Laser Valley - Land of Lights

Impact Study Results

Privat and Confidential
14 October 2016

The analysed case studies revealed a series of services and facilities that can be applicable for Laser Valley

	Case Studies	Services and Facilities Applicable for Laser Valley
1 **Technological Development**	• **Sophia Antipolis** France; wide array of high-tech sectors; 1,400 companies, 8 universities; • **Illinois Science Park**, USA; pharmaceutical sector; 18 companies, 6 schools of medicine • **Tehnopol Park**, Estonia; wide array of high-tech sectors; 200 de companies, 1 university • **Liberty Technology Park** Cluj, Romania; IT/software sector; 26 companies	• **Business incubator-** services that help firms achieve their potential, encourage growth, and stimulate knowledge and technology transfer • **Spaces for rent-** for conferences, workshops, training sessions; Flexible real estate offers – from business parks to independent HQs to greenfield spaces – to help ease relocation of R&D activities to the cluster • **Start-up accelerators** - Support functions for newly-formed companies. Includes co-working spaces, consulting in a variety of sectors, access to financing, access to R&D infrastructure
2 **Scientific and Academic Development**	• **Liege Science Park**, Belgium; wide array of high-tech sectors; 85 companies, 1 university, 17,000 students • **Softwarepark Hagenberg**, Austria; IT/software sector; 95 companies, 2 universities; 2,000 students • **Berlin Aldershof**, Germany; wide array of high-tech sectors; 1,013 companies, 1 university, 7,000 students	• **Education (university level and above)** - Academic and research community with opportunities for education through science – courses, training, workshops, etc. • **Technology transfer center -** Helps make innovations and new technologies developed in the cluster easily accessible for all cluster's members • **Shared research facilities** –Laboratories, prototype construction workshops, expert consulting services – for shared use by cluster members from any sector
3 **Social Development**	• **Espoo Innovation Garden**, Finland; wide array of high-tech sectors; over 1,000 companies, 2 universities • **Technopole Chateau-Gombert**, France; astrophysics, mechanics, energy sectors; 210 companies, 7 universities	• **Multifunctional center**– Centre for interaction and social activities, athletic and entertainment activities, and networking • **Housing units**– hotels, residential projects. dorms • **High efficiency public transport**– investments in new energy efficient or electric public transport • **"Green" environment**– air purification, investment in construction of green spaces

Source: PwC analysis, parks' website

Route des Lasers is one of the most relevant case study developed under the French cluster model which supports collaboration between main actors and geographic concentration to optimize innovation

Description of Routes des Laser project from Bordeaux

BORDEAUX Route des Lasers THE PLACE TO BE

Development Method

Development catalyst:
- The cluster was created to accelerate innovation and economic development around the Megajoule Laser, a long-term research project financed by the French Government

Governance:
- Governance Association with public and private participation

Investment/Funding:
- Initial investment of over **1 mld EUR**

Impact

Companies:
- **117** private firms
- **28** start-ups created in the cluster

Universities:
- 3 universities on-site
- ~15.000 students

Economic impact:
- Over **10.000** jobs created
- Total estimated impact of EUR 3 bil.

Map of French clusters
(April 2016, competitivite.gouv.fr)

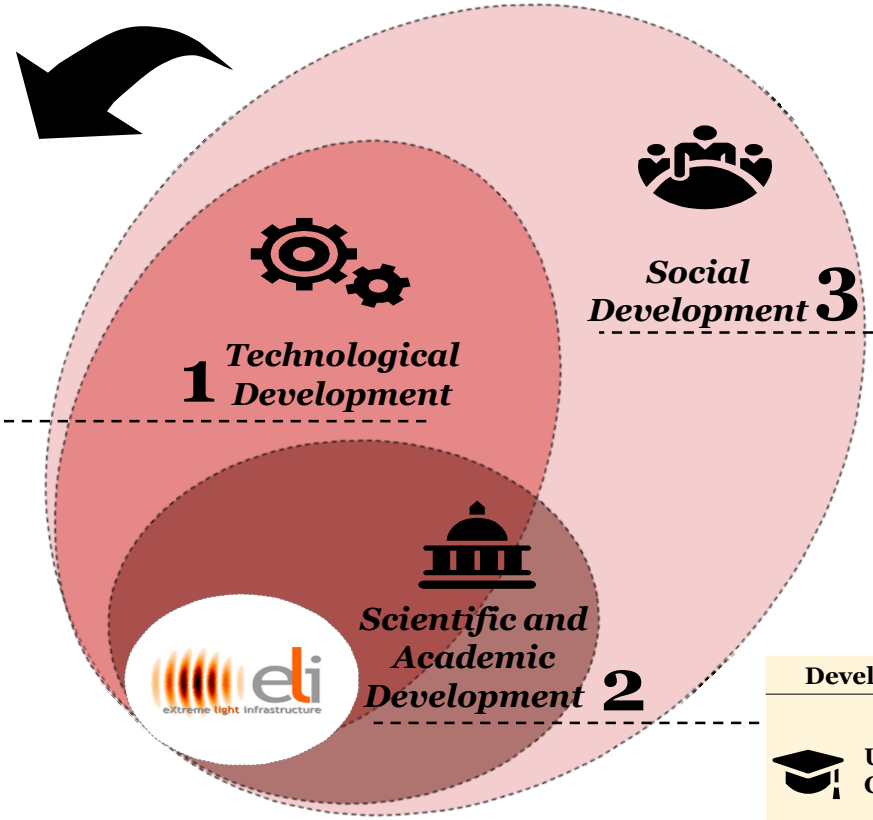
Route des Lasers in Bordeaux is the most relevant case study

- French policies that support cluster development were formulated in 2001-2002 by CIADT and DATAR with the aim of promoting an homogenous territorial development by forming regional "excellence centers" in technological development
- This strategy is currently in Phase 3 (2013-2014) and there were over 6 bln. EUR invested directly into clusters so far

Source: competitivite.gouv.fr, CIADT, websites of national institutions (CNRS, Min. Defense), European Commission reports
DATAR – Interministerial delegation for territory management, CNRS – National institute of research

A series of potential development areas were identified for each key strategic direction

Strategic directions and key development areas



Development areas	Timeline
Office buildings for Research and Development	
Filed to attract multinationals	
Business Incubator and Projects Accelerator	

Development areas	Timeline
Residential Projects	
Hotel	
Multi-functional Center	
Parks and green area	

Development areas	Timeline
University Campus	
Technology Transfer Center	

Short term (1-12 months) | Medium term (1-3 years) | Long term (3+ years)

Source: PwC analysis

Note: the infrastructure development was not taken into account when estimating the economic impact and total investment required

The development areas of the key dimensions could result in over 6,000 new employees and a combined annual turnover of over 600 mln EUR

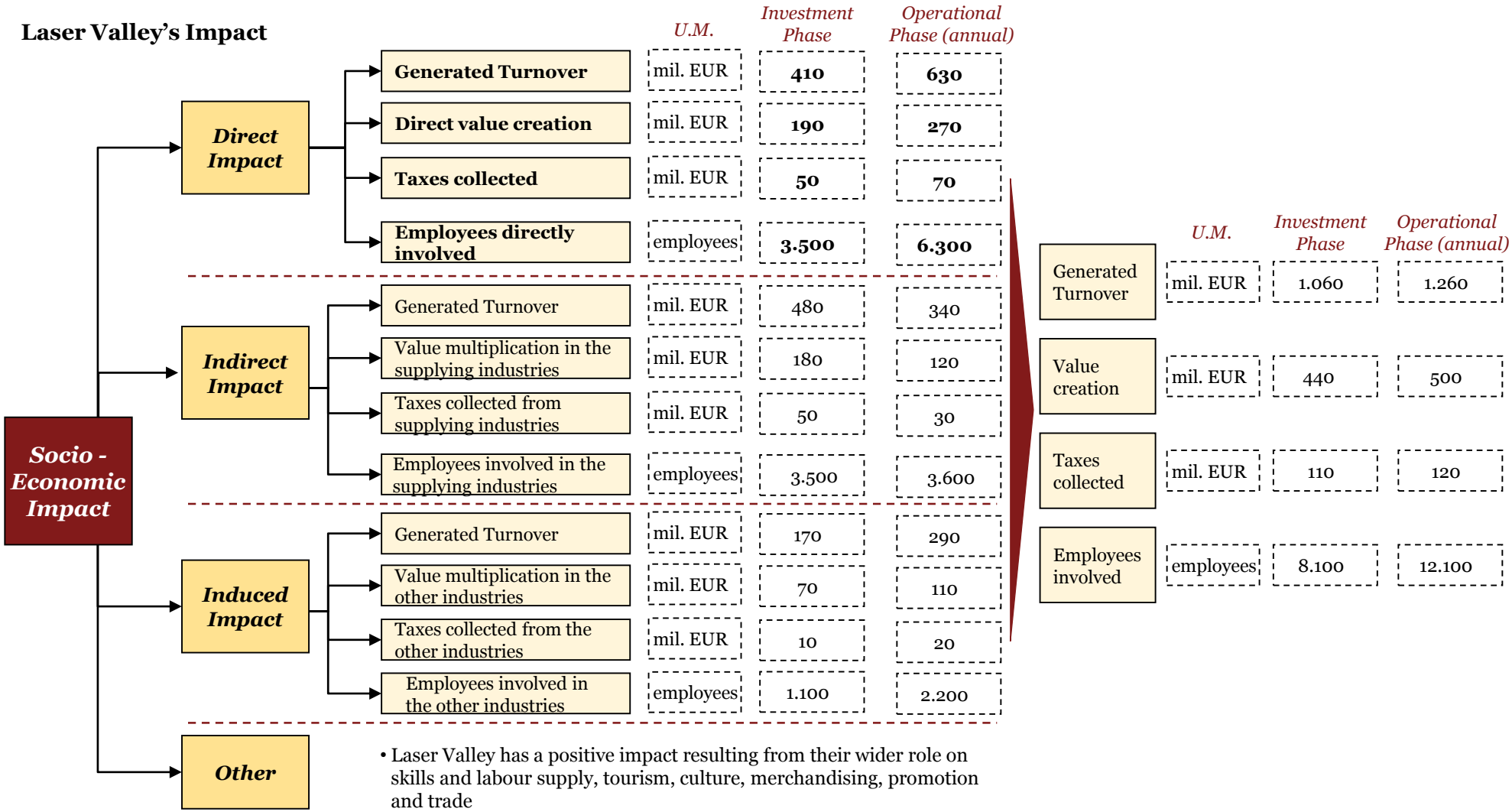
Strategic directions	Key development areas	Key Dimensions				
		No. of Companies (#)	Built surface (m^2)	Average employees/ company (#)	Annual turnover (thd EUR)	Total Investment (thd EUR)
Technological Development	**Business incubator and projects accelerator**					
	Start-ups	23-27	1,000-1,500	7-10	13,000 - 15,000	2,000 - 2,500
	Small and medium size companies	20-30	8,000-9,000	35-40	55,000 - 65,000	21,000 - 23,000
	Office buildings for research and development companies					
	Companies from a variety of industries	20-25	26,000-28,000	90-100	240,000 - 255,000	107,000 - 115,000
	Field to attract multinationals					
	Multinationals	7-8	17,000-18,000	200-220	240,000 - 252,200	125,000 - 135,000
Scientific and Academic Development	**University campus**					
	University center for Research and development		2,000-2500	40-50	700 - 900	5,000 - 5,500
	Student housing		10,000-11,000	10-12	700 - 900	5,000 - 6,000
	Center for technology transfer		8,000-9,000	60-65	3,000 - 4,000	18,000 - 19,000
Social Development	**Housing and accommodation**					
	Residential projects		45,000-47,000	10-12	29,000 - 36,000	54,000 - 58,000
	Hotel		5,000-6,000	70-80	4,000 - 5,000	8,000 - 9,000
	Multifunctional Center		30,000-31,000	950-1,000	14,600 - 16,000	53,900 - 56,900
	Parks and green spaces		53,000-57,000	10-12	10	100
	TOTAL	**70-90**	**205,000 – 220,000**	**6,000-6,500**	**600,000 - 650,000**	**400,000 - 430,000**

Source: PwC estimates and analysis

Note: the infrastructure development was not taken into account when estimating the economic impact and total investment required

Investments in Laser Valley could generate an annual contribution of around ~ 500 million EUR to the Romanian GDP, ~ 120 mln EUR to the state budget and could create ~12,000 new jobs

Laser Valley's Impact



- Laser Valley has a positive impact resulting from their wider role on skills and labour supply, tourism, culture, merchandising, promotion and trade

Source: PwC estimates and analysis

Note: the infrastructure development was not taken into account when estimating the economic impact and total investment required

The conditions required to successfully implement the Laser Valley project are multi-dimensional

1

Land

- Availability
- Forms of ownership
- Integrated plan / land clarifications

2

Infrastructure/ Connectivity

- Public transportation access
- Multimodal transport hub
- Smart infrastructure

3

Funding sources

- Public and private sources of funding
- European Funds
- IFIs
- State-aid/incentive schemes for private sector

4

Governance

- Governance Association
- Local Development Agency

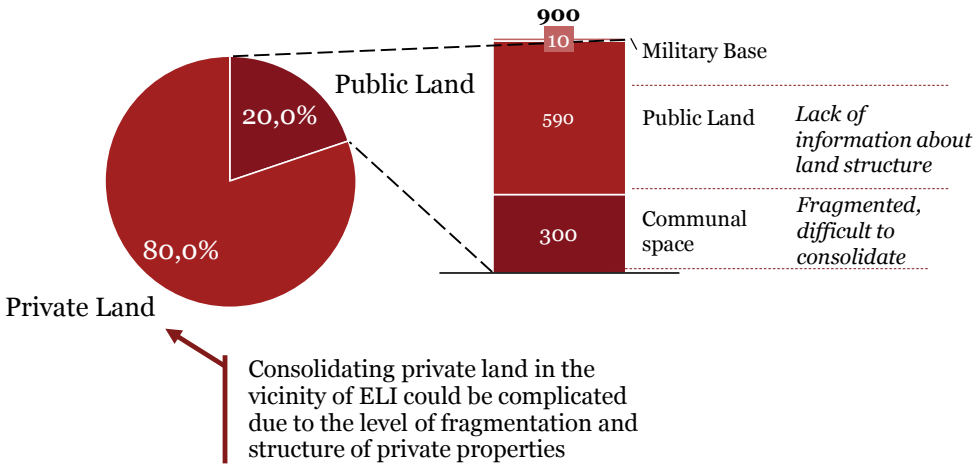
Source: Case studies, PwC analysis

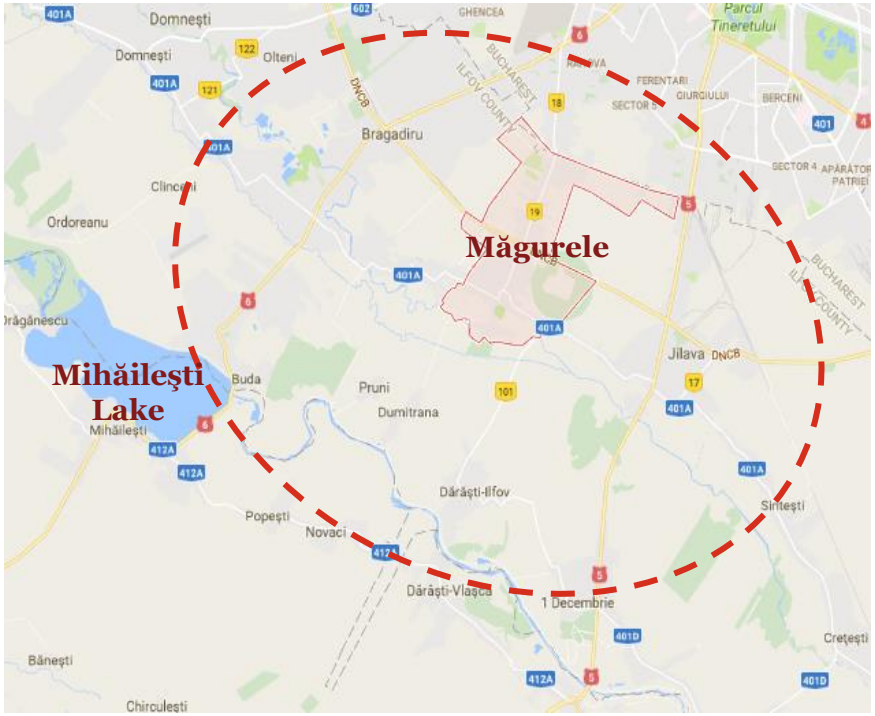
The diverse forms of land ownership in Magurele call for an urban master plan to enable the development of Laser Valley

Magurele Area

- While the land surface in Magurele has ~ 4,500 ha, the proximity area that could be explored for the Laser Valley project covers over 20,000 ha

Magurele land area *(4.500 ha total, 2016)*





Concluzie

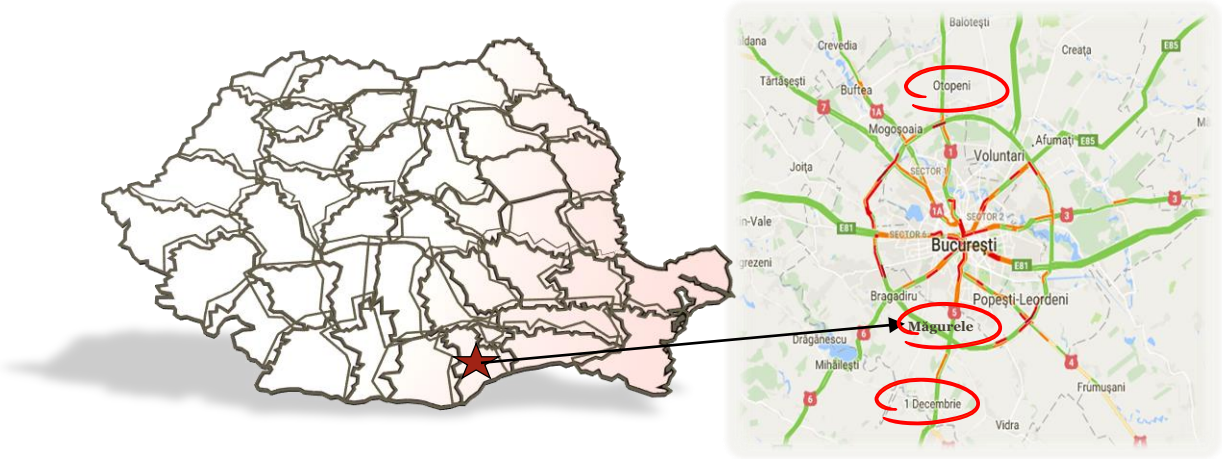
The land in Magurele area has **diverse forms of ownerships** and is located in the middle of a complex urban environment. These factors demand:

- A high level of **coordination between the governance structure and public authorities** in order to consolidate land parcels and develop them in a coherent fashion
- An **urban master plan for the project** that will be integrated into formal metropolitan urban planning (PUG)
- **Consolidating relevant land plots** (public, private, etc.) into the ownership of the dedicated Local Development Agency

Source: Magurele City Hall, PwC analysis
ELI-NP – Extreme Light Infrastructure – Nuclear Physics; PUG – Plan Urbanistic General

Ensuring easy access to Magurele is essential for the development of Laser Valley into a competitive cluster

Geographic location and accessibility



Location and Distances

- Ilfov County, Romania
- 11.5 km from Bucharest city centre
- 26.9 km from Henri Coanda International Airport
- 9.9 km from 1 Decembrie Port

Accessibility

- Can be accessed via a single direct road connected to Bucharest, either with a personal vehicle or public transport

Infrastructure –options for the future

Timeline

Development Areas

- A shared project between Bucharest City Hall and Magurele City Hall could offer solutions to the low frequency of public transport arrivals – agreeing on transport licenses that are necessary for increasing volume of vehicles on the Bucharest-Magurele route

- Finalizing work on Bucharest beltway road
- Reconditioning Bucharest's railroad beltway, which could connect Magurele directly to the airport
- Other connections to Bucharest

- Building an airport to the South of Bucharest
- Creating a modern **Giurgiu – Bucharest connection** (EU Danube Strategy)

Short term (1-12 months) | Medium term (1-3 years) | Long term (3+ years)

Source: PwC consultations, regional, national, and European strategies, PwC analysis

Laser Valley can benefit from the synergies between the national and regional funding sources

Key Laser Valley relevant investment priorities		Potential Beneficiars
POC - Axis 1: Research, Technological Development and Innovation to support economic competitiveness and business development		
Promoting investments in R&I, developing links and synergies between businesses, research and development centers and higher education	Supports technological and applied research activities, particularly in key enabling technologies (including diffusion of general purpose technologies) ***Categories of eligible projects:*** • Developing **networks of centers of Research & Development**, nationally coordinated and linked with European and international networks of researchers and providing access to scientific publications and databases • Creating synergies with research, development and innovation (RDI) **program Horizon 2020** * of the European Union and other international RDI programs	• Companies with R&D activity filed (prioritized fields being technology information, eco-nano-technologies, advanced materials and health) • Innovation clusters • Institutions for higher education and public R&D institutions
Improving research infrastructure and innovation (RDI) and capacities to develop excellence in R&I and promoting centers of competence	Supports interactions between higher education institutions, R&D institutions and business environment ***Categories of eligible projects:*** • RDI projects undertaken by **individual companies** or in **partnership with R&D institutes and universities** for innovation of processes and products in sectors showing growth potential • **Knowledge Transfer Partnerships**	• Innovative companies with maximum 3 years of experience (start-up and spin-off) • Institutions for higher education and public R&D institutions
***ORIZONT 2020 program**	The largest research and innovation program ever undertaken by the EU with available funding of ~80 bln. EUR over a 7 year period (2014-2020) ***Categories of eligible projects:*** • **Projects that promote scientific excellence**, facilitating collaboration between public and private sectors to provide innovative solutions	• SMEs with high potential for innovation (either a single SME or a consortium of SMEs established in an EU country or a country associated)

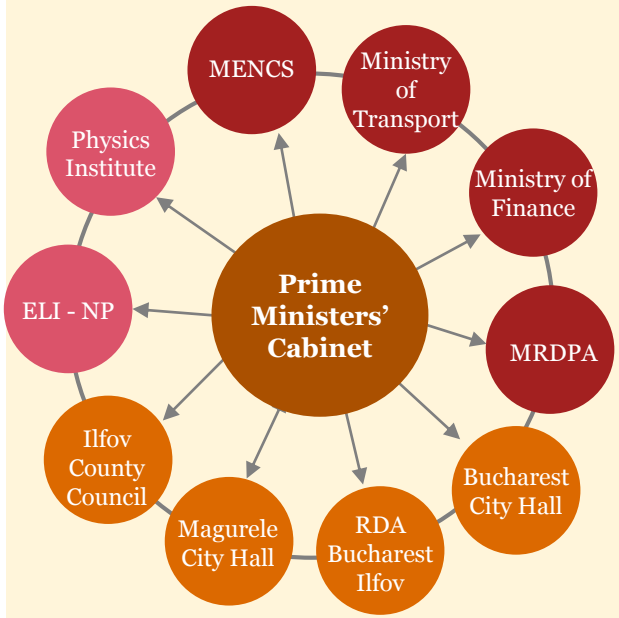
Source: PwC analysis, European Commission

POC – Competitiveness Operational Programme, RDI – Research Development Innovation

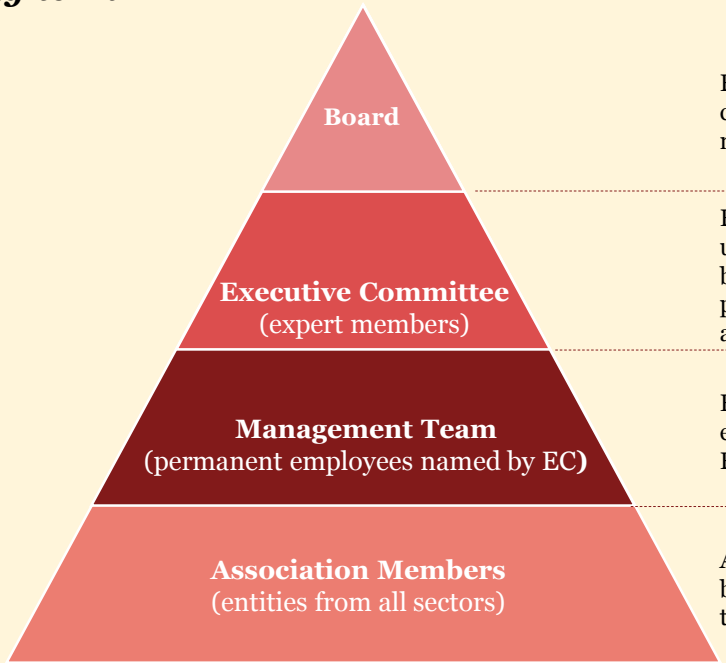
The governance association can be developed in two phases having an evolutionary and flexible mechanism

Structure of the Governance Association

Short-term



Long-term



Entities from any sector voted by cluster members – founding members are part of the Board

Experts selected by the Board, usually from research or academic backgrounds (specialists). In time private sector members could be appointed as well

Full-time specialized employees selected by the Executive Committee

All cluster entities, including board members. Members pay taxes and vote in elections

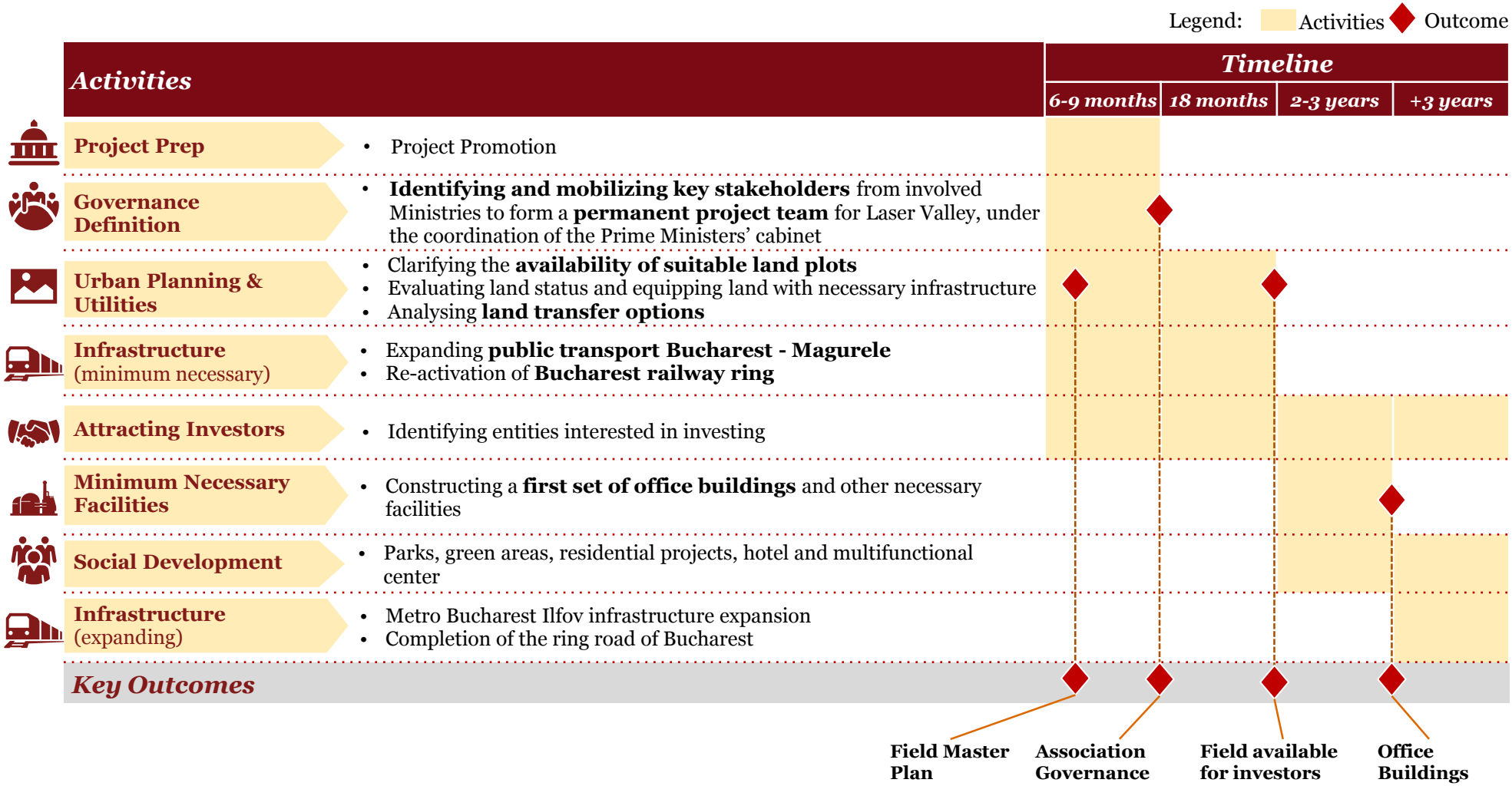
Characteristics of Laser Valley Structure

- **In the short-term, a project team could be created** with representatives from Ministry of National Education and Scientific Research, Ministry of Transport, Ministry of Finance, Bucharest City Hall, Buchares-Ilfov Regional Development Agency, Magurele City Hall, Ilfov County Council, ELI-NP Centre, and the National Physics Institute, and coordinated by the cabinet of the Prime Minister
- **In the long term the project team could develop into a Governance Association with legal status**, which could emulate the French model – governed by a Board, an Executive Committee, and a Management Team

RDA – Regional Development Agency; MENCS – Ministry of National Education and Scientific Research, MRDPA – Ministry of Regional Development and Public Administration

Source: Route des Lasers, http://www.routedeslasers.com/, ALPhA annual reports, PwC research

Several key development steps have been identified for the implementation of the Laser Valley project



This report has been prepared solely for Ministry of National Education and Scientific Research's internal use for the purpose mutually agreed and is not to be used for any other purpose. We do not accept any responsibility for losses occasioned to Ministry of National Education and Scientific Research or to any other party as a result of the circulation, reproduction or use of our final or draft report contrary to the provisions of this paragraph.

The report is based on information supplied by Ministry of National Education and Scientific Research and interviews conducted during September 12 and October 5. This information has not been independently verified by us and we therefore do not provide any assurance as to its completeness or accuracy. This report contains information confidential to Ministry of National Education and Scientific Research and/or PricewaterhouseCoopers (PwC).

The good practice guidelines represented within the text and diagrams of this report are the property of and are proprietary to PwC. Ministry of National Education and Scientific Research is able to adopt and use this information for application within their business, as set out in the Terms and Conditions mutually agreed. However, the information may not be used or reproduced for or by any third parties without the written consent of PwC.