in architettura**  
*Genius memoriae* in architecture  
*Cecilia Bolognesi*
- 711 **Il Disegno delle strutture provvisorie da Brunelleschi ai ponteggi a telai prefabbricati**  
Scaffold design drawing: from Brunelleschi to frame prefabricated scaffolding  
*Francesco Broglia*
- 719 **L'utilizzo della prospettiva nella tarsia "Amon violante Tamar" del coro di Santa Maria Maggiore a Bergamo**  
The use of perspective in inlay "Amon violante Tamar" in choir of Santa Maria Maggiore in Bergamo  
*Giorgio Buratti*
- 727 **Di-segno in segno. Rivoluzioni tecnologiche e cambiamenti eidomatici**  
Di-sign in sign. Technological revolutions and eidomatic changes  
*Daniele Calisi*

- 737 **Le Superfici Piegate. Un metodo per la rappresentazione di forme in movimento**  
Folded Surfaces. A Method for Representing Forms in Movement  
*Michele Calvano*
- 745 **L'Iter progettuale e la sua rappresentazione letterale**  
The design process and its literal representation  
*Laura Carnevali, Fabio Lanfranchi*
- 751 **Rappresentazione diagrammatica e concezione progettuale. Il caso studio del progetto di rigenerazione e riuso del mercato di Panjiayuan a Pechino**  
Diagrammatic representation and design conception. The case study of the regeneration and requalification project of the antiques market of Panjiayuan in Beijing  
*Francesco Carota*
- 759 **Il disegno come luogo del progetto**  
*Disegno* as "locus" of the project  
*Franco Cervellini*
- 767 **Animazione di corpi rappresentati, fra scienza e progetto**  
Animation of represented body, between science and project  
*Massimiliano Ciamattella*
- 775 **Il Disegno come traccia del pensiero progettuale di Leonardo da Vinci**  
The drawing as a track of Leonardo da Vinci's design thought  
*Fabio Colonnese, Marco Carpicci, Irene Di Bernardino*
- 783 **Lo schizzo d'invenzione e il fascino della complessità. Disegni di Luciano Baldessari per il Padiglione Breda a Milano del 1952**  
The spark of invention and the charm of complexity. Drawings by Luciano Baldessari for the Breda Pavilion in Milan of 1952  
*Gabriella Curti*
- 789 **L'assonometria come "forma simbolica" del linguaggio moderno nel XX secolo**  
Axonometry as "Symbolical Form" of the Modern Language in the XX<sup>th</sup> Century  
*Giuseppe D'Acunto*
- 797 **Algorithmic modeling and prototyping of a structural joint for freeform surfaces**  
*Francesco Di Paola, Andrea Mercurio*
- 803 **Il linguaggio visivo come progetto inclusivo**  
The visual language as inclusive project  
*Maria Linda Falcidieno*
- 809 **Three dimensional integrated survey of the Basilica Santissima Annunziata in Florence. The drawing as a tool for the research of architectural generating geometries in Alberti's Tribuna**  
*Federico Ferrari, Daniele Felice Sasso*
- 813 **Architect Miguel Ángel Roca: A vast architectural work preceded by his own drawings**  
*Roberto Ferraris, Victoria Ferraris*
- 819 **The Baldassarre Peruzzi's design process and the lost wooden model of Carpi's Cathedral**  
*Isabella Friso*
- 823 **Louis Kahn, del silenzio a la luz: dibujar para encontrar**  
Louis Kahn, from silence to light: drawing for discovering  
*Noelia Galván Desvaux, Antonio Álvaro Tordesillas*
- 829 **Futurismo e razionalismo in alcuni disegni relativi a edifici progettati a Torino a cavallo fra le due guerre del '900. Alberto Sartoris e la rappresentazione futurista dell'architettura**  
Futurism and rationalism in some drawings related to projected buildings in Turin between the two wars of '900. Alberto Sartoris and the futurist representation of the architecture  
*Giorgio Garzino*
- 837 **Il Disegno nel percorso creativo**  
Drawing in the creative process  
*Paolo Giandebiaggi*
- 843 **Improbabili morfologie. Un "modello" per Giovan Battista Piranesi ovvero Forma generatrice di Forma**  
Unlikely morphologies. A "model" for Giovan Battista Piranesi like Shape generator of Shape  
*Gaetano Ginex*

- 849 **Sul progetto di restauro. Note dai disegni di Alessandro Minali (1888-1960)**  
On restoration. Notes from the drawings of Alessandro Minali (1888-1960)  
*Michela M. Grisoni*
- 857 **Il Disegno come manifesto di Stile. Gio Ponti e i codici della rappresentazione nel rinnovamento del progetto**  
Design as manifesto of *Stile*. Gio Ponti and representation codes for the project renewal  
*Maria Pompeiana Iarossi, Giampiero Mele, Michela Rossi*
- 865 **Vincenzo Baldoni. Schizzi e disegni**  
Vincenzo Baldoni. sketches and drawings  
*Antonio Giulio Loforese*
- 873 **Futurismo e Razionalismo in alcuni disegni relativi a edifici progettati a Torino a cavallo tra le due guerre del '900. Leggere, pratiche e veloci: le stazioni di servizio nel disegno delle architetture futuriste.**  
Futurism and Rationalism in some drawings related to projected buildings in Turin between the two wars of '900. Light, practical, ephemeral and swift: gas station and futurist architecture  
*Elena Teresa Clotilde Marchis*
- 881 **Architetture virtuali. Le ragioni del disegno delle videoproiezioni architettoniche**  
Virtual architecture. The reasons of the architectural video projections drawing  
*Luca Martini, Giovanna Ramaccini*
- 889 **Il disegno di progetto nel Razionalismo Italiano. Espressività e lettura semantica**  
The design in the Italian Rationalism. Expressiveness and semantic interpretation  
*Fatima Melis*
- 895 **Il Disegno degli alberi nella progettazione dei "vuoti" urbani**  
The design of the trees in the "empty" urban spaces planning  
*Maria Evelina Melley, Andrea Maiocchi*
- 901 **M.C. Escher: Trasformazioni affini, proiettività e profondità materializzate nello spazio virtuale**  
M.C. Escher: Affine transformations, projectivity and deepness materialized in the virtual space  
*Antonio Mollicone*
- 907 **Drawing and American culture: the Doheny Ranch Project by Frank Lloyd Wright**  
*Cosimo Monteleone*  
  
Thinking / drawing. Changes of cognitive paradigms in the heuristic of design process  
*Marco Muscogiuri*
- 917 **Levantamiento y trazas de cantería de las escaleras medievales del siglo de oro valenciano**  
Survey and traces of the stonemasonry of medieval staircases from the "golden age" of Valencia  
*Pablo Navarro Camallonga, Pablo Navarro Esteve*
- 925 **Le ragioni del disegno come strumento di analisi e comunicazione per gli archivi di architettura del Novecento.**  
The reasons behind the use of drawings as analysis and communication tools for 20<sup>th</sup> century architecture archives  
*Caterina Palestini*
- 933 **Il pensiero progettuale per architetture industriali: analisi dei disegni d'archivio del complesso CSELT di Torino**  
The design thinking for industrial architectures: analysis of the archival drawings of CSELT complex in Turin  
*Francesca Paluan*
- 941 **Il disegno come strumento per progettare le architetture di sottrazione contemporanee. Intenzioni, caratteri e tracce dello spazio scavato**  
Drawing as a tool to design contemporary subtracted architectures. Intentions, features and traces of carved space  
*Maria Bruna Pisciotta*
- 947 **PressToPlay. Il disegno di interfacce per videogiochi arcade tra dimensione immateriale e consistenze simbolico culturali**  
PressToPlay. Designing Interfaces for Arcade Video Games. Between the Immaterial Dimension and Cultural Symbolic Consistency  
*Daniele Rossi, Federico O. Oppedisano*
- 957 **Rappresentazione e gestione della complessità nell'evoluzione del progetto navale**  
Representation and management of complexity in the naval project evolution  
*Maria Elisabetta Ruggiero*
- 965 **Dallo schizzo alla realizzazione: l'esperienza dell'automotive**  
From sketch to the realization: the *automotive* experience  
*Luca James Senatore, Carlo Inglese*
- 971 **Il disegno delle architetture claustrali espressione di intenzionalità progettuale nella costruzione del paesaggio lucano**  
The design of the cloistered architectures expression of project intent in the construction of landscape of Lucania  
*Valentina Spataro*
- 979 **Il credo del disegno**  
The creed of drawing  
*Giacinto Taibi, Mariangela Liuzzo, Rita Valenti, Tiziana Patanè*
- 987 **Il pensiero prende forma. La progettazione di Filippo Sargiacomo all'inizio del Novecento.**  
Thinking takes shape. Filippo Sargiacomo's design at the beginning of the Twentieth century  
*Pasquale Tunzi*
- 993 **Una mappa per il disegno di architettura contemporaneo "Made in Italy"**  
A Map for Drawing Contemporary Architecture "Made in Italy"  
*Maurizio Unali*
- 999 **Forma: conoscenza, processo e comunicazione**  
Form: knowledge, process e communication  
*Graziano Mario Valenti*
- 1007 **Forma e struttura nei disegni di Pier Luigi Nervi: le ragioni del disegno come espressione della creatività e strumento di comunicazione dell'idea progettuale**  
Form and structure in Pier Luigi Nervi's drawings: the reasons of drawing as an expression of creativity and communication tool of design idea  
*Chiara Vernizzi*

### 3. LE RAGIONI DEL DISEGNO COME DOCUMENTO E PROTOCOLLO PER LA RAPPRESENTAZIONE

#### THE REASONS BEHIND THE DRAWING AS A DOCUMENT AND PROTOCOL FOR REPRESENTATION

- 1017 **The perspective tabernacle of Bitonti and Borromini, the geometric protocol of baroque solid space**  
*Giuseppe Amoroso*
- 1021 **Il disegno "geometrico" per rappresentare l'architettura**  
The "geometric" design in representing architecture  
*Barbara Aterini*
- 1027 **Sulla interpretazione delle prospettive architettoniche**  
On the interpretation of the architectural perspectives  
*Leonardo Baglioni, Marco Fasolo, Riccardo Migliari*
- 1033 **I disegni ottocenteschi del nuovo Palazzo Municipale di Cagliari**  
The nineteenth-century design drawings for the new City Hall in Cagliari  
*Vincenzo Bagnolo*
- 1039 **The architectural space in an inclusive protocol for the 3D integrated acquisition of Cultural Heritage for documentation, diagnosis, representation, enhancement and conservation**  
*Marcello Balzani, Federica Maietti*
- 1045 **Levels of development for historic building information modeling: towards building simulation**  
*Carlo Biagini, Vincenzo Donato*
- 1051 **La ricostruzione grafica di architetture storiche: le facciate degli oratori confraternali di Parma**  
The graphic reconstruction of historic architecture: facades of confraternal oratories in Parma  
*Donatella Bontempi, Giorgia Bianchi*
- 1059 **Open Street Art Map. An interactive online platform project to record and visualize murals in a shared 3D context**  
*Giovanni Caffio*

- 1063 Dal piano allo spazio: ipotesi per la costruzione diretta della prospettiva su superfici curve. Il caso studio del Refettorio di Andrea Pozzo a Trinità dei Monti  
From plan to space: hypotheses for the direct construction of perspective on curved surfaces. The case of Andrea Pozzo's Refectory in Trinità dei Monti  
*Antonio Calandriello*
- 1071 Measurement in perspective between the seventeenth and eighteenth century  
*Cristina Cándito*
- 1075 Strumenti di rappresentazione innovativi per la ricerca di soluzioni ottimizzate. Dal pannelling alle strisce sviluppabili  
*New tools finding optimized solutions. From paneling to Developable Strip*  
*Mara Capone, Emanuela Lanzara*
- 1083 I disegni d'archivio per la ricostruzione delle stazioni ferroviarie ottocentesche  
The archive drawings for the rebuilding of the nineteenth century railway stations  
*Raffaele Catuogno*
- 1091 Peter Nicholson: il disegno tra teoria e pratica  
Peter Nicholson: drawing between theory and practice  
*Stefano Chiarenza*
- 1099 Tecniche per il miglioramento dell'apparenza visiva dei modelli 3D: una rassegna di casi studio ravennati  
Techniques for the improvement of 3D models visual appearance: an overview of case studies from Ravenna  
*Luca Cipriani, Silvia Bertacchi, Jorge Francisco Martínez Piqueras, Filippo Fantini*
- 1107 Geometria, progetto e cantiere. Annotazioni su tre casi studio  
Geometry, design and worksite. Annotations on three case studies  
*Carmela Crescenzi*
- 1115 Regola e Rappresentazione: la ragione del disegno di architettura militare nei trattati di Bernardo Puccini e Bonaiuto Lorini  
Rule and Representation: the reason of the military architecture design in the treatises of Bernardo Puccini and Bonaiuto Lorini  
*Sara D'Amico*
- 1123 BIM per la gestione del patrimonio architettonico e storico  
BIM for the architectural and historical heritage management  
*Sanaz Davardoust, Anna Osello*
- 1131 The enhancement of architectural heritage through HBIM and interoperability  
*Matteo Del Giudice, Anna Osello*
- 1135 La evolución gráfica del proyecto arquitectónico representado por autores de épocas distintas (XIX-XX sec.). El Hospital Provincial de Castellón, España  
The graphic evolution of the architectural project represented by architects from different periods of time (XIX<sup>th</sup>-XX<sup>th</sup> cent.). The case of the Provincial Hospital of Castellón, Spain  
*Anna Delcampo Carda, Ana Torres Barchino*
- 1143 The architecture, geometry and representation of the Amphitheatre of Pompeii  
*Fausta Fiorillo, Emanuela De Feo, Daniela Musmeci*
- 1147 La concinnitas nel contemporaneo. Trascrizioni segniche tra matrici e progetto  
The concinnitas in the contemporary. Signic transcriptions among matrices and project  
*Riccardo Florio, Teresa Della Corte*
- 1155 Il Caffè Arabo alla IV Esposizione Nazionale di Palermo: dai disegni di Ernesto Basile alla ricostruzione virtuale  
The Caffè Arabo at the IV Esposizione Nazionale in Palermo: From the Drawings of Ernesto Basile to its Virtual Reconstruction  
*Vincenza Garofalo*
- 1163 Dal bidimensionale al tridimensionale: *modus operandi* delle anamorfosi olandesi  
From 2D to 3D: *modus operandi* in Dutch anamorphosis  
*Francesca Gasperuzzo*
- 1171 Le costruzioni geometriche nei tracciati di cantiere: tra pensiero progettuale e realizzazione della forma nei cantieri edili a Roma e nelle province dell'Impero  
Geometric constructions in the worksite tracings: between design concept and form realization in construction sites in Rome and empire provinces  
*Carlo Inglese*
- 1179 "Sostegno e adornamento": riflessioni per una semiotica nel disegno degli ordini  
"Support and emblazonment": reflections on the semiotic of design orders  
*Anna Marotta*
- 1187 The semantic qualification of Digital Heritage: the case of Santa Maria della Matina's Abbey  
*Andrea Marraffa*
- 1191 Il disegno svelato Un percorso di ricerca per la valorizzazione dell'archivio dei disegni di Franco Antonelli  
The unveiled drawing Looking to promote the archive of Franco Antonelli's drawings  
*Valeria Menchetelli*
- 1197 BIM, Virtual and Augmented Reality for citizen involvement in the evaluation of the urban transformation  
*Giuseppe Moglia, Francesca M. Ugliotti, Anna Osello, Maurizio Dellosta*
- 1201 Il BIM per il patrimonio edilizio storico: realizzazione di un database per la manutenzione  
BIM for architectural heritage: implementation of a database for maintenance  
*Anna Osello, Marco Zerbinatti, Valeria Uffredi, Matteo Del Giudice, Niccolò Rapetti*
- 1209 Dal dipinto all'architettura: fruizione di percorsi virtuali  
From the painting to architecture: fruition of virtual paths  
*Rosaria Palomba*
- 1217 Il Castello dei Conti Guidi a Poppi, la certificazione nel rilievo laser scanner quale base morfologica di indagini diagnostiche per la conservazione e la valorizzazione del monumento  
The Conti Guidi Castle in Poppi, The certification of laser scanner surveys as a morphological basis of diagnostic investigations for the conservation and enhancement of monuments  
*Giovanni Pancani*
- 1225 Il ridisegno critico della Regola delli cinque ordini d'architettura di Giacomo Barozzi da Vignola: tra testo e disegno, intenzione e realizzazione  
Critical redrawing of the Regola delli cinque ordini d'architettura di Giacomo Barozzi da Vignola: between text and drawing, intention and creation  
*Martino Pavigano*
- 1231 Il Disegno come strumento di rappresentazione dell'architettura berbera in Marocco. L'oasi di Skoura, documento e progetto di una geometria formale  
The drawing as a representation of Berber architecture in Morocco. The oasis of Skoura, document and project for a formal geometry  
*Chiara Pietropaolo*
- 1239 Architettura anni '30 in 3D. Dai progetti di Mario Ridolfi a nuovi contenuti digitali e applicazioni di realtà aumentata per l'analisi grafica e la conoscenza  
Thirties & 3D architecture. From Mario Ridolfi's project to new digital contents and Augmented Reality application for graphical analysis and knowledge  
*Ramona Quattrini, Romina Nespeca, Roberto Pierdicca, Adriana Formato, Anna Paola Pugnaroni*
- 1247 La rappresentazione della concezione di Francesco Borromini in S. Ivo alla Sapienza tra teologia e filosofia  
Francesco Borromini's conception of S. Ivo alla Sapienza: between theology and philosophy  
*Luca Ribichini*
- 1255 Il capitello del *De prospectiva pingendi*: geometria, arte, architettura  
The capital of the *De prospectiva pingendi*: geometry, art, architecture  
*Jessica Romor*
- 1263 Le ragioni del Disegno "inattuale": rappresentazioni di Scuola Romana del Novecento  
The Reasons of "Out-Dated" Drawings: The Representations of the Twentieth Century  
*Scuola Romana*  
*Antonella Salucci*
- 1269 La rappresentazione in *propia forma* nel *De Prospectiva Pingendi* di Piero della Francesca  
Representation in *propia forma* in the *De Prospectiva Pingendi* by Piero della Francesca  
*Marta Salvatore*

- 1275 “Delle volte, e vari modi di farle”. Modelli digitali interpretativi delle lastre XIX e XX nell'*Architettura Civile* di Guarini, fra progetti e realizzazioni  
“On the vaults and various modes of making them”. Interpretative digital models of the XIX and XX plates in Guarini's *Architettura Civile*, between designs and buildings  
*Roberta Spallone*
- 1283 Analisi matematica e geometria nei profili degli ordini architettonici: esempi dalla “Regola delli cinque ordini d'architettura di M. Iacomo Barozzio da Vignola”  
Mathematical and geometrical analysis of the outlines of the architectural orders: samples from the “Regola delli cinque ordini d'architettura di M. Iacomo Barozzio da Vignola”  
*Maria Luisa Spreafico, Gianfranco Casnati, Roberto Notari, Martino Pavignano, Ursula Zich*
- 1291 Luce sul chiaroscuro palladiano. Osservazioni sulla rappresentazione delle ombre nei Quattro libri dell'architettura di Andrea Palladio  
Light on the Palladio chiaroscuro. Observations on the representation of shadows in the Four Books on Architecture by Andrea Palladio  
*Ursula Zich, Ugo Comollo*
- #### 4. LE RAGIONI DEL DISEGNO COME NARRAZIONE THE REASONS OF DRAWING AS NARRATION
- 1301 Il rilievo per la ricostruzione: i disegni inediti del fondo del Museo Regionale di Messina  
Reconstruction phase architectural survey: the unknown drawings of Regional Museum of Messina  
*Adriana Arena*
- 1309 Un'occasione perduta: l'Eden Teatro Biondo di Ernesto Basile. Dai disegni di archivio alla ricostruzione digitale.  
A lost opportunity: the Eden Biondo's Theatre by Ernesto Basile. From archive drawings to digital reconstruction.  
*Fabrizio Avella*
- 1317 Raffaello Bibbiani e il progetto del Teatro della Spezia (1926-1933); narrazioni attraverso disegni e cambiamenti dei paradigmi di rappresentazione tra le due guerre.  
Raffaello Bibbiani and the project of La Spezia Theater (1926-1933); narratives through drawings and paradigm shifts in representation during the interwar period.  
*Matteo Ballarin*
- 1325 New York City Sketchbooks  
*Hugo Barros Costa*
- 1329 Il disegno come narrazione: “Gran Budapest Hotel”  
Drawing as Narration: “The Grand Budapest Hotel”  
*Cristiana Bartolomei, Alfonso Ippolito*
- 1337 Monk: dallo scriptorium medievale all'alfabeto digitale  
Monk: From the medieval scriptorium to the digital alphabet  
*Paolo Belardi*
- 1345 La prospettiva come “forma retorica” nel prodotto audiovisivo contemporaneo  
Perspective as “rhetorical form” in the contemporary audiovisual product  
*Enrica Bistagnino*
- 1353 Il disegno come modello teorico per il cinema: da Piranesi a Ęjzenštejn, da Escher a Nolan  
Drawing as a theoretical model for the cinema: from Piranesi to Ęjzenštejn, from Escher to Nolan  
*Nazarena Bruno, Andrea Zerbi*
- 1361 Architettura e paesaggi cinesi nei disegni del taccuino di viaggio  
Chinese architecture and landscapes in the drawings of travel sketchbook  
*Marianna Calia*
- 1367 I temi della rappresentazione del territorio e del paesaggio urbano  
The representation themes of territory and urban landscape  
*Carolina Capitanio*
- 1375 Di-segno, ricostruzione 3D e navigazione virtuale. Il racconto dell'utopia interrotta di *Ferdinandopoli*  
Drawing, 3D reconstruction and virtual navigation. The tale about the interrupted utopia of *Ferdinandopoli*  
*Valeria Cera, Elisa Mariarosaria Farella, Domenico Iovane*
- 1383 Narrare l'irreale. Le città invisibili svelate.  
To narrate the unreal. The invisible cities revealed.  
*Maria Grazia Cianci, Daniele Calisi*
- 1391 Visual Landscapes Sciences. Perception, Visualisation and Communication in Research on Landscape  
*Enrico Cicalò*
- 1397 Verso un'architettura dell'Appennino. Il racconto della costruzione di un linguaggio nell'opera di Cesare Spighi a Bagno di Romagna.  
Towards an Apennine architecture. The tale of a language building in the Cesare Spighi's work in Bagno di Romagna  
*Michele Cornieti*
- 1405 Nuovi linguaggi per il disegno dell'architettura  
New languages for the architectural design  
*Michela De Domenico*
- 1413 Il disegno e la dimensione della città ricostruita. Tipi edilizi della via dei Crociferi a Catania  
Design and dimension of the re-constructed city. Building types of the street Crociferi in Catania  
*Giuseppe Di Gregorio*
- 1421 La narrazione grafica nelle mappe del tempo  
The graphic narrative in the map of the time  
*Francesca Fatta, Manuela Bassetta*
- 1431 La raffigurazione del paesaggio agrario nei poster di propaganda cinesi  
Representation of agricultural landscape in Chinese propaganda posters  
*Antonino Frenda*
- 1439 Entorno Paisajístico del Sanatorio de San Francisco de Borja en Fontilles. Un caso de estudio sobre el Patrimonio del Paisaje.  
Landscape Surroundings of San Francisco de Borja's Sanatorium at Fontilles. A case study on Heritage Landscape.  
*José Luis Higón Calvet, Jorge Llopis Verdú, Javier Pérez Igualada, Pedro Cabezos Bernal, Jorge Martínez Piqueras*
- 1447 Il Disegno utile e le forme del linguaggio visuale. Sperimentazioni di artefatti visuali in campagne di comunicazione di pubblica utilità  
Useful Design and Forms of Visual Language. Experiments with Visual Products in Public Communication Campaigns  
*Elena Ippoliti*
- 1457 The image of the Russian Empire in the traveller's drawings  
*Mariya Komarova*
- 1461 El Sanatorio de Fontilles. Una propuesta gráfica para la difusión y puesta en valor de los valores patrimoniales inmateriales  
Fontilles Sanatorium. A graphic proposal for the dissemination and valorisation of intangible heritage values  
*Jorge Llopis Verdú, F. Hidalgo Delgado, J. Torres Barchino, J. Serra Lluch, R.E. Marin Tolosa*
- 1469 Il segno dimenticato. Un racconto per immagini  
The forgotten sign. A story told through images  
*Massimiliano Lo Turco, Alessio Tommasetti*
- 1477 La representación gráfica como reinterpretación significativa.  
The Graphical Representation as Significant representation.  
*Paula Lomonaco*
- 1485 Visual Storytelling. Un'alternativa universale alla trasmissione verbocentrica del sapere.  
Visual Storytelling. An universal alternative to the verbocentric transmission of knowledge.  
*Alessandro Luigini*
- 1493 Another species of space: a building site for contemporary art. Drawing strategies for visualising the activity of *Fondazione Volume!*  
*Marta Magagnini*

- 1497 Il disegno dello spazio nella narrazione letteraria e teatrale. Due autori a confronto: lo spazio mentale disegnato da Pirandello e lo spazio fisico rappresentato da Eduardo De Filippo  
The drawing of the space in the literary and theatrical storytelling. A comparison of two authors: the mental space designed by Pirandello and physical space represented by Eduardo De Filippo  
*Rosario Marrocco*
- 1507 I mercati delle Vettovaglie in Firenze  
Food Markets in Florence  
*Alessandro Merlo, Gaia Lavoratti, Andrea Aliperta*
- 1515 Per una rappresentazione "sensibile": la comunicazione della forma per la percezione aptica  
For "Sensible" Representation: Communicating the Form for Haptic Perception  
*Alessandra Meschini, Filippo Sicuranza*
- 1523 Influences of the Engravings of Louis Lozowick upon Drawings by Louis I. Kahn.  
*Carlos Montes Serrano, Marta Alonso Rodríguez*
- 1529 Il disegno, tra conoscenza e fruizione. La chiesa di Santa Maria dell'Incoronata a Napoli  
The design, between knowledge and use. The Santa Maria dell'Incoronata Church in Naples  
*Lia Maria Papa, Giuseppe Antuono*
- 1535 Role of Representation in a Digital Communication System  
*Giulia Pettoello*
- 1539 Il disegno come narrazione. I manifesti sovietici della Rivoluzione d'Ottobre  
The drawing as narration. The Soviet posters of the October Revolution  
*Manuela Piscitelli*
- 1547 Adalberto Libera e "L'avvio di un nuovo discorso" per il disegno dell'architettura.  
Cinema Airone a Roma.  
Adalberto Libera and "The start of a new speech" for the architectural design. The Airone Cinema in Rome.  
*Paola Quattrini*
- 1555 La casa di Abramo  
The House of Abraham  
*Adriana Rossi*
- 1563 Narrare con testi e immagini: ragioni del disegno e della rappresentazione digitale  
A Tale by Images and Texts: Reasons for Drawings and Digital Representation  
*Rossella Salerno*
- 1571 Architetture di e sulla carta  
Visionary and paper architecture  
*Marcello Scalzo*
- 1577 Ermeneutica del segno cinetico. Disegno e danza  
Hermeneutic of kinetic sign. Drawing and dance  
*Starlight Vattano*
- 1585 Evolving Role of Drawing in Times of Architectural Web-Broadcasting  
*Daniele Villa*

# Traditional Wooden Architecture in Northern Europe: methods and digital systems for the documentation of the Karelian Heritage

Sara Porzilli\*

THIS RESEARCH WORK ADDRESSES THE SURVEY AND REPRESENTATION METHODOLOGIES FOR THE DOCUMENTATION OF WOODEN ARCHITECTURE IN NORTHERN EUROPE, THROUGH THE EXPERIENCES DEVELOPED DURING A RESEARCH PROJECT ON THE WOODEN BUILDINGS IN THE RUSSIAN VILLAGES. THE MAIN TOPICS ARE RELATED TO THE ANCIENT THEME OF THE VITRUVIAN "PRIMITIVE HUT". IN THIS WORK THE DETAILED ACTIVITIES ARE RELATED TO THE UNDERSTANDING OF THE PLACE AND THE DESCRIPTIVE SYSTEMS FOR ITS REPRESENTATION ARE PROPOSED, AS WELL AS FOR THE DETECTION AND THE POST-PRODUCTION METHODOLOGIES. THE DIRECT SURVEY ACTIVITIES, THE LASER SCANNER AND TOPOGRAPHIC INDIRECT SURVEY, SIMULTANEOUS PHOTO-MODELLING WITH PHOTOGRAPHIC CAMPAIGNS FOR THE CREATION OF DIGITAL DATABASES ARE NECESSARY FOR THE DEFINITION OF DOCUMENTARIES OF THESE SEVERELY COMPROMISED CONTEXTS.

KEYWORDS: TRADITIONAL WOODEN SYSTEMS, KARELIAN ARCHITECTURE, LASER SCANNER, PHOTO-MODELLING, DIGITAL DATABASE.

## Introduction

This research work about the analysis and documentation of the landscape and traditional wooden architecture in Karelia represents part of the activities carried out by the European Project "*Wooden Architecture*"<sup>1</sup> which I attended as an *Early Stage Researcher* during the my three-years of PhD-studies in "Survey and Representation of Architecture and Environment"<sup>2</sup>.

The research activities started in January 2012 and were focused on the definition of techniques and survey methods for the documentation of wooden architecture, experimenting new data acquisition systems and new possibilities of integration of the information collected, evaluating the final results for the concluding definition of methods and tools for the documentation and preservation of the original identity of these contexts.

Wooden architecture has been recognized as an object of growing interest of scientific research even on international scale, not only from the architectural point of view but also from theoretical approaches. Vitruvius' old theory of the "primitive hut" caused the notion that all architecture and classical compositional models would come from the first "wooden hut" designed by our ancestors<sup>3</sup> (figg. 1-2). It is known that wooden architecture is one of the oldest building systems adopted by the majority of people belonging to different geographic areas. Over time they have developed building techniques dictated by local characteristics, the availability of the raw material on site and the geomorphological and climatic characteristics of the area. In spite of these facts, it is often possible to discover strong similarities in different contexts, especially in planning compositions of villages and in the choices of manufacturing solutions. Research-theory-practice triangle has offered new insights into the world of wooden architecture, different sectors of

investigation have found mutual interaction in 2D and 3D new digital representations. This project has defined not only a comparison and analysis of practical matters or of sophisticated techniques, but it is gone deeper into the epistemological foundations of knowledge in these places, in the sense of understanding the real spirit of the place, the so called *genius loci*<sup>4</sup>. During the several research missions in Karelia, about fifteen wooden traditional villages have been documented and studied. These case studies are characterized by different settlement systems, particular building typologies, specific and unique environmental contexts, subjected day by day to a strong urban expansion or otherwise characterized by a depopulation phenomenon with the consequent risk of loss of the identity of the historical memory of the villages themselves.

Structure of the methods and development of the activities. Local traditions have defined in these areas architectural models which over time have been mixed with modern Soviet administrative structures, upsetting the function and the original identity of this landscape. Therefore it was necessary to start the analysis of the existing architectural and landscape heritage in Karelia, in order to achieve the formulation of normative systems able to regulate the social and environmental changes and to control the interventions that every day are corroding the authentic image of this heritage. All the information obtained from archive research and practical activities in field studies have contributed in the researcher's mind to the formation of a multi-layered image and specific themes related to the same place so that they have determined the construction of the operational diagrams for this research project (fig. 3). The primary purpose of this work project has been to address the issues of how-to-do research on wooden buildings with comparisons and analysis that go deeper to experimentation of the newest digital systems.

Through the study of the wooden Karelian heritage it was possible to define methods and tools for dynamic data management, through the use of upgradeable digital catalogs. The complete research work collects all the info-graphic documentation of the performed experiences, translated into a rich digitized database that keeps archive of all the analysis, results and graphic materials developed for each case study. Each village has been studied from general to particular aspects with new operating methods of intervention, by developing systems of investigation, by data-census collections and by the organization of the information using code systems. The research has included analysis and surveys with the experimentation of different digital techniques for redrawing and representing on different scales the environmental main elements or until the description of the smaller architectural details.

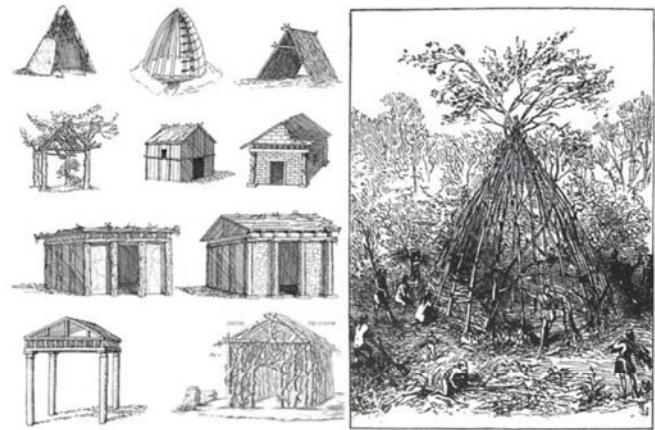
The survey activities can be summarized with these main research steps:

1/ The personification of Architecture, sitting on the ruins of a lost construction of which only moldings and capitals fragments are remained, indicates to a child committed to following the direction of his hand the Vitruvian hut. From M.A. Laugier, *Essai sur l'architecture*, Paris, 1675.



Previous research archive activities: accurate selection of literature that has documented wooden architecture examples and consultation of the existing documentation on each village or monument studied. This activity has guided the structuring of the survey activities on field, and it has given the cognitive back-ground, necessary for planning and setting the new phases of analysis.

2/ Eighteenth-century representations on the interpretation of the theme of "the primitive hut" by Claude Perrault according to Vitruvius' description. Following drawings by William Chambers on the evolution of the concept of the primitive hut: from the first shelter thought and planned by humans to symbol and original matrix for the development of the architectural orders, 1769. Below, a representation of the Vitruvian hut by Rondelet. On the right, a representation that comes from "The primitive hut, *Histoire de l'Habitation Humaine*", 1875 by Eugène Viollet-le-Duc.



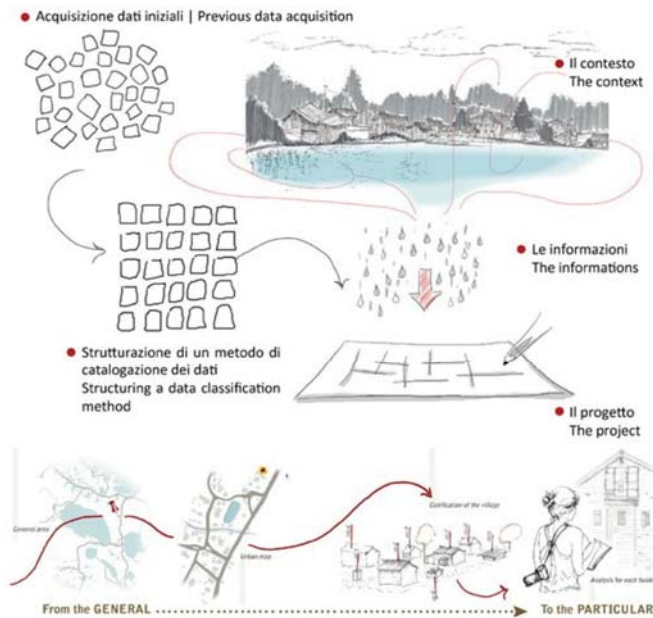
Analysis of the formation and structure development of the villages and towns, investigating the physical, natural and artificial aspects that have changed the visible image of the village, like natural or social events as relevant anthropization processes (fig. 4).

Investigation with local inhabitants through interviews, especially with the oldest villagers, who know well and have directly lived the development of the settlements, understanding the phenomena that have change the urban centers and the different aggregative systems. This activity has provided important insights and useful information for the investigation, because it has given the opportunity to understand the original structures of the plans of the settlements, obtaining the main dating of the oldest buildings. By collecting authentic photographic materials and historical background it has been possible to operate comparisons with the present state.

Direct and indirect survey campaigns with laser scanner and topographic methodologies on villages, monuments and landscape. According to the results achieved it has been realized a large documentary *corpus*, with the development of new cartography, through comparative analysis with the historical maps, implemented and updated thanks to the new survey activities. This aspect was well supported and verified thanks to the realization of aerial photography campaigns and thanks to the use of aerial views provided by digital means. These operative steps have given the possibility to realize new technical vector drawings of general plans, floor plans, elevations and sections of buildings, typological and descriptive analysis related to the perceptual aspects of the places (figg. 5-6).

Photo-modelling experiences and photogrammetric survey: development of digital skills and procedures for documenting wooden architectures improving experimentations with new photo-model-

3/ During the research experiences, the approach to the Karelian landscape and the various villages analyzed were extremely complex and not easily understandable. More than elsewhere, here the knowledge and the interpretation of the signs have been with a slow and gradual approach; step by step, focusing on recognition and identification even of seemingly superfluous or marginal data and information for the activities carried out but, definitely, fundamental and crucial for the understanding of the identity elements of these realities.



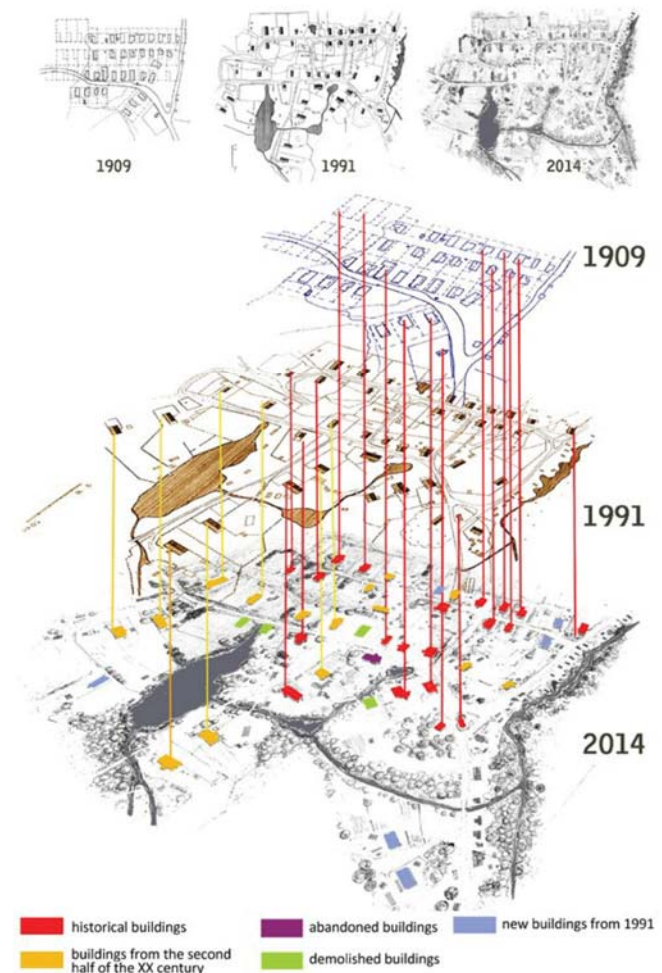
ling software, elaborating 3d mesh models by the using of picture sequences (fig. 7).

Photo campaign documentation: each studied object of wooden heritage is photographed in an accurate and technical way from the general to the particular point of view. This activity has given the possibility to realize a rich and huge digital database, organized in folders and codes, where there are archived most of the fundamental information for each wooden building and contexts (fig. 8).

Post production phase: realization of 3D digital models which are able to support and collect all the information obtained by several different survey activities. Digital reconstructions are used as virtual prototypes which are able to describe three-dimensional static and structural characteristics and performance of the buildings analyzed. The serial combination of different 3D models typologies allows illustrating a real 3D representations of the architectures in their specific contexts (fig. 9).

Census activities for the analysis of the settlements, elements and details, for the environmental and landscape recognitions by producing fundamental synthetic thematic maps for understanding of various natural and anthropological systems. This step has produced important graphic atlas for understanding of the tangible and intangible aspects, as well as for guiding the local urban planners to be more aware and conscious of these realities and for helping

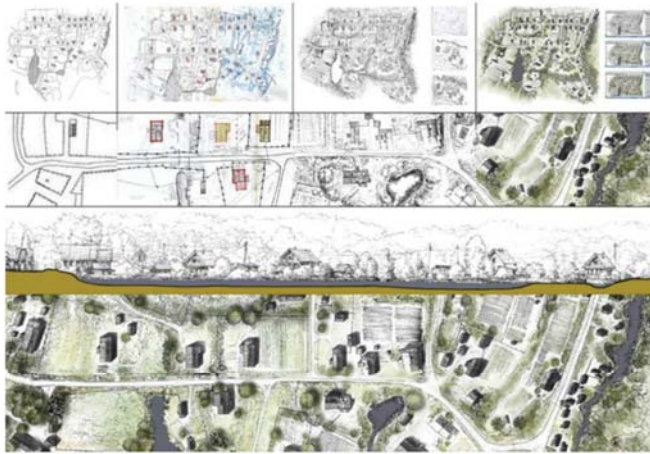
4/ The retrieval of the existing cartographic materials was critical to understanding the settlement systems of the different case studies analyzed. The comparison work among the historical maps with the existing situation has allowed to identify the original nucleus and expansions that these villages have been over the years. These schemes have been joined by synoptic data integration for the construction of the digital information system. Reconnaissance activities and verification of the survey project have always been carried out by living direct immersion in the context analyzed, evaluated qualitatively and quantitatively each proposed operation.



them in finding good strategies for re-establishing the genuine and correct structure of these places (fig. 10).

Concluding considerations on the results achieved. The results of these research activities have highlighted that the development of strategies of interventions for preservation of cultural heritage must today be based on updated documentations. It is evident that the careful acquisition of the data has a fundamental role in validating each decision. The importance of the documentation becomes even more valuable considering the conservation as a whole, thinking about the “physical characteristics” and the “immaterial intrinsic elements” as the proof value of the historical,

5/ Methodology of analysis and comparison of cartographic material found on the historic village of Korza. The 1909 map only identifies the settlement scheme. In the map of 1991 the data refer to the identification of the paths, buildings and property boundaries. Thanks to the work of surveying and analysis conducted on this case study, the cartography was evidently implemented, corrected, verified, updated and enriched with new descriptive landscape and the architectural elements.



artistic and cultural memory which the architecture, the building or landscape have conserved over the times. The result of the survey operations have a testimonial and documentary value for the description of the physical and material characteristics of the building and its environment, and it is a representative model of the object investigated. The elaboration of new typologies of analysis on the architectural and landscape heritage in Karelia has represented a strong, high, urgent necessity. Experimentations with different planning techniques and management of work activities were aimed at presenting the most effective methods thanks to with formulate a normative system able to direct, manage and control, in a conscious way, changes and interventions that every day are corroding the authentic image of these contexts. Intensive measurement campaigns and analysis have demonstrated the importance of the appearance of complexity management of both quantity and quality data collected. Central part of the research has been also the definition of the structure and the possible productive uses of the “new” knowledge.

The application processes described here represents valid foundations for the construction of common standards containing rules relating to the following topics:

- Survey activities, measurement operations for representing the architecture, the landscape and the environment;
- Creation of intervention guidelines for the national legislative Russian system which more or less has weakened the protection, preservation and management of these smaller rural settlements;
- Evaluation of the level of transformation that each specific village is able to tolerate.

The research experience has allowed the definition of methods devoted to a correct understanding of the wooden architecture and

6/ Vector and graphic redesign of the village of Shucknavolok. On the top are showed two significant images of the 3D modeling in PhotoScan Environment (Agisoft software) with the identification of the High Angle point shooting. In the general plan are emphasized the vector restitution of village with post graphic production through the use of graphics and photo editing software. In order to manage the properties and characteristics of the elements represented it was defined a specific list of layers for the control and the management of the thicknesses of the printing nibs.



landscape in Karelia with the creation of a new documentary corpus that consists principally of:

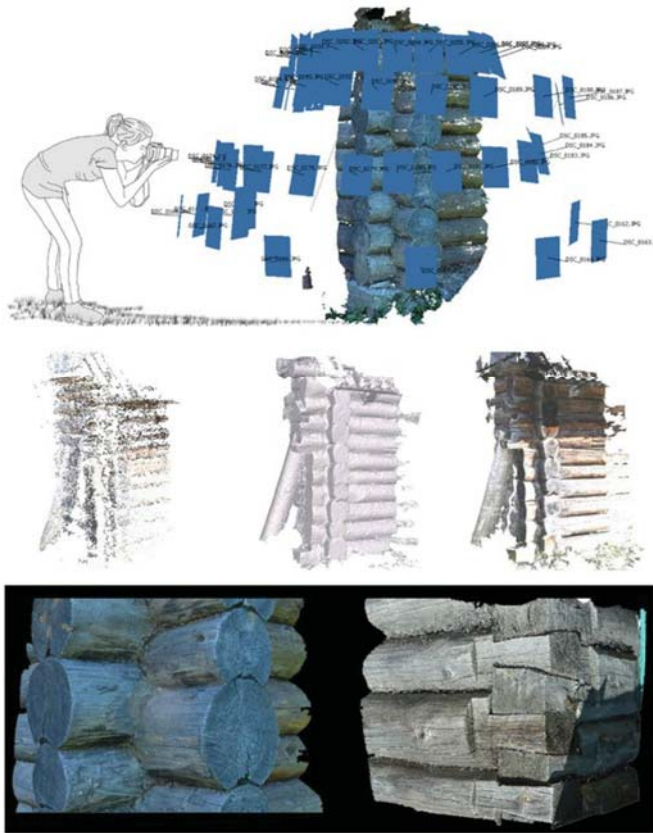
General and detailed plans, environmental and architectural sections, with the consequent updating of the documentation related to the current state of the case studies. This technical material will improve the definition of the main guidelines for the general management, in order to prefer develop controlled and regulated building expansions. In some cases there has been total absence in the technical offices of descriptive documentation of these settlements. The environmental sections have the purpose to understand the dimension of the open spaces, the mutual metrical relations between buildings, and between buildings with environmental elements, the understanding of the empty and full spaces.

Census of the tangible and intangible elements of the landscape and of the architectural heritage. This activity has the purpose to establish and define all the value lists related to specific aspects with the use of descriptors. Realization of census for each building analysis related to the architectonic structures, state of conservation with the final aim to collect all this information for creating thematic maps on which make synthesis useful for the understanding of the constitutive elements of the identity of village.

Descriptive photograph atlases, in order to collect a large photo database related to general or specific characteristics of these contexts.

Three-dimensional modeling of the various settlements and buildings by using different techniques of data acquisition at the territorial scale (with the experience of aerial photo-modelling) and at the technological level through the realization of detailed and metrically correct models.

7/ Representation of the operational phase of the photograph activities necessary for reconstructing a 3D mesh textured model of wooden architectural details through the experience of photomodeling. Simple 3D models can be an important instrument metrically reliable and chromatically realistic to perform specific analysis on an understanding the specific characteristics and level of preservation of wooden structures. The main steps for the realization of a 3D model through the images processing on PhotoScan are: image acquisition; alignment of the pictures in PhotoScan environment; Processing of the point cloud "sparse" and "dense"; construction of the mesh model; processing of solid geometry; application of textures.



Those deliverables and experiences it has deepened some aspects related to perceptive analysis, such as the study of the basic viewpoints and the environmental levels, for the definition of the so called buffer-zones, one of the important topics considered by the documentation systems of the UNESCO evaluation. This research investigate the development and elaboration of scientific-technical and operational methods and tools for documentation and preservation of the wooden structures. The survey operations and analysis become the main technical strategies for determining the new values and innovative procedures necessary for intervention projects or restoration activities. By creating a dialog between different types of scientific activities it will enhance the knowledge of wooden buildings in Karelia and thus helping to define the main guidelines for understanding and designing appropriate research methods. In general it also hopefully strengthens the epistemological foundation of the present studies on wooden architecture and its preservation.

8/ The village of Korza with the activities of identifying micro-areas in which the architectural and natural presences have been split and analyzed individually. The practical operations were performed following a method of constant interpretation of data with the architectonical and landscape elements. Three-dimensional modeling representative of the architecture and open spaces presences, detected by using different methods and instruments have allowed the definition of descriptive catalogs about the different typologies of main and secondary buildings encountered through the villages studied.



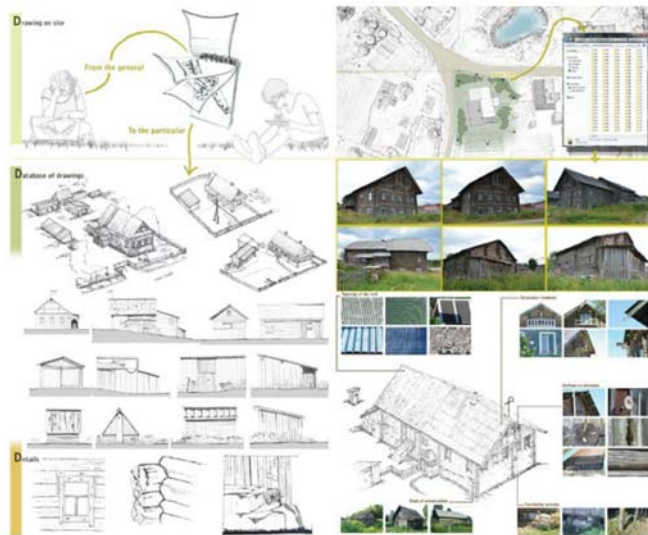
#### Notes

\*Department of "History of Architecture and Restoration Studies", Oulu School of Architecture – University of Oulu, Aleksanterinkatu 6, Oulu, Finland.

<sup>1</sup> Complete data of the European Project: Seventh Frame Programme Marie Curie Actions People International Research Staff Exchange Scheme. Full title: "Wooden Architecture. Traditional Karelian Timber Architecture and Landscape". Identification number: 269185. Partners: Dept. of Architecture DIDA of the University of Firenze, Dept. of Civil Engineering and Architecture of the University of Pavia, Dept. of History of Architecture and Restoration Studies of the University of Oulu (Finland), Engineering Faculty of the Petrozavodsk State University (Fed. Russa). Scientific Responsible Prof. S. Bertocci of the Dept. of Architecture DIDA, Scientific Coordinator Prof. S. Parrinello Dept. of Civil Engineering and Architecture in Pavia. Thanks to this research opportunity of international collaboration all the participants have undertaken a series of missions in the karelian regions and carried interchanges experiences between these universities.

<sup>2</sup> Ph.D. in "Science of Representation and Survey" afferent to the National Graduate School, address in "Survey and Representation of Architecture and Environment", VII Cycle (2012-2014), Disciplinary Sector ICAR 17, developed at the Dept. of Architecture DIDA of the University of Firenze (a.a. 2012-2014). The PhD thesis is the winner of the ninth edition of the "Thesis Award of the University of Florence", orga-

9/ The census of a village by setting up a computerized database is intended to define and organize these significant elements of the environment and of individual buildings that determine identity of the place. The organization and the choice of descriptors of analysis was carried out through the decomposition into subcategories of each building identifying the main descriptors for the study and analysis of each individual building. The descriptors identified are intended to analyze the building in relation to the context, in relation to the rest of the buildings and then focused on the identification of the construction, architectural and decorative elements. After the general analysis of the structures there were carried out some conservation analysis to understand the possible different types of deterioration that a wooden structure have suffered.



10/ Thematic maps, elaborated on the new cartography produced, in which took place the graphic redrawings of the information collected through the survey, census and cataloging works. They represent the final work in which are synthesized all the contributions reflecting the different survey and documentation activities. Through cross-readings of different themes has been possible to carry out critical analysis of the various research areas that have involved the analysis of building typologies, architectural structures, materials, but also analysis of the "state of health" of the entire village by identifying on the maps the state of conservation of each building, until the investigations related to the perception of the place and the analysis of the mutual relations.



nized by the publishing house "Florence University Press", with the mention of "Best PhD Thesis 2015 for Technological Area".  
<sup>3</sup> This theme was brought to the attention for the first time by Vitruvius in "De Architectura. Libri X". In the treaty the description on the concept of "primitive hut"

appears in Book II and one of its first graphical representation was made by Filarete in his "Trattato di Architettura."  
<sup>4</sup> Norberg-Schulz, 1992.

## Bibliografia - Bibliography

- Bertocci Stefano, Bini Marco, 2012. *Manuale di rilievo architettonico e urbano*. Torino: Città Studi edizioni, 2012, 436 p. ISBN: 978-88-251-7362-8.
- Bertocci Stefano, Parrinello Sandro (a cura di), 2007. *Wooden Architecture in Karelia. A collaboration programme for the preservation of the traditional Karelian timber architecture*. Firenze: Edifir edizioni Firenze, 2007, 188 p. ISBN: 978-88-7970-326-0.
- Bertocci Stefano, Parrinello Sandro (a cura di), 2009. *Wooden Architecture in Karelia II. Timber architecture as a phenomenon of National Culture*. Firenze: Edifir edizioni Firenze, 2009, 304 p. ISBN: 978-88-7970-439-7.
- Docci Mario, Maestri Diego, Gaiani Marco, 2011. *Scienza del disegno*. Milano: CittàStudi editore, 2011, 448 p. ISBN: 978-8825173673.
- Hansen Hans Jurgen, 1969. *Architetture in legno*. Firenze: Vallecchi Editore, 1969, 280 p.
- Norberg-Schulz Christian, 1992. *Genius loci. Paesaggio ambiente, architettura*, Milano: Mondadori Electa, 1992, 215 p. ISBN: 978-8843542635. Ed. orig. *Genius Loci: Towards a Phenomenology of Architecture*. Edimburgh: Edinburgh University Press, 1979.
- Pryce Will, 2005. *Architettura del legno. Una storia mondiale*. Bergamo: Bolis Edizioni, 2005, 320 p. ISBN: 88-7827-136-5.
- Rykwert Joseph, 1972. *On Adam's House in Paradise. The idea of the primitive hut in architectural history*. London: Museum of Modern Art Academy Editions, 1972. 240 p. ISBN: 978-0262680363.
- Summerson John, 2000. *Il linguaggio classico dell'architettura. Dal Rinascimento ai maestri contemporanei*, Torino: Einaudi editore, 2000. 100 p. ISBN: 9788806154523. Ed. orig. *The Classical Language of Architecture*, Boston: MIT Press, 1966 [1963], ISBN 0-262-69012-8.
- Toricelli Maria Chiara, Del Nord Romano, Felli Paolo, 2001. *Materiali e tecnologie dell'architettura*, Roma: GLF Editori Laterza, 2001. 416 p. ISBN: 9788842060536.
- Ugo Vittorio (a cura di), 1990. *Laugier e la dimensione teorica dell'architettura*. Bari: Edizioni Dedalo spa, 1990, p. 240. ISBN: 9788822060921.
- Zwenger Klaus, 2012. *Wood and Wood Joints. Building Traditions in Europe, Japan and China*. Germany: Birkhauser Basel, 2012, 304 p. ISBN: 978-3-0346-0685-1.