

An abstract graphic design featuring a large white chevron pointing right, set against a background of orange and teal geometric shapes. The teal area contains text, and the orange area is on the left. The overall style is modern and minimalist.

Sustainability

Universal Design

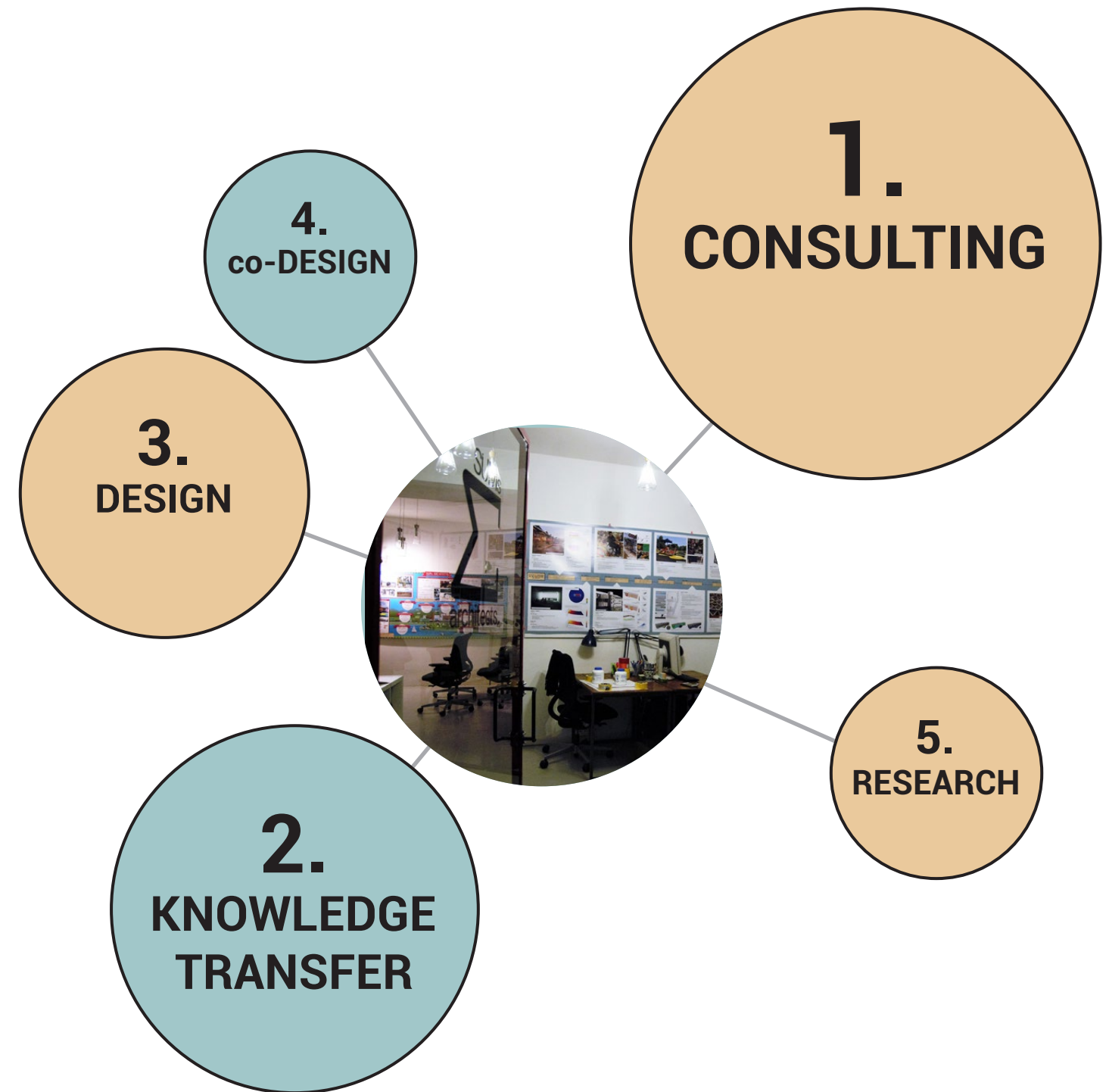
Mathematics for parametric design

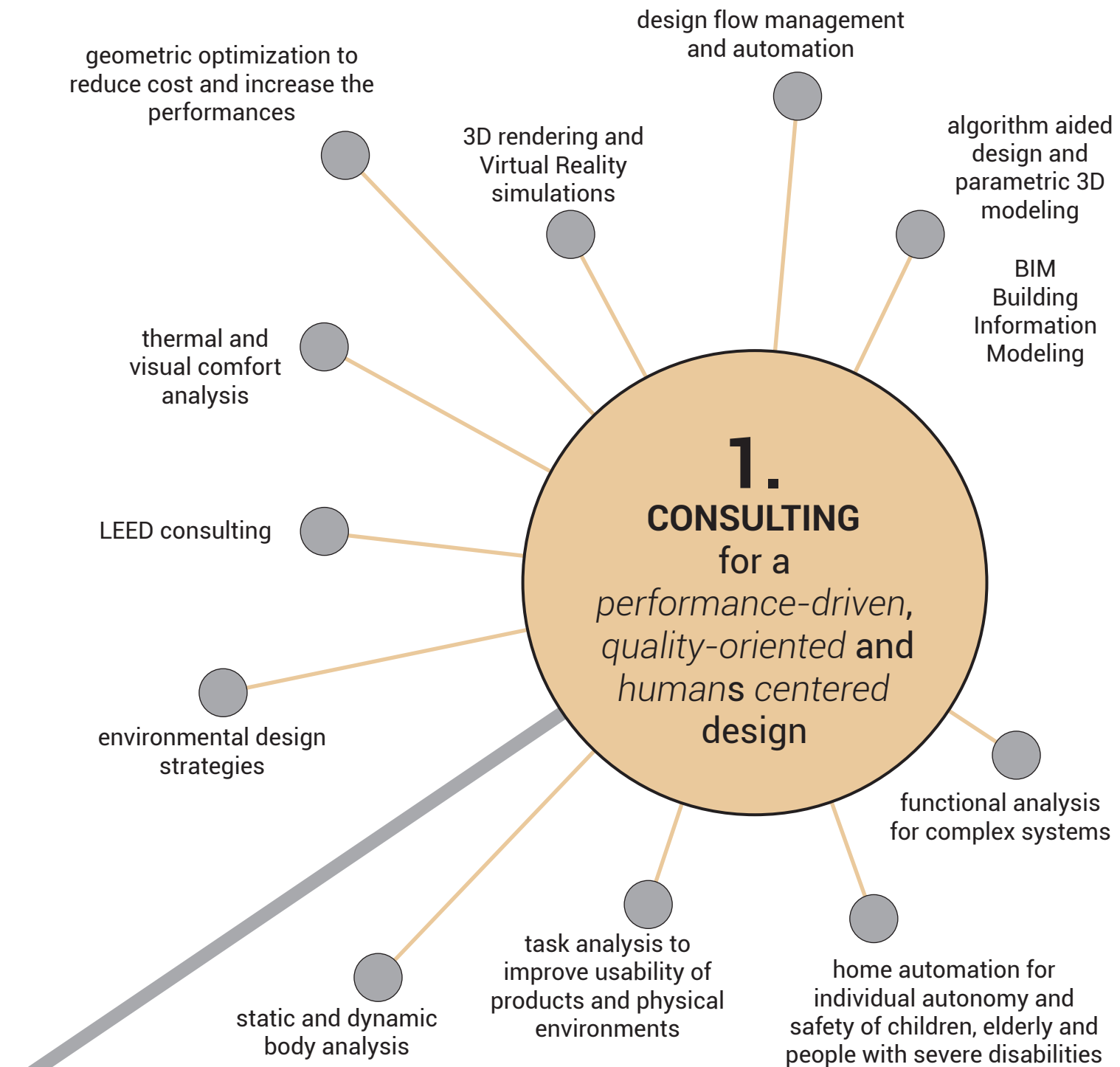
SUMs architects

SUMs is an architecture firm based in **Bologna** (Italy) committed to increase the quality and liveability of spaces and buildings while respecting the environment and the diversity of people through the use of algorithms for design optimization, modeling and simulation.

Sustainability, **U**niversal Design and **M**athematics for parametric design represent the 3 subject areas of SUMs that are combined in consulting, research and knowledge transfer activities, design and co-design services.

Since 2016 SUMs is part of the **creative hub** of piazza dei Colori as one of the winners of the public tender published by Comune di Bologna, Settore Marketing Urbano e Turismo and by "IncrediBOL!".







SCHOOL COMPLEX LUIGI PIRANDELLO - Isnello (PA), 2019-2021




project by AM3 architetti associati
services: LEED certification, daylight, energy modeling, inclusive design

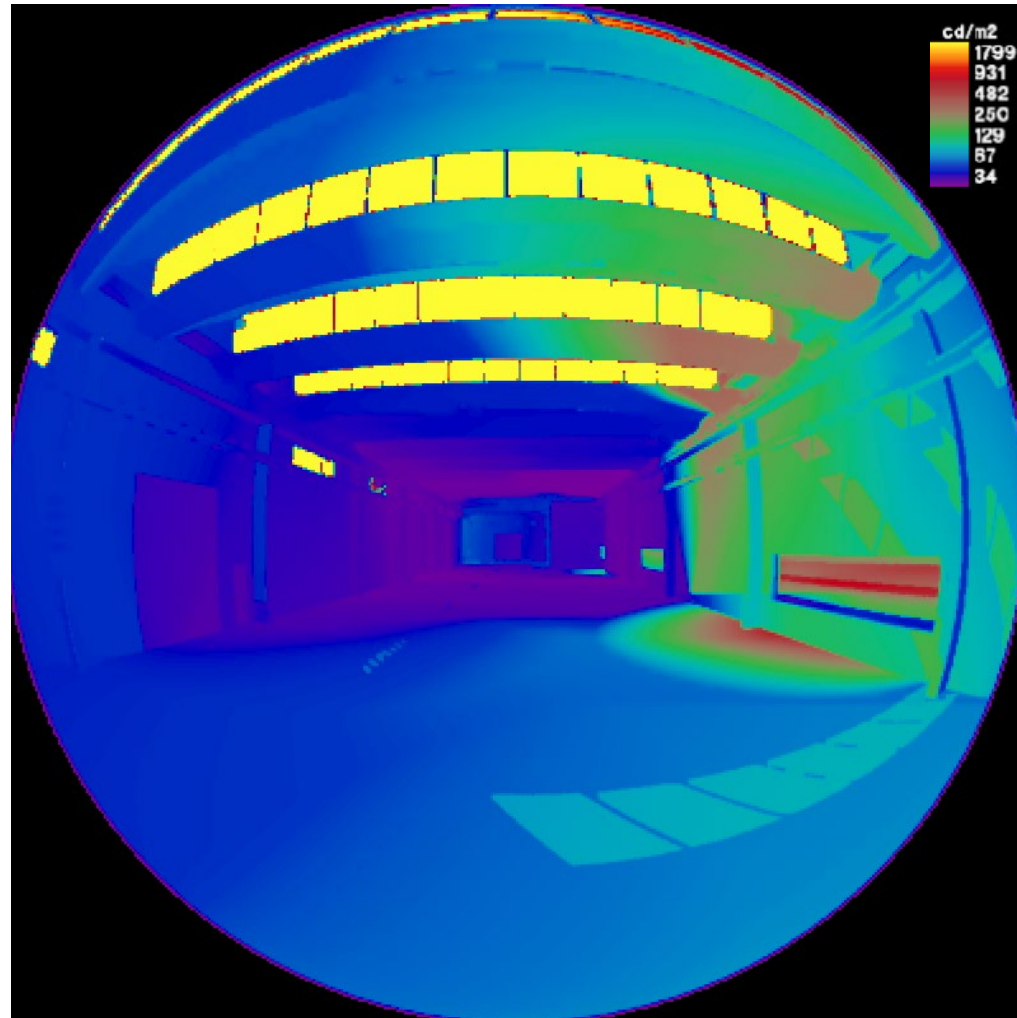
OUTPUTS

**ASE < 10%**
sDA = 64%

**-100%** water demand for irrigation

compliant with **Universal Design** and **LEED Pilot** credit requirements

CFG RETTIFICHE manufacturing building - Traghetto di Argenta (FE), 2018



project by SG/A Sedici gradi
services: LEED pre-assessment, daylight, energy modeling

OUTPUTS

⚡ **-26%** cooling energy demand
(compared to baseline)

🌡️ **-80%** discomfort hours in
summer (compared to
baseline)

G-FACTOR incubatore della Fondazione Golinelli - Bologna, 2017



project by Diverserighe studio
services: average daylight factor analysis

OUTPUTS

👁️ **materials replacement** for a
better daylight distribution

✓ **daylightfactor** values above
the minimum required

LA TERRA DEI BAMBINI youth centre - Gaza Strip, 2011



project by ARCò Architettura & Cooperazione - MC A
services: design optimization for improving comfort and resource efficiency

OUTPUTS

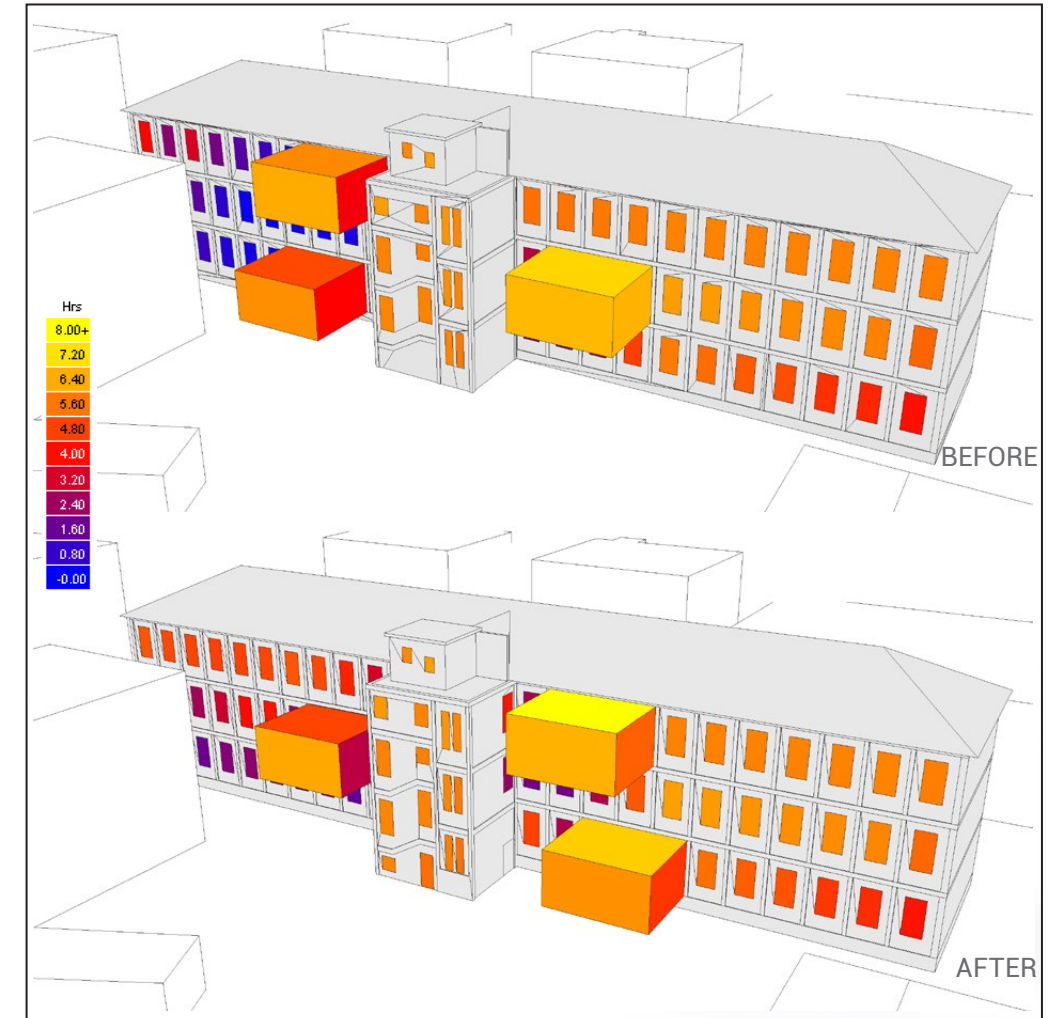


-79% of direct solar radiation over the southern facades during hot months (compared to the base case)



8 months of water self-sufficient

VIA PEDROTTI building renovation - Torino, 2015



project by King Roselli Architetti
services: greenhouse design optimization

OUTPUTS



+16% of direct solar radiation over the greenhouses and the facades in winter (compared to the base case model)

IL SUPERMERCATO DELL'ACCOGLIENZA - Bagno di Gavorrano (GR), 2005



project by FISH - Unicoop Tirreno
services: accessible design of the physical environment and furnitures

OUTPUTS



winner of the Ethic Award
2005



increased number of accessible retails
of Unicoop Tirreno in line with the
Universal Design principles

"GIOCHIAMO TUTTI!" inclusive playground - Genova, Milano, L'Aquila, 2010-2015



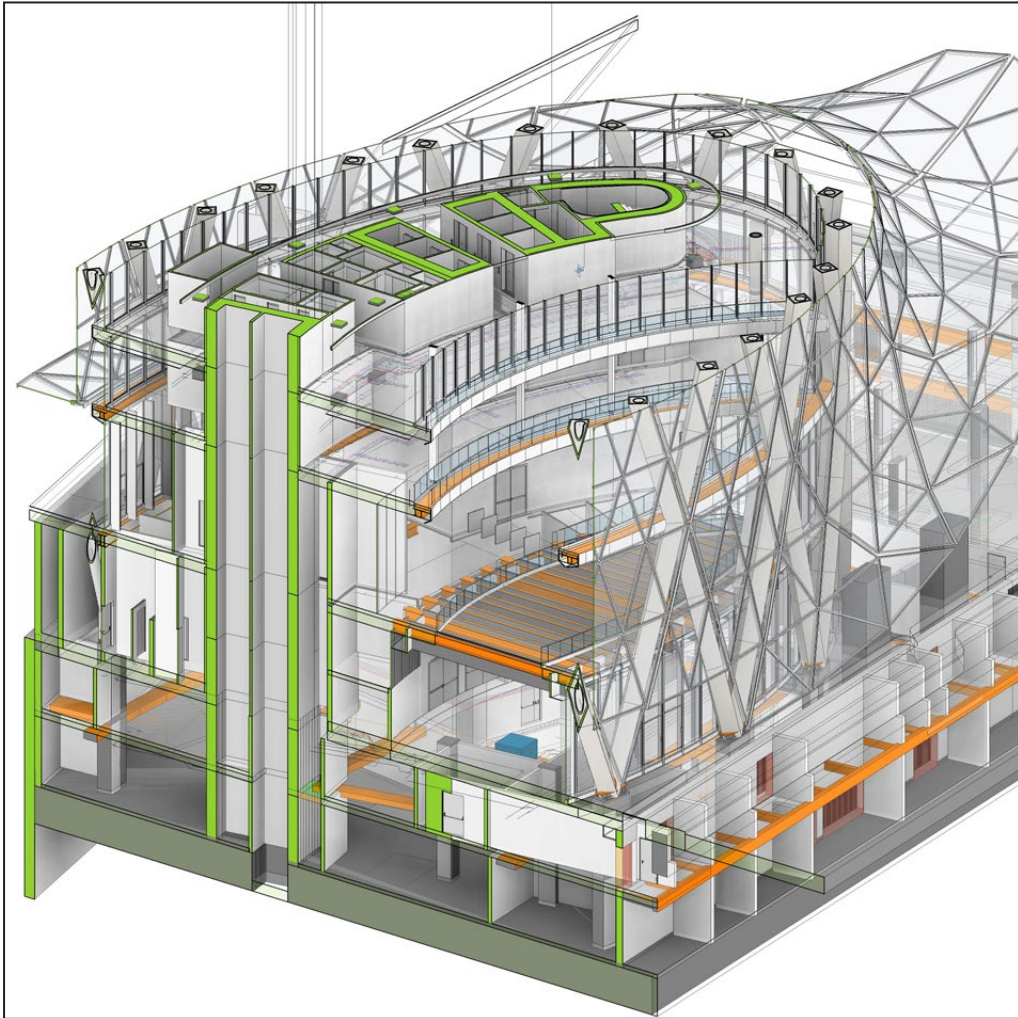
project by FISH - Enel Cuore Onlus
services: accessibility design solutions

OUTPUTS



accessible and inclusive playgrounds,
open to the public and free of charge
for all

NUOVO CENTRO DIREZIONALE UNIPOL - Milano, 2015-2017



project by Mario Cucinella Architects MC A
services: architectural BIM Coordination; parametric facade design

OUTPUTS

0 interferences/clashes between architectural, structural and MEP elements

130 consistent drawings generated from the BIM model

ONE AIRPORT SQUARE mixed use building - Accra, Ghana, 2014

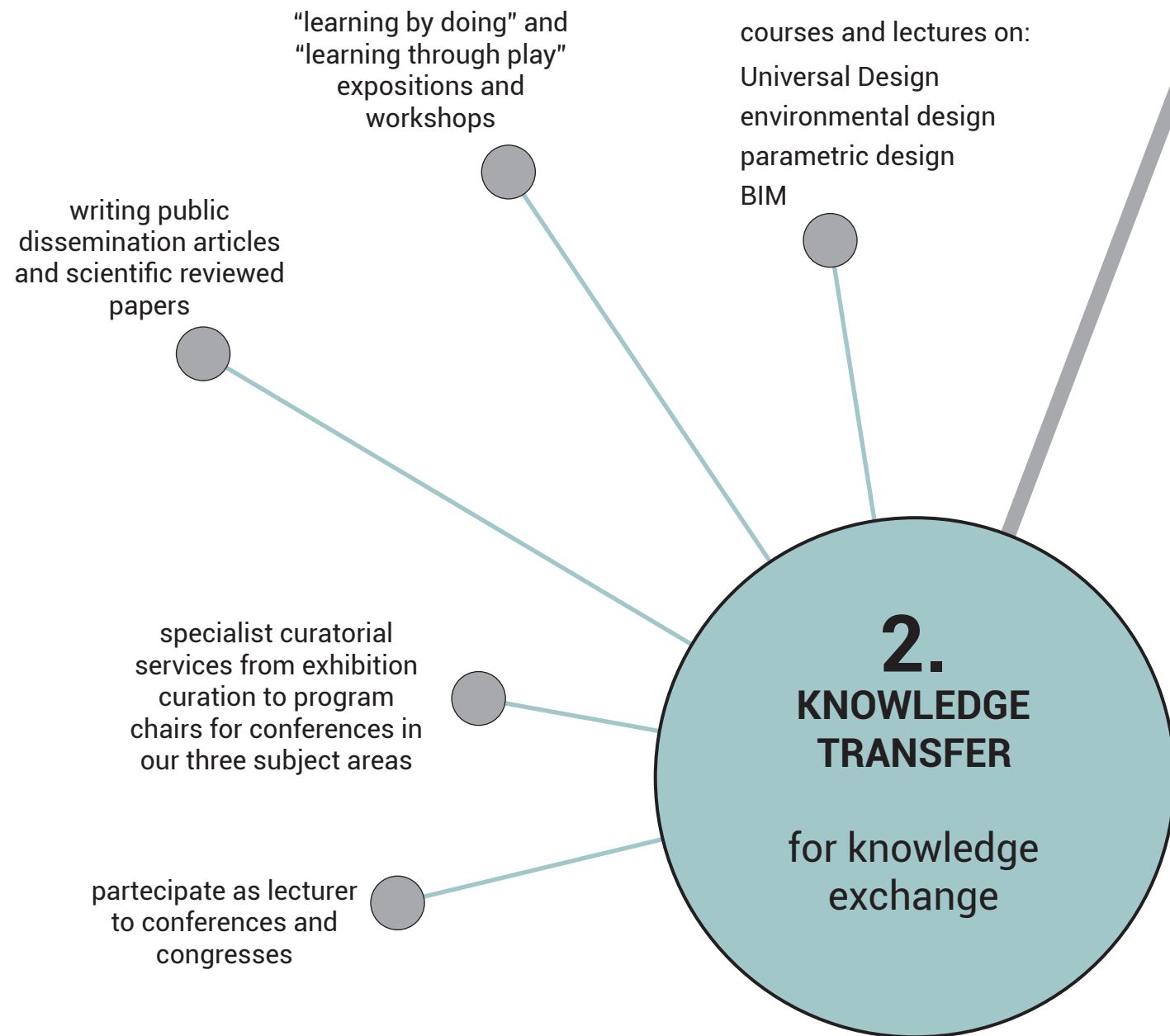


project by Mario Cucinella Architects MC A
services: parametric 3D modeling, facade optimization for construction

OUTPUTS

28 types of different nodes instead of the 648 types of the initial project

-1 million euros of the cost of the facade structure



REVIT 2018 ARCHITECTURAL COURSES - Bologna, 2018



client: Mario Cucinella Architects
services: customized training courses on BIM approach and tools

OUTPUTS



20 participants appreciated the practice-based learning model



40 hours / Continuing Professional Education credits

GRASSHOPPER COURSES - Bologna, 2018



client: groups of private students
services: course planning and accreditation, teaching

OUTPUTS



100% of positive feedback responses through anonymous surveys



16 hours / Continuing Professional Education credits

UNIVERSAL DESIGN WORKSHOP - Ramallah, West Bank, 2016



client: EDUCAID Onlus in partnership with GVC Onlus. Donor: AICS
services: 3 days workshop for practitioners of MoEHE, UNRWA and GVC

OUTPUTS



15 participants per day, on average, involved in active learning activities



6 renovated schools according to the Universal Design principles

PLEA2015 Architecture in (R)Evolution - Bologna, 2015



activity of Building Green Futures
services: program chair of the scientific conference

OUTPUTS



350 participants appreciated
the innovative meeting
format



3 days of debate between
practitioners and researchers
from different disciplines

FESTIVAL DELLA SCIENZA DI GENOVA- Genova, 2006-2008

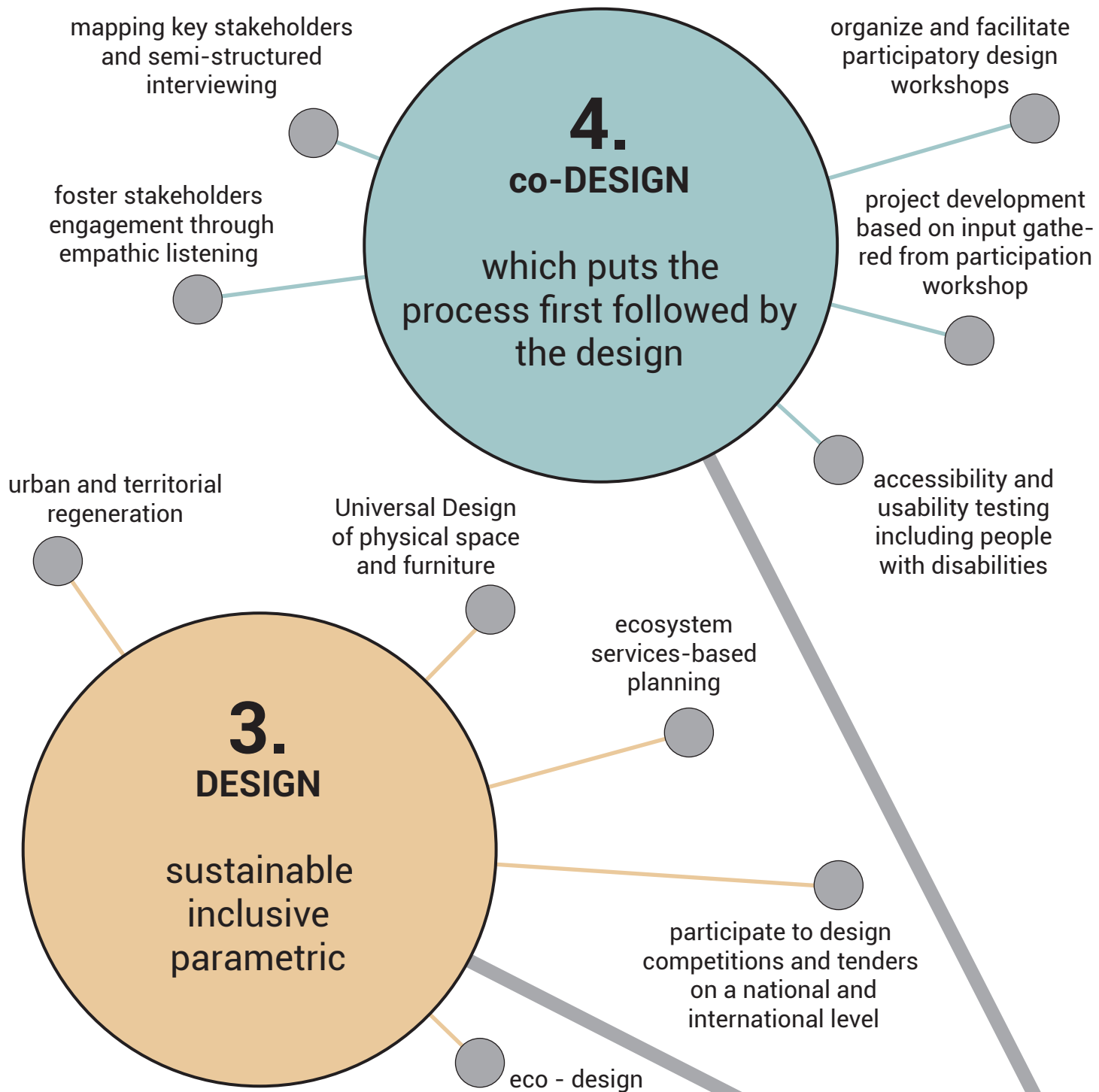


activity of Laboratorio Interdisciplinare FORMULAS
services: content development of exhibitions on applied mathematics

OUTPUTS



thousands of visitors among elementary, middle and high
school students, university students, families and professionals
involved in learning by playing and learning by doing activities





PARCO DELLA RESILIENZA - social housing "il Quadrilatero", Bologna, 2018




client: ACER Bologna
services: preliminary design for the regeneration of the outdoor areas

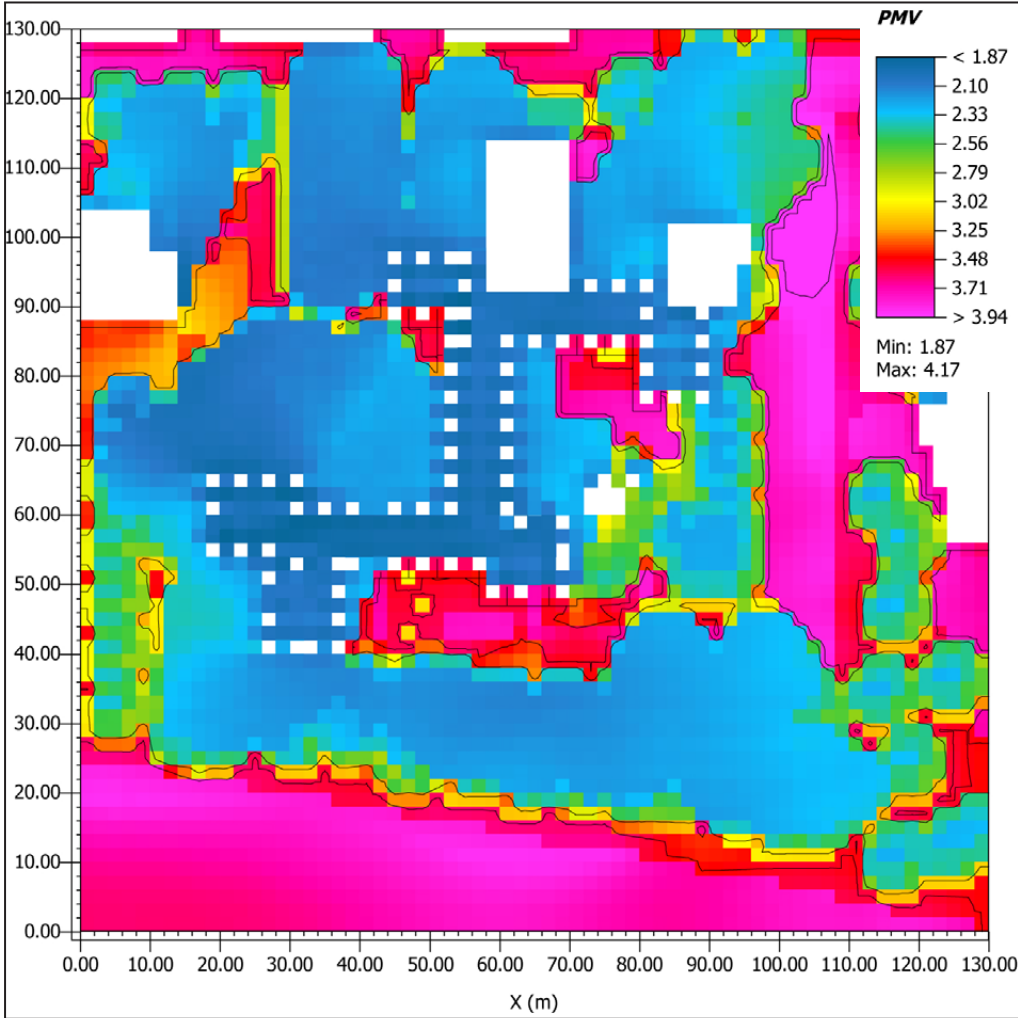
OUTPUTS

 **100%** of rainwater managed on site using LID and GI

 accessible and inclusive park **for all**

 **winner project** of Regional funding tender

GANDUSIO VILLAGE - social housing "Gandusio", Bologna, 2018



client: Comune di Bologna
services: preliminary design for the regeneration of the outdoor areas

OUTPUTS



optimization of the themal
comfort index (PMV)



winner project of Carisbo
funding tender

BUSSVEIEN new bus stops shelter - Norway, 2016



International design competition

OUTPUTS



use of **recyclable**
materials



energy
self-sufficient



accessible and inclusive
furniture **for all**

RENOVATION OF 3 UNRWA SCHOOLS- Shuafat Camp, East Jerusalem, 2017



client: Studioazue for Educaid - Overseas. Donor: AICS
services: participatory design process and preliminary design project

OUTPUTS



17 participants to the co-design lab among the UNRWA technical staff, parents, students and teachers



3 renovated schools by adopting the Universal Design approach

"A ZUGHÈR - gioco arte musica in strada" - Piazza dei Colori, Bologna, 2017



activity developed by SUMs together with the Participatory Design Table of the District of San Donato - San Vitale of Bologna

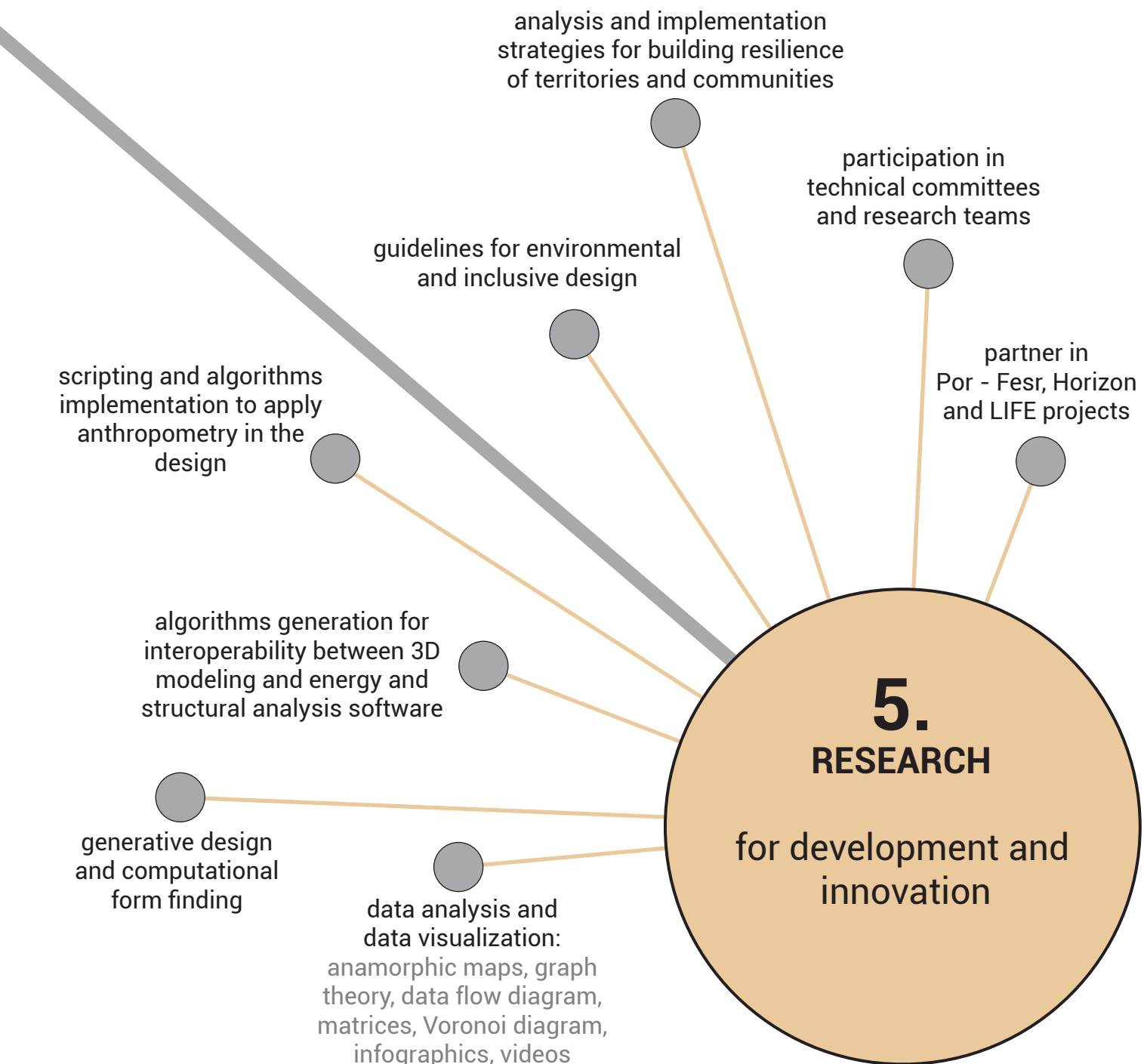
OUTPUTS



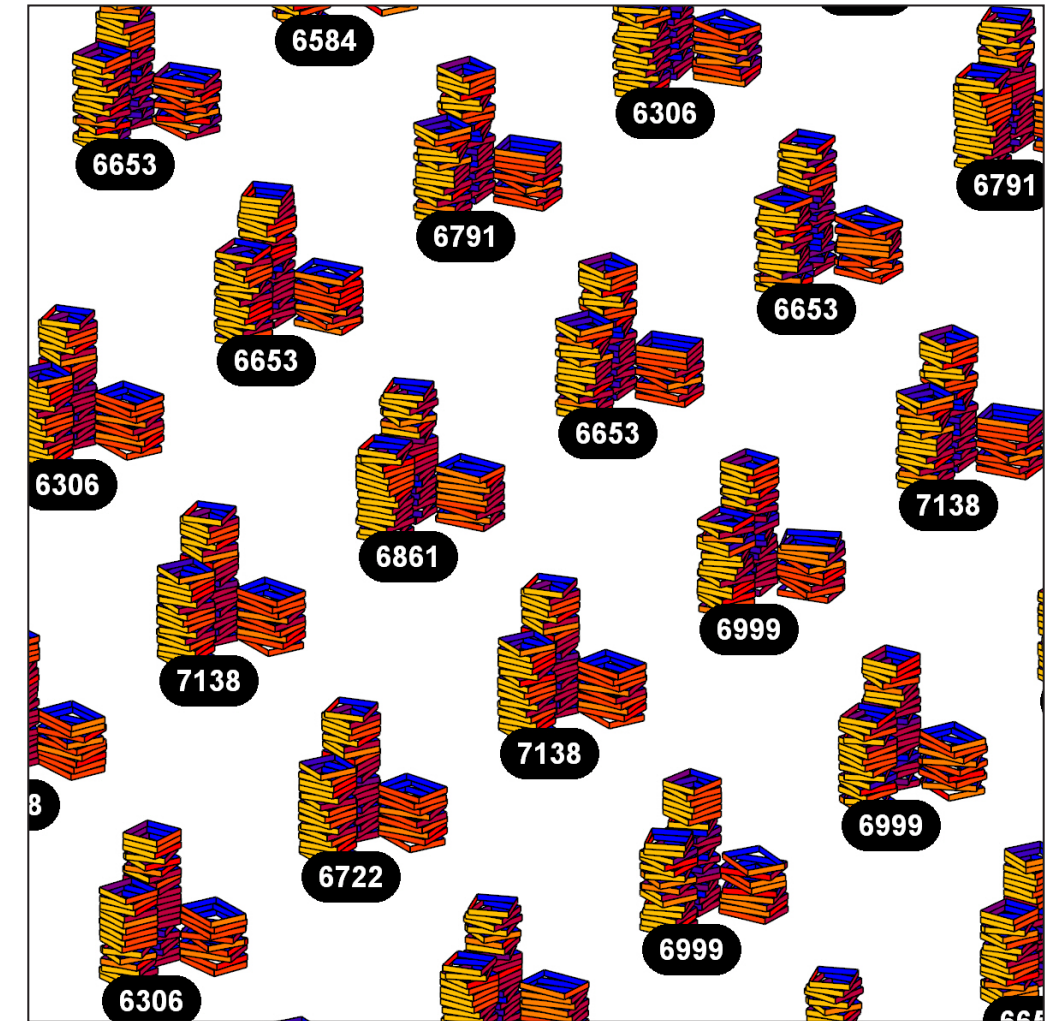
10 economic and social entities of the district involved in the participatory process



1 message: regeneration projects as a result of participatory process



EXPO VILLAGE form-finding of high environmental performance towers



applied to a social housing project of MC A services: generative algorithms development for form finding processes

OUTPUTS

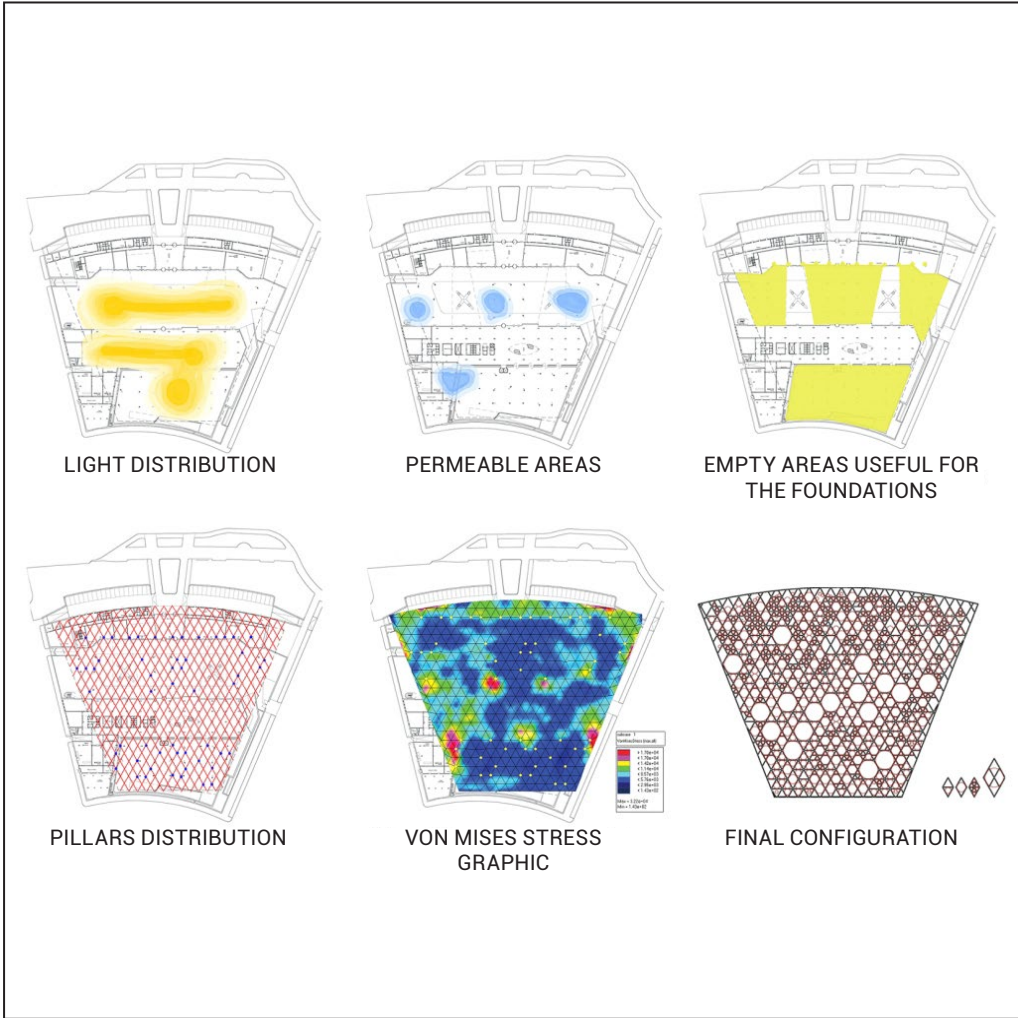


increased amount of apartments exposed to direct sun for at least 2 hours per day in winter




algorithms generation for interoperability between 3D modeling and energy analysis software


MUSEO DELL'AUTOMOBILE - Torino, 2005



project by RicciSpain Architetti
services: 3D parametric modeling of the roof structure design

OUTPUTS

 **reduced** amount of metal roof elements


 **VBScript** to optimize the roof structure design according to the environmental targets and structural requirements


EXPO GUIDELINES SUSTAINABLE SOLUTIONS - 2013



activity of Building Green Futures with FLA for EXPO Milano 2015
services: guidelines development

OUTPUTS

 **85%** of pavilions have integrated shading devices

 **74%** of pavilions adopted water saving solutions

CHI SIAMO

GIULIA PENTELLA

Architect - **LEED AP BD+C** - Accredited Professional in compliance with **ISO/IEC 17024** - qualified technician for energy certification by Emilia-Romagna Region - works on **sustainable planning and bioclimatic architecture**. She worked at Reinberg ZT GmbH and FontanaAtelier and from 2009 to 2015 she was an advisor for sustainability within the R&D team at MCA Mario Cucinella Architects. From 2013 to 2015 she was the executive director of the BGF Building Green Futures association to promote sustainable development in emergency contexts and in 2015 she was the Program Chair of the 31st edition of the international conference on Passive Low Energy Architecture (PLEA). She has been lecturer to numerous conferences, juries and post-graduate courses in Italy and abroad and the editor of several guidelines on sustainable and inclusive planning. She has published several articles on social and environmental responsibility of an architect with Franco Angeli Edizioni as a member of the InCreaSe research group.



FABRIZIO MEZZALANA

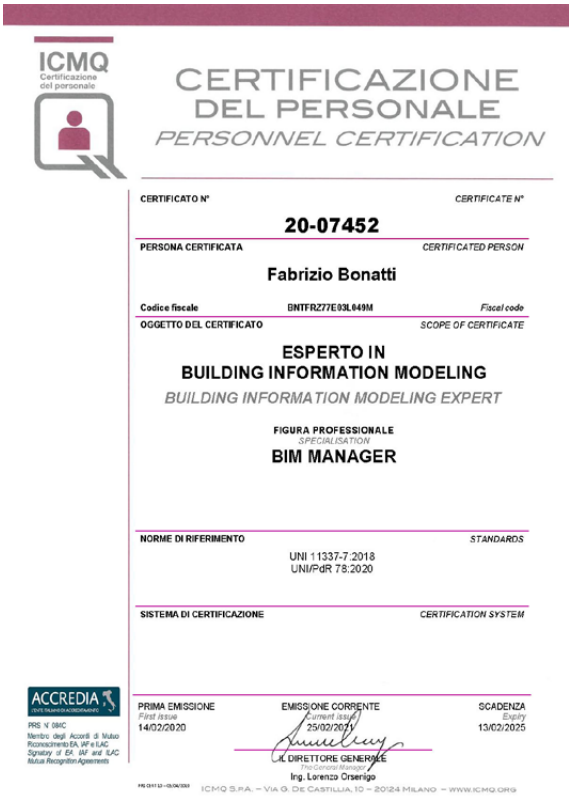
Architect - works on **inclusive and Universal Design** in the private and public sectors, and for community, rehabilitation and hospitality buildings. Since 1998 he is responsible for Accessible Design Service at "Centro per l'Autonomia", a publicly funded rehabilitation center, that delivers every year ninety adaptation projects of workplaces and homes for people with disabilities who would like to improve their autonomy. Author of different guidelines and regulations for inclusive planning on behalf of associations for people with disabilities and in collaboration with: FISH; INRES-COOP; ARPA Lazio, Parco Appia Anti-

ca; Corpo Nazionale dei Vigili del Fuoco; UNI Ente Nazionale Italiano di Unificazione. Architect and construction work supervisor for home adaptation projects, home automation (domotics) system design for people with severe disabilities, rehabilitation and healthcare facilities, care homes for elderly people, inclusive and accessible urban playgrounds. As a cooperation expert of the Italian Development Cooperation he participated in monitoring field missions under the "Strengthening the Primary Healthcare System POSIT" programme. He is involved in teaching activities on the specific subject.

FABRIZIO BONATTI

Architect, **BIM Manager** and **CDE Manager** - works on **parametric modeling and computational design**; he is one of the founding members of the Formulas Interdisciplinary Laboratory with which he manages to combine his interests in mathematics and architecture participating in numerous teaching and training experiences as well as numerous editions of the Festival della Scienza in Genova and the Festival della Matematica in Rome. He has been Lead Architect, computational designer and information system manager at Insula Architettura e Inge-

gneria (from 2006 to 2009) and at King Roselli Architetti (from 2009 to 2011); he has been Senior Architect, BIM Manager, IT Manager and Manager of computer-aided design/manufacturing technologies (parametric modeling, BIM, 3D printing, design flow management and automation, generative algorithms, script-language and flow charts) as a member of the Research and Development team at MCA Mario Cucinella Architects (from 2011). He participates as a lecturer in numerous conferences on this topic.



SUMs ARCHITECTS

perFORMance

Shapes and material selection are based on their capacity to act as "human's third skin"
[Karl Lotz]

A MULTIDIMENSIONAL APPROACH

We use the same approach and core values for every single project, despite its dimensions

BIOCLIMATIC ARCHITECTURE VIEWED AS A TOOL, NOT ANYMORE ONLY AS A GOAL

We "build" sustainable lifestyles

AN UPSIDE-DOWN VIEW

We observe reality from new and different perspectives

A MATHEMATICAL VIEW OF OUR WORLD

We use algorithms for advanced data management, shape optimization and interactive simulation

REGENERATE - REQUALIFY RENOVATE

We have four goals:
- land consumption,
+ safety,
+ quality of life,
+ comfort

A GLOBAL ARCHITECTURAL LANGUAGE

We use a global methodology to find local solutions

PRAISE DIVERSITY TO GO BEYOND STANDARDS

We design inclusive environments to suit different users





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