

Towards SMART Armenia

Strategic approach on the development of the innovation ecosystem

Summary of working results of EU-SMEDA –

Technical support to Ministry of Economic Development and Investment for development of a comprehensive Government strategy and action plan to foster innovation with a special focus on SMEs

2017-2018

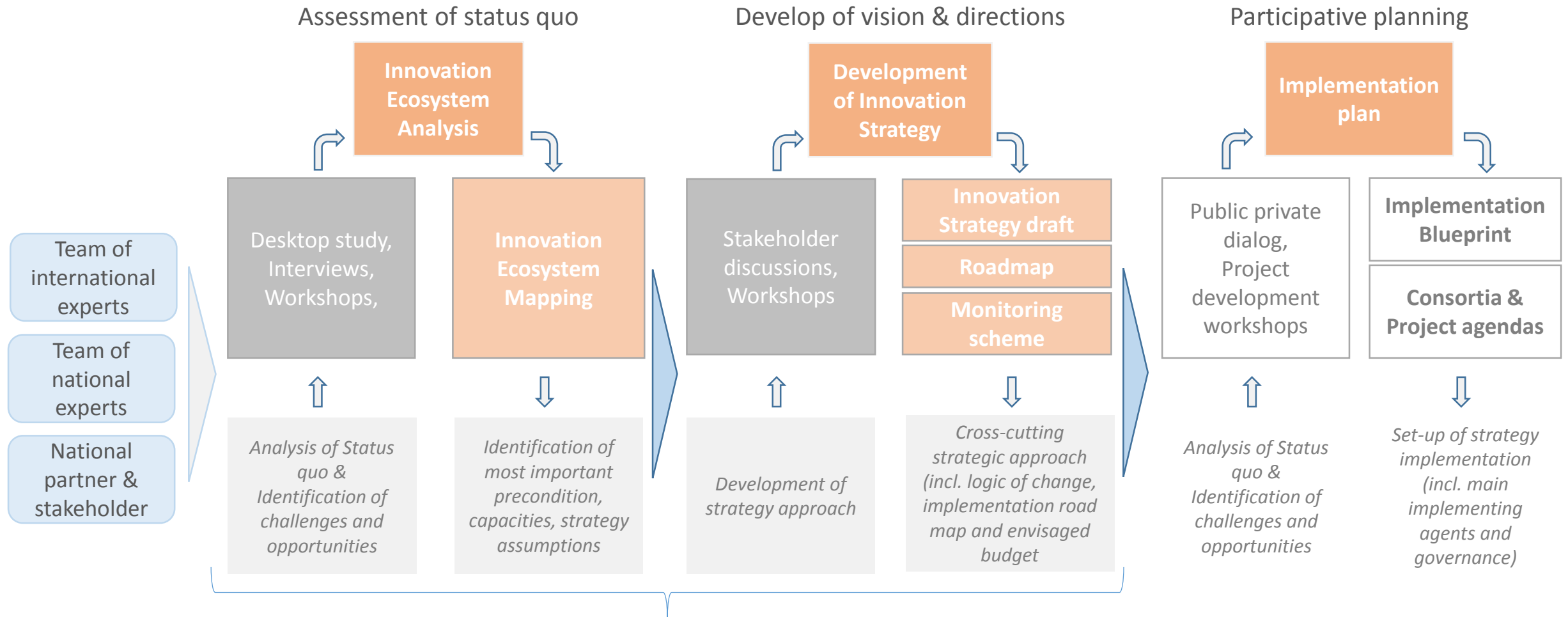


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Development of strategic approach fostering innovation in Armenia – support set-up (phase 1)

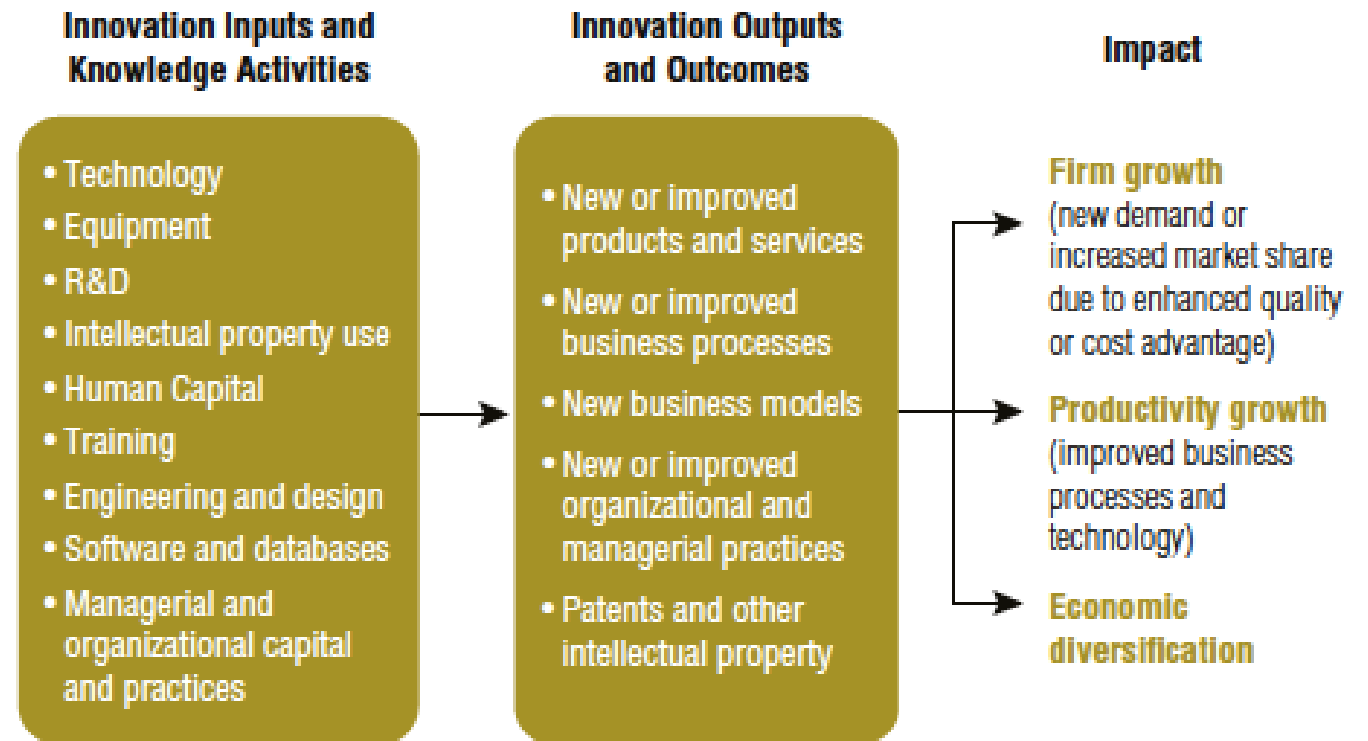


Phase 1 EU-SMEDA support

Innovation: an imperative for future competitiveness, quality jobs and for addressing social and environmental challenges

An **INNOVATION IS** the implementation of a new or significantly improved **PRODUCT** (good or service), or **PROCESS**, a new **MARKETING METHOD**, or a new **ORGANISATIONAL METHOD** in business practices, workplace organisation or external relations.

Source: OECD/Eurostat, 2005



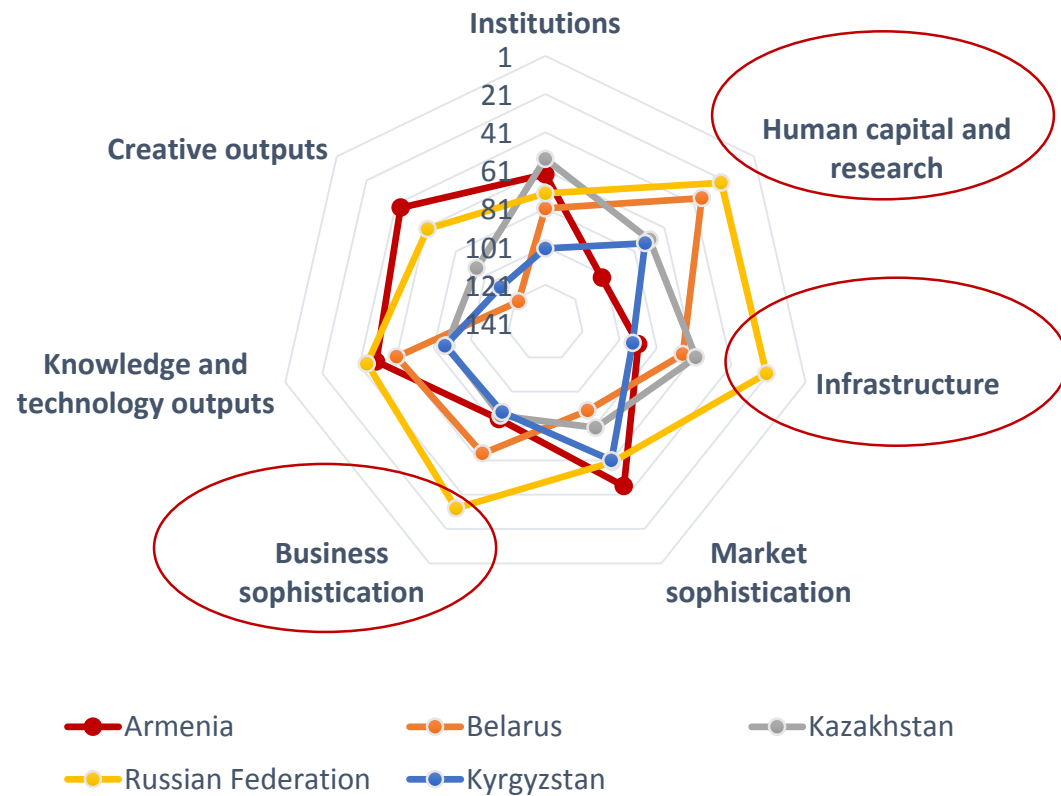
Source: World Bank

Armenia's innovation system performance gives ground for optimism but significant gaps need closed to reach a 'higher grade' (GII 2017)

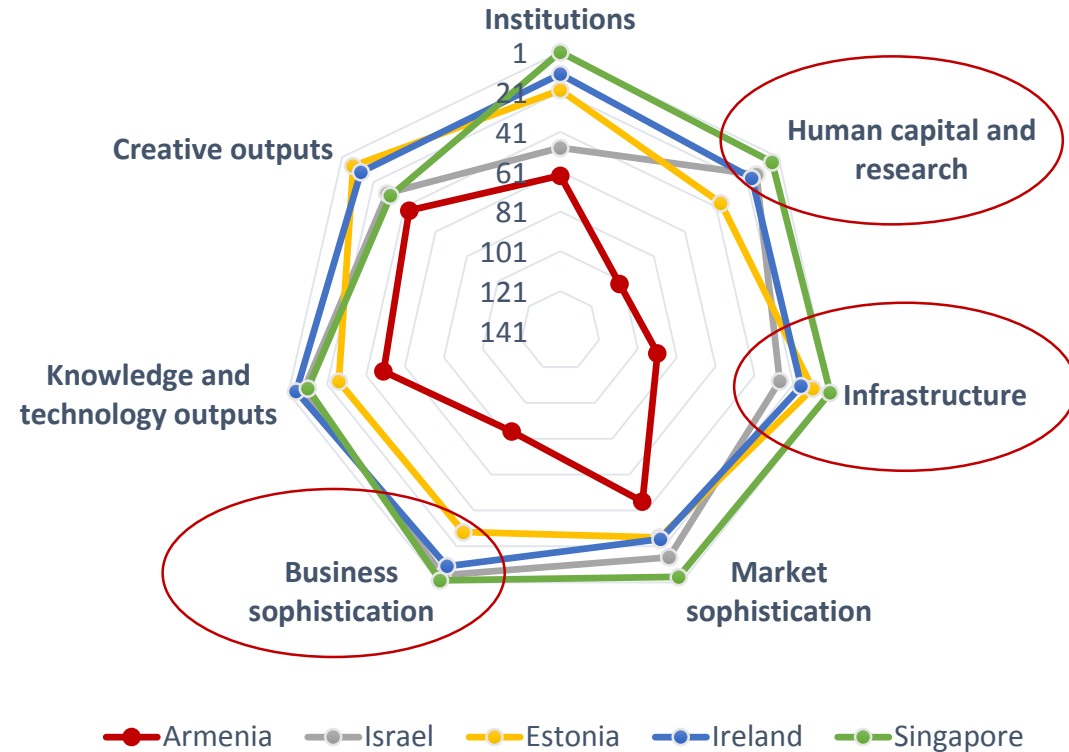
Armenia's overall rank in 2017 among 141 countries

59

Benchmark with EAEU countries










Benchmark innovation-based fast growth countries



Relative performance and trends are highly uneven with some strengths but as many weaknesses in national innovation system

Armenia's overall GII position: 59

GII Pillars	GII 2013	GII 2017	Strengths	Weaknesses
1. Institutions	57	63	 Labour market flexibility Ease of starting business	Rule of law Government effectiveness
2. Human capital and research	71	103	 Tertiary enrolment Tertiary inbound mobility (foreign students)	Expenditure on education Graduates in science & engineering Gross expenditure on R&D
3. Infrastructure	97	91	 ICT access	Logistics performance GDP/unit of energy Environmental certification
4. Market sophistication	48	46	 Ease of access to credit	Domestic credit to private sector
5. Business sophistication	84	85	 Knowledge intensive employment (% total employment)	% Firms offering formal training University-industry collaboration Cluster collaboration
6. Knowledge & technology outputs	58	50	 Relative rates of patents and scientific publications ICT service exports	High & medium tech manufacturing ISO 9001 quality certification
7. Creative outputs	53	44	 Creative goods & services Online creativity	Creative goods exports

Armenia's innovation system: selected key metrics

Business specialisation and value added	Indicator	Armenia	Benchmark	Indicator	Armenia	Benchmark
	Professional, scientific & technical sector, % GDP)	1.3%	10% in the EU28	STEM graduates	90 th /of 102 countries	GII 2017
	Innovation active enterprises %	9.4 %	Estonia 26.5% EU28 49%	Researchers in R&D per million population	1,499 (2014)	Estonia 3,284, Lithuania 2,961 Russian 3,102
	Export orientation High-technology exports (% of manufactured exports)	6.05%	Central Europe & the Baltics 10.8% Estonia 10.8%	Firms offering formal training % firms	84 th out of 92 countries	GII 2017
	Inward investment (net inflow) % GDP (ave. 2006-16)	5.4%	Central Europe & the Baltics 4.94% Estonia 7.5% Georgia 10.1%	Innovation partnerships/clusters	89 th / 123 countries	GII 2017
Innovation support ecosystem	Indicator	Armenia	Benchmark	Indicator	Armenia	Benchmark
	Financial instruments to support business investment in R&D & I	n.a.	BERD financed by Gov. PPS\$ per capita. Estonia 9.3 Ireland 19.3	Gross R&D expenditure per capita (2014) (PPS\$)	17.64	Central & Eastern Europe 153.24 <-> Georgia 23.91
	University-industry collaboration in R&D	88 th out of 137 countries	GCR 2017-18	Scientific specialisation	13 th all subjects / 7 th Physics and astronomy	Eastern European countries (SCIMAGO)
	Availability of latest technologies	77 th of out 137 countries	GCR 2017-18	Technological specialisation	Mechanical eng. 35% total / chemistry 19.3% / electrical eng. 15.8%	Based on national patent classes
				GERD per researcher (2014) (PPS)	<i>Estimated</i> 13.53	Central & Eastern Europe 74.01 <-> Georgia 12.56

Skills, talent & mindsets

Scientific & technological specialisation

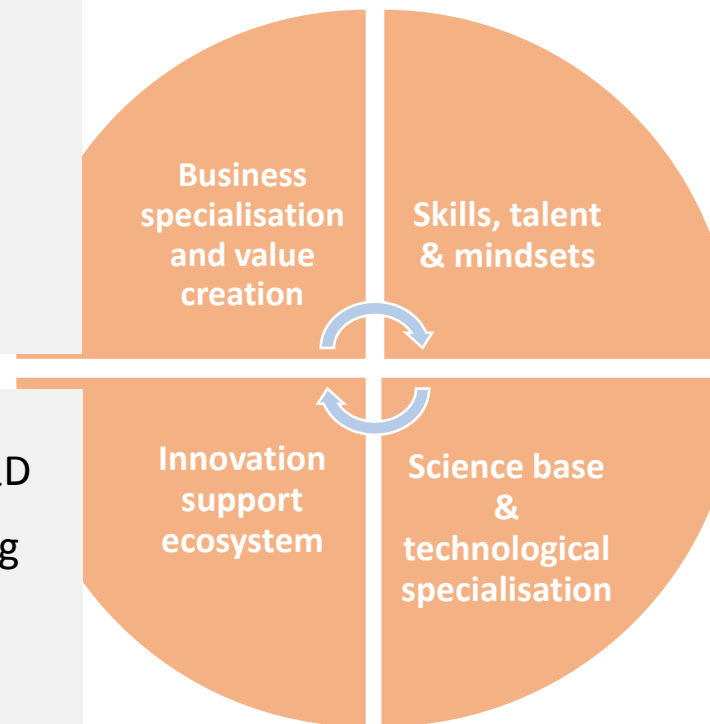
The innovation support toolset is limited and largely depend on donor financing

	Startups	Operating companies
Toolset	<ul style="list-style-type: none">• Idea grants• Technology training and skills development delivered by technology centers (MIC, EIF, GTC, VTC etc)• Seed funding guarantees (SMEDNC)• Income tax incentives for IT start ups• Idea and innovation matching (EU)• Incubation and acceleration services (available in Yerevan and two large cities)• Technology consulting in the frame of donor funded projects delivered through external consultants (e.g. PUM, Farmer to Farmer)	<ul style="list-style-type: none">• VAT and customs duty incentives for import of production technologies• Debt financing with privileged interest rates for introduction of energy efficient technologies• Export support (DFA)• Grants for collaborative R&D from SCS (co-financing from business is precondition)• Subsidize introduction of agriculture machinery and technology (MA)• Credit guaranty scheme• Idea and innovation matching grants (EU)• Technology consulting in the frame of donor funded projects delivered through external consultants (e.g. PUM)• Subsidized consultancy services for management system upgrade (EBRD SBS)• Limited VC financing available for high growth businesses largely focused on high tech firms (Granatus Ventures, Smartgatevc, HIVE Ventures)
Sectoral focus	<ul style="list-style-type: none">• IT, engineering and some high tech fields• SME DNC “Successful start” program with focus on rural businesses (minor focus on innovation)	<ul style="list-style-type: none">• Risk capital financing is largely focused IT, engineering and some high tech fields• Almost all other sectors are eligible for rest of tool set

Armenia's innovation system is not a basis to enhance long-term competitiveness

- Share of **knowledge intensive sectors** in economy is less than half that of advanced countries
- Less than 10% of firms are **innovation active**, although varies by sector.
- **Export orientation** to less demanding (technological, quality, etc.) markets
- **Weak FDI** limits potential for tech. & managerial upgrading

- **No financial instruments** to support business investment in innovation or R&D
- **Absence of key functions**, within existing agencies, required to develop in-house capacities of business to innovate
- Few organisations providing **specialised services** (innovation management, technology advice, IP, standards, etc.)



- **Insufficient STEM graduates**
- Relatively **low number of researchers** in Armenian science system
- **Gaps in managerial, technical and vocational skills** required for innovation activity in business sector.
- Limited experience in developing **innovation partnerships** (clusters, etc.)

- **R&D expenditure** stable at low level in last decade (missing data on business R&D)
- Aside from physics, **weak international scientific specialisation**.
- **Limited technological specialisation** in electrical & mechanical engineering & chemistry
- Scientific funding is spread over a large number of **sub-critical scale institutions**

High-level commitment, inherited research capabilities and successful initiatives are solid bases for boosting innovation

Existing assets

- **High recognition of innovation** on policy level (Government programme, ADS 2030)
- **Internationally competitive research capabilities** in selected fields and relatively strong scientific output results
- **Success in building dynamically developing and internationally linked innovation ecosystem** in ICT and, to some extent, engineering service sectors
- **Networked and experienced diaspora** in science and technology (S&T) and business sectors
- **Large-scale educational initiatives** and positive attitude towards education
- Some examples of **innovation support infrastructure and services** (funded by government, donor and diaspora)

Examples of key factors

Science and education

- Good performance in physics & astronomy by H-index
- Upgrade of educational capabilities ANEL, MIC, TUMO
- New EU project with TUMO on boosting educational base in STEM
- FAST Foundation

Business

- IT and engineering service clusters with 600 mln USD turnover
- Presence of several MNCs
- Internationalized local companies (Picsart, Sololearn...)
- Emerging capabilities in the field of disruptive technologies (AI, Big Data, Robotics and drones etc)
- Expanding business development infrastructure: EIF, GTC, VTC, FEZs

To utilize Armenia's capacities effectively and efficiently a shift in overall innovation support approach as well as its governance is needed.

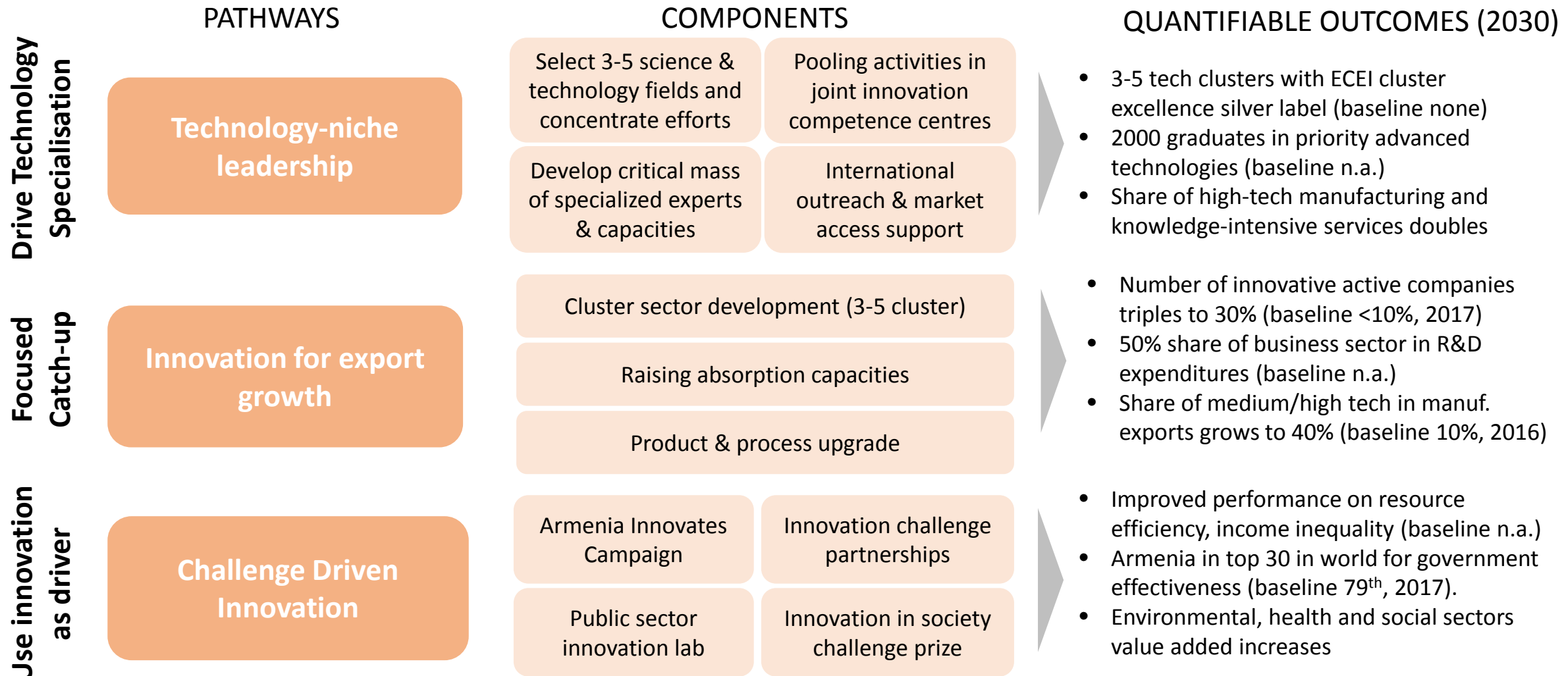
Current set-up of innovation ecosystem

- **Low level of investment in research & innovation** do not match aspiration to develop a 'smart' economy.
- **Weak innovation activity** in business which lacks managerial and technical capacities to support technological upgrading.
- **Incomplete support portfolio** with mainly general instruments distributed in different implementation agencies
- **No clear strategy** and midterm roadmap
- **No coordination** between science, education and economic policies and activities
- **Not coordinated** donor activities with case by case intervention

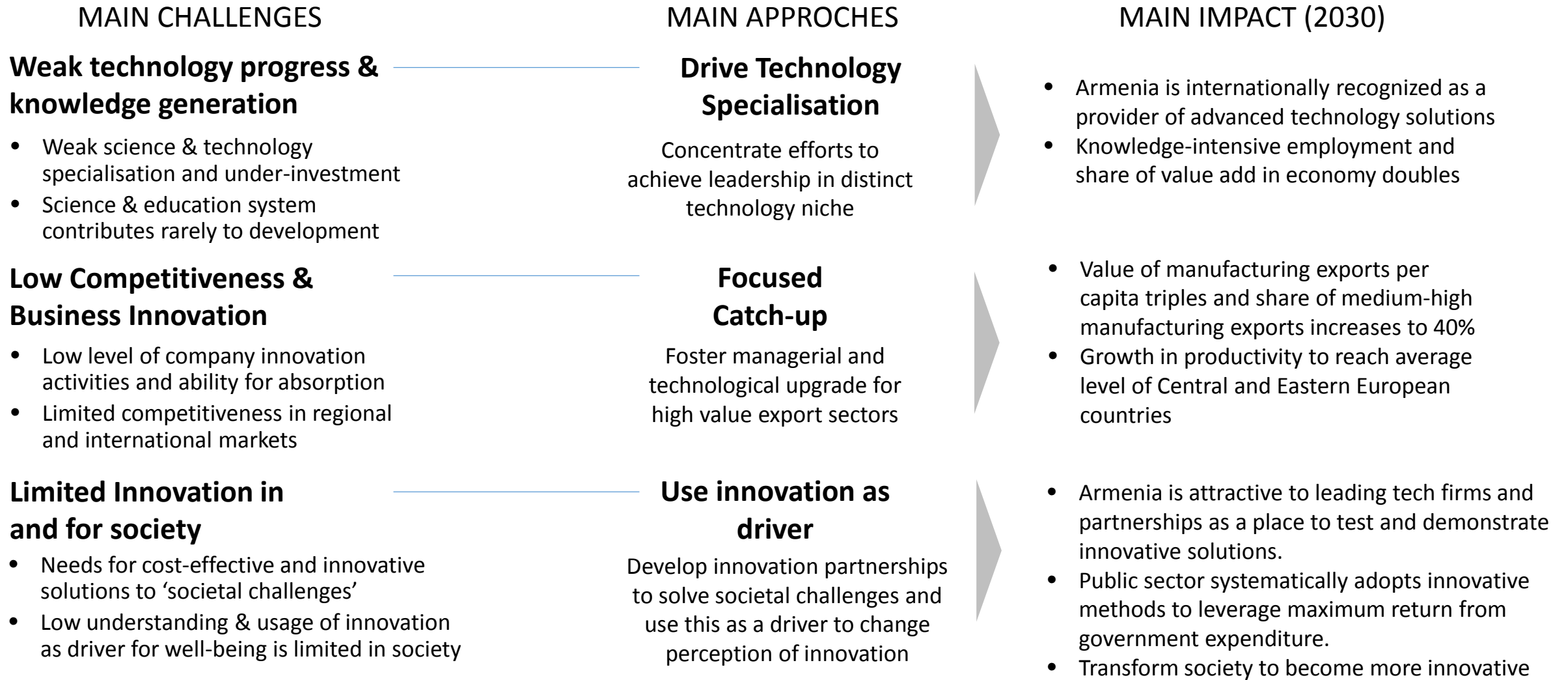
Suggest change in set-up of innovation ecosystem

- **Shift to a programme approach** through structuring of innovation support services with clear strategic focus
- **Systematic sectorial approaches** to foster efficient use of joint infrastructure and develop learning industries
 - Focus on **raising of absorption** capacity and innovative upgrade of companies
 - Increase **quantity and quality of human capital** in the addressed sectors
- **Establishment of coordinated action** between science, education and economic policy and instruments, donor activities aligned

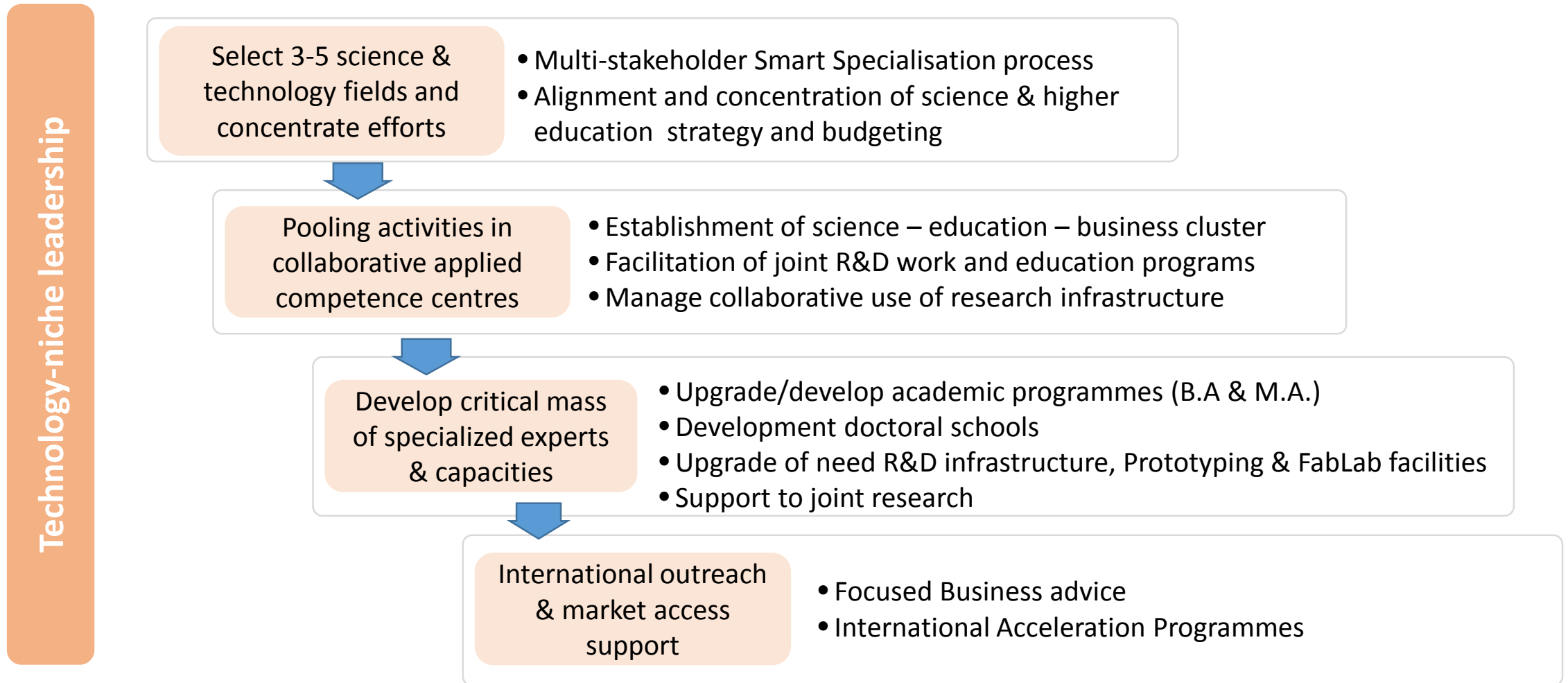
The strategy proposes three pathways to shift Armenia towards a knowledge economy and foster innovation-led growth opportunities.



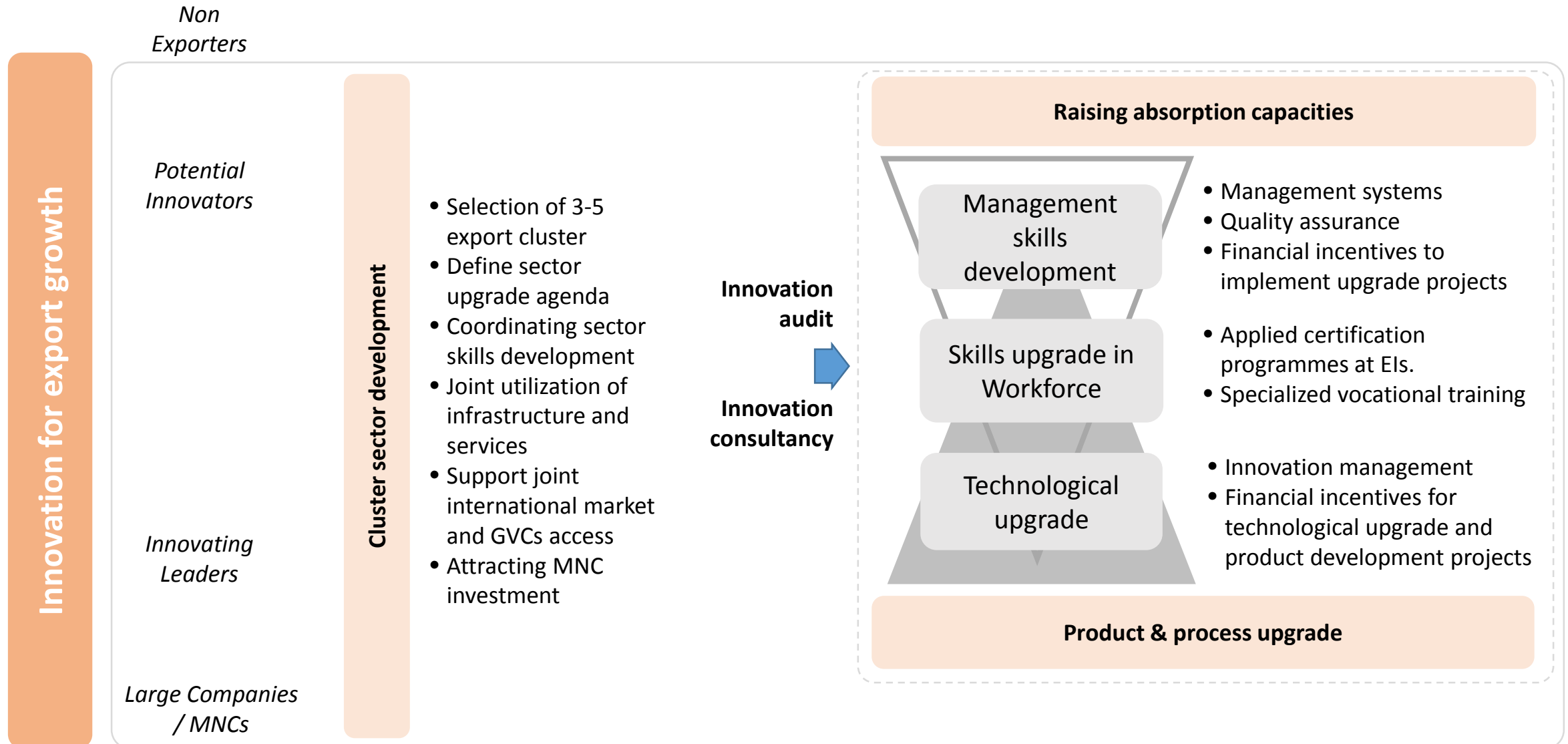
By applying innovation Armenia can overcome three main challenges and become a more prosperous economy in 2030.



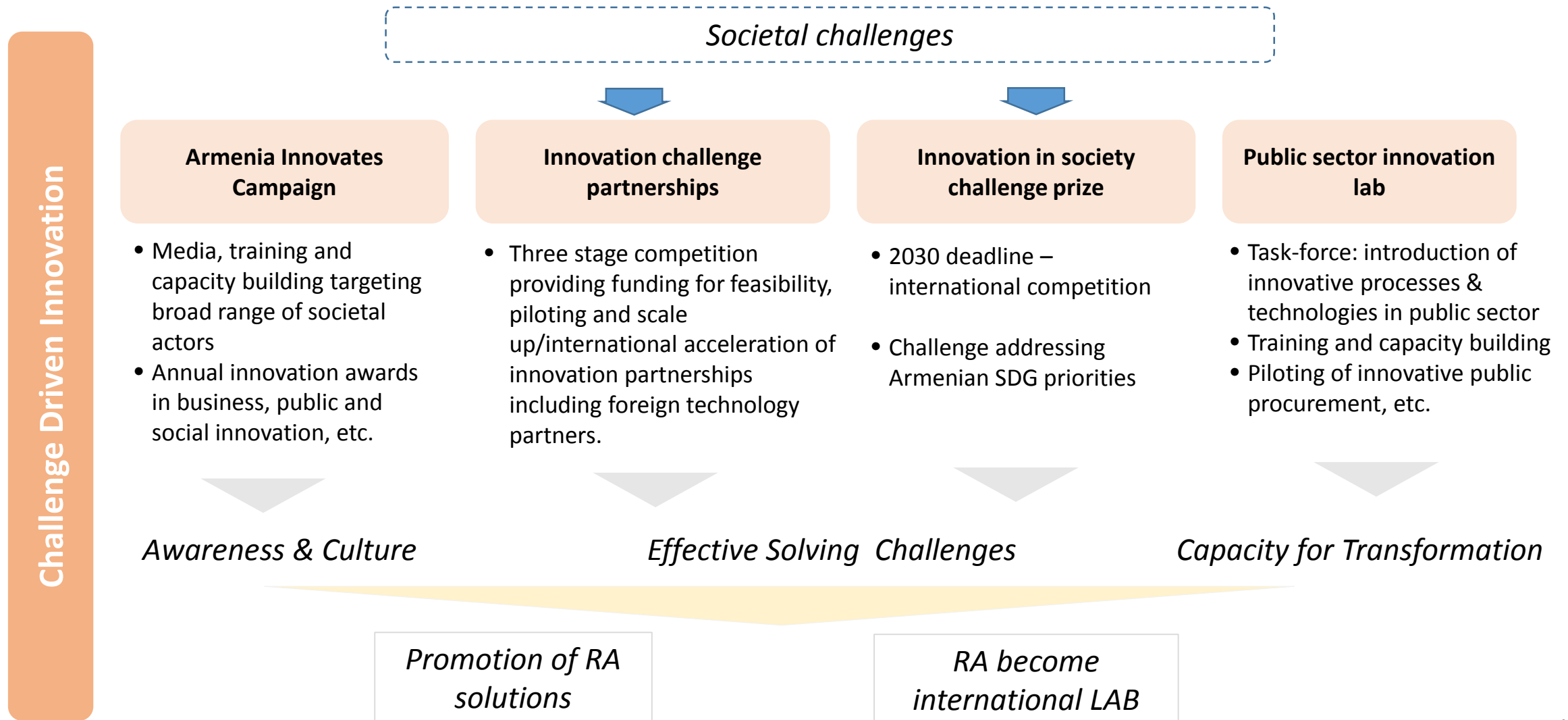
Building up 3-5 new high tech clusters with focused public investment in education and R&D followed by intensive internationalisation support.



Improve the international competitiveness of the export oriented sectors by improving technology absorption and later innovation capacities of the companies.



Applying the challenge driven innovation pathway Armenia can effectively solve societal challenges and utilizes this to become international lab for innovative technologies.



Examples from best practice for 3 pathways

Drive Technology
Specialisation

Case

Ireland: Centres for Science, Engineering & Technology (CSETs)
Science Foundation Ireland (2003-12)
Objectives: Improve linkages between scientists and engineers, foster new tech firms, attract FDI in tech fields

Key interventions

10 centres funded (ICT, bioscience, nanotech) by SFI = €225m over 10 years
New research facilities & equipment
Joint academic-industry research strategies
Education (Masters, PhDs, staff exchange)
Tech-transfer and commercialisation

Key results

€77m of industry funding leveraged
57 industry partners – majority MNCs
By 2011, 1341 staff employed by CSETs
287 industrial PhDs and 159 MSc generated by centres
32 patents granted and 72% of industry partners applying CSET results

Focused
Catch-up

Basque Country (Spain): Cluster policy developed in 3 phases since 1992.
Managed by SPRI (industrial development agency)
Objective: restructure main sectors & increase value added exports

Cluster support programme: p.a. per cluster €2.5m for cluster development services and €0.5m for internationalisation
Funding for joint R&D projects
INNOBIDEAK programme for managerial and organizational innovation upgrading

Currently 22 clusters of which 11 are national/world class (e.g. automotive, advanced machinery, energy), .
Growth in turnover, specialization and exports (e.g. automotive and metal manufacturing clusters, 2013-15).

Use innovation
as driver

Scotland: Wave & Tidal energy partnership
Scottish Enterprise/HIE 2010-2015
Objective: develop and capture the the full value from natural resource (25% of EU capacity in Scottish Waters)

European Marine Energy Centre (2003-) technology campus in Orkney
Wave Energy Scotland: funding for firms (incl. MNC) to test technologies in Scottish waters
Saltire Challenge Prize (launched in 2007) for 1st commercial generation from marine energy

MeyGen tidal stream energy project in commercial phase – 120 jobs created.
WES: 56 projects funded with 150 organisations from 11 countries
More than €30m in EU R&D funding secured – notably via EMEC and MeyGEN.

To ensure the implementation of innovative approaches in different policy fields the following overarching principles should be applied.

- Inter-ministerial task force proposes an overall financial framework (taking account of public, private and donor spending) for 3 short term budget and long term indicative planning
- Policy initiatives of all ministries should include priority fields/sector/challenges as criteria for funding.
- Impact assessment on innovation made a pre-condition for new regulatory and legislative proposals from all ministries
- Guidance framework on optimising innovation and best available technologies when using procurement, public-private partnership investments, etc. (approved by Innovation Council)

To further elaborate and implement the strategy, the Government and MEDI should focus on the following initiatives in 2018.

1. Strategy consultations
 - Strategy adaption consensus
2. I. Strategy conference (05/18)
 - Gathering actors
 - Donors coordination mechanism
3. SMART-specialisation (05-11/18)
 - Selection of priority fields (3 pathways)
 - Definition of Roadmaps and players
4. Innovation council first meeting (10/2018)
 - Establishment of high-level steering structure
5. II. Strategy conference (11/18)
 - Approval of priority fields & roadmaps
 - Commitment of actors and resources
 - Donor involvement matrix
6. Agreement/Funding (11/18)
 - Investment and budget plan
7. Launch of pathways (01/2019)
 - Appointment of coordinating structures
 - Procurement of support services
 - Call for cluster etc. management

The full package of innovation mapping & strategy was handed over to the RA Ministry of Economic Development and Investments.

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