URBAN
INCD
INCERC

Research and Development in Construction, Urban Planning and Sustainable Territorial Development National Institute "URBAN-INCERC" R&DNI "URBAN-INCERC"
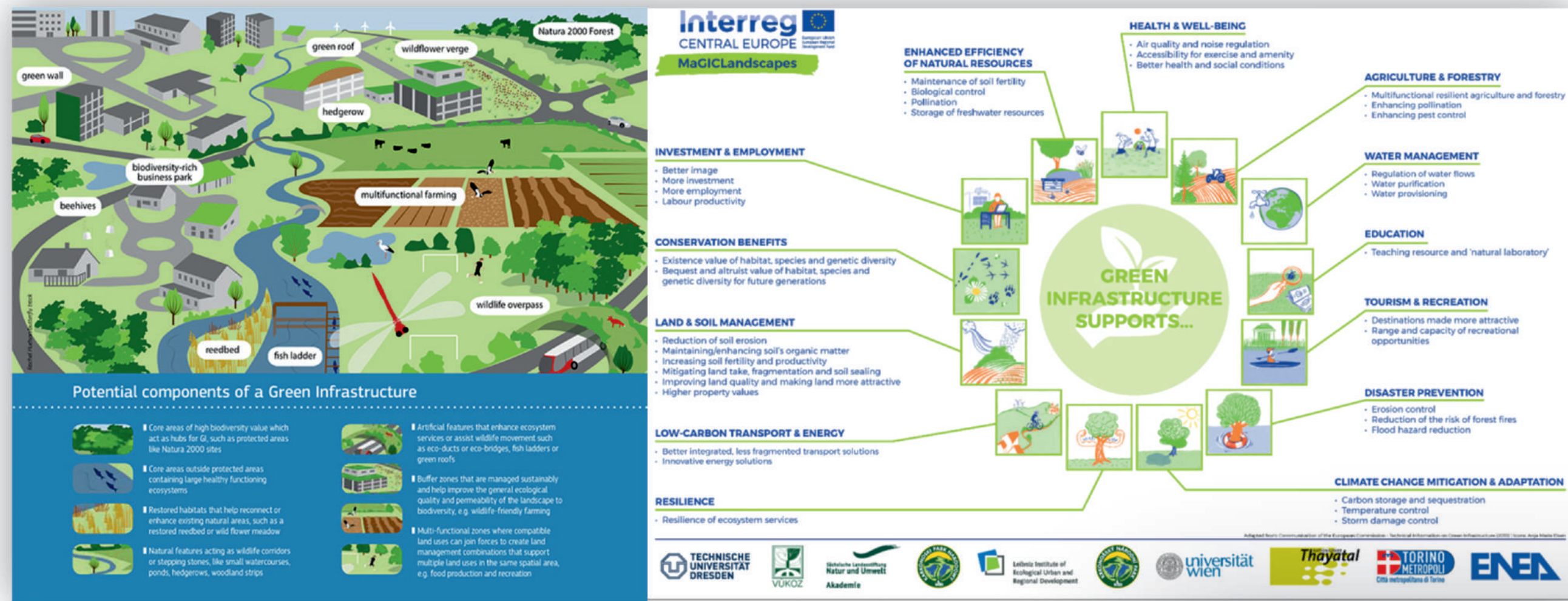
The challenges of implementing the green-blue infrastructure at the level of the metropolitan areas of the big cities in Romania

Authors: SR III Antonio-Valentin TACHE, SRIII Oana-Cătălina POPESCU, SR Cristina IVANA, SRIII Gabriela VOLOACĂ
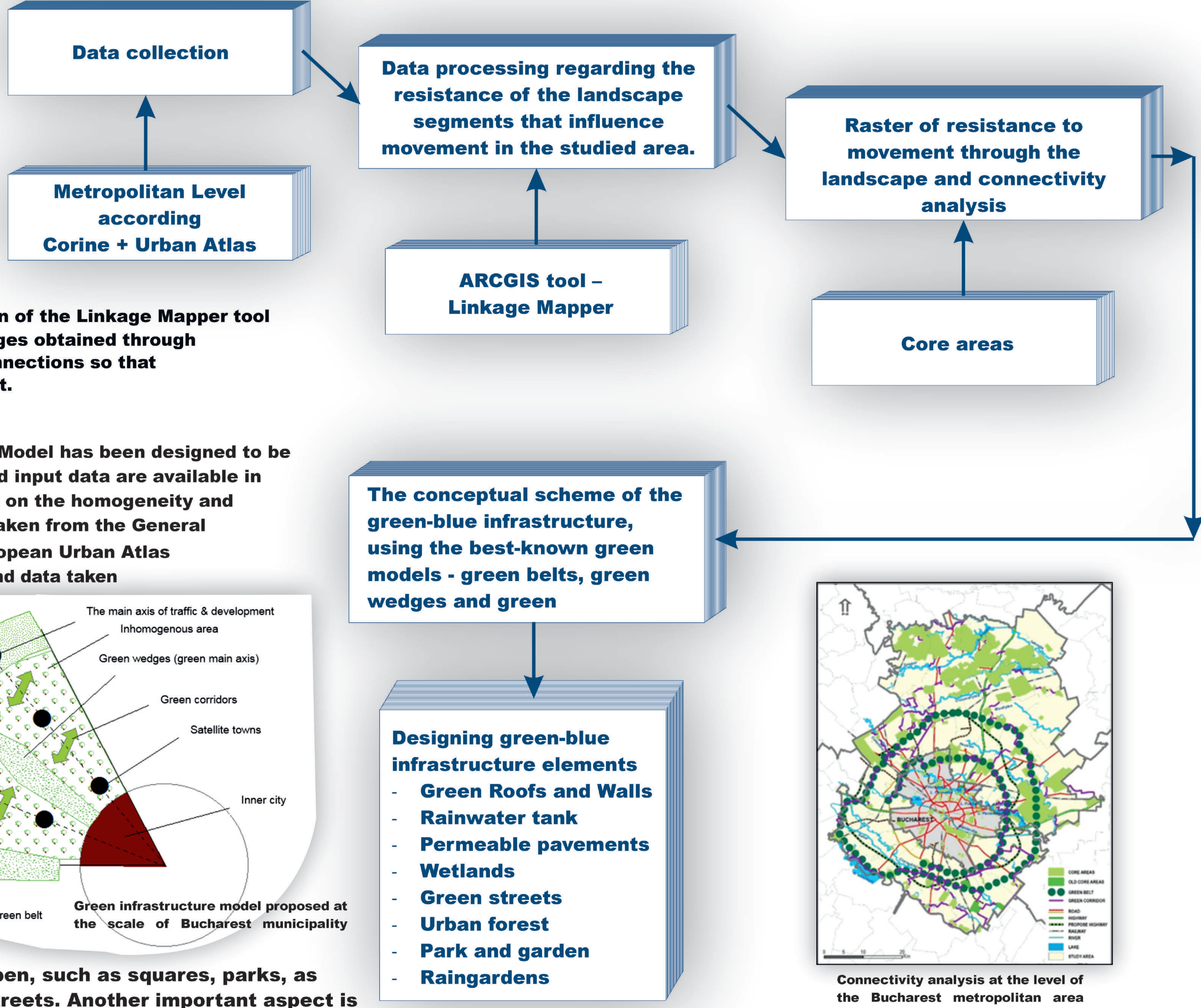
The Problem

Planning the green-blue infrastructure system successfully contributes to combating uncontrolled urban expansion and land use that neglects the sustainability of landscapes and open green spaces. For this reason, the need to integrate the goals and related objectives of the green-blue infrastructure implementation strategy is recognized worldwide in as many policy areas as possible and especially in urban and territorial planning. The implementation of green-blue solutions at the level of a large city must take into account its development vision, the historical and geographical context, the social and economic elements and, last but not least, the local governance mechanisms. That is why the European Commission in 2013 asks European countries to make a special effort to protect their last remaining natural habitat areas. The European Commission (2013) considers green-blue infrastructure as infrastructure capable of providing sustainable management of green and blue areas in the context of climate change and providing a wide variety of benefits to society.

The Goal

The Goal of this study is to define the elements of green-blue infrastructure and analyze the connectivity at the local and metropolitan level of the big cities in Romania, in order to increase the quality of life and biodiversity, but also to protect the landscapes with great recreational value and the connections between them. The methodology consists in compiling European geodata (Corine CLC, European Urban Atlas) and metropolitan and local data with the help of GIS tools and obtaining a connectivity analysis of the studied area.
All the connections obtained through the implementation of the Linkage Mapper tool were operationalized, using high-resolution satellite images obtained through the Copernicus program and correcting the obtained connections so that the deviations from the real environment are insignificant.

The Solution

The Big City Metropolitan Blue Green Belt identification Model has been designed to be usable with input data at different scales, as the required input data are available in different quality levels. The quality of the result is based on the homogeneity and quality of the input data. For the big cities, digital data taken from the General Urban Plans and digital data taken from the from the European Urban Atlas are combined, and for the metropolitan area, Corine data and data taken from the National Cadastre Agency are used.
Data processing is based on the authors' expertise in ecology and spatial planning and European research on connectivity and landscape service provision.
The evaluation of the green-blue infrastructure connectivity can be done based on the innovative tools of the ARCGIS 10.X software.
Open urban areas remain the most important spaces for social contacts of city dwellers despite technological progress and its impact on the social life of the individual (social networks, virtual reality, etc.),so their importance for cities remains undisputed (Ward Thompson, 2002). Urban public spaces are those places located in cities that are open, such as squares, parks, as well as connecting spaces such as sidewalks and streets. Another important aspect is the need to expand green areas inside and outside the city to improve the microclimate that contributes to lowering the temperature and the urban heat island effect (UHI), reducing energy consumption in buildings, managing rainwater, increasing the resilience of ecosystems by improving their functional and spatial connectivity. Starting from these principles, a territorial analysis scheme was created that includes the planning concepts of green-blue infrastructure connecting green space, open areas, road and rail systems and water sources as elementary components in built-up urban areas and in areas periurban.

Data collection

Metropolitan Level according Corine + Urban Atlas

Data processing regarding the resistance of the landscape segments that influence movement in the studied area.

ARCGIS tool – Linkage Mapper

Raster of resistance to movement through the landscape and connectivity analysis

Core areas

The conceptual scheme of the green-blue infrastructure, using the best-known green models - green belts, green wedges and green

Designing green-blue infrastructure elements
- **Green Roofs and Walls**
- **Rainwater tank**
- **Permeable pavements**
- **Wetlands**
- **Green streets**
- **Urban forest**
- **Park and garden**
- **Raingardens**

The main axis of traffic & development
Inhomogenous area
Green wedges (green main axis)
Green corridors
Satellite towns
Inner city
Green belt

Green infrastructure model proposed at the scale of Bucharest municipality

Connectivity analysis at the level of the Bucharest metropolitan area

Results and discussions

The blue-green infrastructure is a planned network that offers viable solutions to urban and climate challenges through a combination of major infrastructure, ecological restoration and urban design in order to optimise the human-nature relationship. The blue-green infrastructure has the role of multiplying ecological services with major social, ecological and environment benefits for the inhabitants of the city. For this reason, green-blue solutions are used with a positive impact on people's quality of life.

Conclusion

The need to protect the metropolitan territory of large cities from the intensity and dispersion of the phenomenon of urban development by integrating green-blue infrastructure and sustainable development in urban and territorial planning.

Park and garden | Green Wall | Green Roofs | Urban forest | Waterways | Permeable pavements | Rainwater tanks

Aknowledgement

Bibliography

1. European Commission (2013) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Green Infrastructure (GI) – Enhancing Europe's Natural Capital. Brussels: COM (2013) 249 final, 11 p [online]. Available at: https://ec.europa.eu/environment/nature/ecosystems/index_en.htm [Accessed: 15 September 2020]
2. Ward Thompson, C.W. (2002). Urban open space in the 21st century. Landsc. Urban Plann. 2002, 60(2), 59–72.
3. Worboys, G.L.; Francis, W.L.; Lockwood, M. (Eds.) Connectivity Conservation Management: A Global Guide (with Particular Reference to Mountain Connectivity Conservation); Earthscan: London, UK, 2008; p. 382.

The 18-th edition of the International Specialized Exhibition (ISE) - "INFOINVENT 2023", 22-24 November, Chișinău, Moldova