LASER VALLEY
LAND OF LIGHTS

from vision to action

2021


LASER
VALLEY
Land of Lights

What is the moment?

This leaflet marks a new stage in developing Laser Valley, Land of Lights. A new step with meaning and substance.

Organically, this leaflet capitalises on the Laser Valley history - on all the spectacular initiatives from the past 10 years. It ensures the continuity of the orchestrated efforts from 2016, when the *vision* became the *committed Laser Valley ambition*, which inspired a pragmatic dialogue between the government, the local authorities in Ilfov, Măgurele and Bucharest, the academic and research community, the business community, the civil society and the international financial institutions - a true performance for Romania in territorial development governance.

This new leaflet reconfirms, but especially repositions the Laser Valley, Land of Lights vistion in the recent *Twin Transition* (*Green & Digital*) paradigm of the European Union - which will mark the bloc's investments, including the ones on cohesion and regional development, in the next 30 years -, adding new puzzle pieces.

Looking at the challenges and opportunities today and, in the years ahead, at the incremental development of Laser Valley, Land of Lights, this leaflet is providing the decision-makers involved in 2016 with a concept of smart territorial development and a set of strategic projects which can make for a first phase of transforming the region.

The projects are natural extensions of the existing infrastructure and capitalise on the last five years of efforts in achieving the vision; they are the most opportune instantiations of ELI-NP's *knowledge and economic potential spillovers* announced by the World Bank in 2018 in the study inspired by the Laser Valley vision.

To this end, the leaflet sets out the ambition regarding the next period of funding and, besides offering a first answer to the challenges and objectives of PNRR, it fuels the anticipative dialogue on resilience and opens up the perspective of future synergies with the European Cohesion Fund, with ERDF, and with ESF.

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UEFISCDI INNOVATION AND CREATIVITY

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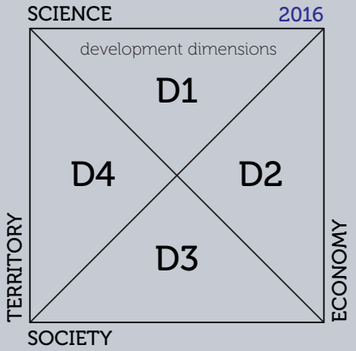
LASER VALLEY, LAND OF LIGHTS VISION

ACTION LINES

ENABLING CONDITIONS

LASER VALLEY VISION

In 2030, Laser Valley, Land of Lights is an accelerator of Romania`s transformation. The culture of creativity makes Laser Valley an attraction not only for talented Romanians, but also for innovators from around the world. Măgurele is an urban ecosystem in which people, technology and nature are evolving together.



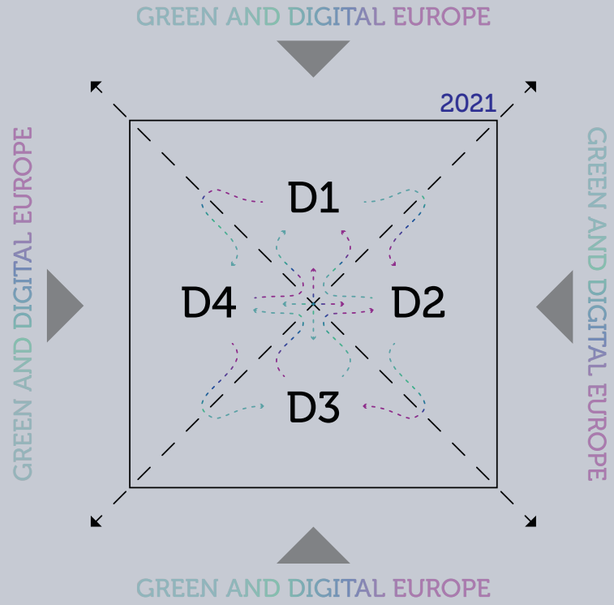
D1 Science / Openness
D2 Economy / Competitiveness
D3 Society / Regeneration
D4 Territory / Connectivity

D1. An inspired *open* approach that is dynamically facilitating *knowledge spillovers* would render the region a global pole of excellence and a European hub of discovery on the frontier of science and technology, with social and economic impact.

D2. ELI-NP has to be exploited as a unique research facility within the science, technology and education hub already existing in Măgurele. Orchestrated anticipatory policy and governance of territorial development could harness the potential for *economic spillover* of ELI-NP.

D3. The urban hub of Măgurele, regenerated, is the centre of the 'tornado' of transformations in the entire ecosystem, and the focus is on human-nature-technology symbiosis, as the essence of sustainability.

D4. Laser Valley has the potential to become an accelerator for transforming an entire territory, centered on Măgurele, on neighbouring Ilfov c., Bucharest, Giurgiu c., extended west - Teleorman c., and east - Călărași c. and Constanța c.



D1 **Science** / Openess / *Outreach* › Business / Education / Health | *knowledge spillovers*
D2 **Economy** / Competitivity <> Resilience > Energy / Health | *economic spillovers*
D3 **Society** / Regeneration <> Education <> Health <> Lifestyle | sustainable development
D4 **Territory** < *Positive Energy District* > Connection / Housing / Fabrication | green transition

GREEN AND DIGITAL Europe (*Twin Transition*)

The new strategic targets of the European Union:

- In 2050 there will be no net emissions of greenhouse gases. We will transition to a circular, cleaner economy and the economic growth will be decoupled from resource use. No person and no place will be left behind.

This requires investments in clean technologies, supporting innovation in the industrial sector, decarbonisation of the energy sector, and international cooperation for new environmental standards.

- The digital solutions will put people first. They will open up new opportunities for businesses and will enable a vibrant and sustainable economy, will foster an open and democratic society, and will achieve the green transition.

Europe will become a global role model for the digital economy.

D1. ***Laser Valley, Land of Lights - Twin Transformation***

The new transformational paradigm at the European level is inspiring and boosting the Laser Valley vision through the multiple links between developments and through the organic extensions of the existing infrastructure - the potential for *knowledge and economic spillovers*.

The question becomes: *How do we invest in a territory to bring it in the „new normal", marked by sustainability and vibrating with creativity, innovation and entrepreneurship?*

The green transition of Laser Valley, with the territorial developments, but also with the developments in science and society, will be substantially shaped by the *Positive Energy District* approach - a space of experiment for the green technologies of the future.

D4. Digitalisation will streamline the science and innovation ecosystem and will adjust the options for *knowledge spillovers*; will accelerate economic development and will connnect; will becoome embedded in everyday life.

DEVELOPMENT ACCELERATOR

***Laser Valley, Land of Lights* is about capitalising on the unique scientific and technological Pan-European infrastructure Extreme Light Infrastructure - Nuclear Physics (ELI-NP), about capitalising on the scientific, technological and talent hub already existing in the city of Măgurele, Ilfov County, about capitalising on the geographic location, neighbouring the southern area of Bucharest and close to the Danube River, about creating an economic growth pole as a regional science, innovation and entrepreneurship ecosystem, about integrated disruptive development ('game changer') and about an accelerator of territorial transformation.**
In essence, it is about an accelerator for Romania's development.

Laser Valley, Land of Lights targets an entire territory, covering several counties with important implications for the development, transport and European mobility Axis represented by the Danube, with expectations regarding its link to the EU Strategy for the Danube Region (EUSDR) as a flagship project.

The next years, 2021-2027 will come with opportunities and challenges, including for Laser Valley, Due to its uniqueness, size, complexity and potential socio-economic impact, the project is among the most challenging in post-1989 Romania - certainly the largest in terms of smart territorial development.

The success of Laser Valley, Land of Lights depends on the successful action of the state, as an entrepreneurial state, on the public-public partnership (local - central administration), on the public-private partnership and on the private initiatives, both individually but, especially, concerted. The public commitment at Government level, the local administration commitment, the stakeholders' involvement and national and international communication are also key drivers for concrete results.

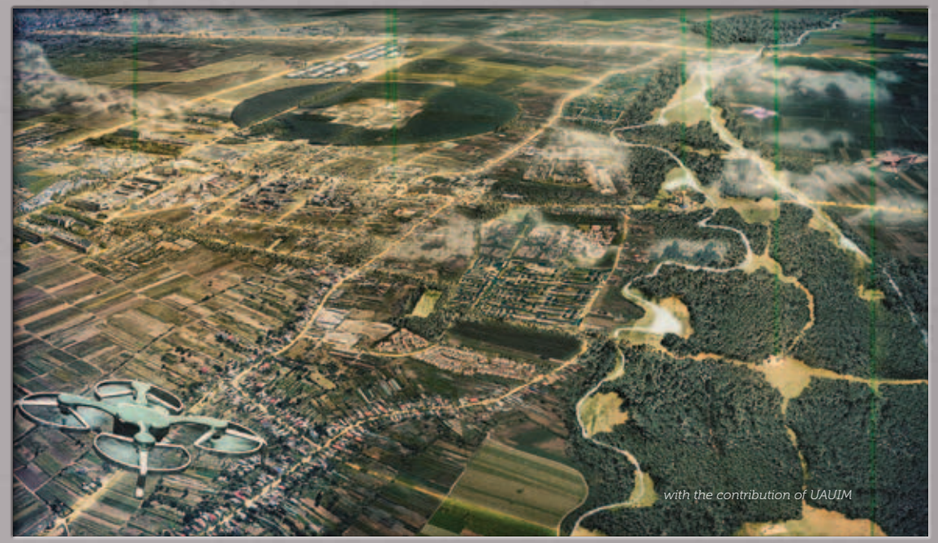
The need for an open governance structure for the development of Laser Valley is a major conclusion of 2016. This structure is critical for the coordination of interventions, for making the most of the exceptional potential and for obtaining positive impact on competitiveness and welfare.

As ELI-NP is an example of continuity, since it was assumed by all Governments in the past 10 years, we strongly believe that Laser Valley, Land of Lights already has the necessary dynamics to be on the agenda of any Government, at least in the next 10 years.

2011

FOREIGN INVESTORS COUNCIL RANKED ELI-NP AMONG THE TOP FIVE INVESTMENTS IN ROMANIA

FIC estimated in 2011, before the building of ELI-NP started, that the project might attract investments of 1 billion EUR in the period 2012-2019 - and after completion it might attract additional investments, especially for the development of secondary facilities in the medical field.
FIC estimated that ELI-NP could generate on the medium term a GDP increase by 0.6% (and implicitly an increase by 0.5% of the state budget contributions) and 12,700 jobs.



2012

EUROPEAN STRATEGY FORUM ON RESEARCH INFRASTRUCTURES (ESFRI) ANNOUNCES THAT IT IS EXPECTED FOR ELI TO HAVE "HUGE ECONOMIC IMPACT IN THE HOST TERRITORIES, ESPECIALLY IN MEDICINE"

2016

PRICEWATERHOUSECOOPERS DEVELOPED THE ELI-NP SOCIO-ECONOMIC IMPACT STUDY

"The Laser Valley, Land of Lights regional ecosystem will create 12,000 jobs and will generate an annual turnover of 1.26 billion EUR, with 500 million EUR impact on GDP and 120 million EUR in taxes collected to the state budget."

SMART TERRITORIAL DEVELOPMENT south of Bucharest, north of Danube

The substantiation of the Laser Valley, Land of Lights vision is scale-dependent. Consequently, there is a need for an in-depth analysis of three different perspectives which all contribute to building a coherent and consistent profile for the entire project:
a *local perspective*, focused exclusively on the city of Măgurele;
a *metropolitan perspective*, focused on aspects related to the accessibility of the city centre, on the city interface with Bucharest, and on the valleys of the three rivers crossing the area, with the lakes, the delta and the existing forests;
a *territorial perspective*, mainly focused on the economic competitiveness of a vast territory it influences, south of Bucharest and north of the Danube - especially Giurgiu and Ilfov counties.

The developments will be varied and complementary, falling under several axes:

They will capitalise on ELI-NP as an unique research facility which may generate an international scientific and technological pole of excellence together with the existing hub in Măgurele, which includes seven national research-development institutes and a university, and also the connection with Bucharest and the concentration of universities, research and talent resources there.

Will foster the multiplier effect which can be triggered by the links with knowledge-intensive sectors both as providers for the ELI-NP needs, and as beneficiaries from the economic use of research outcomes. They will generate an area of creativity, innovation, experiments and testing - an entrepreneurial and innovative ecosystem.

Will foster the creation of scientific, technological and industrial parks, inspired by public initiatives, by public-private partnerships and by private initiatives.

Will influence lifestyle through living areas, creativity and recreation areas which capitalise on the natural capital, and through various complementary educational facilities with a strong experimental component in the Science Village.

This environment will have a strong international component, because there will be people from all over the world living and working in Laser Valley.

Will implement the concepts of *intelligent infrastructure, FabLab, green technologies, smart eco-living, positive energy buildings* and will entail detailed urban regeneration programmes, likely to target Măgurele first, leading to a deeper understanding of the geography and of the host territory, as both a generator and a beneficiary of smart development.

Will put a new focus on initiatives at meta-regional level and on the Danube Strategy, on the cross-border component and on *smart specialisation*.

Will require integrated territorial interventions, the design and operationalisation of funding synergies.

Will focus on predictability and communication, which will create the need and the framework for action of the entrepreneurial state - incentives, facilities and guarantees.

Because Laser Valley is the Land of Lights, a place where you enjoy working and you enjoy living.

BEYOND LASER VALLEY

territorial competitiveness and resilience

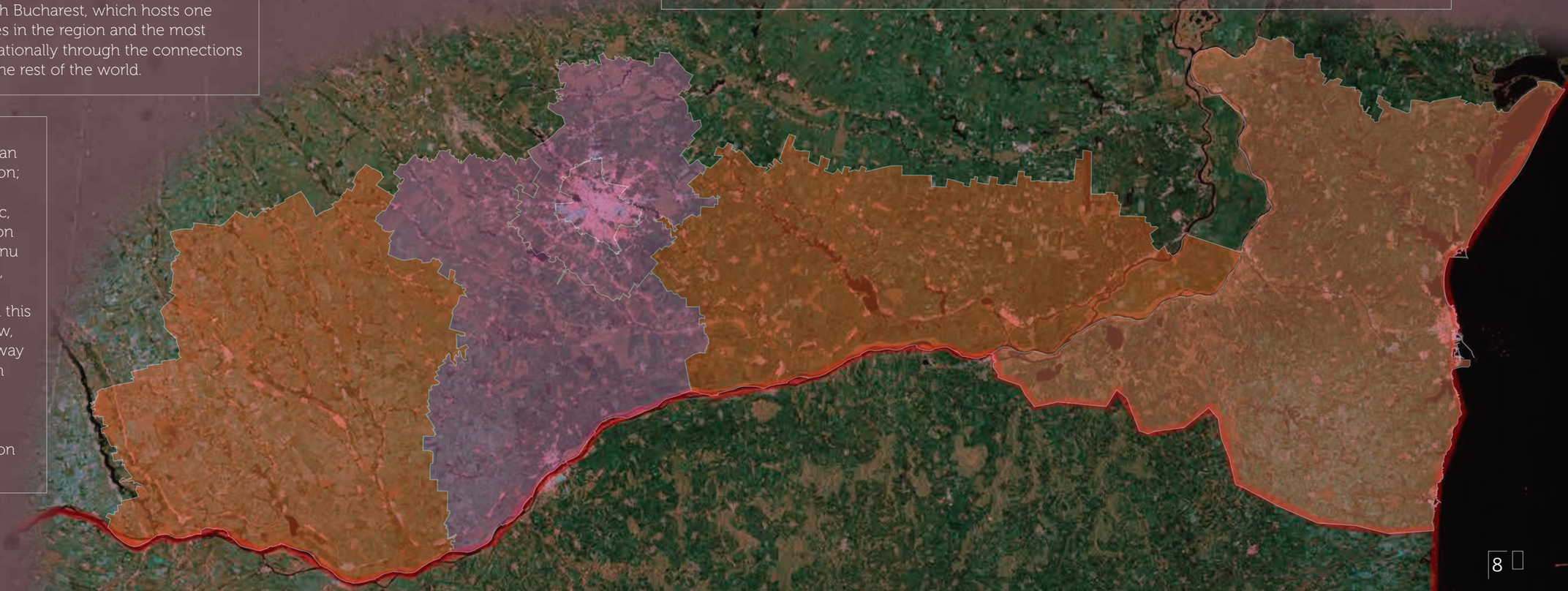
The territorial logic in which the Laser Valley, Land of Lights project is anchored indicates three modelling drivers:

The first is its immediate vicinity with Bucharest, which hosts one of the most important talent reserves in the region and the most important in Romania, visible internationally through the connections linking Bucharest with Europe and the rest of the world.

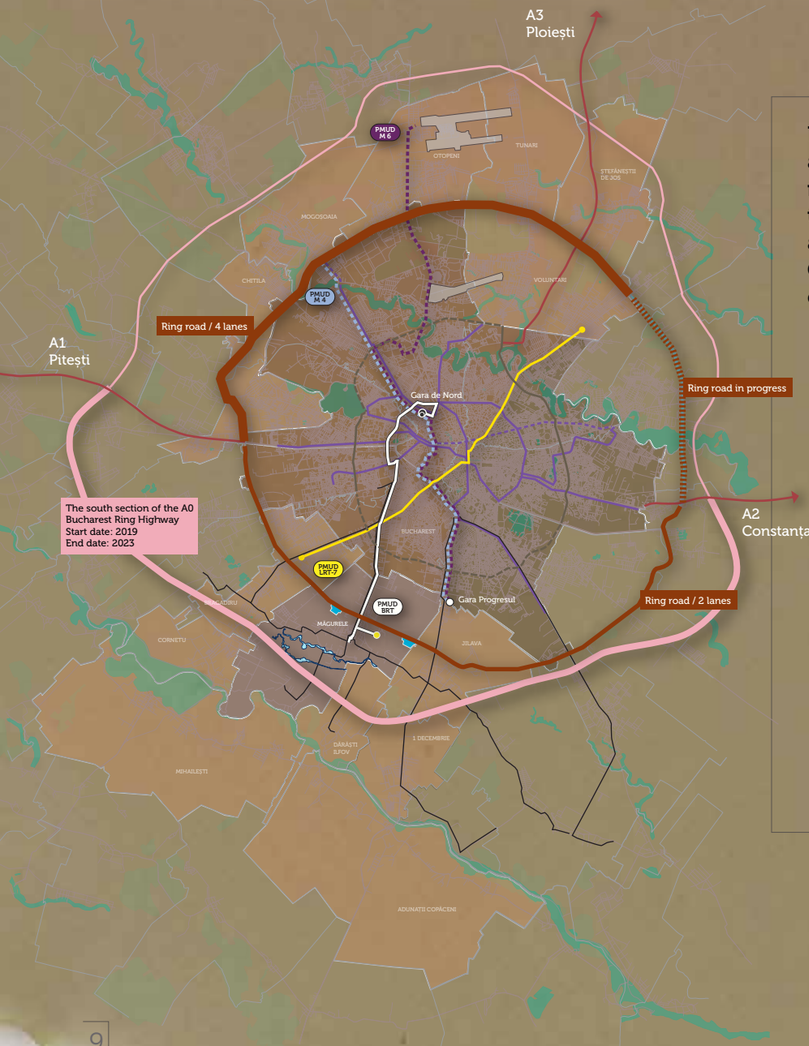
The second is the Danube axis, supported since 2011 by the European Union Strategy for the Danube Region; it includes several pairs of Danube cities which could induce systematic, sustainable cross-border cooperation between Romania and Bulgaria: Turnu Măgurele - Nicopole, Giurgiu - Ruse, Oltenița - Turtucaia and Călărași - Silistra. Shifting the perspective from this transversal to a vast longitudinal view, the Danube is so far the only waterway which enables Romania's interaction with Western Europe and Asia. Therefore, it becomes the southern part of Romania's continental and intercontinental economic integration axis.

The third driver is the Black Sea - as a place of international exchange and Bucharest as direct hinterland of the Port of Constanța, the largest commercial port to the Black Sea. The inland influence of Constanța is transmitted through the intermodal corridor consisting in the high speed railway connecting Bucharest to Constanța, the A2 highway and the navigable Danube, together with the Danube - Black Sea Canal. Thus, the intermodal corridor completes Romania's international economic integration axis. Currently, this axis lacks two important elements: the Bucharest - Danube Canal, of medium- and long-term interest, and a direct railway connection between Bucharest and Giurgiu, of immediate interest, reflected in the priorities of the Ministry of Transport.

In this territorial setting, Laser Valley, Land of Lights has the potential to become a development accelerator for an extended region - towards the west, Teleorman County and towards the east, Călărași and Constanța Counties.



A CONNECTED VALLEY



Laser Valley is part of the southern area of Bucharest. It is directly relevant for the development of the Giurgiu and Ilfov counties, but also for the nearby Teleorman and Călărași counties. The core is the city of Măgurele, the ELI-NP host.

The completion of the south section of the A0 Bucharest Ring Highway, between the A1 and A2 motorways, will have a significant impact on the future development of the Laser Valley area and of the entire southern part of Bucharest.

The South Section of A0 has been contracted in 2019, to be delivered in 2023.

Moreover, the enlargment of the Bucharest ring road section between Jilava (DN5) and Chiajna (A1) to four lanes will contribute to the connectivity of the *Valley*.

In December 2020, the urban train that is connecting Gara de Nord with Otopeni Airport has been put into service.

Also in 2020, the contract for the modernisation of the railway between Vidra and Comana has been signed; it includes the construction of a new rail bridge over the Argeș river which will ensure speedy connections with Giurgiu.

The second section, from Gara de Nord to Jilava, estimated to be completed within the next 6-7 years, will cross Măgurele and will include 16 stations (9 existing, which will be modernised, and 7 new ones). 3 of those stations are located in Măgurele: *Vârteju*, *Măgurele,* and *Măgurele Laser*.

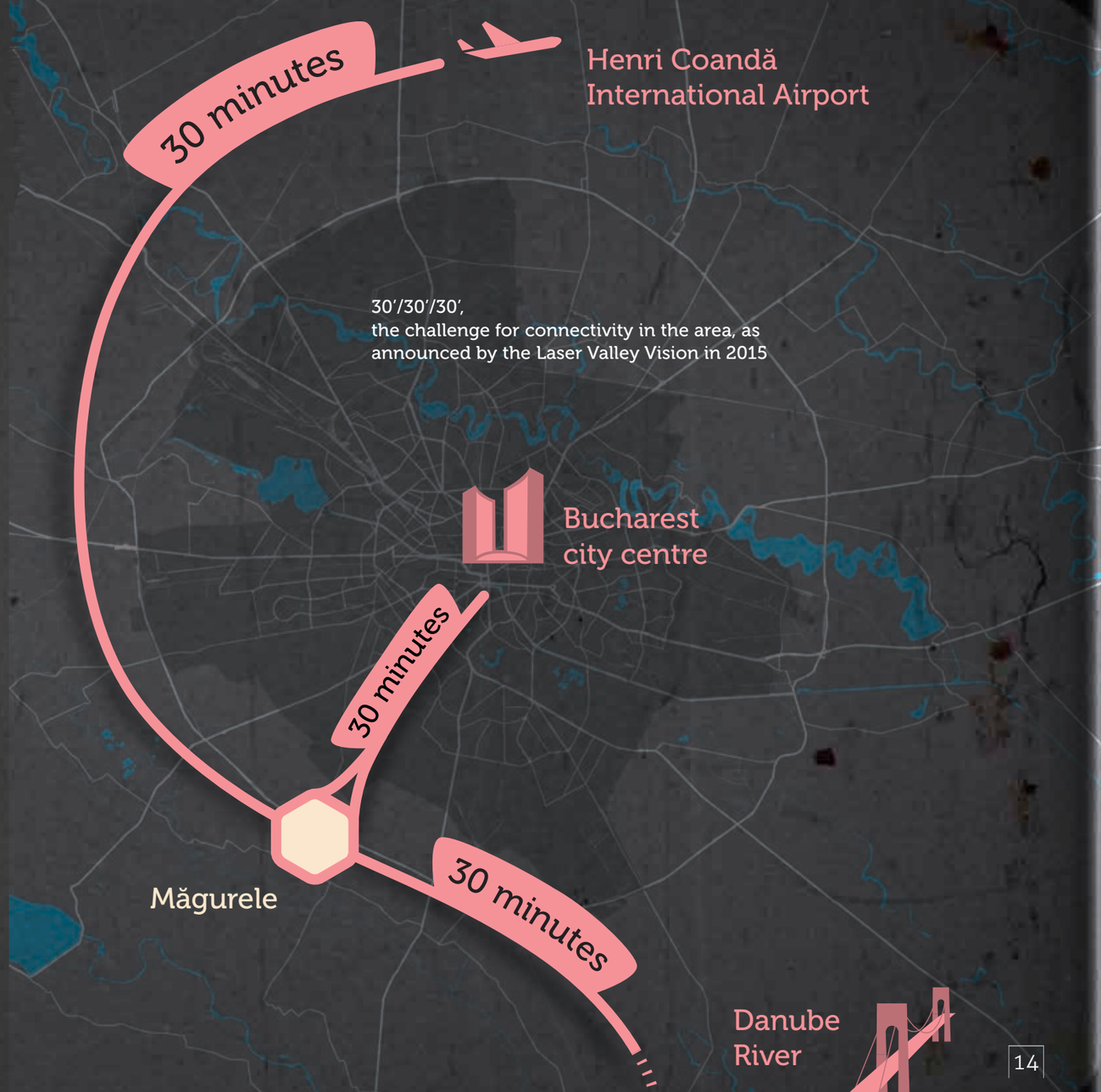
This way, the vision to have direct rail connections between the airport and Laser Valley within 30 minutes is becoming a reality.

Măgurele city centre, with all its public research facilities, the Science Park , the "Henri Coandă" international airport, the Bucharest city centre, the recreation areas and the Danube River will be virtually closer, including closer to the northern part of Bulgaria, which can lead, on a longer term, to the development of a cross-border high-tech area.

The modernisation and completion of the southern section of the Ring Highway, the rail ring that would link Gara de Nord and Gara Progresul with urban trains and, on the longer term, the interconectivity with the metro lines 4, 6 and 1, the train connection to Giurgiu, the outer motorway, but also settling the access to Bucharest from the south will contribute to the mobility within the region and will ensure access inside and from the *Valley* to the Airport, to Bucharest city centre, to 1 Decembrie Port and to the Danube.
The vision from 2015 - which emphasized the need to increase the accesibility of the region and launched the idea of 30 minutes connections from its central area, Măgurele, to the Airport, to Bucharest city centre, and to the 1 Decembrie Port - is becoming a reality through the major road infrastructure rehabilitation projects, through the ring railway project of the ministry of transport, through the integrated projects of the Ilfov County Development Strategy 2020-2030, and through the projects proposed by the Plan of Sustainable Urban Mobility for Bucharest-Ilfov 2016-2030 which address the connections between Bucharest and the neighbouring areas.

Laser Valley leaflet, 2015

The rail and road infrastructure will ensure the connection with Mogoșoaia, where a *Health & Life Science* hub is expected.



Laser Valley leaflet, 2015

The entire electric infrastructure and the developments will be oriented towards *microgrid* and *virtual power plant* approaches under the concept of "Positive Energy District".

Laser Valley leaflet, 2015

There will be important investments in the public transport system, both those already announced by the Ministry of Transport - to ensure mobility with urban trains within the territory and to the Laser Valley area - and the investments provided by the Ilfov County Development Strategy 2020-2030 and by the integrated urban mobility plan for Bucharest and Ilfov.

Besides public transport, there will be pedestrian lanes and bicycle lanes, a shared eco-cars system to ensure mobility between educational and scientific facilities, science, innovation and entrepreneurship areas, business and commercial areas, the Măgurele city centre, the Mihăileşti lake and the 1 Decembrie Port, and green recreation areas - *the future city of science*.

THE SMALL CITY OF BIG SCIENCE

A sustainable urban environment

Măgurele offers a unique geographic location for an urban area situated at the intersection of - the economcally, socially and culturally vibrant - Bucharest, Măgurele - the small city of big science, with its hub of talents and research infrastructures and with its entrepreneurial and rapid ptototyping space, a true FabCity - and the exceptional natural capital of the neighbouring areas - from the Mihăileşti Lake to the 1 Decembrie Port, the Neajlov Delta and Argedava, with its lowland forests and rivers, near the Danube.

Since science is at home here, and since it provides a starting point, the development of Măgurele focuses on creating a sustainable urban environment, as part of the smart and sustainable territorial development - Laser Valley. Starting from a new *science driven* approach, Măgurele may play an important role, even become the leader in promoting innovation in the fields of environmental technologies and sustainable development.

The construction of ELI-NP in Măgurele already includes an energy efficiency solution, unique in size and in terms of its technological approach.

A next step, essential for Măgurele as a Positive Energy District, could be to impose energy efficiency and smart infrastructure solutions for all the urban developments: from smart-grids to communications, resource management, waste collection and recycling, to connectivity - Smart City solutions.

This type of development entails special dynamics and raises a challenge for both those directly involved and those who look from the outside. The new solutions validated here may influence the future development of other localities as well.

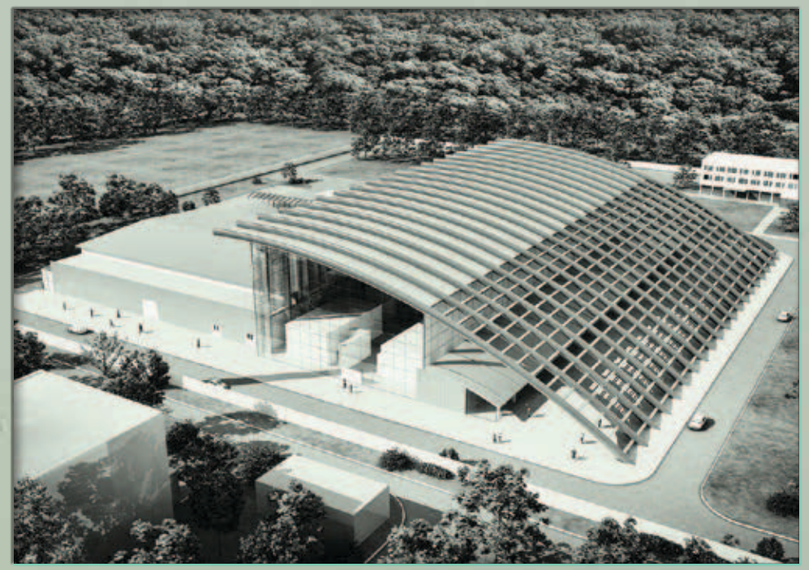
An inspired, coordinated *open* approach may turn this area into an example of smart territorial development for the entire region between Bucharest and the Danube River - as city of science, inspiration and entrepreneurship, as a vibrant living environment, as *valley of the lasers*.

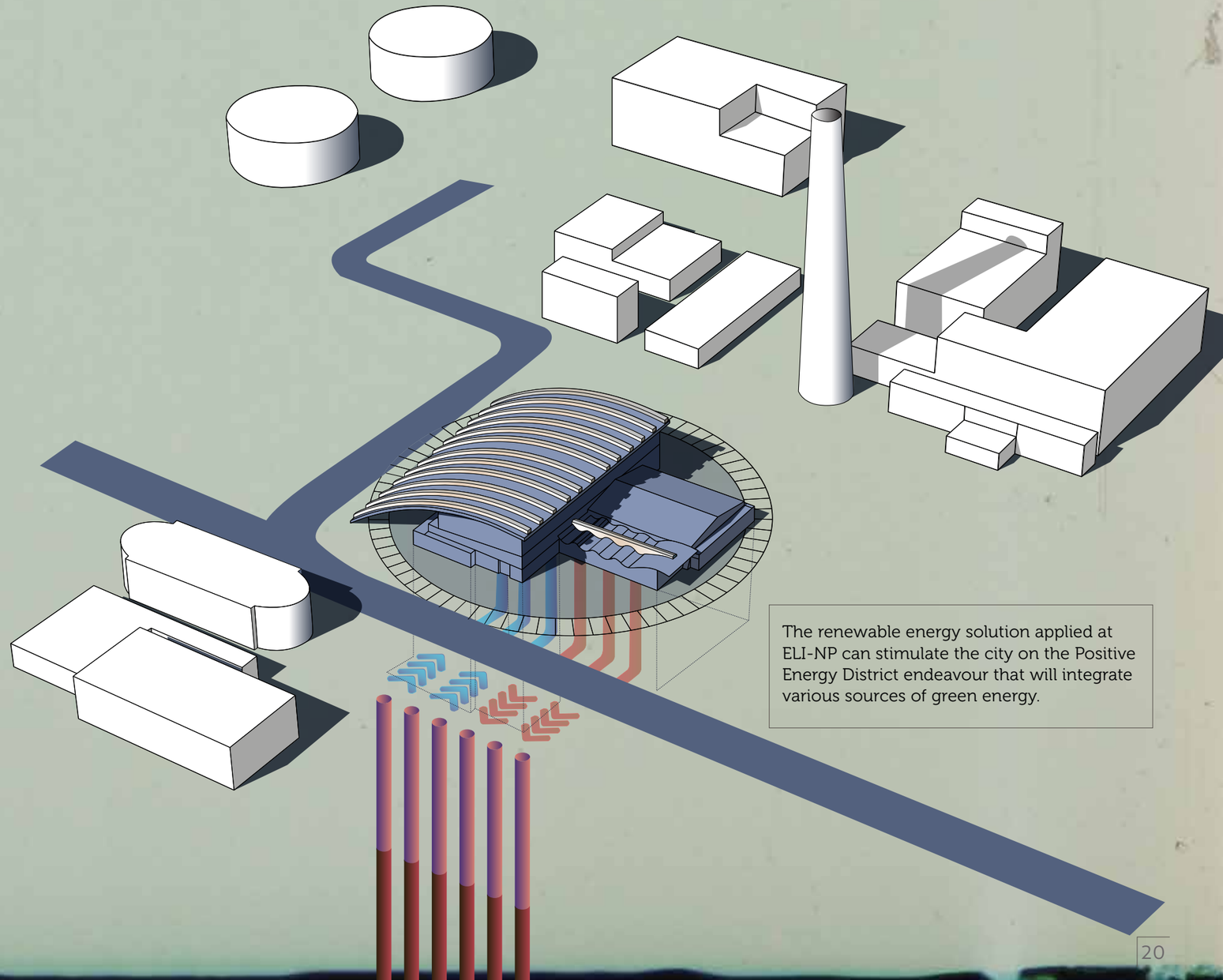
A unique geography for an urban area situated at the intersection of Bucharest, the research infrastructure in Măgurele and the exceptional natural capital of the neighbouring areas

Green and digital become the universal options for development.

Energy efficiency and smart infrastructure

The laser in Măgurele is hosted by an ecological building, currently the largest building in Europe supplied with energy from unconventional sources - geothermal energy generated by 1,080 geothermal pits of 120 m depth each, covering an area of about 27,000 m^2. The borehole thermal energy storage (BTES) conditioning system used at the ELI-NP centre is an European first for such applications and ranks fourth worldwide.





The renewable energy solution applied at ELI-NP can stimulate the city on the Positive Energy District endeavour that will integrate various sources of green energy.

Reconstruction, urban regeneration and housing.
Măgurele Positive Energy District

The Laser Valley, Land of Lights concept envisages the urban regeneration of the city of Măgurele, the ELI-NP host and the heart of the territory, and its development as a *Smart Green City*, *Positive Energy District*.

Măgurele has been included in the list of the first 100 cities (from 20 Member States) that will be Positive Energy Districts in 2025.

//jpi-urbaneurope.eu/ped/

Laser Valley leaflet, 2015

A necessary action in the immediate future - for the operationalisation of "*Măgurele Positve Energy District*" and for ensuring the coherence of the developments in connection with the European Strategic Energy Technology Plan (SET Plan) - is to develop a substantiation study / plan for the urban reconstruction and regeneration of the city of Măgurele.

Railway ring

Areas of expansion and densification of the city centre

Development areas will be closely linked to the current city centre, in line with the 15-min. city principle. The eastern part of the Atomiștilor St. is the most suitable area for the first stage of expansion and urban densification.

Land readjustment

To foster new developments, the existing plots will be reconfigured. The new plots will have regular shapes and a variety of sizes, in order to encourage a wider range of developments. The local administration will play an active role in preparing the land to facilitate future investments.

Public space, pedestrian areas and quality green areas

The public space will be accessible to citizens of all ages, including people with disabilities, while the maintenance of the existing green areas and their expansion into the residential areas will significantly contribute to the quality of the public space.

New pedestrian-friendly car routes and alternative public transport

The expansion of the city center will encourage new investments within an integrated street network that will facilitate coherent traffic at the city level.

Smart grid & Smart Infrastructure

Area of urban densification

City centre buildings rehabilitation

Area of uban regeneration

Oteteleșanu Park planning

IFIN-HH

ELI-NP research centre

the future Science Park

Green axis between the centre and the science park

1

2

3

4

New iconic buildings

New building uses, with green and public spaces, will become architectural landmarks for the entire Laser Valley area. For these kinds of projects, the local administration will foster architectural and urban planning national and international competitions.

Area that requires ecological reconstruction: Ciorogârla and Sabar

Ring Highway (A0)

Overhauled existing buildings

The rehabilitation of existing buildings and the new inserts will fit into the *Near Zero Energy Building Policy* (promoted at the European level since 2021). under the integrated framework of *Positive Energy District*.

Smart and sustainable solutions

All new interventions will be based on smart infrastructure and microgrid and will address the concepts of *prosumer*, *virtual power plant* and *green mobility*. The entire territory will become a platform for research and innovation in green energy and energy efficiency.

The regeneration of the city will implement two essential principles: *Smart Infrastructure* and *Positive Energy District*. The urban interventions will therefore explore the development lines proposed at European level by the SET Plan and the European Green Deal.

PED districts will be those areas capable to generate more renewable energy than they consume, which will entail low-consumption urban infrastructure and high-efficiency constructions, industry and transport. Specifically, PED will cover the entire energy process, from generation and storage to consumption, replacing the consumer with the *prosumer*. In other words, PED will govern both the way in which the residential neighborhoods are built and the planning of their energy infrastructure, using microgrids and virtual power plants capable to increase the resilience and flexibility of the districts.

The smart solutions for energy, mobility, and ITC in the city will be integrated with innovative business models, which will serve as pilot projects for Europe. These synergic actions will transform Măgurele into an experimental platform in which citizen participation will become factors of improving the lifestyle and developing the local economy.

The territory will become a testing platform for the innovative energy technologies of the future (production, storage and distribution) and for smart newtorks of IoT sensors.

This way, the development will support establishing new innovation-intensive businesses which will stimulate entrepreneurship and will provide the conditions for technology and innovation clusters.

The city centre has a significant potential for development to the north and east.

The expansion of the Măgurele city centre through the modernisation of the campus, new community facilities in the residential areas, and the transformation of the area east of Atomiștilor St. into a mixed housing-services area will significantly increase the attractiveness of the city. In the central area, buildings with historic and architectural value such as the Oteteleșanu mansion, and buildings with urban value such as the research institutes, will be rehabilitated and used at their true value.

source: Development Strategy for the Măgurele Area, 2020, WB

Top research applications which will improve community life

The city of Măgurele hosts, besides the ELI-NP centre, other six research institutes and the Faculty of Physics of the University of Bucharest, active in the fields of *physics and nuclear engineering*, *lasers*, *plasma and radiation*, *space sciences* and *material physics*.

The uniqueness and wealth of resources offer the conditions for *basic research* (atomic nucleus, astrophysics, quantum electrodynamics) and for *strategic basic research* in *security and terrorism prevention* (research on special materials of strategic interest, ionising radiation imaging), *ecology and environment protection* (research on new methods for waste diagnosis and management), *materials enrineering* (the effects of intense radiation fields on matter), *nuclear medicine and life sciences* (using accelerated particles beams in hadrontherapy and new medical imaging techniques), *radiopharmaceuticals* (new types of radioisotopes) and *high tech industry* (advanced optics and photonics, artificial intelligence, and quantum computing and computers).

with the contribution of UAUIM

with the contribution of UAUIM

The use of scientific applications and technologies developed here, in the research centres and by companies, will lead to an improved quality of life.

Scientific applications from medicine, scalable and adapted to individual and community needs, will lead to the provision of high quality medical services, using innovative technologies.

Laser Valley leaflet, 2015

Looking at the Laser Valley territory, with the technological concentration in Măgurele, the cluster of universities in Bucharest, the array of research infrastructures and innovative firms, and considering the current challenges in the health field, there is the obvious need to concentrate resources on a set of strategic areas for Romania.

Therefore, a part of Laser Valley could be an integrated *Health & Life Science* hub in Mogoșoaia, with:

"Regional Platform for Multidisciplinary Diagnosis and Advanced Therapies in Personalised Medicine",
"Genetics" Platform,
"Blood" Platform.

Laser Valley leaflet, 2015

A VIBRANT ENVIRONMENT, A DIVERSITY OF OPTIONS

Science, education, creativity, innovation and entrepreneurship

The Laser Valley, Land of Lights concept, with the urban hub Măgurele as core pole, is about creating an interconnected ecosystem of science, innovation and entrepreneurship focusing on the symbiosis man-nature-technology. The natural background is the main element in connecting the prevailing functions (work, education, housing, culture, sports-recreation), in the development of a vibrant, creative and innovative community and in providing high quality of life, for the new international community of researchers, engineers, and students, for the business community and also for the local community.

From an architectural and urban perspective, the central area of Măgurele is dominated by the seven national research institutes and by the Faculty of Physics of the University of Bucharest. The future development will have to take into consideration both the urban regeneration of the area, and possible developments of the education, research and experiment public facilities.

ELI-NP and its future developments, in terms of both scientific facilities and technological applications, is an area marked by the forest ring; the Science Park, and all its related developments, will generate a new node in this design.

It is likely that this science, education, innovation and entrepreneurship axis will generate spectacular developments both in Ilfov and in the southern part of Bucharest.

The science park will naturally integrate a facility and will stimulate the creation of a cluster of firms in *cyber security*. Of course, Bucharest's universities will be interested in locating their own facilities in this area dense with skills and resources. Many will be willing to capitalise on the diversity of the scientific, business and entrepreneurial environment, and this density and proximity will radiate development and encourage cooperation, including cross-border links with Bulgaria.

What is the ideal location for Science Village, an area of experiments and education for children, close to the miracle of extreme lights and to the hub of research facilities waiting to be visited and to inspire, close to, and integrated by nature?

what will they visit, where will they camp, and how will creativity camps be integrated?

Laser Valley leaflet, 2015

Education through science will contribute to the development of social values of responsible citizens and will encourage scientific careers.

Integrated immersive technologies - XR technologies will provide the perfect background for creativity, education and cooperation.

Laser Valley leaflet, 2015

Students will have acces to education, research and experiment facilities and to creative public spaces; they will nurture their ideas in accelerators and tech hubs and they will validate them in FabLab facilities.

Laser Valley leaflet, 2015

City of science, inspiration and entrepreneurship, a vibrant living environment in Laser Valley

with the contribution of UAUIM

The involvement of the citizens, of the Laser Valley community in co-design sessions using augmented reality will turn the public space into a meeting place for the present with future's ideas, for locals with people from all over the world.
The beauty of nature, the uniqueness of the extreme lights and the cosmopolitan place will be enough for a festival of lasers, music, design, holograms and creativity.

gardening is everywhere

In Măgurele, the urban gardens are places in which healthy food grows and where people reconnect with nature.
They are also meeting and experiment spaces for the new ideas and shapes of the city; images of alternative social models, shaping answers to the following questions: how can the intercultural dialogue be encouraged?, how does participation and *meaningful employment* look like in postmodern cities?, what is responsible food production and consumption and what is the future of sustainable food?

Măgurele, FabCity, is also about experiments in urban gardening, about innovation and social entrepreneurship, about the green of the garden - until now exiled outside the borders of the city - returned to the center and seeking answers to sustainable food and responsible use of resources - "food loss and waste reduction", target 12.3 of the UN 2030 Agenda.

LASER VALLEY STRATEGIC PROJECTS

WHAT IF…?

STRATEGIC PROJECTS
of the moment

This endeavour is about:

- *capitalising on the scientific and technological uniqueness of the ELI-NP pan-European infrastructure,*
- *capitalising on the scientific, technological and talent hub already existing in Măgurele,*
- *capitalising on the geographic location, south of Bucharest and close to the Danube River,*
- *achieving the ELI-NP's potential for knowledge & economic spillovers, discussed by the World Bank in 2018,*
- *capitalising on the moment - the PNRR funding opportunities in synergy with the European funds and addressing the resilience challenges.*

To this end, the projects described here are parts of a first potential wave of interventions in the Valley of the lasers. They are designed to address all the challenges above, under the logic of the Laser Valley, Land of Lights vision and are, in fact, natural extensions of the existing infrastructure.

"*Măgurele Science Park*" will facilitate *knowledge* and *economic spillovers* of ELI-NP and covers a key area of *outreach* in and for the business sector; it is about community - tech hub, entrepreneurship and startup, rapid prototyping and FabLab, and about children and science in real world and in XR reality; it is the project with the highest maturity level, and to start the construction of the facilities would be essential for achieving the strategic objectives, for predictability and for harmonizing the Laser Valley interventions.

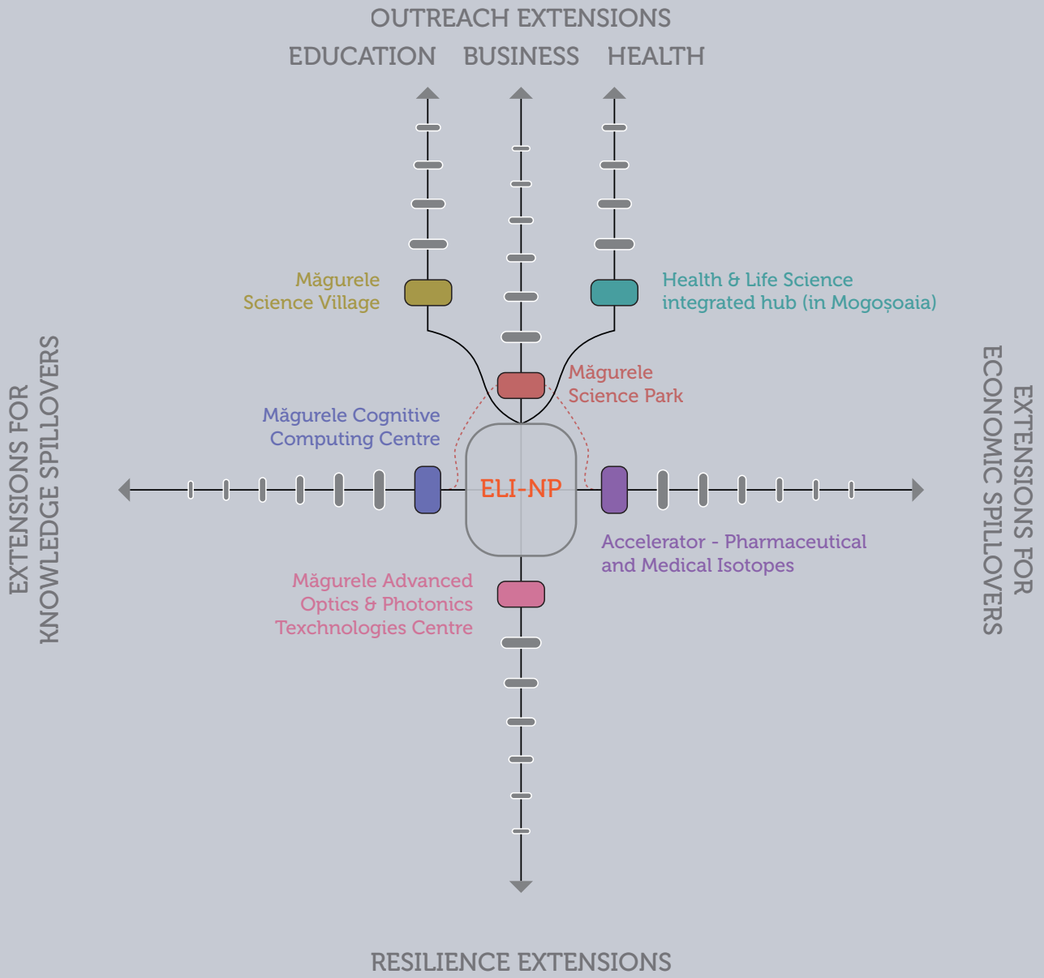
"*Măgurele Cognitive Computing Centre*" is a major opportunity of *knowledge spillover* of ELI-NP and can transform Romania into a regional research & innovation hub in the field - artificial intelligence, human intelligence, together.

A particle accelerator for the production of pharmaceutical and medical istotopes is, in connection with the ELI-NP infrastructure, the first instance of *economic spillovers*, with strategic importance for Romania, but also for Eastern Europe.

"*Măgurele Advanced Optics & Photonics Centre*" will increase Romania's economic resilience, covering a field critical for the sustainable operation of the ELI-NP infrastructure.

"*Măgurele Science Village*" is the *outreach* intervention in education, with transformational potential.

A *Health & Life Science Hub in Mogoșoaia* is the element of *outreach* in health and meets the need of transformation linked to the current crisis.



outreach - business; knowledge & economic spillovers: *Măgurele Science Park*
knowledge spillovers: *Măgurele Cognitive Computing Centre*
economic spillovers: *Accelerator - Pharmaceutical and Medical Isotopes*
resilience: *Măgurele Advanced Optics & Photonics Technologies Centre*
outreach - education: *Măgurele Science Village*
outreach - health: *Health & Life Science integrated hub* (in Mogoșoaia)

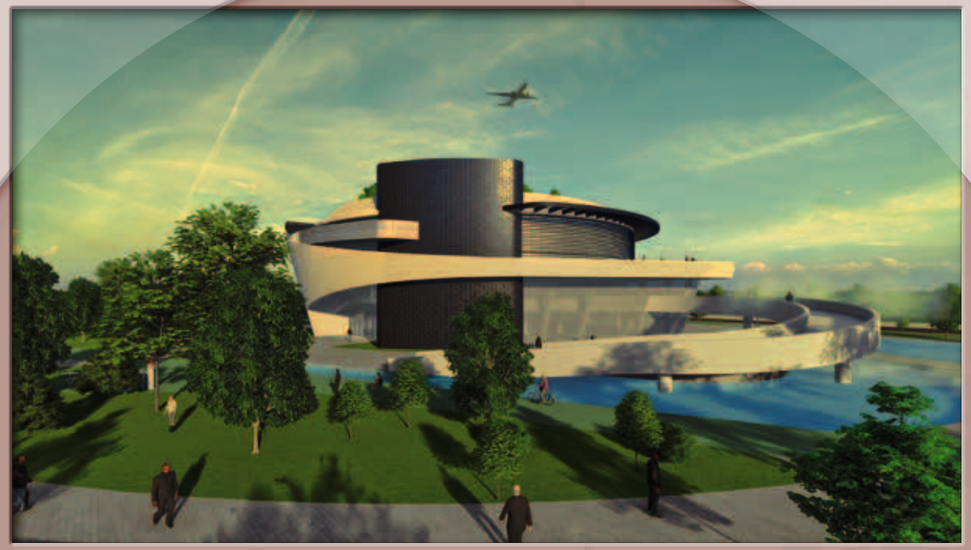
Măgurele Science Park

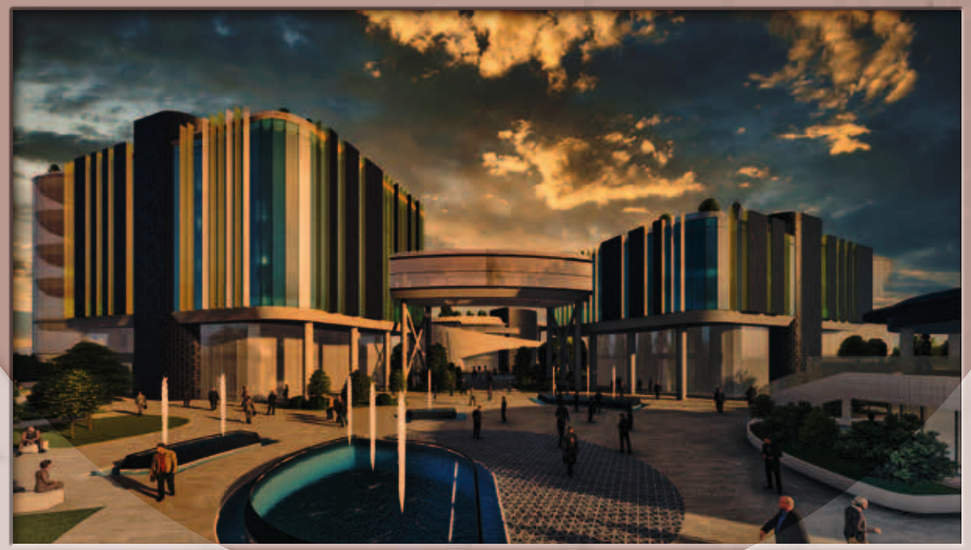
Măgurele Science Park is a state-of-the art investment project of international relevance, a place where the convergence of the academic and business communities will create an ecosystem favourable to the development of innovative institutions and companies. Here, research will blend with the conditions for a high quality of social life that will attract highly qualified human resources in the Laser Valley region.

The international companies, the R&D departments and institutes will benefit from key facilities, spaces and services clustered in a unique location. The Park will facilitate the contact with the world of science from the Măgurele Platform (9 research institutes and the UniBuc faculty of physics, ELI-NP and other 43 research infrastructures, over 1,000 researchers and 1,000 support staff) and the access to top scientific and technological knowledge.

The major facilities of Măgurele Science Park will be: business incubator, tech transfer hub, FabLab, co-working spaces and science village. Companies will be able to enjoy a modern infrastructure, with access to meeting and events facilities, and also support services such as administrative, secretariat, consultancy and business mentoring.

MSP, through its FabLab facility, will inspire and support the development of Măgurele as FabCity - which by 2054 will produce everything it consumes, alongside cities such as Paris, Barcelona, Amsterdam, Mexico City and Detroit under the global Fab City Network initiative: *locally productive, globally connected cities*. //fab.city/





Cognitive Computing Centre

The centre will have a regional dimension within the EU and will connect to the European initiatives of digital transformation and to the efforts of the European Commission in the field of High Performance Computing.

Will be focused on the development of advanced technologies, new computational solutions and new skills, and also the development of capacity to understand experiment data (processing, storage, and numerical simulations of extreme complexity): from ELI-NP, from CERN, from Danubius, but also the data regarding the impact of climate change in Romania.

Will favour the development and testing of innovative models for integrating blockchain technologies with cognitive computing algorithms in IoT spaces, with public, industrial and commercial applications. Va facilita identificarea riscurilor de securitate cu ajutorul inteligenței artificiale și Big Data. Will facilitate the development of experimental technologies in quantum computing, of new artificial intelligence algorithms, parallel calculus and software robots.

This capacity will be built by taking advantage of the existing skills in Romania, in fields such as ICTs, artificial intelligence and cybersecurity.

The research infrastructure needs and data access flows for the Măgurele Platform and within the entire ESFRI strategic ecosystem will be established in an international dialogue; "Scientific Data Processing and Computing White Book" will be published.

Romania could become a regional research & innovation hub in cognitive computing, artificial intelligence, and cybersecurity, with experimental capacities in quantum computing.

The knowledge and technologies developed here will be able to generate paradigm shifts in sectoral organisation and functioning.

Accelerator - pharma and medical isotopes

The Isotopes used in medicine are a key strategic asset at the European level.

However, over the past 15 years, the global production of these radioisotopes has been extremely vulnerable. Symbolic for the systemic problem - the isotope Technetium-99m, the most widely used radioisotope for diagnosis (Europe is the second largest consumer, with over 20% of the global consumption) has a life span of only 6 hours, which generates issues with its transportation; even more problematic, it is produced in nuclear reactors built in the 1950s - 1960s, that reached the end of their operational period. Therefore, over the past years, the news describe spontaneous interruptions of its production and a potential crisis in key medical services across Europe. Meanwhile, the global radioisotope market for medicine amounts to 20 billion EUR, with high dynamics of the associated workforce - there are over 700,000 specialists in Europe alone.

Against the background of the current challenges regarding the sustainable production and the transportation of the isotopes, and with increasing economic and trading opportunities, the accelerator will be a key piece in achieving short-term economic spillovers of ELI-NP.

The accelerator's connection to ELI-NP will activate major experimental opportunities. Romania could become a strategic regional hub and a European benchmark for alternative approaches to the production of radioisotopes. Such a scientific and technological ecosystem will increase the relevance of ELI-NP as a top pan-European infrastructure and as a true landmark with huge economic impact in the medical field, as announced by ESFRI in 2012.

Will provide the connection between ELI-NP and the isotope production for pharma and medicine, with impact on the economic competitiveness of Romania as a strategic hub in the region.

Advanced Optics & Photonics Technologies Centre

Optics and photonics are the science and applications of light. They are essential to our modern life and economy, enabling high-tech manufacturing: from the production and inspection of integrated circuits in almost any electronic device, mobile phone screens, fiber-optic internet, solid-state lighting energy technologies (LED, OLED, PLED), advanced security features, to a variety of medical tools.

Research in optics and photonics generates deep technological applications that foster the industries of the future: they are critical components in aeronautics and in the autonomous vehicles industry; they are essential in data encryption and in the defense sector; in medicine, photonics represent approximatively 80% of the in-vitro diagnostic instruments market; photonic integrated circuits are faster than traditional electronics and consume considerably less energy, being a sustainable choice for the future.

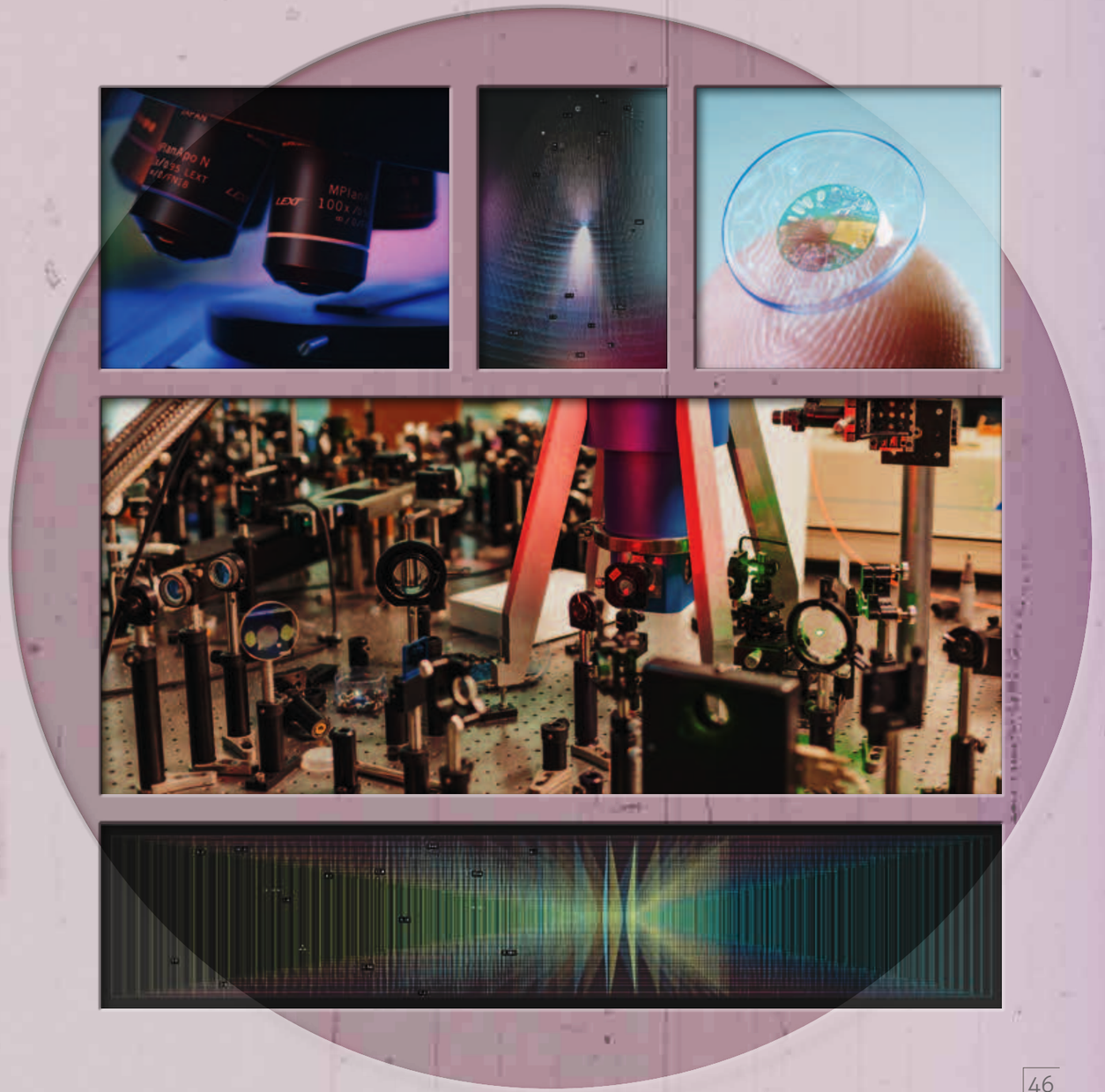
The European deep technology capability, which is essential for the future digital transformation of Europe, relies focusing the resources in optics and photonics, while the current dynamic is governed by the European Technology Platform Photonics21 and the scientific results in photonics and photonics-enabled sciences of the three top European, Nobel Prize-winning, researchers (Gérard Mourou - Physics, 2018; Stefan W. Hell - Chemistry, 2014; Theodor W. Hänsch - Physics, 2005).

In this context, the strategic activity of the centre - with added value for science, technology and economy - will be the production of mirrors and crystals and devices for advanced photonics.

The centre will develop strategic, industrial and medical applications.

The facility will be technologically connected to ELI-NP and CETAL.

Centrul va activa capabilități tehnologice consistente în ansamblul ELI-NP - CETAL și, prin aplicațiile strategice, industriale și pentru sănătate, va fi un pilon al rezilienței economiei românești.



Măgurele Science Village

Science Village will be a space for science camps, for educational events and solutions, will blend real-world interaction with virtual technologies and will operate not as a museum of science, but as an educational *living lab* - a space of experiment for learning. Education and technology for education will be at the proximity of the scientific and technological fronteer.

Living lab will accommodate the virtual presence of milions of children every year (a target of Science Village), the physical presence in the experiment facilities (essential for the personal development of the children) and will be a collaborative platform for interdisciplinary teams (for example, the physics, chemistry, biology and social sciences olympic teams).

Will be the space of XR, of the physical experiment and rapid prototyping.

The Science Village is the element that would transform education - with a major impact on the Romanian education reform and on the resilience capacity. It will be the "new normal" in education as an alternative to (traditional) education parks.

Living Lab will be the testing space for *gaming* solutions in education, which could consolidate a development programme for Romania in *gaming*.

Health & Life Science Hub

Regional Platform for Multidisciplinary Diagnosis and Advanced Therapies in Personalised Medicine

"Genetics" Platform

"Blood" Platform

A part of Laser Valley could be an integrated Health & Life Science hub in Mogoșoaia, with: (a) "Regional Platform for Multidisciplinary Diagnosis and Advanced Therapies in Personalised Medicine", (b) "Genetics" Platform, and (c) "Blood" Platform.

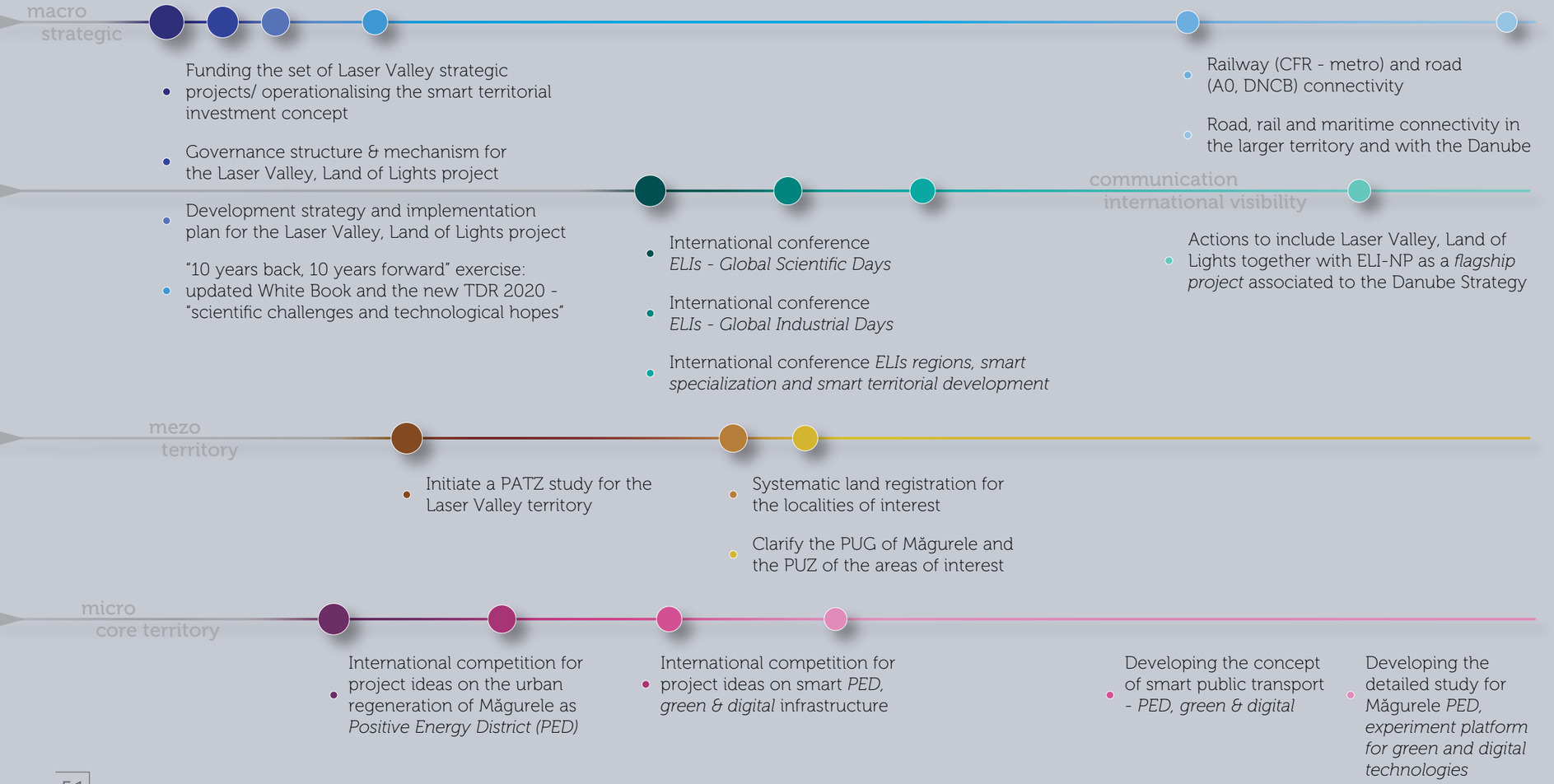
Looking at the Laser Valley territory, with the technological concentration in Măgurele, the cluster of universities in Bucharest, the array of research infrastructures and innovative firms, and considering the current health challenge, there is the obvious need to concentrate resources on a set of strategic areas for Romania, with a focus on: advanced and biodegradable sensors, nanomaterials and technologies, genomic sequencing, bioinformatics and data interoperability, personalized food, artificial intelligence covering the whole cycle of prevention, diagnosis and advanced treatment.

The integrated hub will be about interdisciplinarity and multidisciplinarity, about advanced therapies and about artificial intelligence, genome editing, microbiome, biocompatibility and bioprinting.

The integrated health & life science hub will be a space of interdisciplinarity, of research, technologies and innovation, which will increase the flexibility of the Romanian health system.

BEYOND 2016 2021

NECESSARY ACTIONS



The institutional dialogue to clarify the funding of the (most oportune in the context of the new PNRR) strategic projects is critical, as is the phasing of the interventions and the synergies with the structural funds for operationalising the concept of smart territorial development.

Laser Valley, Land of Lights is, in its form today, very close to becoming a reality.

Understanding the territory is also essential, in parallel with and complementary to the ongoing actions. All the Laser Valley, Land of Lights initiatives depend on a set of integrated territorial projects which, in turn, should be part of a clear and realistic legal, economic and social background. Therefore, the project's substantiation is closely related to the following actions: clarification of the land's situation following land registration actions; harmonisation of provision of various urban planning documentations which govern and regulate the development of the entire area, and streamiling the policies for smart territorial development. Some of these actions are already ongoing, but there is still a need for harmonising and orchestrating the developments.

Focusing on Măgurele as PED and as FabCity and on its green and digital transition - in the new European and global context with its targets and challenges - is of major strategic interest.

GOVERNANCE OF DEVELOPING LASER VALLEY, LAND OF LIGHTS

Considering the recommendations from the socio-economic impact study on ELI-NP developed by PwC in partnership with Aspen Institute Romania and in dialogue with international funding bodies - EIB, EBRD and WB, the conclusion is that a sound substantiation of joint decisions and actions for the development of Laser Valley, Land of Lights requires a governance mechanism, preferably an open coordination mechanism.

This mechanism should coordinate the development of the science, innovation and entrepreneurship ecosystem in Laser Valley, Land of Lights by:

- providing a public-public and public-private dialogue platform;
- providing the necessary institutional framework to prepare the strategy and implementation plan;
- substantiating a smart territorial intervention in Măgurele, around ELI-NP and the hub of facilities and talents, to contribute to the development of a knowledge region;
- coordinating communication and dialogue with the international funding institutions;
- periodically informing the Government, the Parliament, the local public administration, the business community, and the citizens.

Such an open coordination mechanism could be ensured, at least in the initial stage, by a High-Level Working Group (HLWG), assisted by a Technical Assistance / Project Management Team, located at the Government headquarters.

A possible proposal for the (initial) membership and operation of the HLWG would consider the coordination of the group at Prime Minister or Deputy Prime Minister level; the working group would be hosted by the Secretariat General of the Government, and have an executive leadership consisting in a High Representative of the Prime Minister. The initial membership of the HLWG should include representatives of the central and local administration (minister / secretary of state, president of county council / vice-president of county council, mayor / deputy mayor): the Chancellery of the Prime Minister, Ministry of Research, Innovation and Digitization, Ministry of Education, Ministry of European Projects and Investments, Ministry of Transport and Infrastructure, Ministry of Finance, Ministry of Economy, Entrepreneurship and Tourism, Ministry of Energy, Ministry of Regional Development and Public Administration, Ministry of Environment, Water and Forests, Ministry of Agriculture and Rural Development, Bucharest Municipality City Hall, Ilfov County Council, Giurgiu County Council, Măgurele City Hall, ELI-NP Project Director, National Agency for Cadastre and Land Registration. The group meetings may include expert professionals as guests.

Facilitated by

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Science
and Innovation Policies,
SNSPA, Bucharest, Romania

2010 ELI-NP White Book

The report – collecting the contributions of 172 top researchers worldwide - includes detailed descriptions of the scientific and technological background of the implementation and applications of the ELI-NP research infrastructure - within the ELI Pan-European infrastructure.

2011 KPMG Study "Research and innovation. A Romanian growth engine"

Integrating the discussions on ELI-NP at that moment, Măgurele is described as a "hotspot for science and business, a place where people will like to live and work". Various landmark projects are announced: a technological park for ICT and life sciences, a national institute of advanced studies, a concentration of universities (Politehnica of Bucharest, University of Bucharest and Carol Davila University of Medicine and Pharmacy).

ELI-NP is seen as "Romania's chance to be at the core of developments" - not just to own a unique European research infrastructure, but also to develop a high-tech and innovation cluster - "Măgurele the city of lights", by promoting public-private partnerships and by synergic use of national, European Cohesion and private funds.

2011 Foreign Investors Council ranks ELI-NP among the top 5 investments in Romania

FIC estimated in 2011, before the building of ELI-NP started, that the project might attract investments in amount of EUR 1 billion in the period 2012-2019 - and after completion it might attract additional investments, especially for the development of secondary facilities in the medical field.

FIC estimated that ELI-NP could generate on the medium term a GDP increase by 0.6% (and implicitly an increase by 0.5% of the state budget contributions) and 12,700 jobs.

2015 Technical Design Reports

This is the first coherent and comprehensive documentation of the future experiments at ELI-NP. There is a collection of 15 reports of almost 1000 pages to which over 100 researchers from all over the world contributed.

The reports were published at the beginning of 2016 in Romanian Reports in Physics.

2015 „Laser Valley, Land of Lights" vision

In 2015, UEFISCDI organised a participatory vision exercise for the smart territorial development model and the outcome of that consisted in the „Laser Valley - Land of Lights" concept, as well as in the main directions of development for the town of Măgurele and the neighbouring areas.

2016 The international urbanism competition for Laser Valley

"Ion Mincu" Architecture and Urbanism University and the Technical University of Civil Engineering in Bucharest jointly organised with the Ministry of Education an international competition of ideas illustrating the Laser Valley, Land of Lights vision for the year 2035.

2016 Commemorative postage stamps by Romfilatelia

The postage stamp issue "Beyond the Knowledge Frontier, Laser Valley - Land of Lights" commemorates the recent scientific and technological history which makes us confident that we have the creativity and the power to achieve great projects.

2016 Laser Valley, Land of Lights: from vision to action

2016 has been a year of exploration and determination to act, for that this *land of of lights* to start becoming reality.

The leaflet published at the end of the year reflected all the previous outputs, especially the activity of the working groups created following the recommendations of the impact study developed by PricewaterhouseCoopers and the discussions with Aspen Institute Romania.

These thematic groups brought together representatives from 32 de organisations involved in the Laser Valley project: Romanian Government - through 9 ministries, central and local authorities from Măgurele, Ilfov and Bucharest, universities, international financial institutions and important players from the Romanian business sector and civil society. This orchestrated effort has led to the identification of the challenges and actions needed for the development and operationalisation of the smart territorial development concept „Laser Valley, Land of Lights".

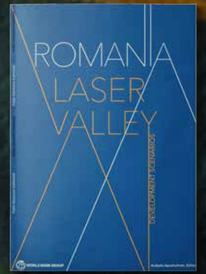
HISTORY INITIATIVES CONTINUITY

2018

World Bank report „Romania. Laser Valley: Development Scenarios"

Following the collaboration in 2016, the World Bank published a complex study on the factors and development lines of the Laser Valley ecosystem, vuilding potential internvention scenarios.

The report is substantiating a possible integrated territorial intervention (ITI) as being the most suitable instrument for orchestrating the efforts to develop Laser Valley, Land of Lights.



2016

Socio-economic impact study on ELI-NP

PricewaterhouseCoopers developed the "Socio-economic impact study on ELI-NP", which highlights the main development axes of the Laser Valley, Land of Lights ecosystem: technological development, academic-scientific development and social development.

The study analyses international practices, the situation of the host territory and connectivity, the Romanian legal and strategic background, proposes a set of actions for the development of Laser Valley, and emphasizes the importance of having a governance mechanism in place.

Estimated socio-economic impact of ELI-NP:

- more than 12,000 jobs
- EUR 1.26 billion annual turnover
- EUR 500 million contribution to GDP
- EUR 120 million additional tax revenue