

**Design
& Health**
International Academy for Design and Health

Milano, Italy 11-14 April 2024

Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment / Healthy people

WELCOME TO MILANO!



**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

MEDIA PARTNER

**Progettare
per la Sanità**
Organizzazione, tecnologia, architettura

edra | SANITÀ 33

SPONSORS

Gerflor

 **REair**

 **Deerns**

cneto CENTRO NAZIONALE
SCIENTIFICO E
TECNICO
OPERATIVO

SESSION 1: Scientific introduction of the congress

**Design
& Health**
International Academy for Design and Health

Milano, Italy 11-14 April 2024

Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment / Healthy people

ARCHITECTURE AND HEALTH

Prof. Stefano Capolongo, MArch PhD

Politecnico di Milano, Director Department ABC

Architecture Built environment Construction engineering, Design & Health Lab



**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

MEDIA PARTNER

**Progettare
per la Sanità**
Organizzazione, tecnologia, architettura

edra | SANITÀ 33

SPONSORS

Gerflor

REair

Deerns

cneto
CENTRO NAZIONALE
SCIENTIFICO E
TECNICO
OPERATIVO


Politecnico di Milano and the Department of Architecture, Built environment and Construction engineering [DABC]




POLITECNICO
MILANO 1863

| **DABC**

DEPARTMENT OF
**ARCHITECTURE, BUILT ENVIRONMENT AND
CONSTRUCTION ENGINEERING**



MILANO, ITALY 28-31 MARCH 2019




POLITECNICO MILANO 1863


1ST EUROPEAN SYMPOSIUM

SALUTOGENIC HOSPITAL DESIGN & URBAN HEALTH

Global Perspectives and Local Identities in Healthcare Architecture



PARTNERS



▷ European Symposium 2019



POLITECNICO MILANO 1863

World Congress 2024 ◀



Milano, Italy 11-14 April 2024



POLITECNICO MILANO 1863

DIPARTIMENTO DI ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO



Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment | Healthy people

Final program

Media partner



Sponsors



About Politecnico di Milano

Born in 1863, Politecnico di Milano is a public scientific-technological university which trains

Engineers, Architects and Industrial Designers

The Values of Politecnico di Milano are:

RESPONSIBILITY

FAIRNESS

RESPECT

TRUST

INTEGRITY

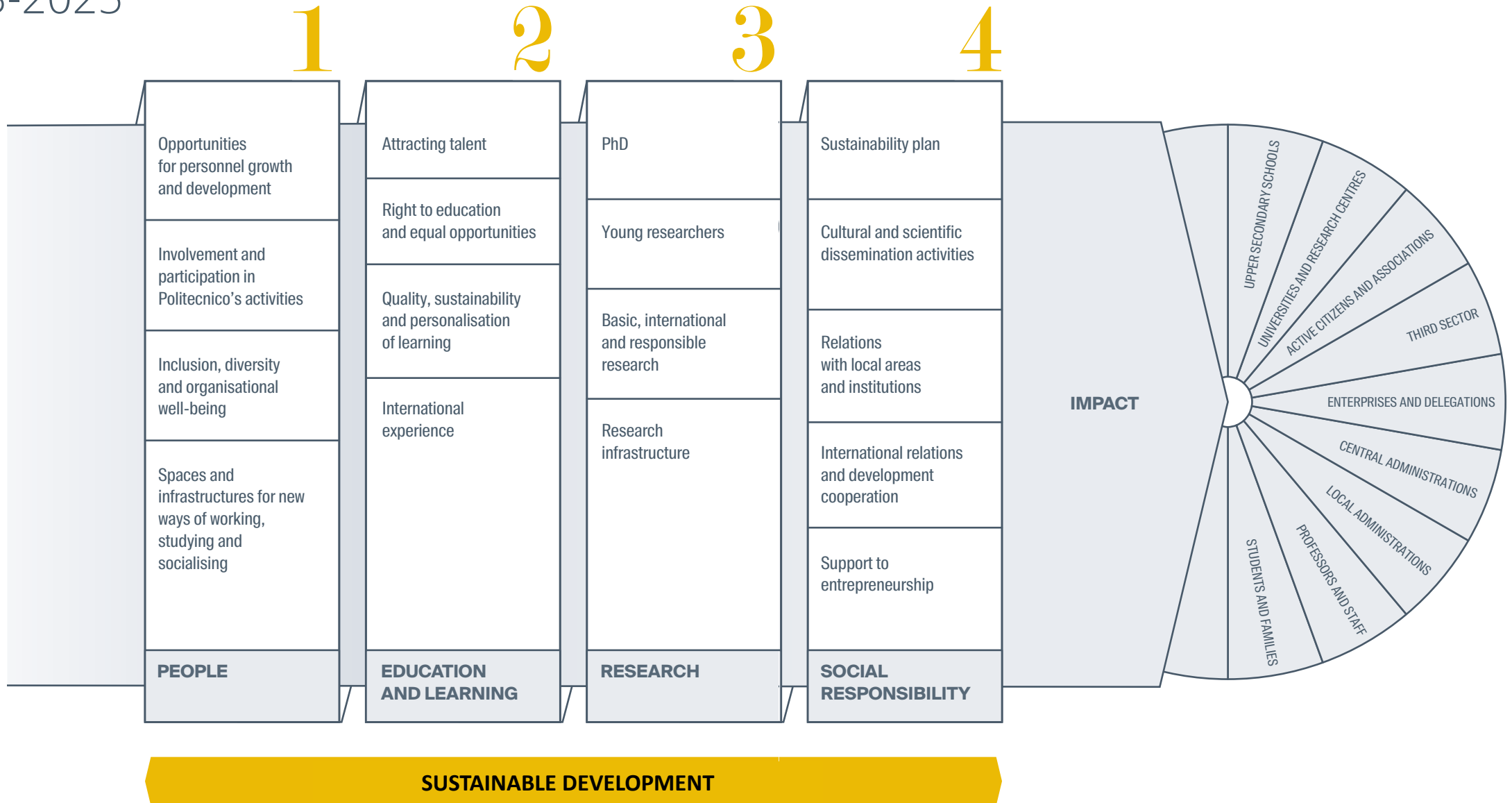
TRANSPARENCY

PROFESSIONALISM



Politecnico di Milano Strategic Plan

2023-2025



Politecnico di Milano Community

2023

OVER 47,900

MSc and BSc students

1,627

Faculty

8258

International students

1,292

Technical and
Administrative Staff





Politecnico di Milano

Achievements

2024

QS ranking 2024

Italy: 1st place

Europe : 3rd Design & Art; 4th Architecture & BE; 6th Engineering & Tech

World-wide: 7th Design & Art; 7th Architecture & BE; 23rd Engineering & Tech

Research

223 projects funded under Horizon Europe, EU grants > 110 M€

48 Individual Grants under Horizon Europe (25 ERC and 23 MSCA PF)

Technology Transfer

Spin-offs: 105 companies established, 82 still active (2000 to date)

2925 patents (update 12/2022)

1021 inventions (update 12/2022)

Politecnico di Milano

Departments

Research activities are organised in **12** different Departments

Department of Aerospace Sciences and Technologies (DAER)

Department of Architecture and Urban Studies (DASU)

Department of Architecture, Built Environment and Construction Engineering (DABC)

Department of Mathematics (DMAT)

Department of Chemistry, Materials and Chemical Engineering "Giulio Natta" (DCMC)

Department of Design (DESIGN)

Department of Electronics, Information and Bioengineering (DEIB)

Department of Energy (DENG)

Department of Mechanical Engineering (DMEC)

Department of Civil and Environmental Engineering (DICA)

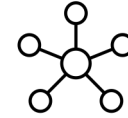
Department of Physics (DFIS)

Department of Management, Economics and Industrial Engineering (DIG)

ABC Department Strategic lines of research



Sustainability:
decarbonised,
resilient, adaptative
and regenerative
Built Environment



Well-being: safe, secure,
inclusive and healthy Built
Environment



Advanced materials and
components, clean tech,
and innovative
manufacturing and
construction technologies



Conservation: Science and
management of **cultural
heritage**



Twin transition:
competitive, **digitalised**
and circular value chain
for construction industry
and built
environment

ABC Department Strategic Plan 2023-2025

1

PEOPLE

- Staff development
- Inclusion, Diversity and Organizational Wellbeing
 - Space and Infrastructures
- New ways of working, studying and socialising

2

EDUCATION

- Talent Attraction
- Scholarship and Equal opportunities
- Quality, Sustainability and Customization of Education
- International Experiences

3

RESEARCH

- PhD and Doctoral Studies
 - Young Researchers
- Basic and applied Research
 - International and Responsible research
- Research Infrastructures

4

SOCIAL RESPONSIBILITY

- Sustainability Plan
- Cultural activities and scientific dissemination
- Relationship with territory and institutions
- Cooperation and institutional support
- Entrepreneurship support

TAKING CARE

ABC Department Community

Attractiveness

66 projects won on competitive basis, such as:
14 Horizon Europe;
12 other european projects
36 nazional / ministerial projects;
4 regional projects
160 average contracts
45% co-funded PhD scholarships
20 Visiting Professors per year

Public Engagemenet

About 300 Public Engagement activitites in 2023; 288 in 2022; 179 in 2021
Curator of **Biennale di Venezia Architettura**.
Agreement with **FAI** (Fondo Ambiente Italiano) for the promotion of cultural heritage.
Collaborating Center for **World Health Organization** healthcare infrastructures
Coordination of **Mantova Architettura, Milano Arch Week, Arte Sella Architettura**.
Coordination of 1 **Polisocial** project.

Over **1.000** people between structured and collaborators

182 Structured
Professors

51
Assistant
Professors

85
Associate
Professors

46
Full
Professors

75

Research
Fellows

178

PhD Students

37

Technical and
Administrativ

577

Teaching
assistant

53

Research
collaborators

1 PhD School in Architecture, Built environment and Construction engineering – DABC

1 Department Lab System (ABCLab)

13 Interdepartmental Laboratories

6 hard units

Tools, instruments and
machineries

19 soft units

Research support for
projects and processess

Large Infrastructures:

Scientific Comitee LPM Material Test
Laboratory
Scientific Director «LaborA»

ABC Department Technology Transfer

19 patents registered
27 inventors (2017-21)

6 winner of a technology
transfer contest (S2P
2017-21)

2 awards for innovation
and digital transformation
of the built environment
(BIM&Digital Award)

13 projects developed with
industrial partners,
financed by the Regional
Government

3 spin-offs

3 participations in consortia
(Fabre, CISE, Poliedra)

6 Laboratory Hard Units

19 Laboratory Soft Unit



Design & Health Lab.

**Multidisciplinary Centre for Research and
Innovation in Healthcare Infrastructures**



POLITECNICO
MILANO 1863

| **DABC**

DEPARTMENT OF
**ARCHITECTURE, BUILT ENVIRONMENT AND
CONSTRUCTION ENGINEERING**

DABC

DIPARTIMENTO DI ARCHITETTURA INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO
DEPARTMENT OF ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING

DESIGN & HEALTH LAB

Department of Architecture, Built environment
and Construction engineering (ABC)
POLITECNICO DI MILANO



DABC Design & Health Lab Multidisciplinary Team



Stefano
Capolongo
Architect



Maddalena
Buffoli
Architect



Andrea
Rebecchi
Architect



Marco
Gola
Architect



Andrea
Brambilla
Architect



Erica
Mosca
Architect



Silvia
Mangili
Architect



Tianzhi
Sun
Architect



Erica
Brusamolin
Designer



Yong
Yu
Architect



Stefano
Arruzzoli
Architect



Michele
Dolcini
Economist



Daniel
Ibrahim
Architect



Isabella
Nuvolari-D.
Architect



POLITECNICO
MILANO 1863

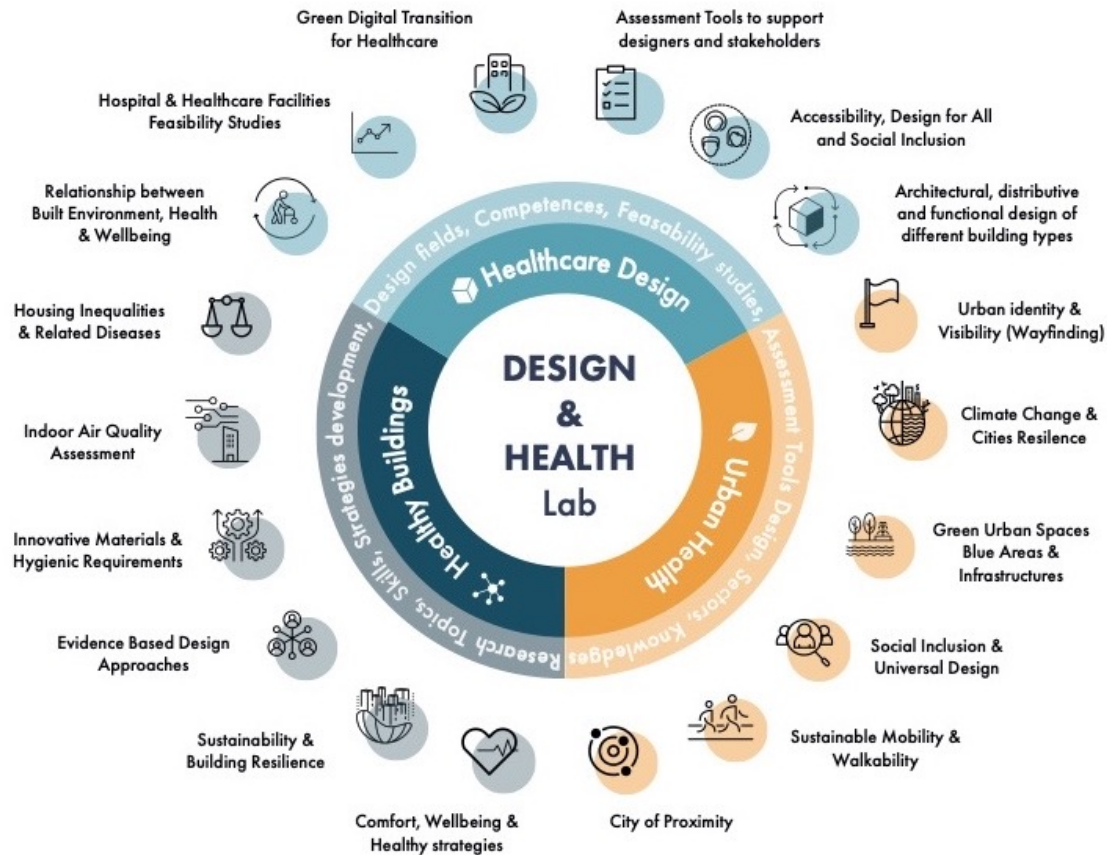
DABC Design & Health Lab

Scientific coordinator: Prof. Stefano Capolongo



Development of Studies and Research in the field of the relationship between the Built Environment and Health, urban spaces, living and working environments with a focus on the Planning, Programming and Design of Hospital and Socio-Health Systems

- **INNOVATE** the methodologies of the design and evaluation process through scientific methods of investigation and simulation
- **EXPERIMENT** research outputs according to an Evidence & Practice-based approach for the protection and promotion of Public Health;
- **VERIFY** the efficiency of processes and project strategies
- **COMMUNICATE** effectively results to facilitate discussion among stakeholders and provide guidance for improvement and innovation actions



POLITECNICO
MILANO 1863

The challenge of Urban Health and Salutogenic Cities



POLITECNICO
MILANO 1863

| **DABC**

DEPARTMENT OF
**ARCHITECTURE, BUILT ENVIRONMENT AND
CONSTRUCTION ENGINEERING**

Urban health post-2015

In Italo Calvino's *Invisible Cities*, Kublai Khan says to Marco Polo "you take delight not in a city's seven or seventy wonders, but in the answer it gives to a question of yours".

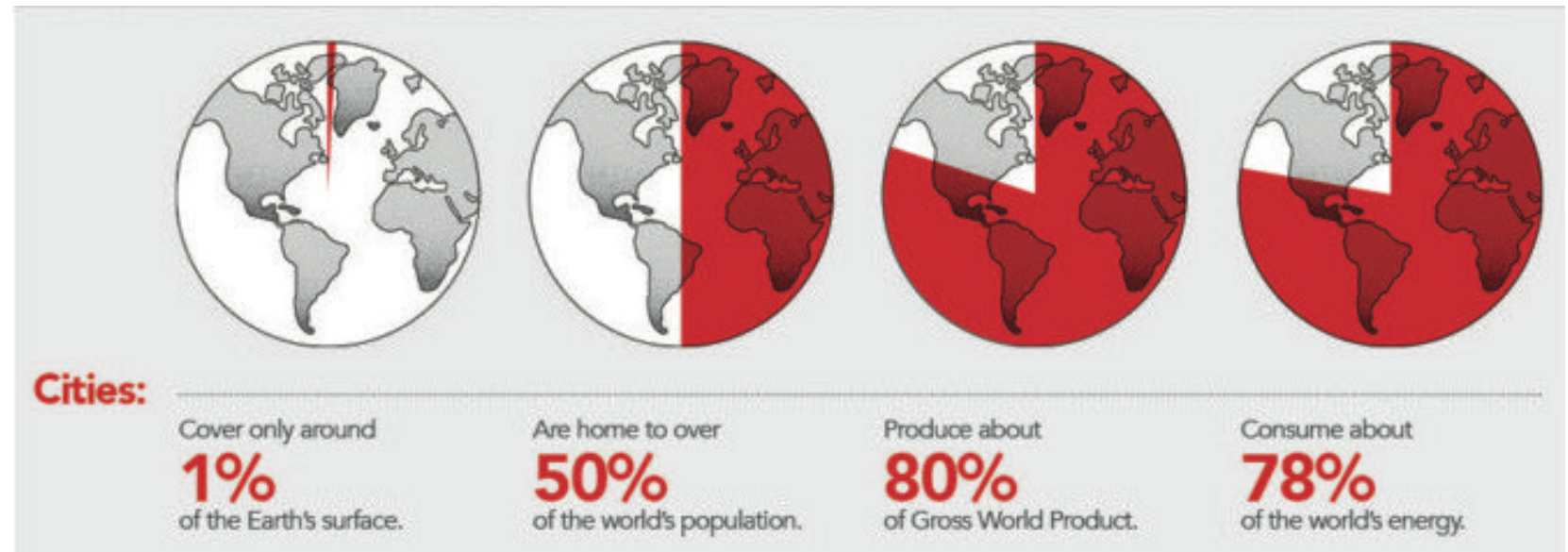
People's lives and to large extent their questions (in the form of desire for economic opportunity, social connection, cultural life, and technology), are increasingly manifest in urban settings. Today 54% of the world's population live in urban areas. This is expected to rise to 70% by 2050, when the world's urban population will surpass 6 billion. Projections by the UN Population Division, Department of Economic and Social Affairs, show that most of the increase will be in Africa and Asia—in particular China, India, and Nigeria. This poses challenges to meet the needs of new urban populations not only for housing and transport, but also for health, education, and employment. Human beings are therefore currently in the midst of a profound change in their ecology. How can we and future generations sustainably thrive in the midst of increasing urbanisation?

The 2012 *Lancet* Commission Shaping Cities for Health reported that cities are complex entities and that urban health needs a multi-sector approach. 75% of economic growth is driven by cities and although the report showed that urban residents have better health outcomes than those in rural settings, the greatest inequity occurs in urban areas. A letter by Shamim Talukder and colleagues in today's

on-going Urbanization Phenomenon

The contemporary cities:

- are currently home of the 50% of the world's population, and the *UN Population Department* forecast an increase till 70% on 2050;
- they occupy just over 1% of the earth's surface;
- are places of social, cultural, economic and educational opportunities;
- are spaces of environmental and public health risk factors;
- are complex and resilient system that requires a **multi-sectoral approach**.

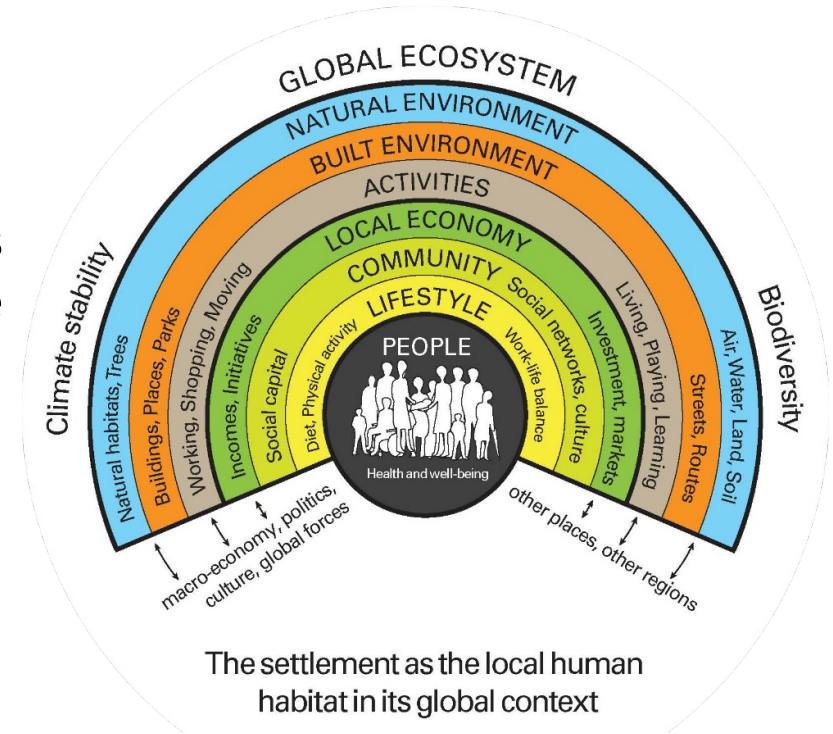


source: Cities Alliance - Climate Change and Cities 2020

Determinants of Health

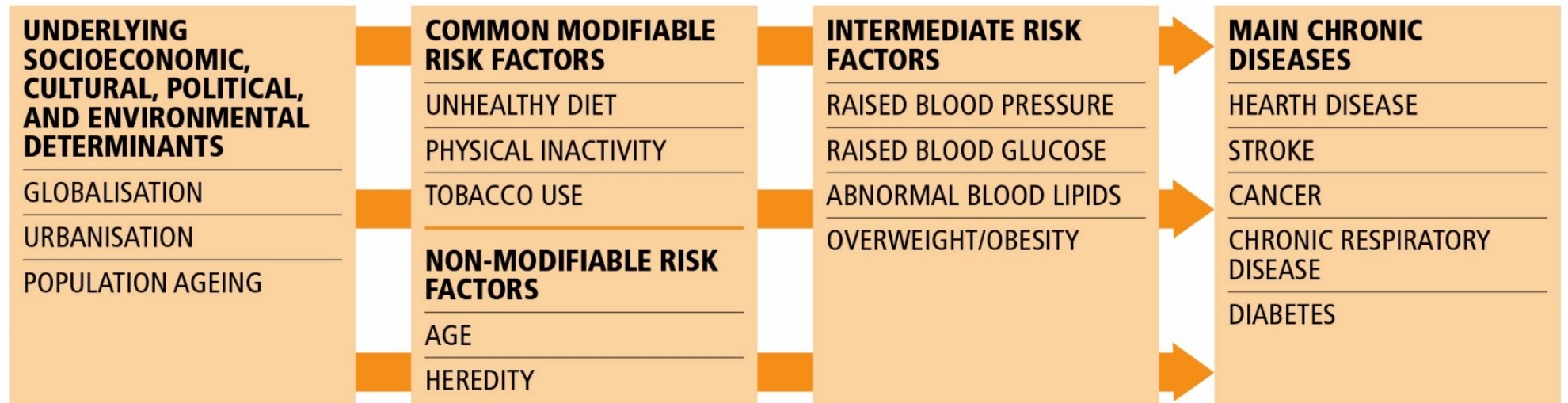
The ability of the city to promote the environmental quality of urban contexts and the adoption of healthy lifestyles plays a role on 70% of the total of the Determinants of Health:

- 50% socio-economic factors and lifestyle
- 20% environmental conditions
- 20% genetic inheritance
- 10% healthcare services



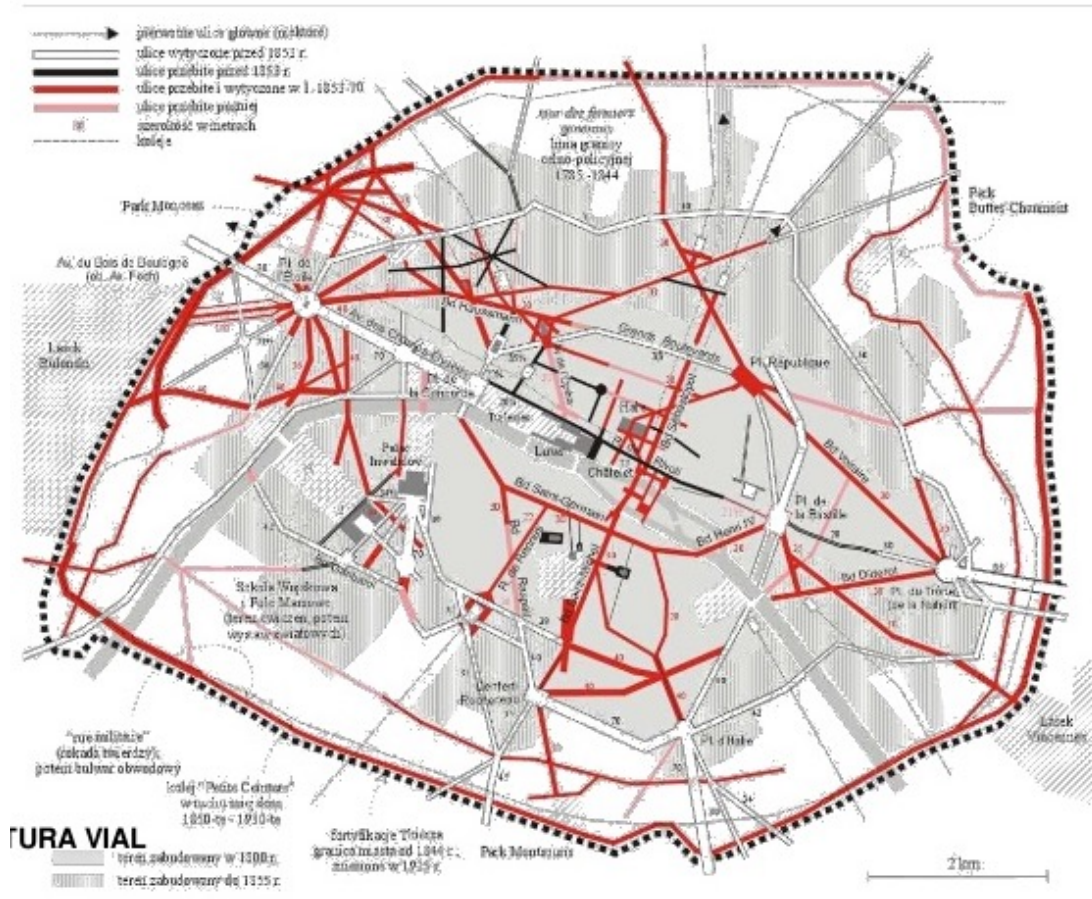
The Settlement Health Map (Barton and Grant 2006) ►

Cause of Chronic Diseases (WHO) ►

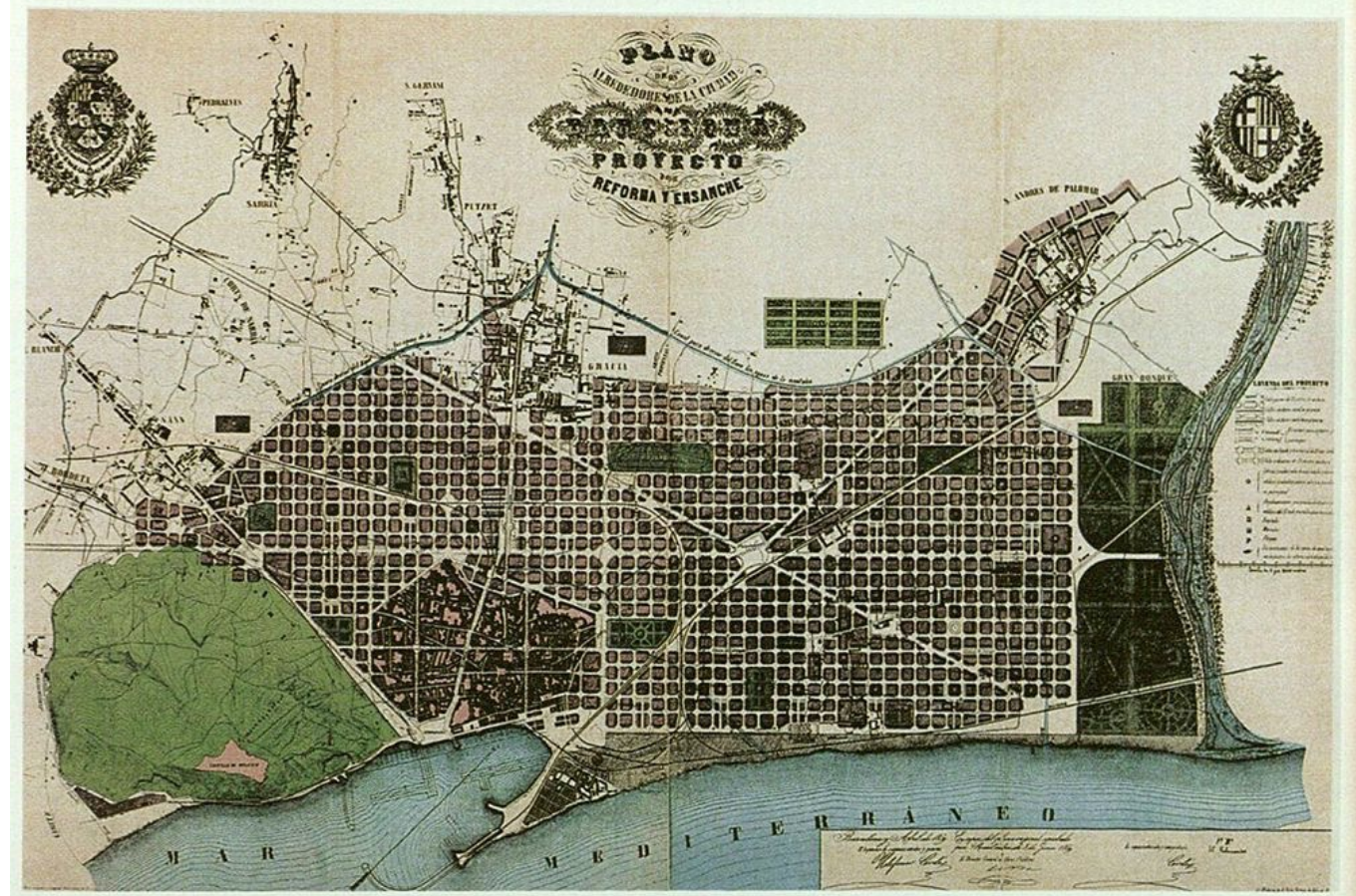


Urban Planning and Public Health origins

Urban planning is born in Europe at the end of 19th Century to face the **increasing of social, health and environmental problems** related to the unhealthy urban environment, created by modern city's growth.



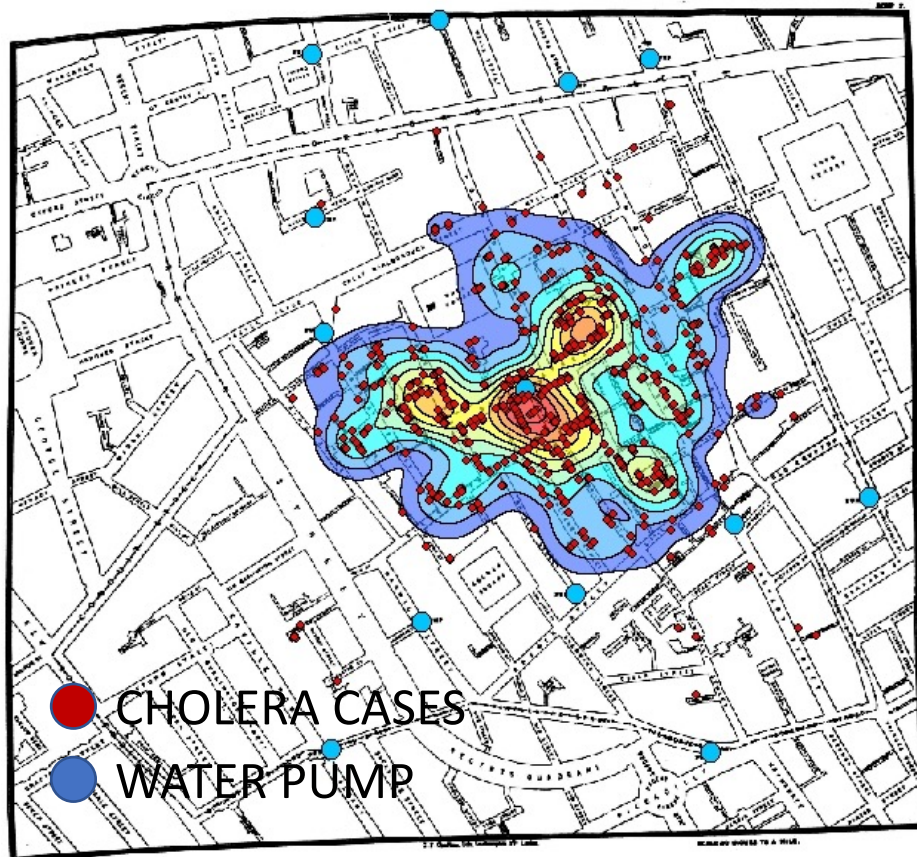
Haussmann city plan for Paris, 1852



Cerdà city plan for Barcelona, 1860

Urban Planning and Public Health origins

London, 1854 - Dr. *John Snow* understood that the **Cholera** sources were contaminated **water pump** (instead of air pollution) and the solution was the most innovative and huge **sewer network** for central London.

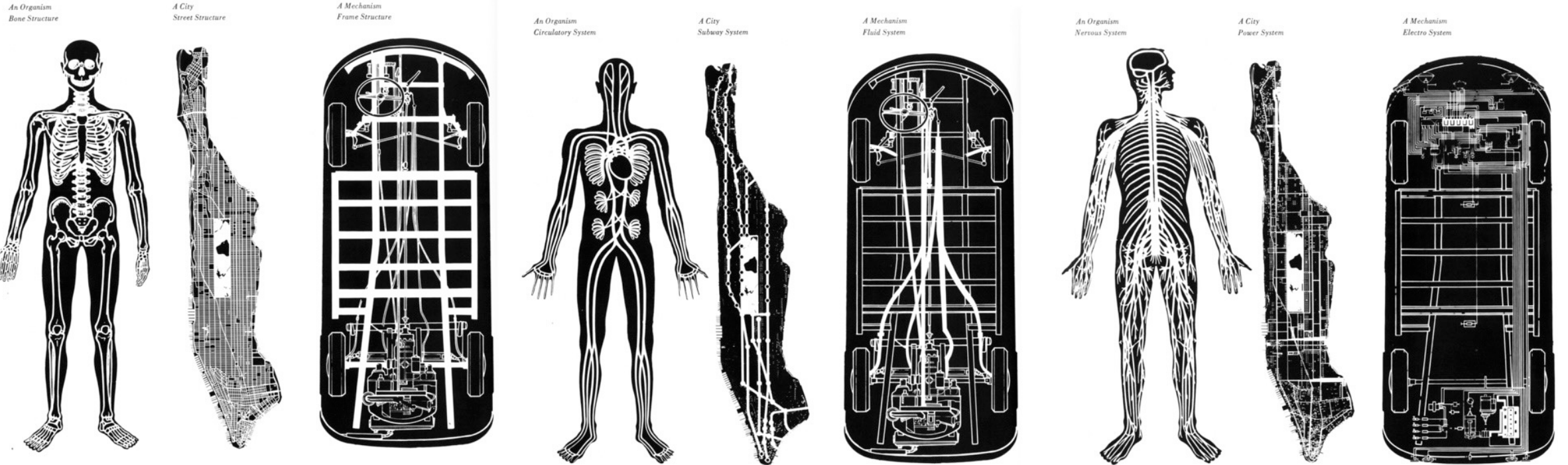


Cities as a “living / changeable / resilient” organism

Streets / Roadways
= **VEHICULAR ARTERIES**

Urban Green Spaces
= **GREEN LUNGS**

City Center
= **HEART OF THE CITY**



«Morphologie City Metaphors» O.M. Ungers (1937)

"Healthy Cities" definition

*"Where people live affects their health and chances of leading flourishing lives. **Communities and neighbourhoods** that ensure access to basic goods, that are socially cohesive, that are designed to promote good physical and psychological well-being, and that are protective of the natural environment, are essential for health equity."*
(WHO, 2015)



Editorial

Architecture as a generator of health and well-being

Stefano Capolongo

ABC Department, Polytechnic University of Milan, Italy

Key Challenges:

- the concept of Public Health moves from a **MEDICAL (individual)** approach, to a **SOCIAL (collective)** approach, strongly influenced by the environmental, economic, cultural and educational issues;
- **URBAN HEALTH & HEALTHY BUILDINGS** research topics will use quali-quantitative assessment tools, and they're moving from a prescriptive to a performance approach, evaluating the capacity of the built environment to protect and promote Health & Well-Being, or to encourage the adoption of healthy life-styles;
- **HEALTHY EXPERIENCED / EVIDENCE -BASED URBAN PLANNING and DESIGN STRATEGIES** should be considered since the early stages of urban planning as primary health prevention policies for population Physical Inactivity.

Urban Health Design Strategies & Actions

ENVIRONMENTAL RISK FACTORS

non-COMMUNICABLE DISEASES:

- OBESITY > DIABETES
- RESPIRATORY DISEASES
- CARDIAC DISEASES
- CANCER
- ALLERGOPATHIES

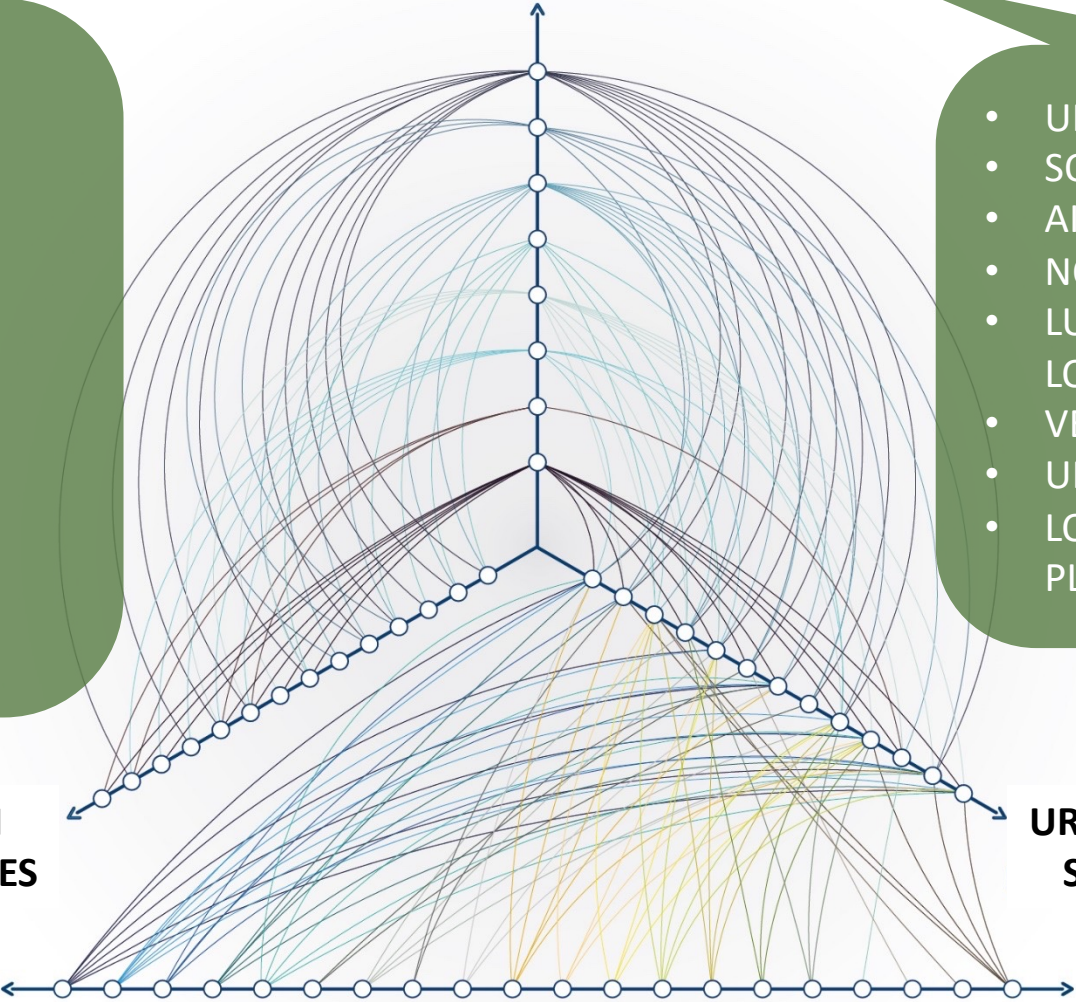
MENTAL HEALTH DISORDERS:

- STRESS CONDITIONS
- ANXIETY
- SLEEPING DISORDERS
- COGNITIVE DEVELOPMENT
- SOCIAL EXCLUSION FEELINGS

- URBAN HEAT ISLAND EFFECT
- SOIL POLLUTION
- AIR POLLUTION
- NOISE POLLUTION
- LUMINOUS POLLUTION AND LOW NATURAL LIGHTING
- VEHICULAR TRAFFIC
- URBAN SAFETY & SECURITY
- LOWER ATTRACTIVITY OF PLACES

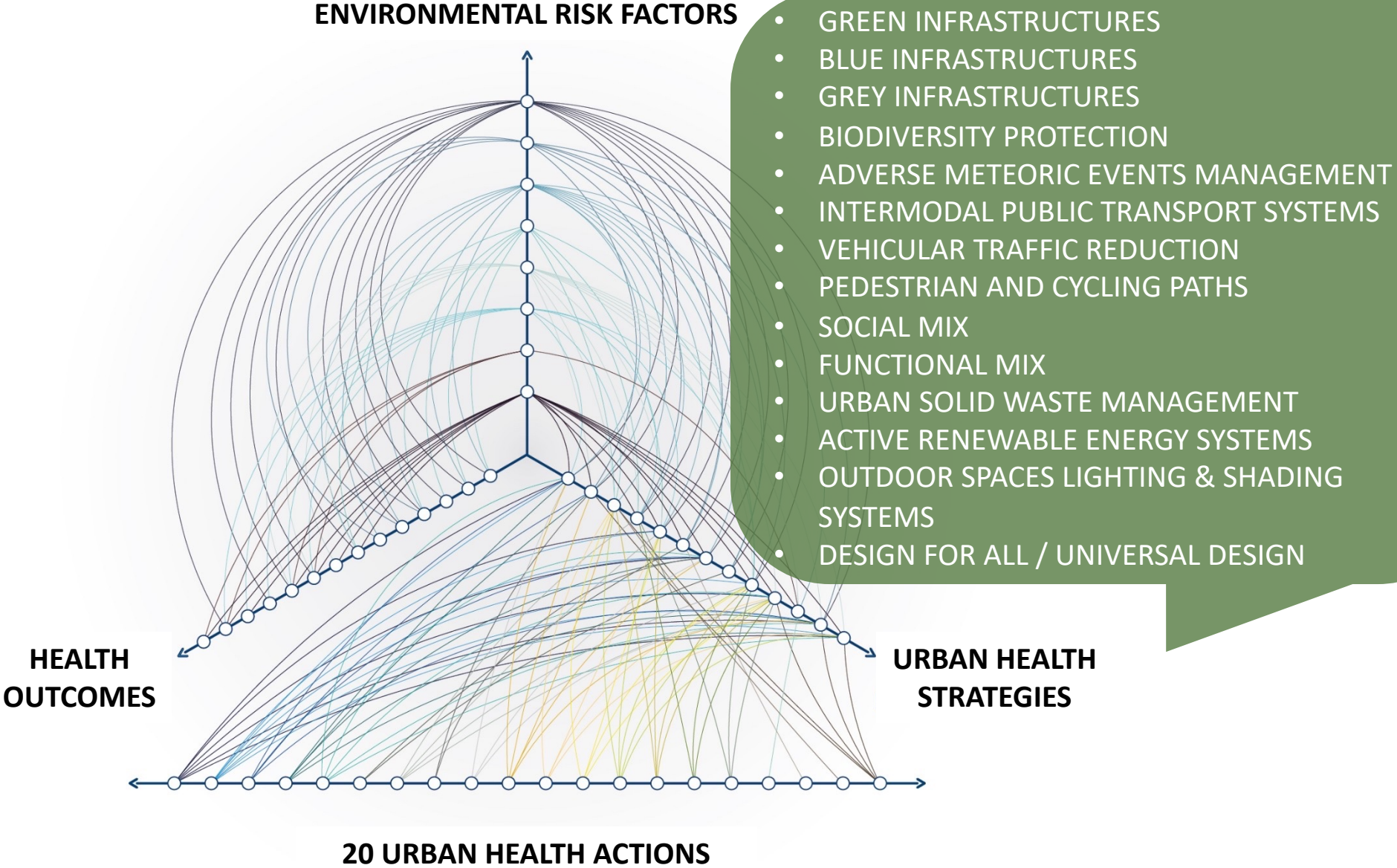
HEALTH
OUTCOMES

URBAN HEALTH
STRATEGIES



20 URBAN HEALTH ACTIONS

Urban Health Design Strategies & Actions



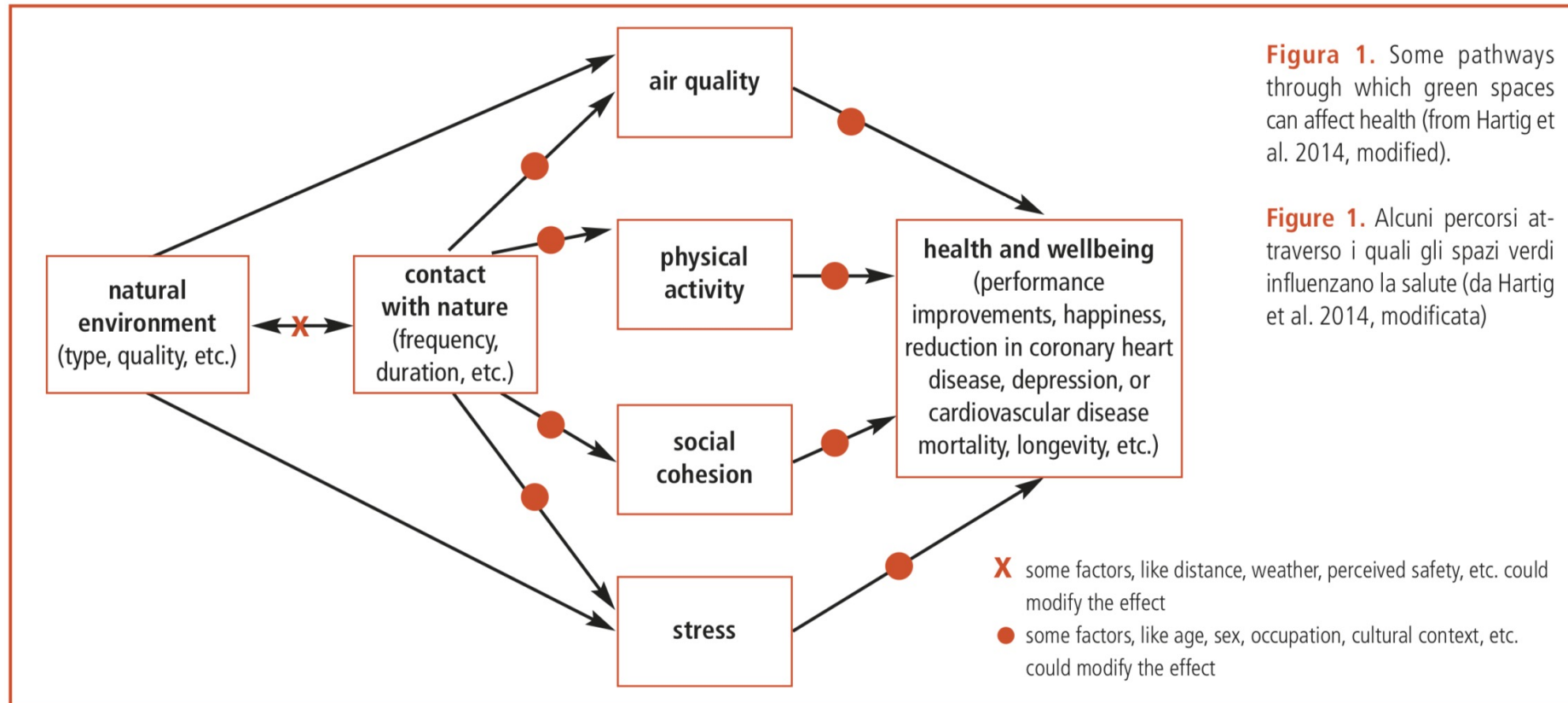
GREEN INFRASTRUCTURES

rif. «*The High line*» in New York City (Diller Scofidio+Renfro)



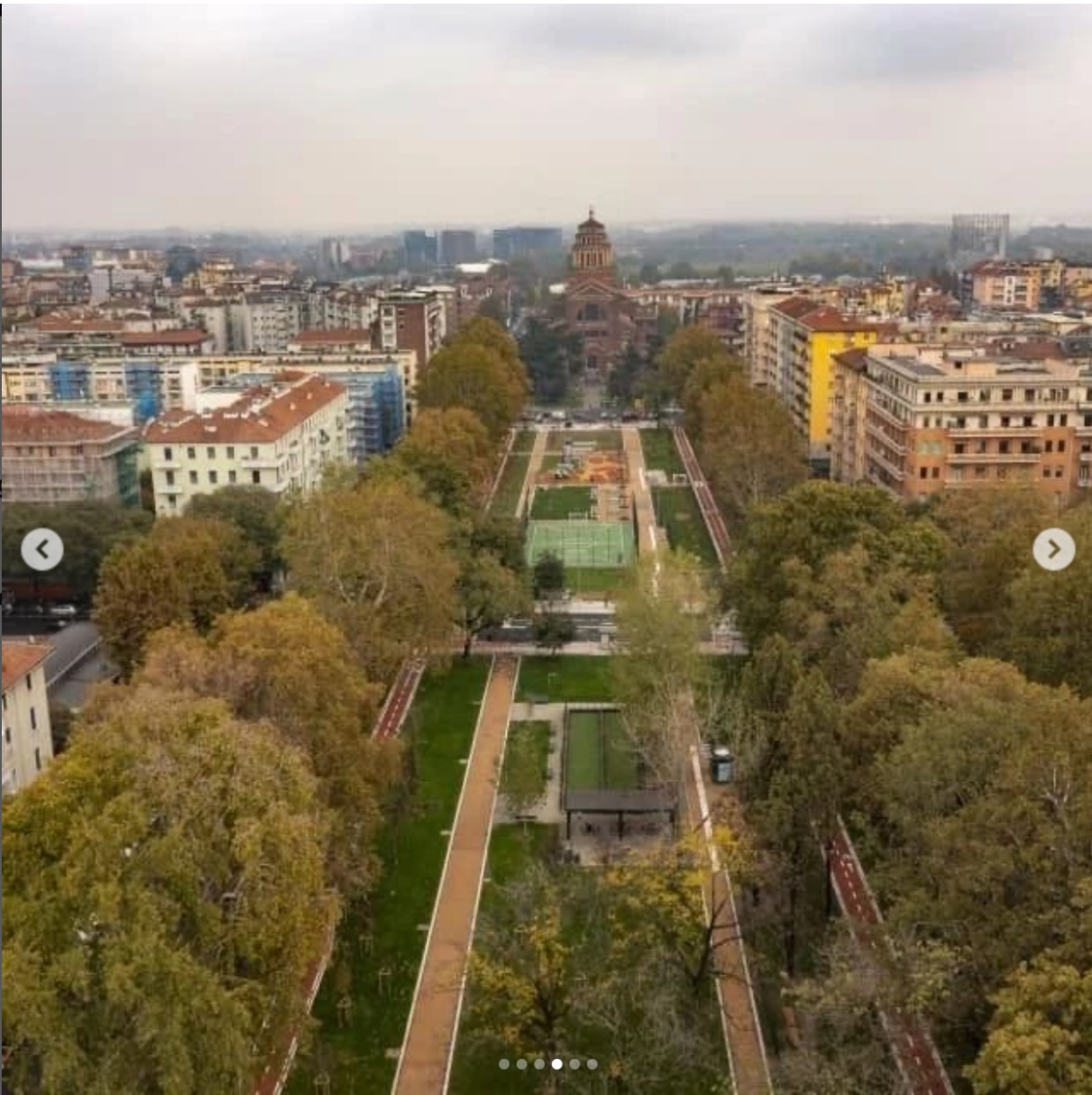
Green areas and public health: improving wellbeing and physical activity in the urban context

Daniela D'Alessandro,¹ Maddalena Buffoli,² Lorenzo Capasso,³ Gaetano Maria Fara,⁴ Andrea Rebecchi,² Stefano Capolongo,^{2,5} and the Hygiene on Built Environment Working Group on Healthy Buildings of the Italian Society of Hygiene, Preventive Medicine and Public Health (SItI)



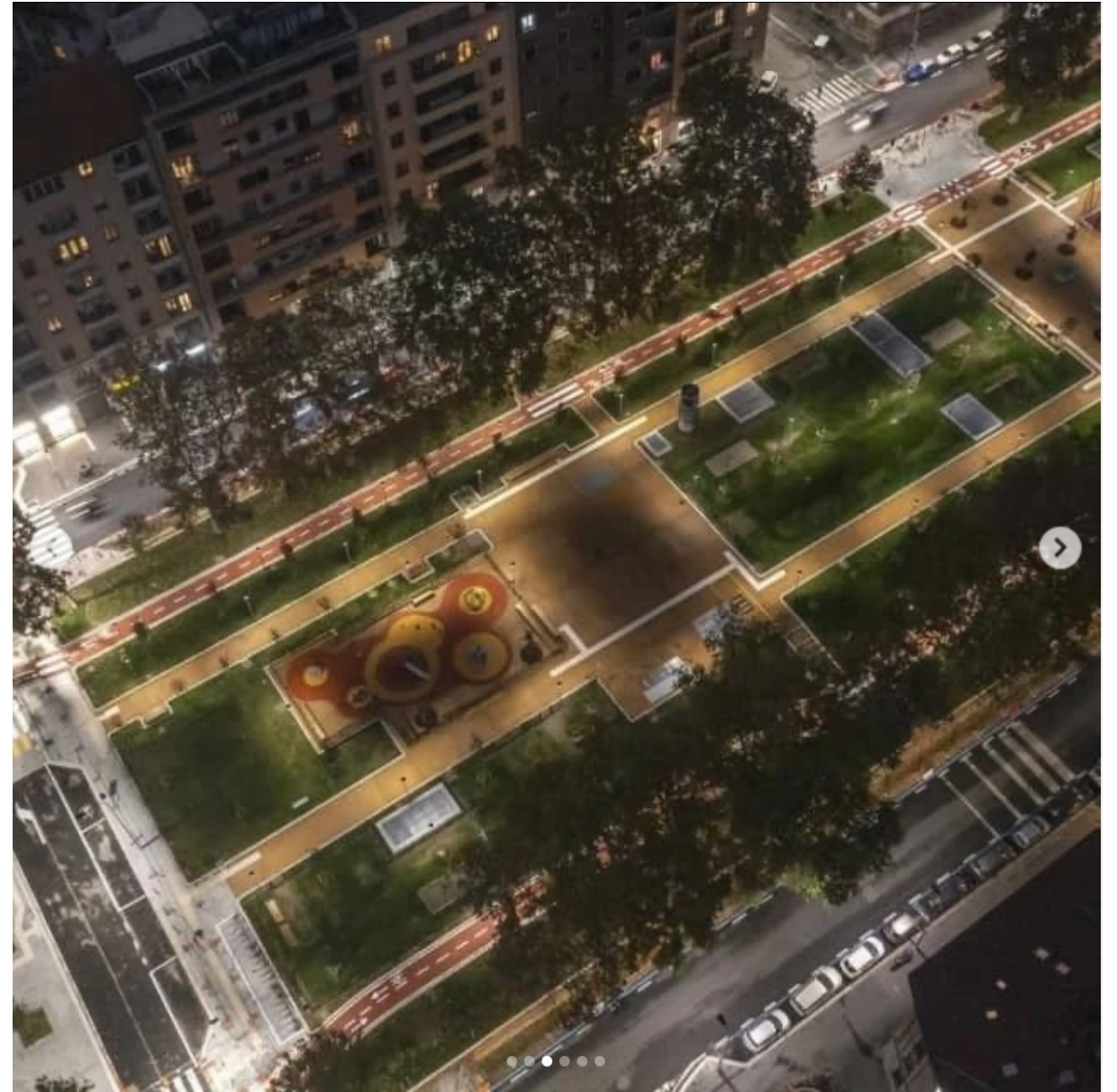
GREEN INFRASTRUCTURES

rif. *Viale Argonne*, Milano 2022



GREEN INFRASTRUCTURES

rif. *Viale Argonne*, Milano 2022



GREEN INFRASTRUCTURES

rif. *Viale Argonne*, Milano 2022



WALKABLE ENVIRONMENTS

rif. «ZEBRA crossing» in Japan (Ph. Jan Becke)



URBAN PUBLIC PATHS

ref. «Superkilen Park» in Copenhagen (BIG Architects)



URBAN PUBLIC PATHS

ref. «Superkilen Park» in Copenhagen (BIG Architects)



URBAN INTERSECTIONS

rif. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)

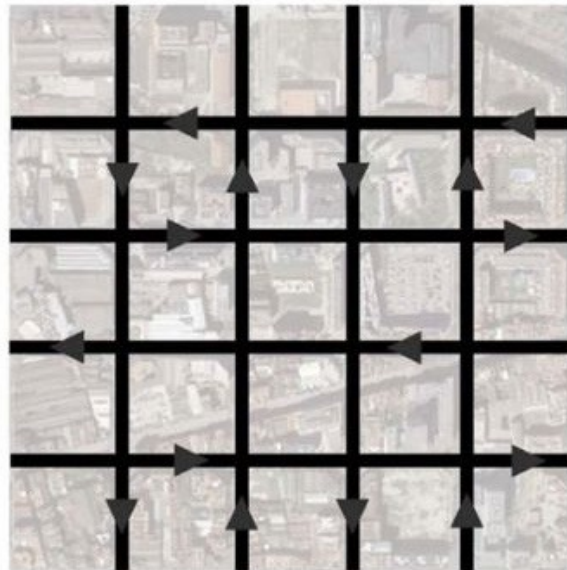


URBAN INTERSECTIONS

ref. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)

The «*SUPERBLOCK*» model moves the focus from motorized vehicles to creating spaces for citizenship, improving active transport, giving back to the community the urban space previously used by cars.

CURRENT SITUATION

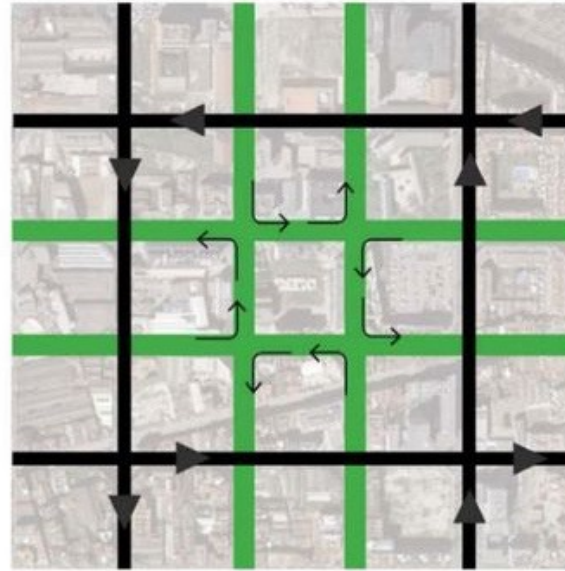


400 meters



SOLE RIGHT: DISPLACEMENT.
HIGHEST AIM: PEDESTRIAN.

SUPERBLOCK

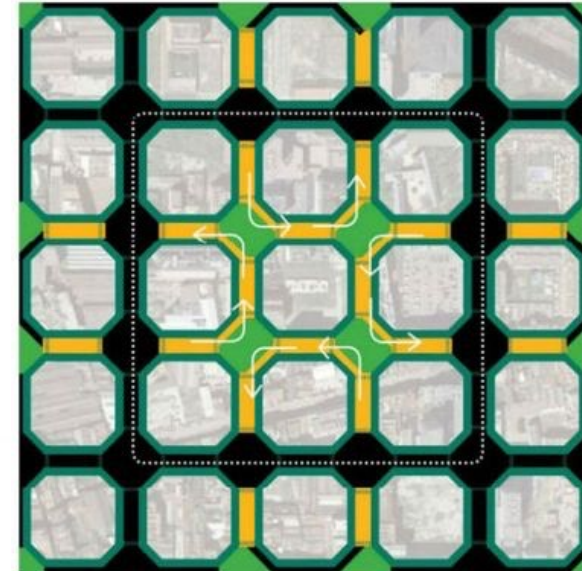


400 meters



EXERCISE OF ALL THE RIGHTS THAT THE CITY
OFFERS. HIGHEST AIM: CITIZEN.

PASSING
VEHICLES
DO NOT GO
THROUGH

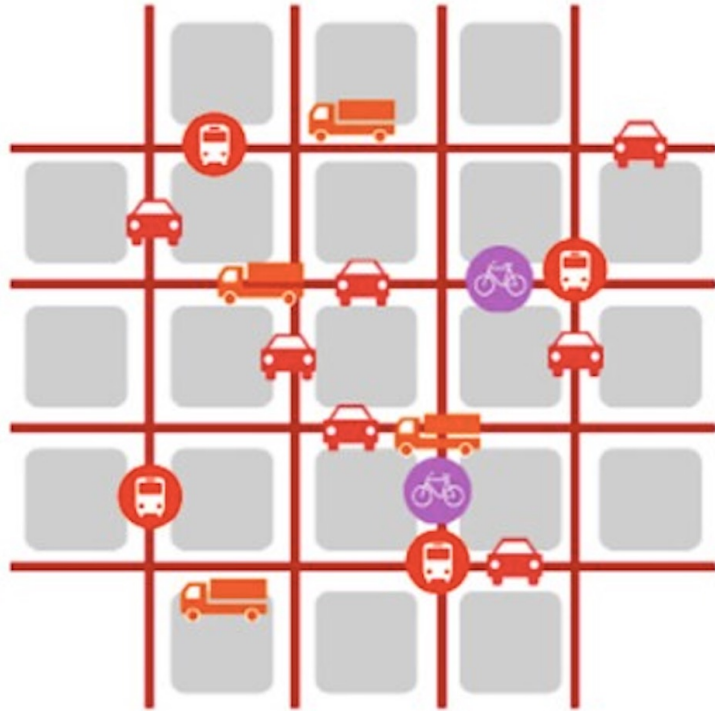


Phase 1

URBAN INTERSECTIONS





ref. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)





Current Model



Superblocks Model



-  PUBLIC TRANSPORT NETWORK
-  BICYCLES MAIN NETWORK (BIKE LANE)
-  BICYCLES SIGNPOSTS (REVERSE DIRECTION)
-  FREE PASSAGE OF BICYCLES

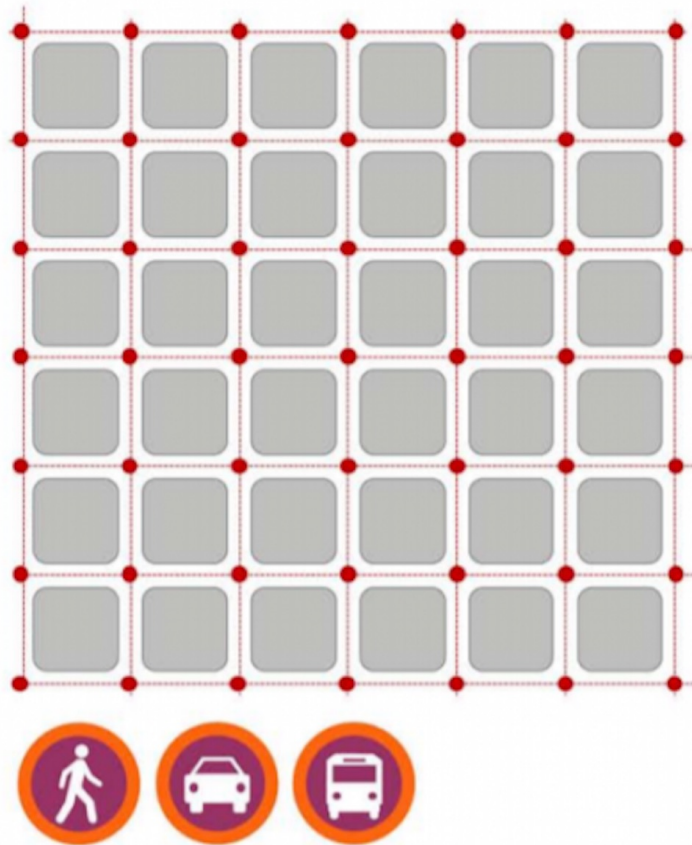
-  PRIVATE VEHICLE PASSING
-  RESIDENTS VEHICLES
-  URBAN SERVICES AND EMERGENCY
-  DUM CARRIERS

-  DUM PROXIMITY AREA
-  ACCESS CONTROL
-  BASIC TRAFFIC NETWORK
-  SINGLE PLATFORM (PEDESTRIANS PRIORITY)

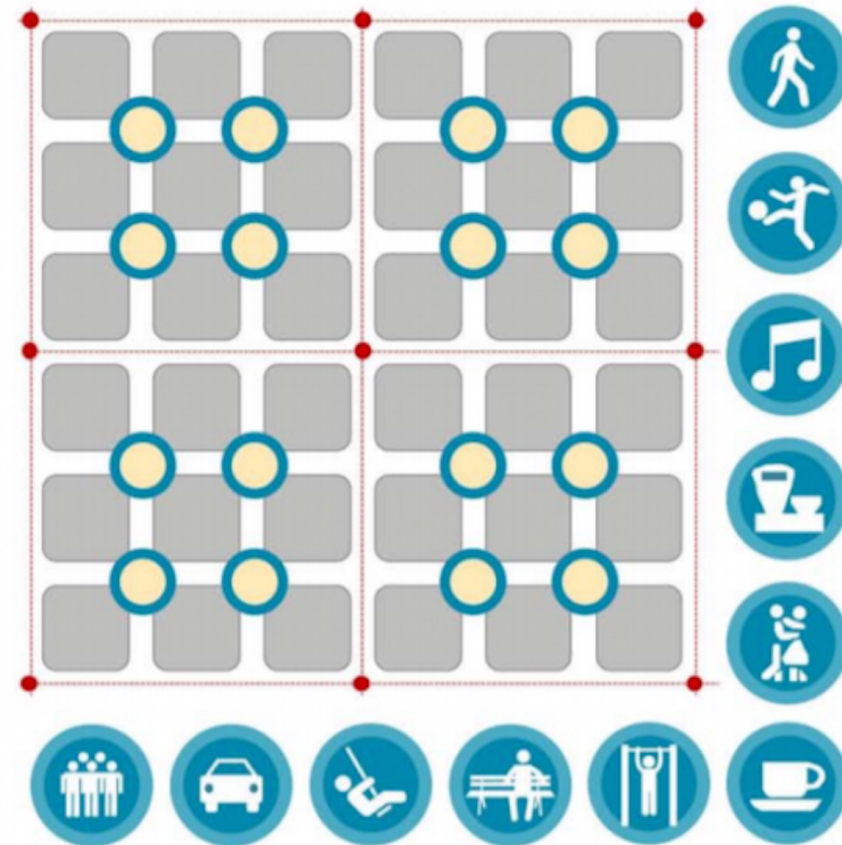
URBAN INTERSECTIONS

ref. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)

Current Model
SINGLE USE: RIGHT OF WAY

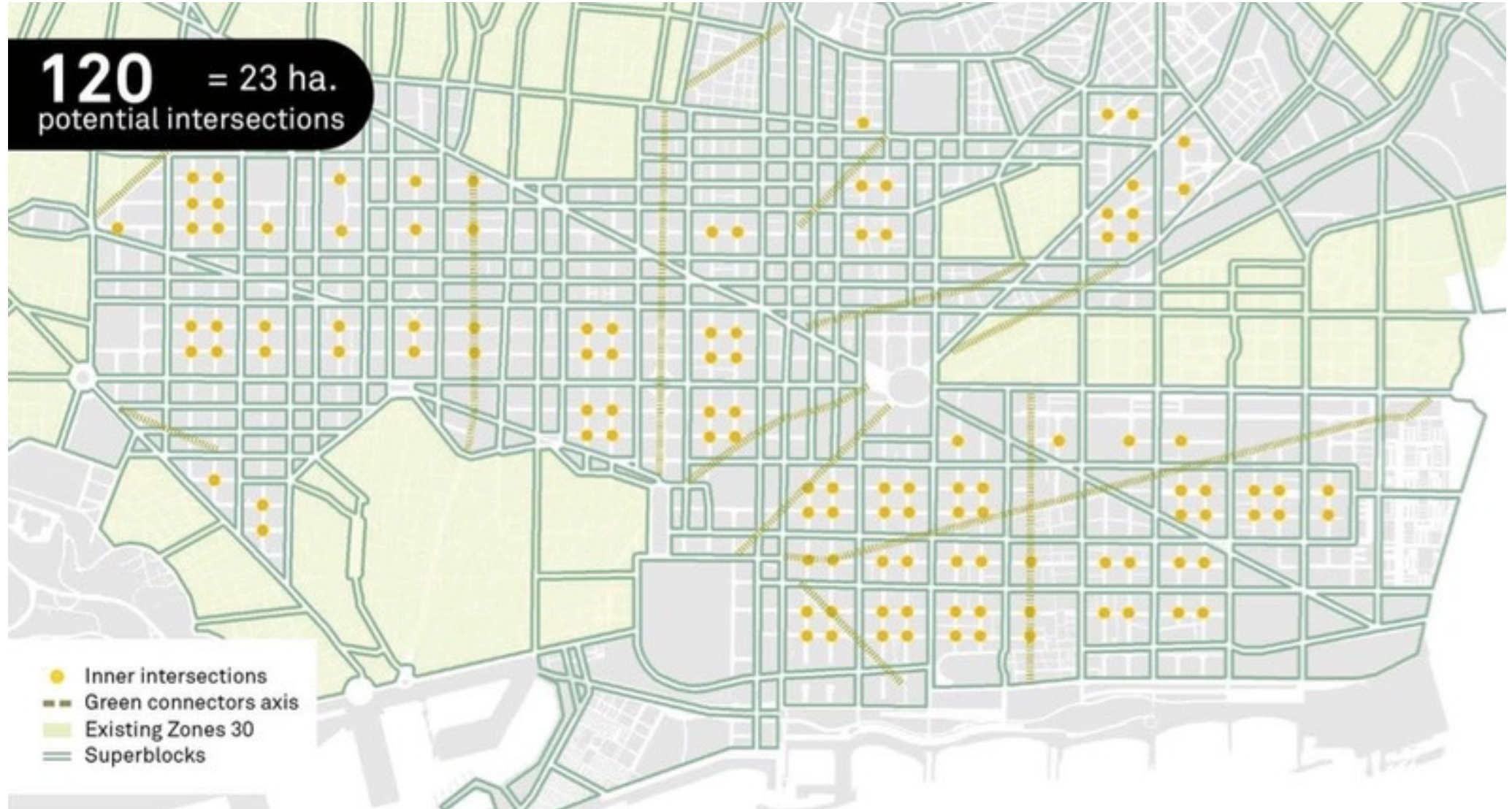


Superblocks Model
MULTIPLE USES AND FUNCTIONS



URBAN INTERSECTIONS

ref. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)



URBAN INTERSECTIONS

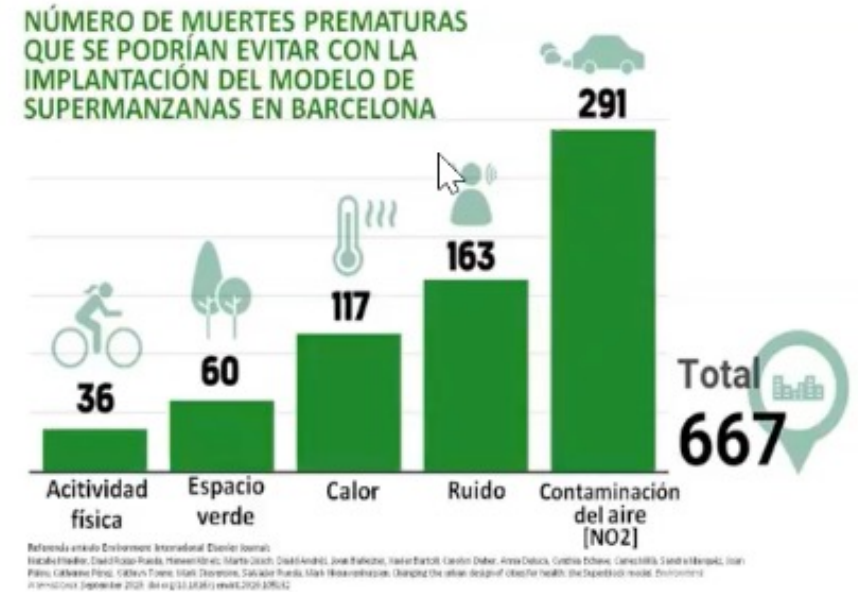
ref. «*SUPERBLOCKS*» model in Barcelona (Salvador Rueda)

Barcelona, at the beginning of 1990, had one of the highest levels of air and noise pollution in Europe, causing (estimated) 3,000 premature deaths per year.

HEALTH OUTCOMES: on-going longitudinal epidemiological study to provide scientific evidence, health impact assessment models and optimization assessment indicators of the first 46 Superblocks as Public Health models (monitoring on a cohort of 23,000 residents).

PRELIMINARY OUTCOMES OF URBAN PUBLIC HEALTH:

- increase from 56.0% to almost 94.0% in the number of people exposed to **acceptable levels of air pollution**;
- increase from 57.5% to almost 73.5% in the number of people exposed to **acceptable levels of noise pollution**.



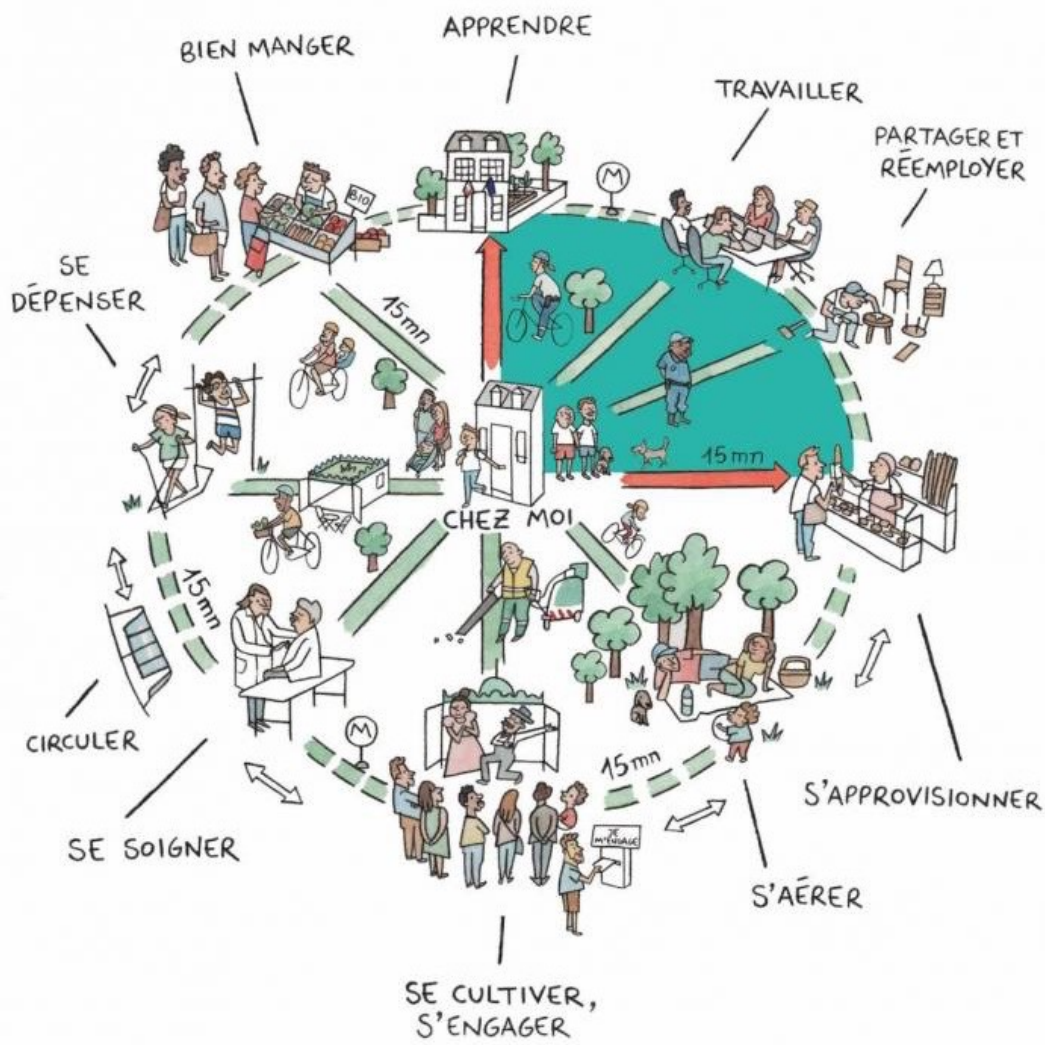
ISGlobal **Barcelona**
Institute for
Global Health

B
ECOLOGIA
N

Agència
d'Ecologia Urbana
de Barcelona

15 MINUTE CITY

ref. «Ville du quart d'heure in Paris»



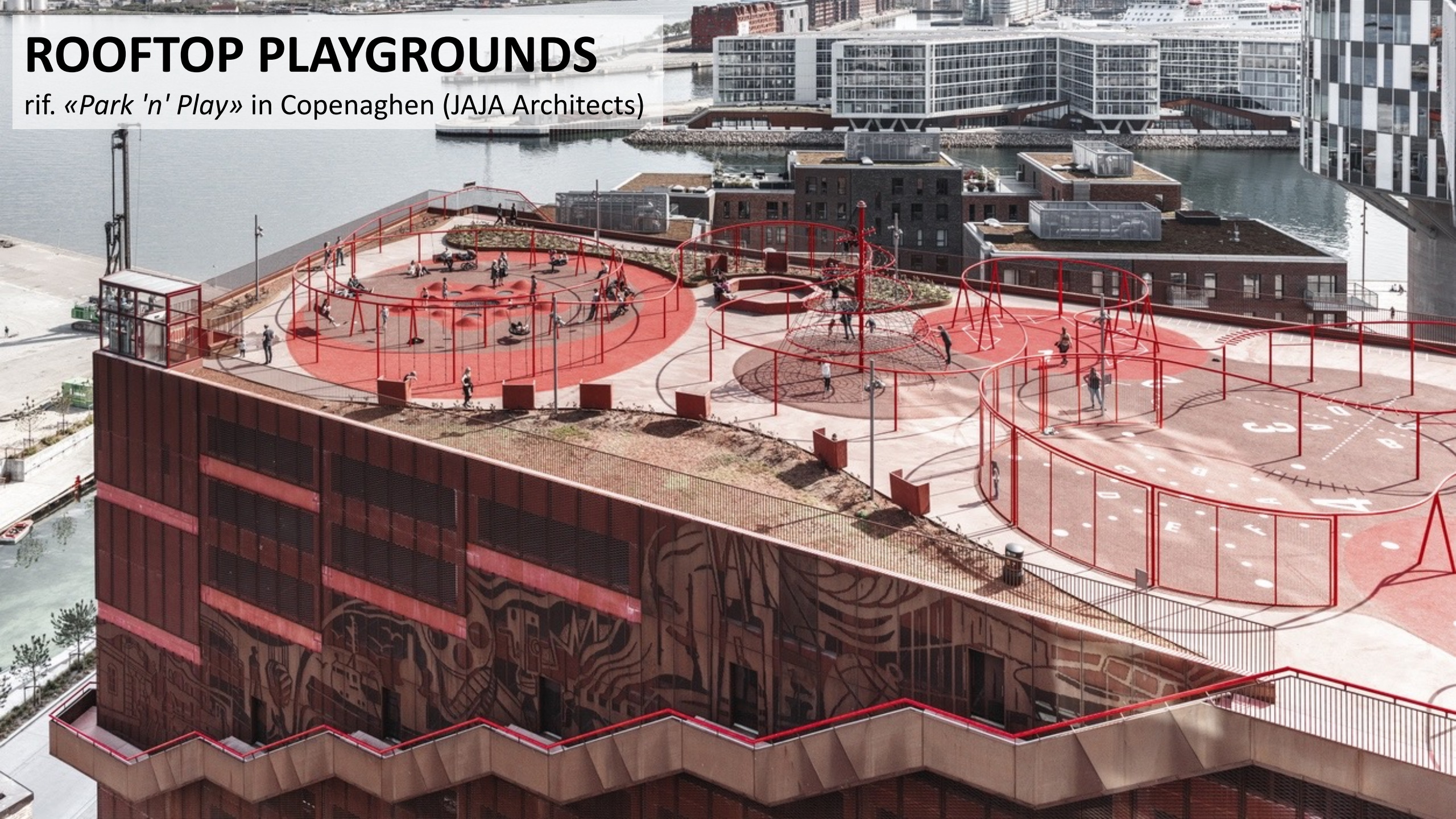
FUNCTIONAL MIX

ref. «Groundfloor Urban Plan for the city of Glasgow»



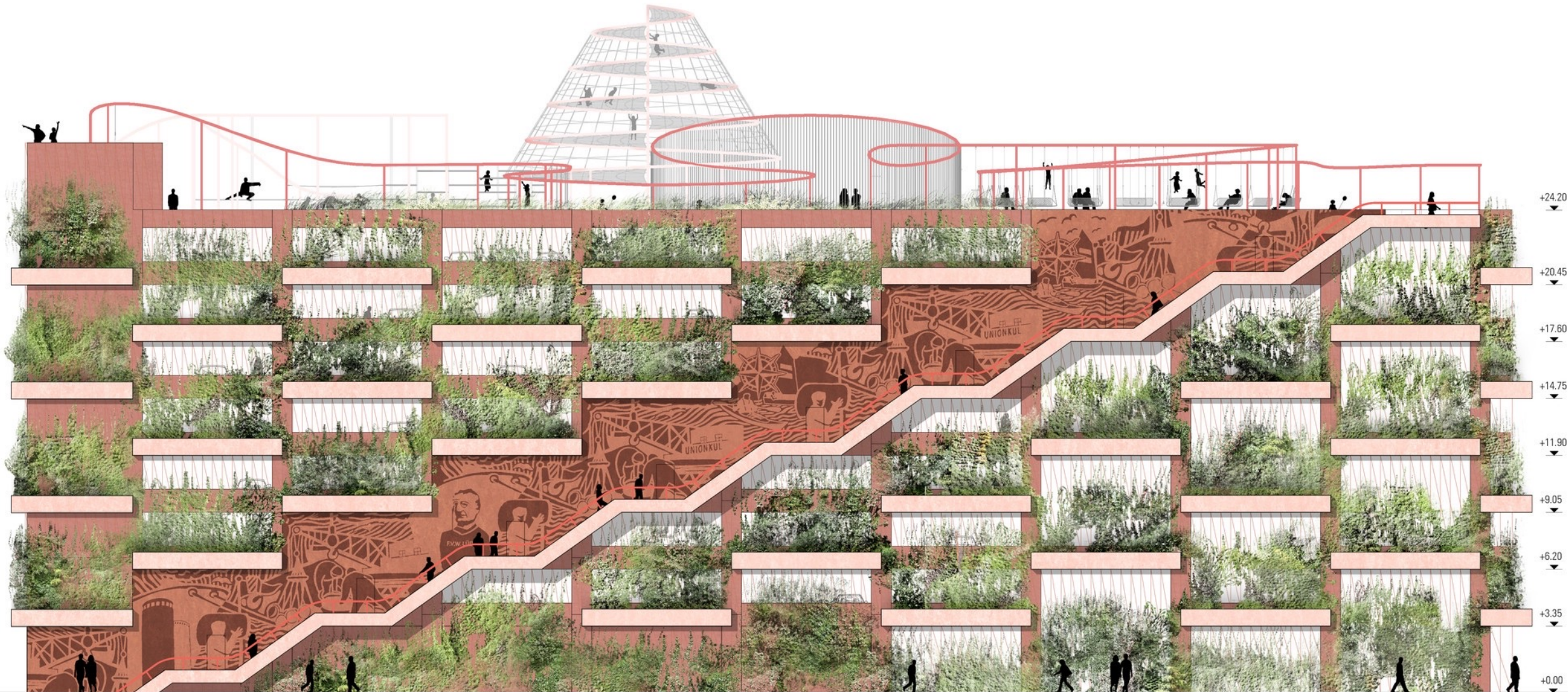
ROOFTOP PLAYGROUNDS

rif. «Park 'n' Play» in Copenhagen (JAJA Architects)



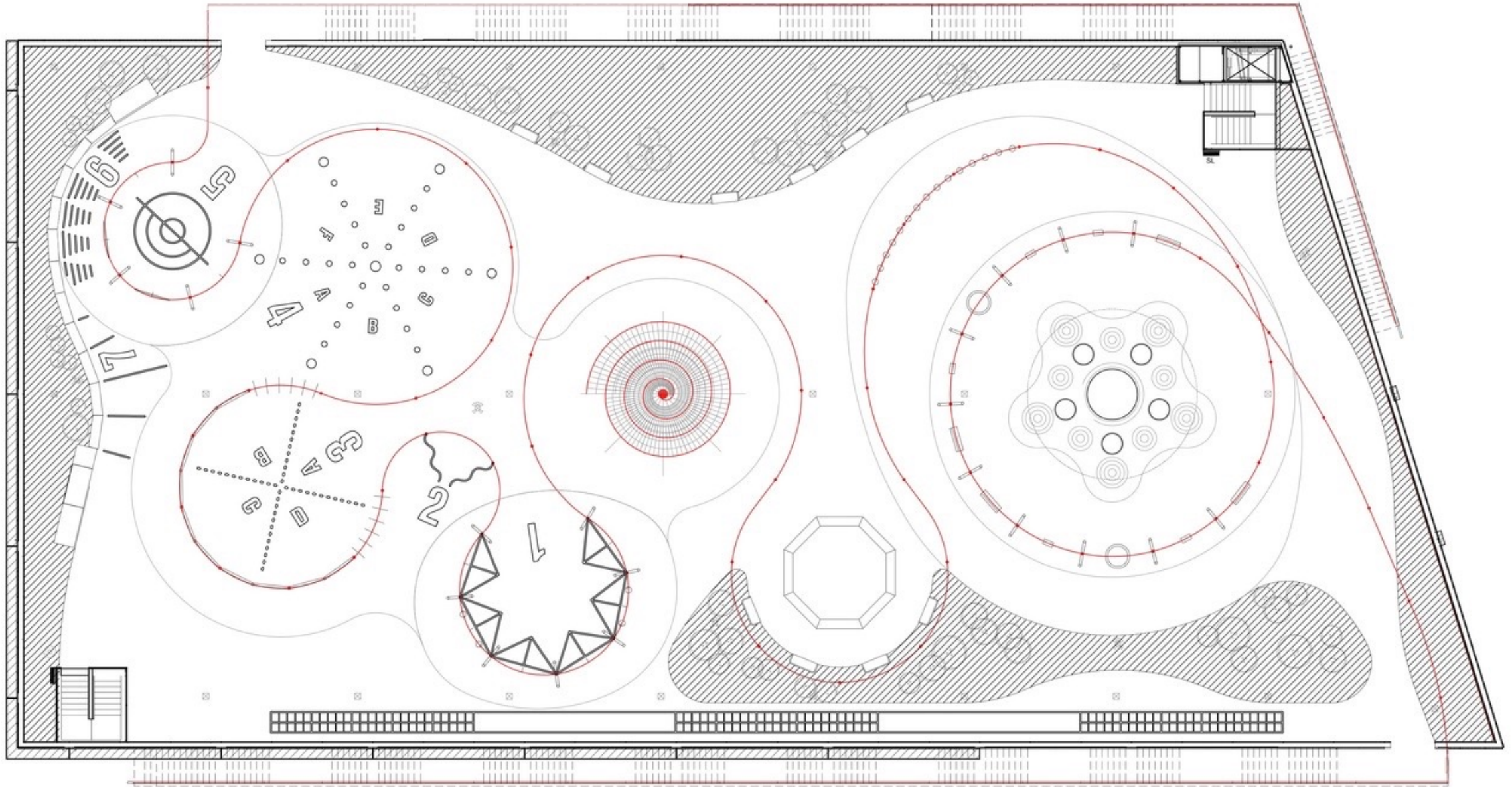
ROOFTOP PLAYGROUNDS

ref. «Park 'n' Play» in Copenhagen (JAJA Architects)



ROOFTOP PLAYGROUNDS

rif. «Park 'n' Play» in Copenhagen (JAJA Architects)



DESIGN FOR ALL / UNIVERSAL DESIGN

ref. *Schandorff Square*» in Oslo (Østengen & Bergo AS)





POLITECNICO
MILANO 1863

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

D&H Lab. RESEARCH EXPERIENCES: *Assessment tools*

Design & Health Lab – tools

URBAN HEALTH

Walkability Measurement Tool



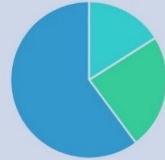
Concept Paper

Walkable Environments and Healthy Urban Moves: Urban Context Features Assessment Framework Experienced in Milan

Macro: criteria and items weights

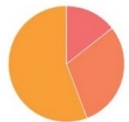


- intersections 15%
- built-up area 10%
- destinations (g.f.) 30%
- sidewalk presence 45%
- transportation stops 36%
- coverage 49%
- parking availability 15%
- street layout 61%
- building layout 15%
- green layout 24%

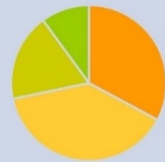


- density .16%
- diversity .24%
- design .60%

Micro: criteria and items weights

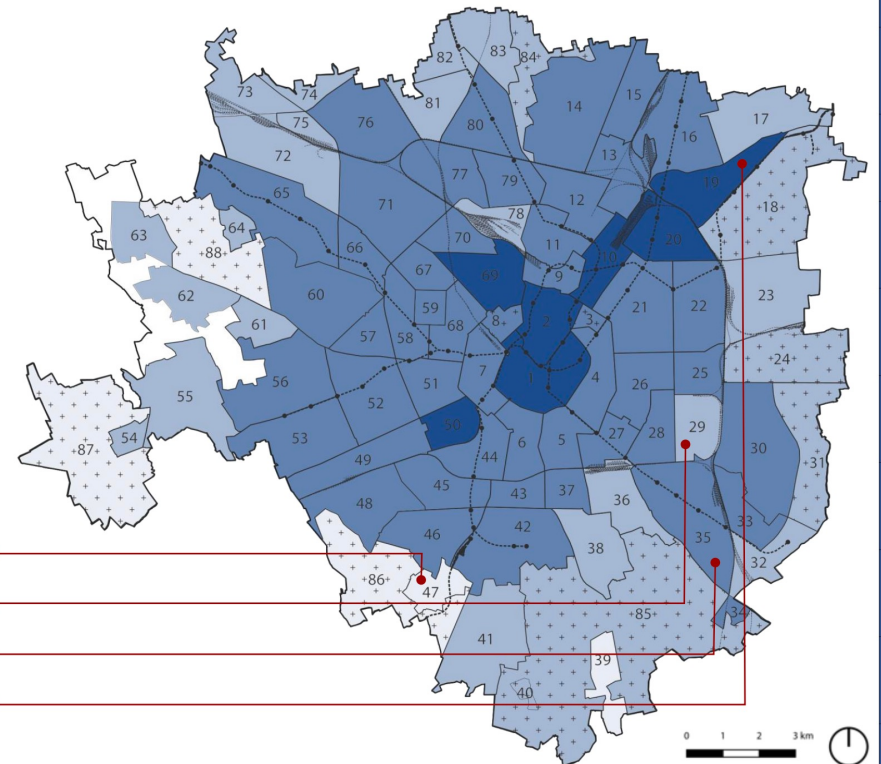
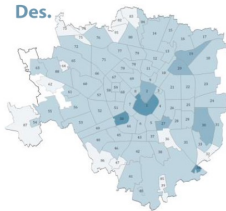
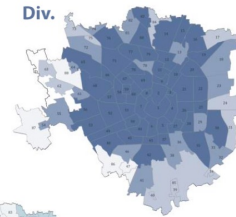
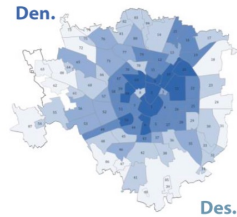


- land use mix 14%
- active environm. 30%
- relational env. 56%
- universal design 25%
- pedestrian/cyclist safeness elements 75%
- relational environm. 38%
- lanes width and obstructions 62%
- urban furniture 38%
- attractiveness 50%
- cleanliness 50%



- usefulness .33%
- safeness .39%
- comfort .18%
- aesthetics .10%

WALKABILITY (Macro scale): Density + Diversity + Design



Data statistics + Legend + Example

- 2NILs 1 > MWM_L > 0
- 22NILs 2 > MWM_L > 1
- 47NILs 3 > MWM_L > 2
- 7NILs 4 > MWM_L > 3

- 47. Cantalupa
- 29. Ortomercato
- 35. Lodi-Corvetto
- 19. Padova

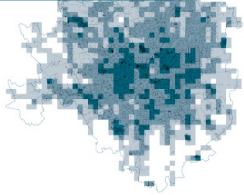
DENSITY
DIVERSITY
DESIGN

Design & Health Lab – tools

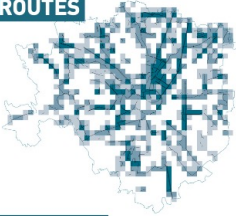
URBAN HEALTH

City of Proximity Tool

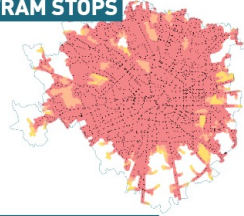
PEDESTRIAN SURFACE



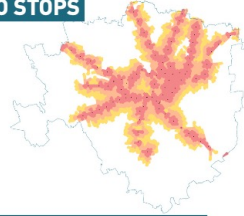
CYCLE ROUTES



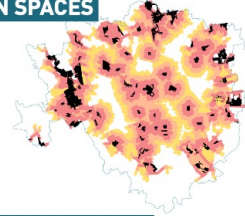
BUS, TRAM STOPS



METRO STOPS



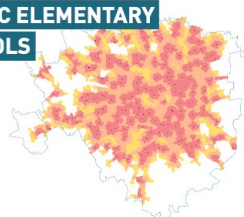
GREEN SPACES



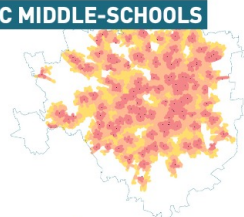
KINDERGARTENS



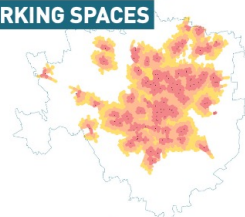
PUBLIC ELEMENTARY SCHOOLS



PUBLIC MIDDLE-SCHOOLS



COWORKING SPACES



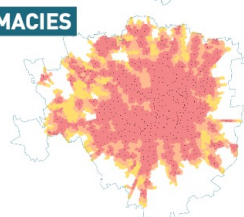
CULTURAL FACILITIES



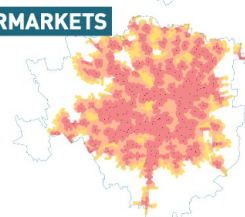
SPORT FACILITIES



PHARMACIES



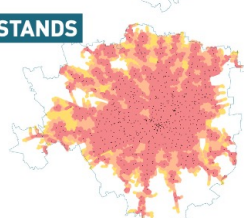
SUPERMARKETS



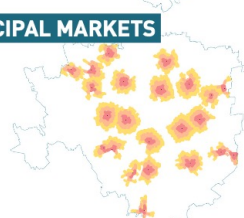
SPECIALTY GROCERY STORES



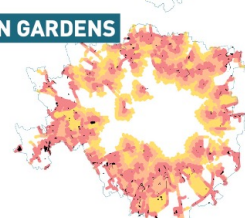
NEWSSTANDS



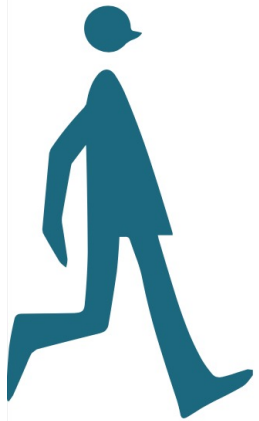
MUNICIPAL MARKETS



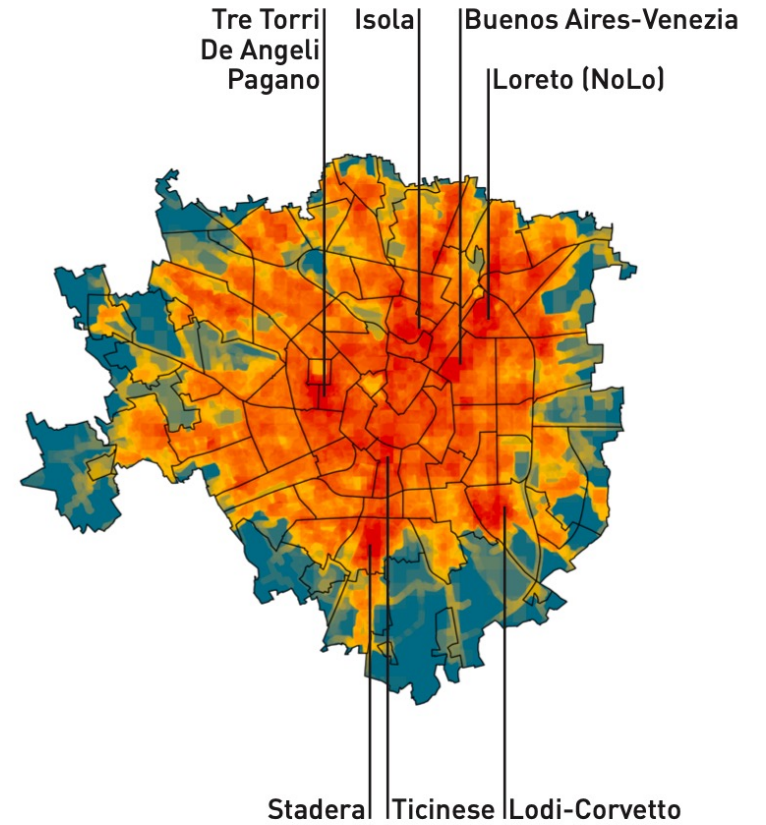
URBAN GARDENS



17
input
layers



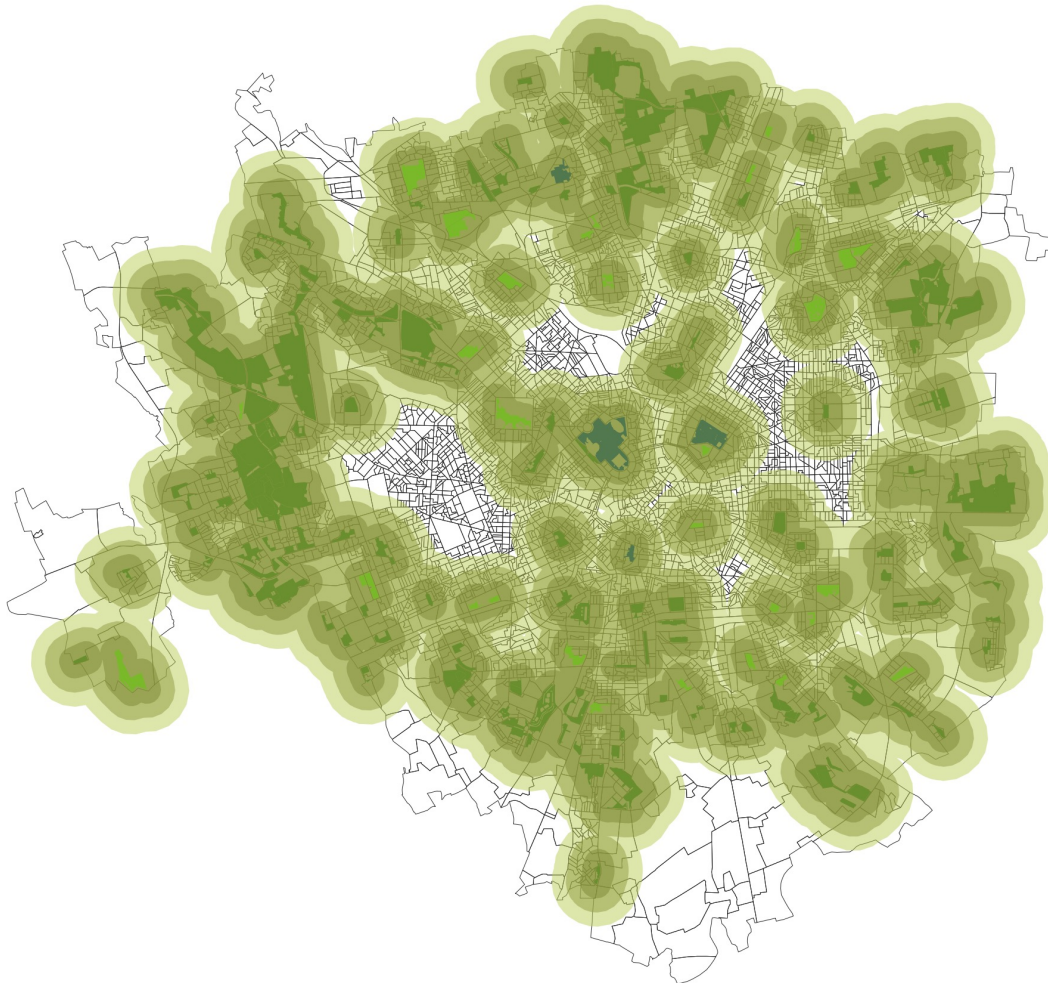
WALKING PROXIMITY



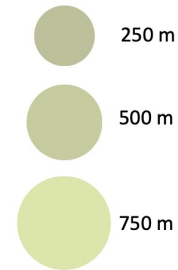
Design & Health Lab – tools

URBAN HEALTH

Urban Green Accessibility Assessment

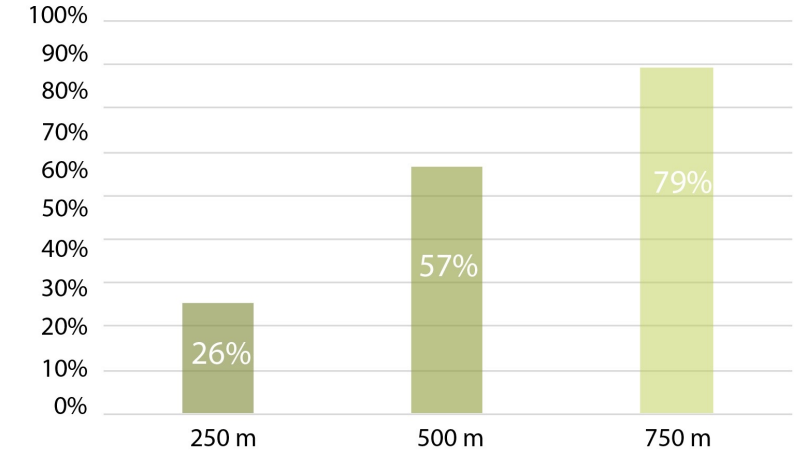


Distanza dalle aree verdi



Classificazione ISTAT

- Verde storico**
Di cui a Milano:
Parco storico recin
- Parchi**
Di cui a Milano:
Giardino
Parco
Parco centrale
Parco di cintura
- Verde attrezzati**
Di cui a Milano:
Parco di cintura
Giardino storico
Giardino recintato



Urban Green Space to Promote Urban Public Health: Green Areas' Design Features and Accessibility Assessment in Milano City, Italy

Maddalena Buffoli¹, Francesco Vilella², Nasko Stefanov Voynov², and Andrea Rebecchi¹

¹ Department of Architecture, Built Environment and Construction Engineering (ABC), Politecnico di Milano, via G. Ponzio 31, 20133 Milan, Italy
{maddalena.buffoli, andrea.rebecchi}@polimi.it

² School of Architecture Urban Planning Construction Engineering (AUIC), Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy
{francesco.villella, naskostefanov.voynov}@mail.polimi.it

Design & Health Lab – tools

URBAN HEALTH

Assessment Tool for Urban Plans [for CCM Italian Ministry of Health]

ASSESSMENT FRAMEWORK	
pre-Requisites	check-list
GENERAL CRITERIA	Demographic and epidemiological data
	Indoor and Outdoor coherence
	Forecasting building capacity
	Land destination (in term of urban functions)
MACRO-AREAs	INDICATORS
ENVIRONMENT	01 - Air and Smells
	02 - Water
	03 - Noise (acoustic pollution)
	04 - Ionizing and non-ionizing radiation
SOIL & SUBSOIL	05 - Land consumption
	06 - Soil permeability and Water Management
	07 - Geological, hydro-geological and seismic risk
	08 - Contaminated sites and areas with high environmental risk
SUSTAINABILITY & HYGIENE OF THE BUILT ENVIRONMENT	09 - Solid waste collection
	10 - Urban waste collection and disposal
	11 - Energy and reduction of emissions
URBAN & SOCIAL DEVELOPMENT	12 - Residential density
	13 - Functional and Social mixité
	14 - Universal Design and Social inclusion
MOBILITY & TRANSPORT	15 - Street infrastructure network and parking system
	16 - Public transportation
	17 - Pedestrian and Cycling path system
OUTDOOR SPACES	18 - Outdoor space system
	19 - Urban green system
	20 - Lighting and visual comfort

Design phase

20 criteria to assess the propensity of urban plans to promote **Urban Health strategies**



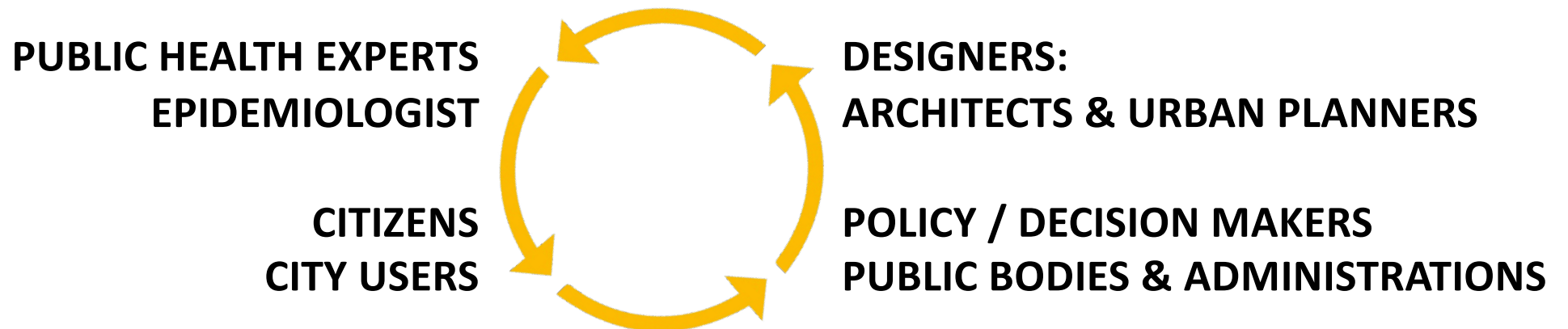
7 macro-areas: the first one including prerequisites while the other 6 constituting the **assessment tool**

ORIGINAL ARTICLE

New competences to manage urban health: Health City Manager core curriculum

*Andrea Lenzi¹, Stefano Capolongo², Gualtiero Ricciardi³, Carlo Signorelli⁴, David Napier⁵,
Andrea Rebecchi⁶, Chiara Spinato⁷*

¹University of Rome La Sapienza, Dept Experimental Medicine; ²Department of Architecture, Built environment and Construction engineering (ABC) - Politecnico di Milano; ³Università Cattolica del Sacro Cuore in Rome; ⁴Università Vita-Salute San Raffaele in Milan; ⁵University College of London (UCL); ⁶Department of Architecture, Built environment and Construction engineering (ABC) - Politecnico di Milano; ⁷Chiara Spinato, Health City Institute



Health City Manager: the training experience



- **Luglio 2016**
Urban Health Manifesto "Health in the cities: a common good"
- **Maggio 2017**
EU CoR Opinion approval on HCM
- **Dicembre 2017**
G7 Summit on Health: Rome Urban Health Declaration
- **Marzo 2018**
Meeting with former EU Commissioner for Health
- **Luglio 2019**
Workshop at the IV Rome Health City Forum
- **Dicembre 2019**
Ministry of Youth and Sport financed the project
- **Marzo - Maggio 2021**
1st courses edition in Bologna / Bari / Turin
- **Aprile - Giugno 2022**
2nd courses edition in Milano / Roma / Genova

From Salutogenic Cities to the Next Generation Hospital



POLITECNICO
MILANO 1863

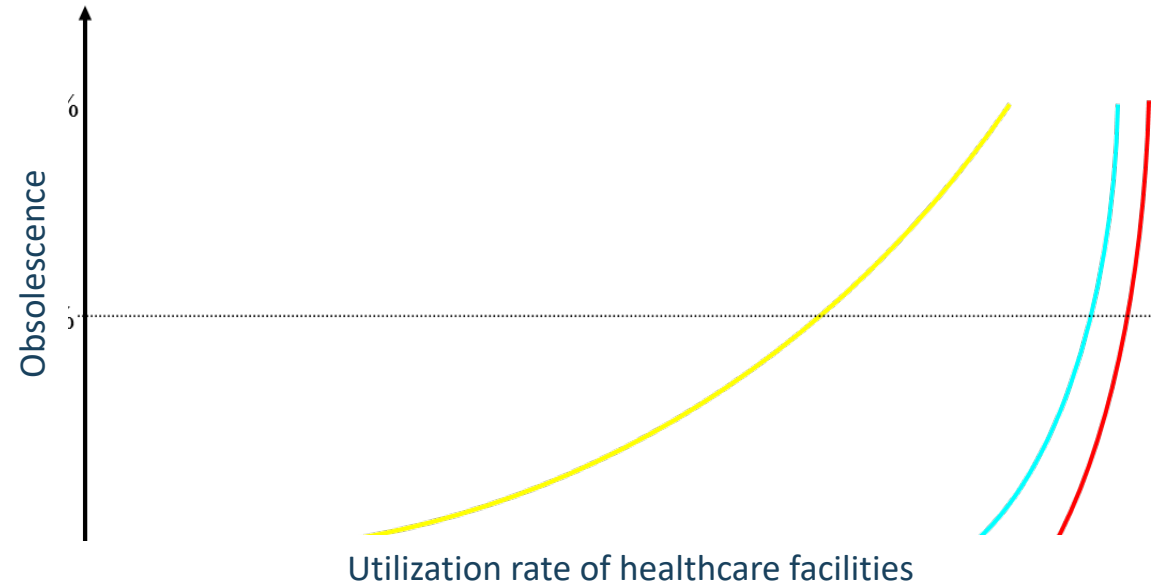
| **DABC**

DEPARTMENT OF
**ARCHITECTURE, BUILT ENVIRONMENT AND
CONSTRUCTION ENGINEERING**

INPUT: «HEALTHCARE INFRASTRUCTURES» AS SIGN OF SOCIETAL CHANGES OBSOLESCENCE of the HEALTHCARE FACILITIES



Hospital Architecture, Nickl-Weller, 2010



40-50 YEARS

OPTIMAL CONTEMPORARY HOSPITAL LIFE CYCLE

source: Osservatorio D&H LAB

10-20 YEARS

DESIGN AND BUILDING TIME OF A NEW HOSPITAL

source: Osservatorio D&H LAB

70% OF EUROPEAN HOSPITALS

HAVE MORE THAN 50 YEARS (OPTIMAL LIFE SPAN)

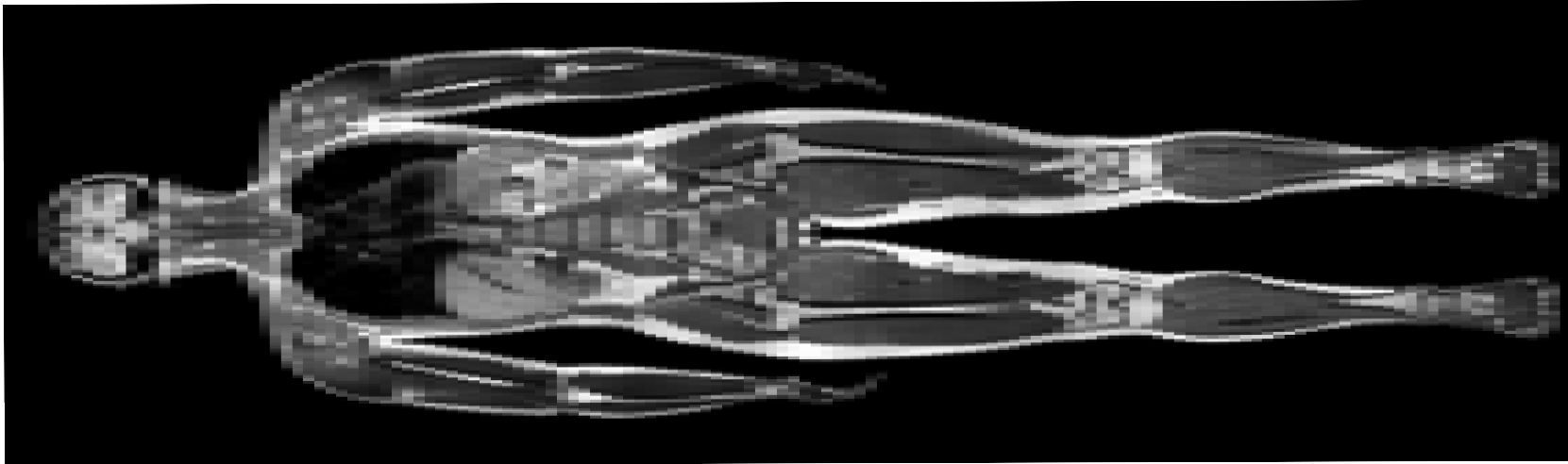
source: INAIL, 2012

50% OF EUROPEAN HOSPITALS

CANNOT HOST CURRENT ORGANIZATIONAL MODELS

source: IRES, 2017

INPUT: «HEALTHCARE INFRASTRUCTURES» AS SIGN OF MEDICAL CHANGES EVOLUTION of the HEALTHCARE FACILITIES



PREDICTIVE MEDICINE

"In the next 10 years, the knowledge and diagnostic methods, as well as therapy and prevention care activities will change more than 80%"

M. Mauri, Polisanità,
Politecnico di Milano

INPUT: «HEALTHCARE INFRASTRUCTURES» AS SIGN OF COVID-19 CHANGES DESIGN STRATEGIES for RESILIENT HOSPITALS | **DECALOGUE DABC**

Acta Biomed 2020; Vol. 91, Supplement 9: IN PRESS DOI: 10.23750/abm.v91i9-S.10117

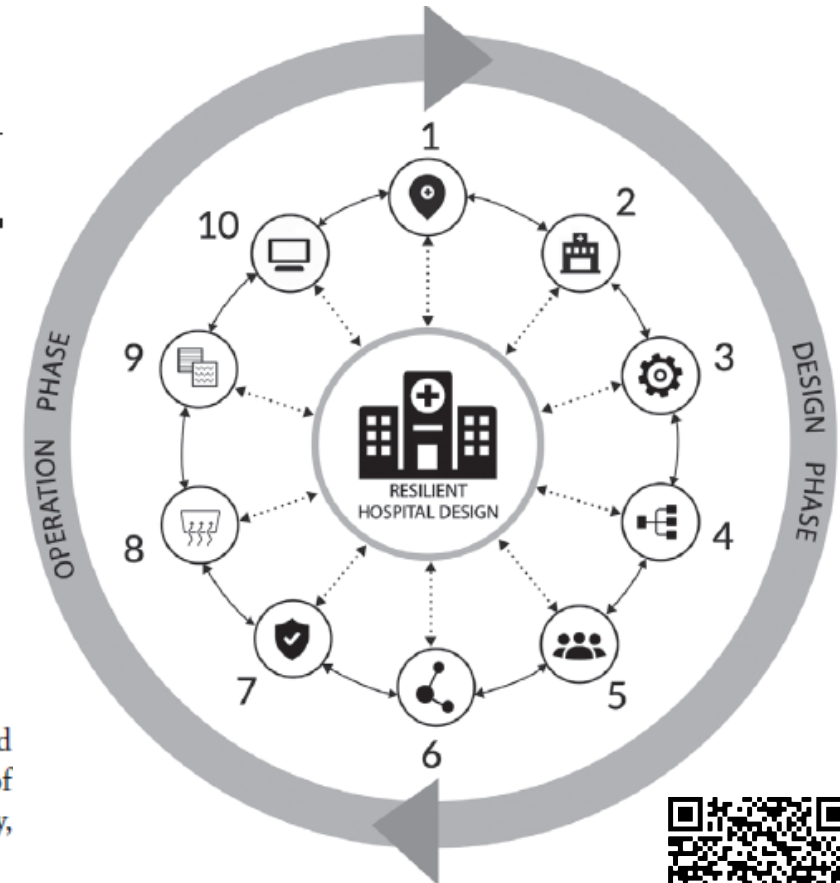
© Mattioli 1885

ORIGINAL ARTICLE

COVID-19 and Healthcare Facilities. A Decalogue of Design Strategies for Resilient Hospitals

*Stefano Capolongo¹, Marco Gola¹, Andrea Brambilla¹, Alessandro Morganti¹,
Erica Isa Mosca¹, Paul Barach^{2,3,4}*

¹Politecnico di Milano, Department of Architecture, Built environment and Construction engineering (DABC), Design and Health LAB, Italy; ²Department of Pediatrics, Wayne State University School of Medicine, Detroit, MI, United States of America; ³Jefferson College of Population Health, Philadelphia, PA, United States of America; ⁴Sigmund Freud University, Wien, Austria



Stefano Capolongo

Design & Health Lab, DABC, Politecnico di Milano

WHO COLLABORATING CENTER

A TECHNICAL BRIEF | KEY MESSAGES

Objective: to support the European Region in planning, programming and design new hospitals and redevelopment of existing healthcare facilities with innovative strategies.

- STRATEGIC LOCALIZATION
- FLEXIBILITY AND RESILIENCE
- FUNCTIONAL DESIGN
- NUCLEUS HOSPITAL
- SINGLE PATIENT ROOM (+1)
- SUSTAINABILITY
- HEALING GARDENS
- HEALTHY WORKING SPACES
- INDOOR AIR QUALITY
- SAFETY AND SECURITY
- INCLUSIVE DESIGN
- DIGITALIZATION
- TERRITORIAL HEALTH NETWORK
- EVIDENCE BASED DESIGN
- FUTURE CHALLENGES

Authors POLIMI: Stefano Capolongo, Marco Gola, Andrea Brambilla
Guidance WHO: Natasha Azzopardi Muscat, Mafaten Chaouali, Thomas Zapata
Reviewers: Francesca Racioppi, Ann-Lise Guisset, Bruno Meessen, Hamid Ravaghi, Steve Wright, Johnathan Erskine

Hospitals of the future

A technical brief on re-thinking the architecture of hospitals



POLITECNICO
MILANO 1863



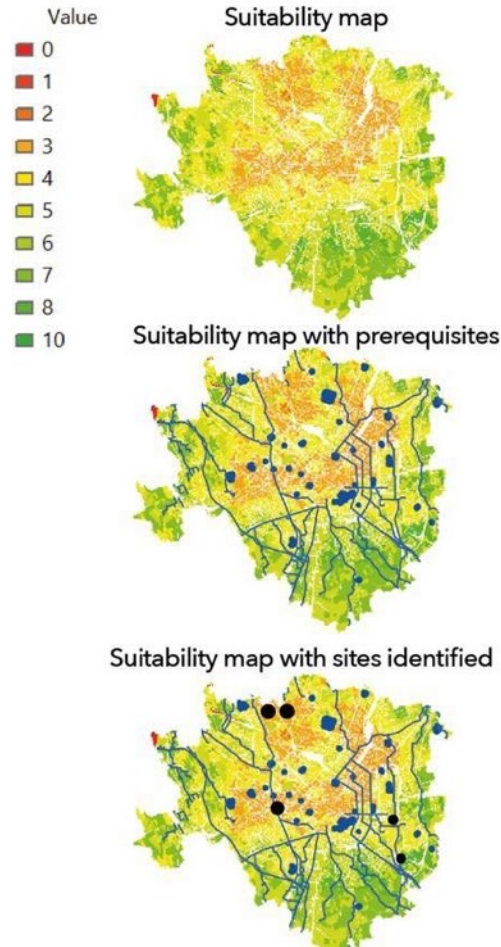
KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | STRATEGIC LOCALIZATION



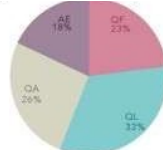
The **strategic localization** of hospitals with different functional orientations in the city centre and boundary areas can foster urban regeneration.

KEYWORDS:

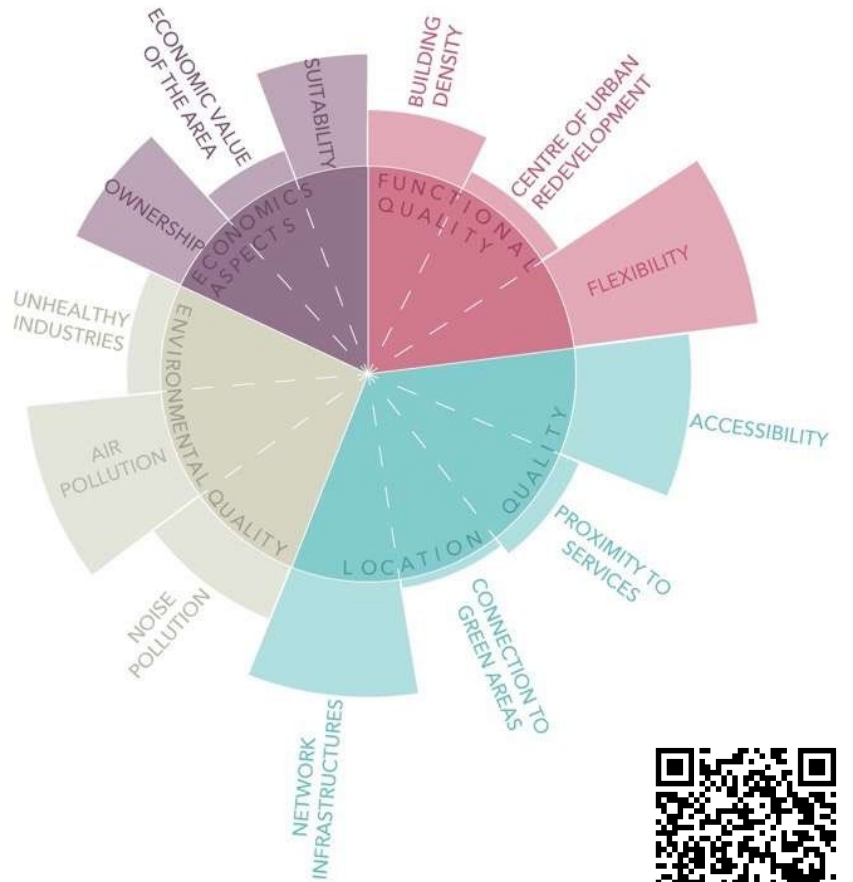
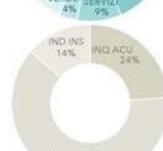
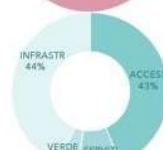
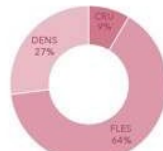
- *Urban accessibility*
- *External expansion areas*
- *Different accesses to the healthcare facilities*



CRITERIA



SUB-CRITERIA



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | FLEXIBILITY AND RESILIENCE



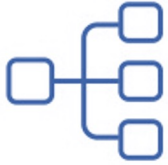
Designing for flexibility and resilience starts in the early phases of a new hospital project, to meet the future needs or in preparation for emergency situations, such as a pandemic or major traumatic events.

KEYWORDS

- *resilience and adaptability*
- *buffer spaces*
- *prefabrication*



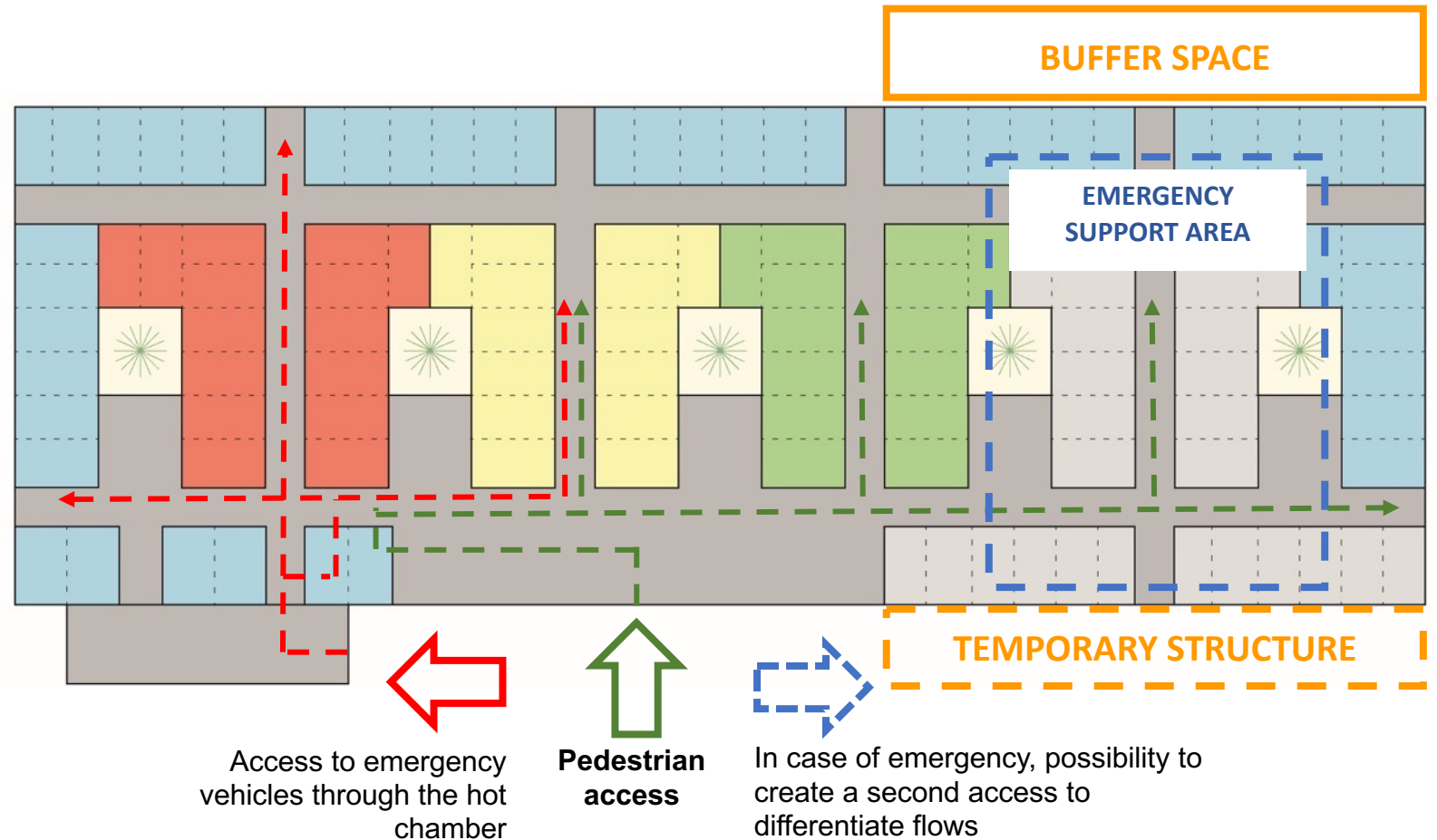
KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | **FUNCTIONAL DESIGN**



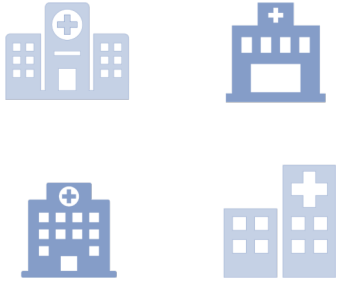
Functional design is fundamental in hospitals to fulfil the needs of different people by separating different hygienic departments and distributing all kinds of flows.

KEYWORDS:

- *User and sanitary flows*
- *Adequate and coherent functional program*
- *Dimensions related to the volume of activities*



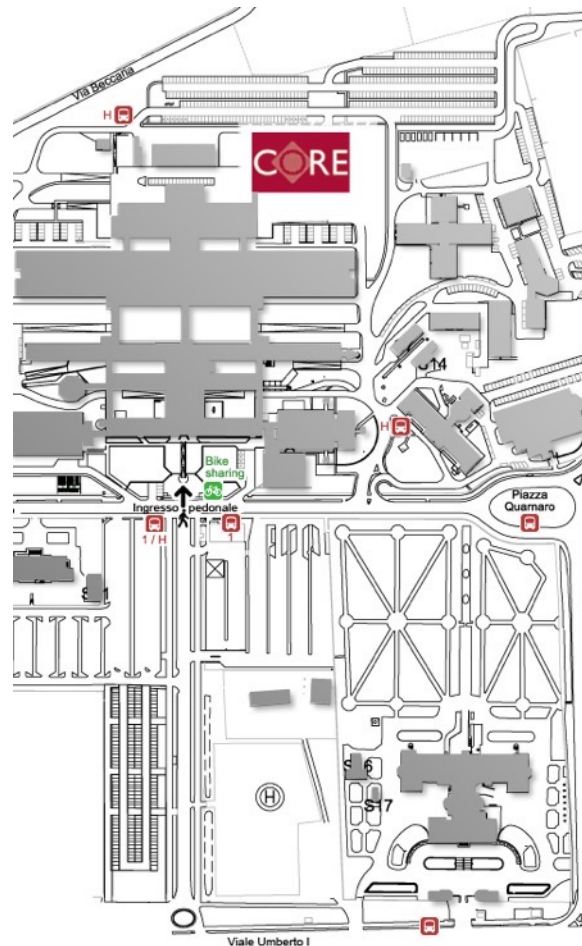
KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | **NUCLEUS HOSPITAL**



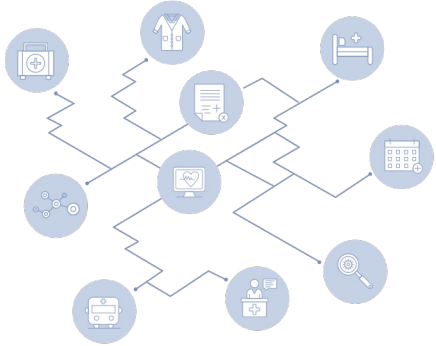
Separated Nucleus should be guaranteed in order to ensure safety and self-sustainability of each area of the hospital in a flexible and resilient way.

KEYWORDS:

- *Satellite*
- *Autonomous buildings*
- *Compartments*



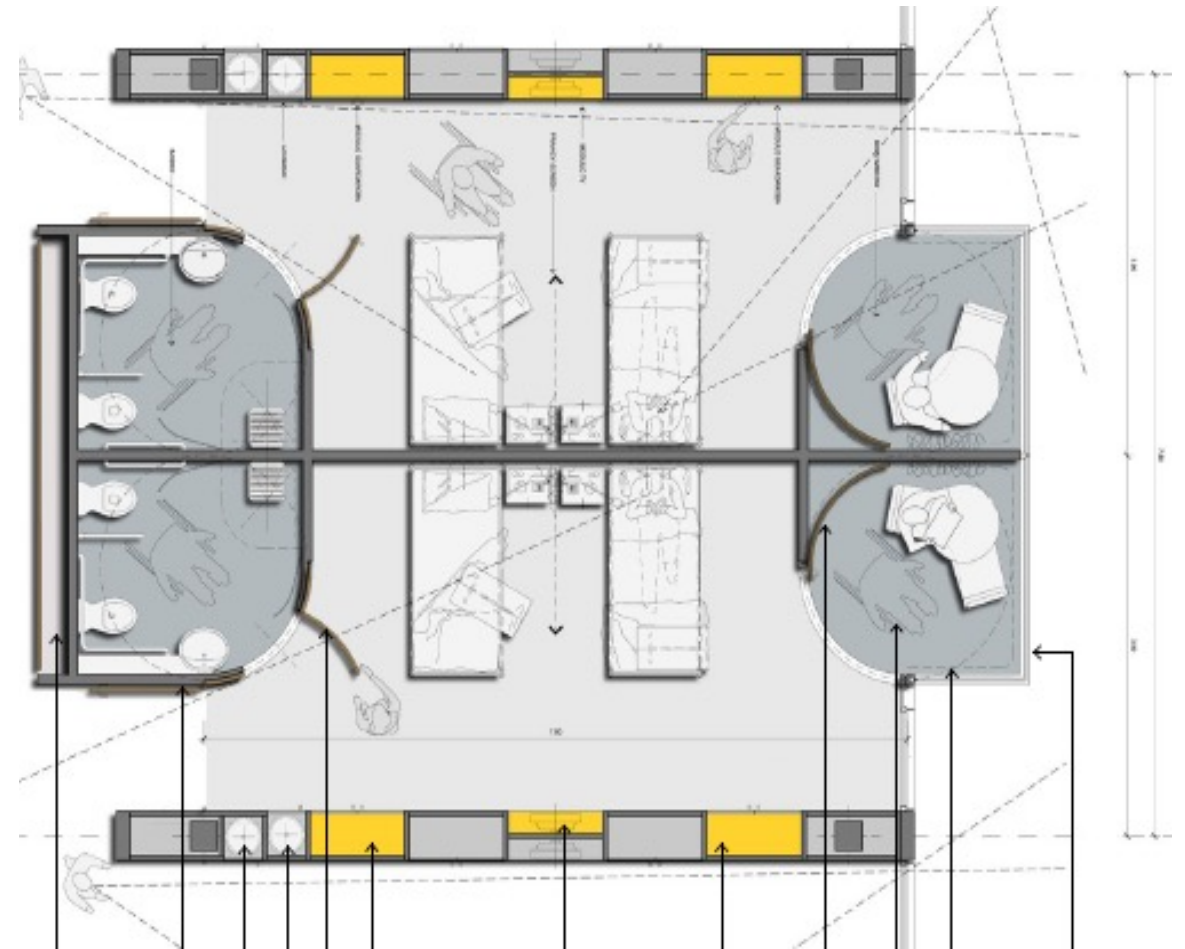
KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | SINGLE PATIENT ROOM (+1)



Single Patient Rooms can improve comfort, flexibility, reduce hospital acquired infections and ensure privacy for patients and caregiver.

KEYWORDS:

- *Reduce cross-contaminations and infections*
- *Fluxes and path differentiations*
- *Waiting room dimension*
- *Living space and Buffer space for family caregiver*



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | SUSTAINABILITY



The **sustainability** of the hospital's social, economic, and ecological (environmental) dimensions needs to be developed as part of the whole life-cycle of the facilities.

KEYWORDS

- *Energy consumptions*
- *Reducing the impacts*
- *Green transition*
- *Sustainable strategies*



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITAL OF THE FUTURES | HEALING GREEN SPACES

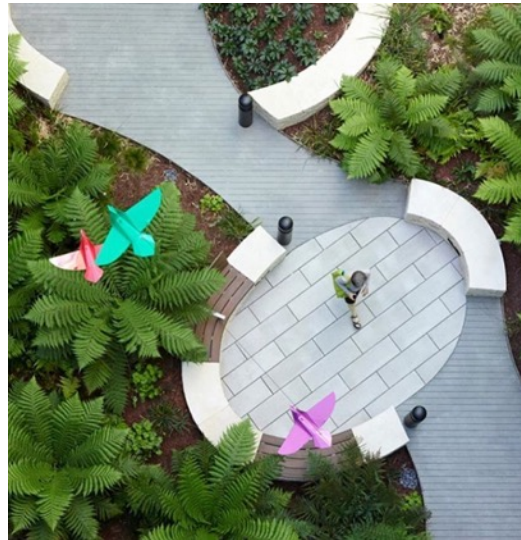


Well-designed **landscapes and healing gardens** can benefit both patients and health care workers, physically and psychologically.

KEYWORDS:

- *Support space dedicated to healthcare staff*
- *Presence of green areas & Healing Gardens*

A survey showed how green reduces the state of anxiety and stress.



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | **HEALTHY WORKING SPACES**



A **healthy working environment** can improve physical protection and mental health from design, management and socio-cultural viewpoints.

KEYWORDS:

- *Wellbeing*
- *Circadian rhythm*
- *High performances*
- *Quality of the performances*
- *Soft qualities*



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | INDOOR AIR QUALITY



Awareness is required of invisible indoor infection risks; attention should be paid to **air-quality control** during the design and construction phases.

KEYWORDS

- *Adequate management of ventilation system*
- *Monitoring activities*
- *Indoor Air Quality devices*
- *Indoor Environmental Quality*



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | SAFETY and SECURITY



Prevention of safety issues is essential, including general safety, fire and seismic events. These can be considered from several points of view.

KEYWORDS

- *design and construction, maintenance management*
- *emergency preparedness*
- *backup functions and territorial networks*



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | INCLUSIVE DESIGN



Universal design should be considered to meet the needs of the population by improving the soft quality aspects, both inside and outside of health care facilities.

KEYWORDS:

- *Temporary and cronic disability*
- *Access to care for All*
- *Beyond barriers*



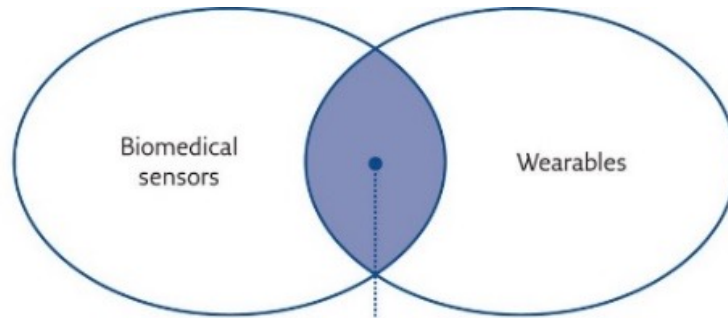
KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | DIGITALIZATION



Digitalization can greatly benefit the management of facility assets and services, organization of tasks and services across the territory, and increase user-friendly services.

KEYWORDS

- *telemedicine*
- *wearables systems*
- *sensory rooms*



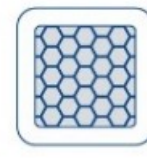
Activity trackers



Smart watches



Smart clothing



Patches/
tattoos



Ingestibles/
smart implants



KEY MESSAGES FROM THE TECHNICAL BRIEF HOSPITALS OF THE FUTURE | TERRITORIAL HEALTH NETWORK



The **synergies through the territorial health network** can improve services and resilience of the healthcare system, and increase patient willingness to access services by resolving proximity issues.

KEYWORDS

- *Community Health Centers*
- *Community Hospitals*
- *Rehabilitation Centers*



FUTURE CHALLENGES FOR THE EUROPEAN REGION

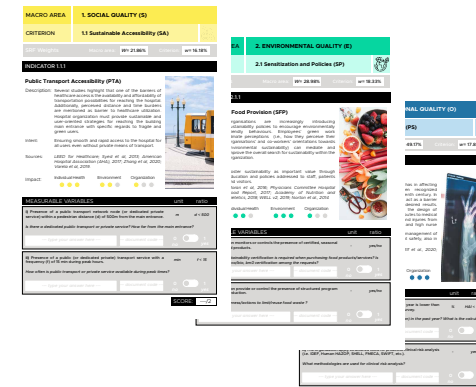
ASSESSMENT TOOLS | EVIDENCE BASED DESIGN



Assessment tools and POEs are encouraged for measuring the quality and effectiveness of the interventions.

KEYWORDS

- Evidence Based design
- Surveys and monitoring activities
- Suggesting solutions and actions
- Improving the performances



OFAT

OPTIMIZED FLEXIBILITY ASSESSMENT TOOL FOR HOSPITAL PLANNERS

EVALUATION OF FLEXIBILITY FOR



Healthcare Facilities during Designing and Planning Phase

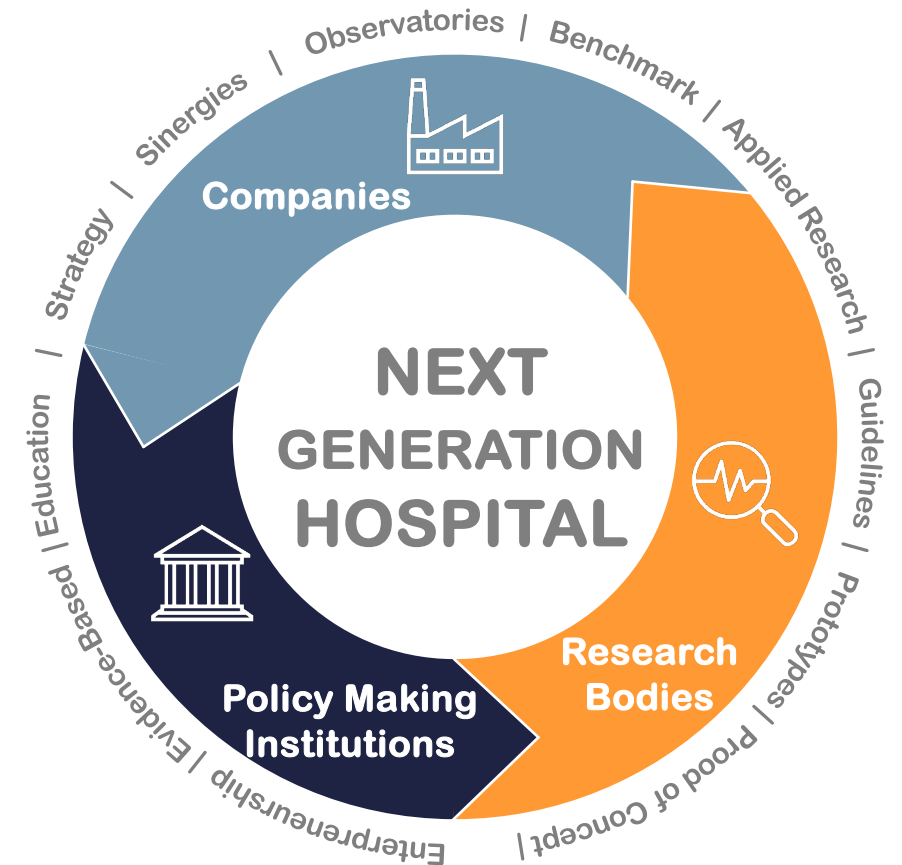


Existing Facilities to understand to what extent they satisfy the criteria

FUTURE CHALLENGES FOR THE EUROPEAN REGION

TARGET AUDIENCE | **MULTIDISCIPLINARITY**

- » **Transnational healthcare institutions, associations, networks and organizations**
- » **Welfare system governance bodies, leaders and strategic managers**
- » **General managers, medical directors and strategic directors of health care infrastructures**
- » **Planners and designers of healthcare infrastructures**
- » **Technical directors and facility managers of healthcare infrastructures**



FUTURE CHALLENGES FOR THE EUROPEAN REGION NEW PROFESSIONAL FIGURES | **THE HOSPITAL PLANNER**



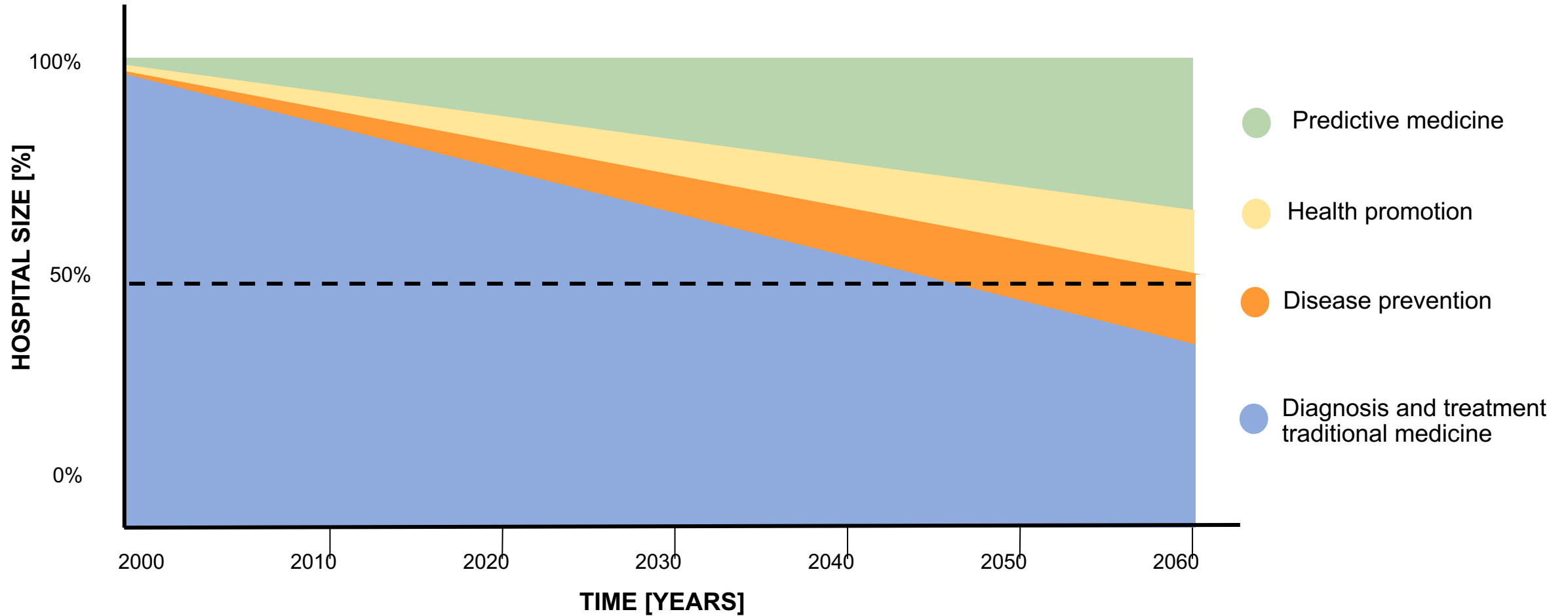
All over the world,
you can find training courses
training courses related to:

- **Hospital Planner**
- **Medical Planner**
- **Doctor Architect**
- **Doctor Engineer**
- **Nurse Engineer**
- **Nurse Architect**



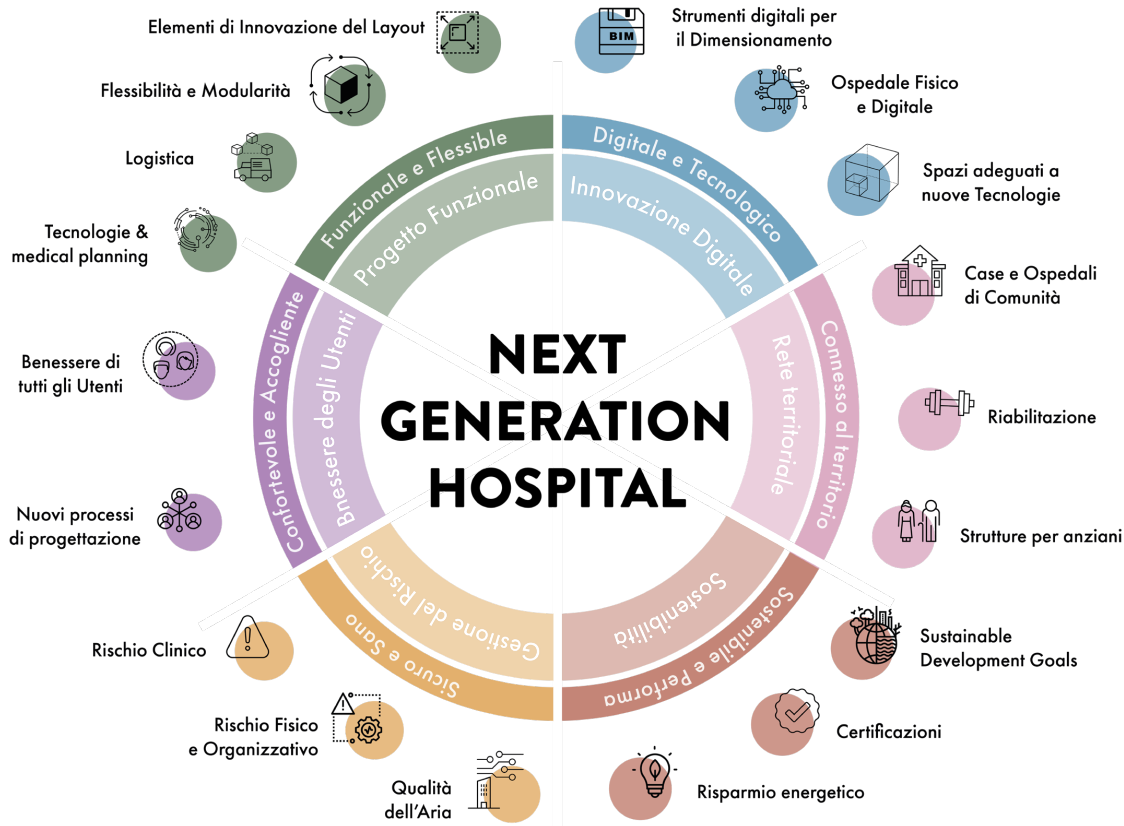
FUTURE CHALLENGES FOR THE EUROPEAN REGION

EVOLUTION OF MEDICINE | EVOLUTION OF HOSPITALS



FUTURE CHALLENGES FOR THE EUROPEAN REGION

JOINT RESEARCH PARTERSHIP | THE NEXT GENERATION HOSPITAL



The **JRP HI** aims at facilitating the discussion on the construction of scenarios concerning **technological evolution**, shared between the Politecnico di Milano and the companies of the **Healthcare Infrastructures supply chain**.



Associati Platinum



Associati Gold e Istituzionali

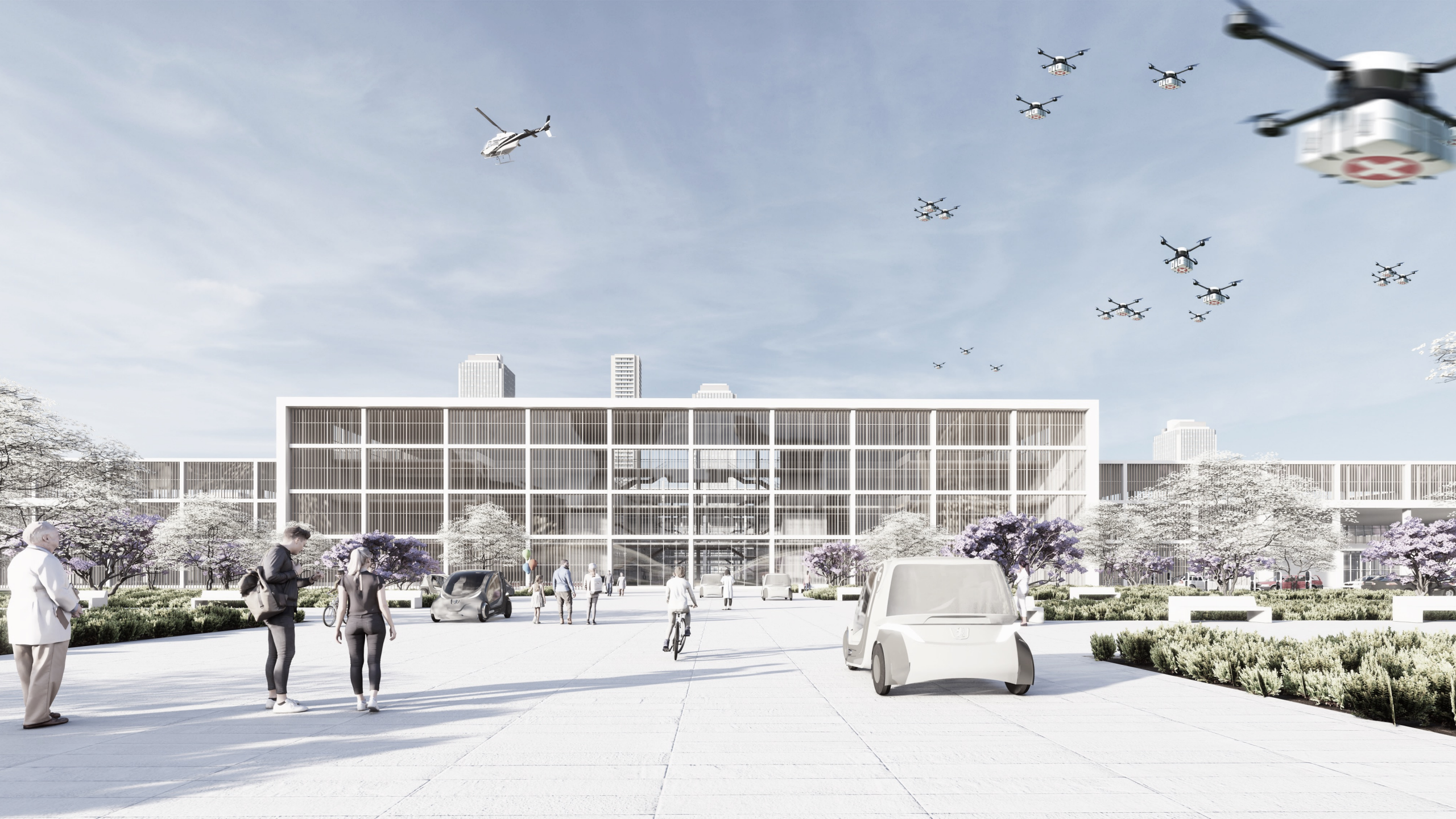


Advisory Board



Stefano Capolongo

Design & Health Lab, DABC, Politecnico di Milano



SESSION 1: Scientific introduction of the congress

**Design
& Health**
International Academy for Design and Health

Milano, Italy 11-14 April 2024

Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment / Healthy people

ARCHITECTURE AND HEALTH

Prof. Stefano Capolongo.

Politecnico di Milano, Director Department ABC

Architecture Built environment Construction engineering, Design & Health Lab



**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

MEDIA PARTNER

**Progettare
per la Sanità**
Organizzazione, tecnologia, architettura

edra | SANITÀ 33

SPONSORS

Gerflor

REair

Deerns

cneto
CENTRO NAZIONALE
SCIENTIFICO E
TECNICO
OPERATIVO