

Benefits of Research Infrastructures beyond Science

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Definition of a Pan-EU RI

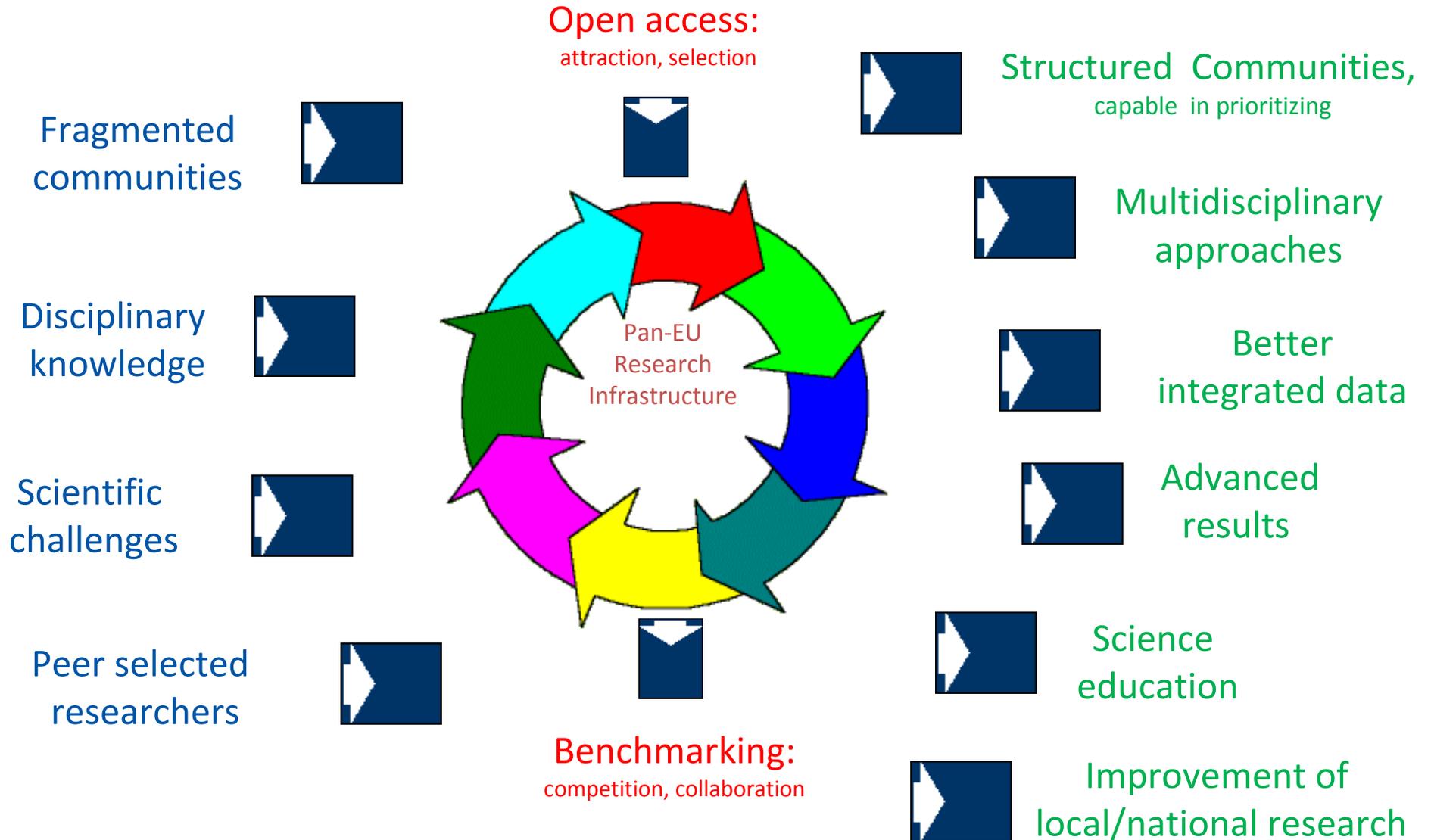
- *Offers cutting-edge, essential service to research, on a non-economic basis, within an ERA outlook;*
- *Awards free open access through international peer-review competition at world level;*
- *Results published/shared in the public domain;*
- *Proprietary and/or training access is marginal;*
- *Clear pan-European added value: e.g. at least 30% of selected users coming from non-host countries.*

Why Research Infrastructures

- ❖ *Modern research in all scientific fields requires international “Research Infrastructures” (RIs).*
- ❖ *By merit-based competitive “Open Access”, they attract / host the best researchers in the world, fuelling a continuous interplay between science challenges and technical responses*
- ❖ *This develops wider cross cutting innovation and world-level quality in all activities: scientific, educational, technical and managerial*
- ❖ *They, thus, become knowledge-based innovation drivers, unleashing creative potential of staff, users and industrial providers, linking research with education and business*

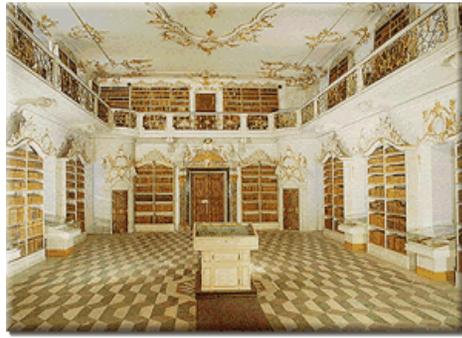
Motors for change

e.g. Science in a level-playing field



Excellence and Growth

Excellence in Research Infrastructures: a long tradition, from the Middle Ages to present time, from Humanities to Physics

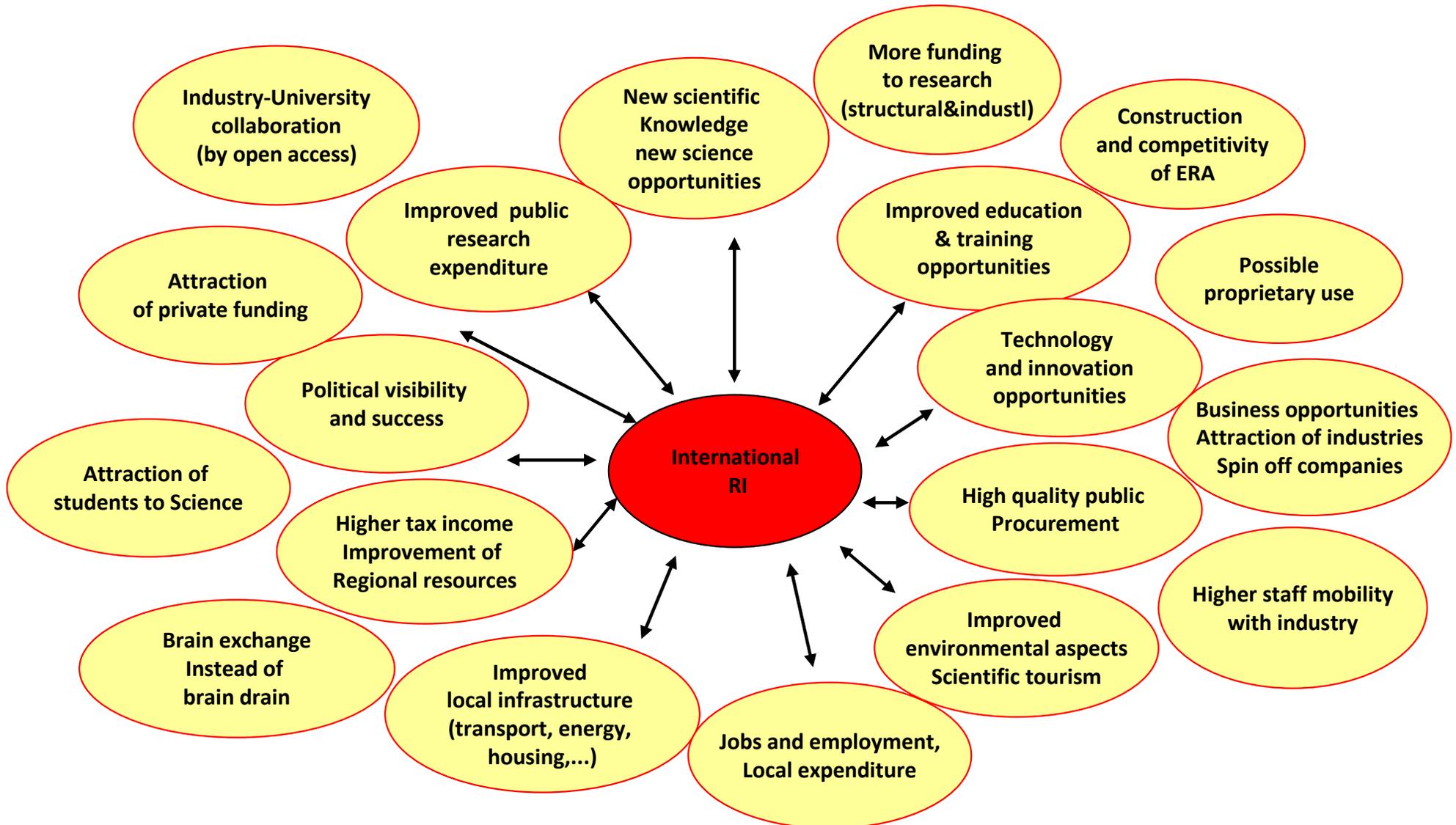


- Abbey-libraries: Centres of Research, Knowledge & Technology Transfer: the EU cultural roots
- Success due to uniqueness and quality attracting world level scholars and researchers, but also in developing technologies and economy

Examples of “unintended” results (e.g.of “blue sky” research, or sports)

- “Ora et Labora”: abbeys as producers of techniques, from construction to chemistry, agriculture, beer, almond sweets....
- Examples of “returns”, from the ink to the beer , from the skiis to the ferrari,...and from the web to the ccd, from instruments to tourism industries
- Strong parallel between RIs and Olimpics

Returns and Stakeholders



Some definitions

Research, Development and Innovation are (economically) very diverse, but get mixed together as “Research” in political and media discourse.

But if we stick to the international trade definitions:

- ***Research***: production of new (previously unknown!!, i.e. unpredictable) knowledge: i.e. discoveries (very rare economic return to investor, and 100% public allowance)
- ***Development***: use of existing knowledge to produce new solutions: i.e. inventions (economic return to investor, albeit risky, and ≈50% public allowance)
- ***Innovation***: improving on existing solutions (economically self-sustaining, and <≈25% allowance), rarely connected only to S&T, but often to finance, marketing, organization,.....

Which economic aspects in an RI ?

- Research, per se, is unable to self-finance (non economic, like sports or soul-searching)
- But most of the researcher's (and staff) activities are Development and Innovation: new instruments, new methods, new training, better organization... there is a lot of D@R and I@R!: Economic potential!
- International RIs need to compete by developing excellent D and I (e.g. invention of the WWW...): enhanced economic potential
- But...due to state employment and lower mobility, D and I have less effect on careers in EU: this is at the root of the "European Paradox"

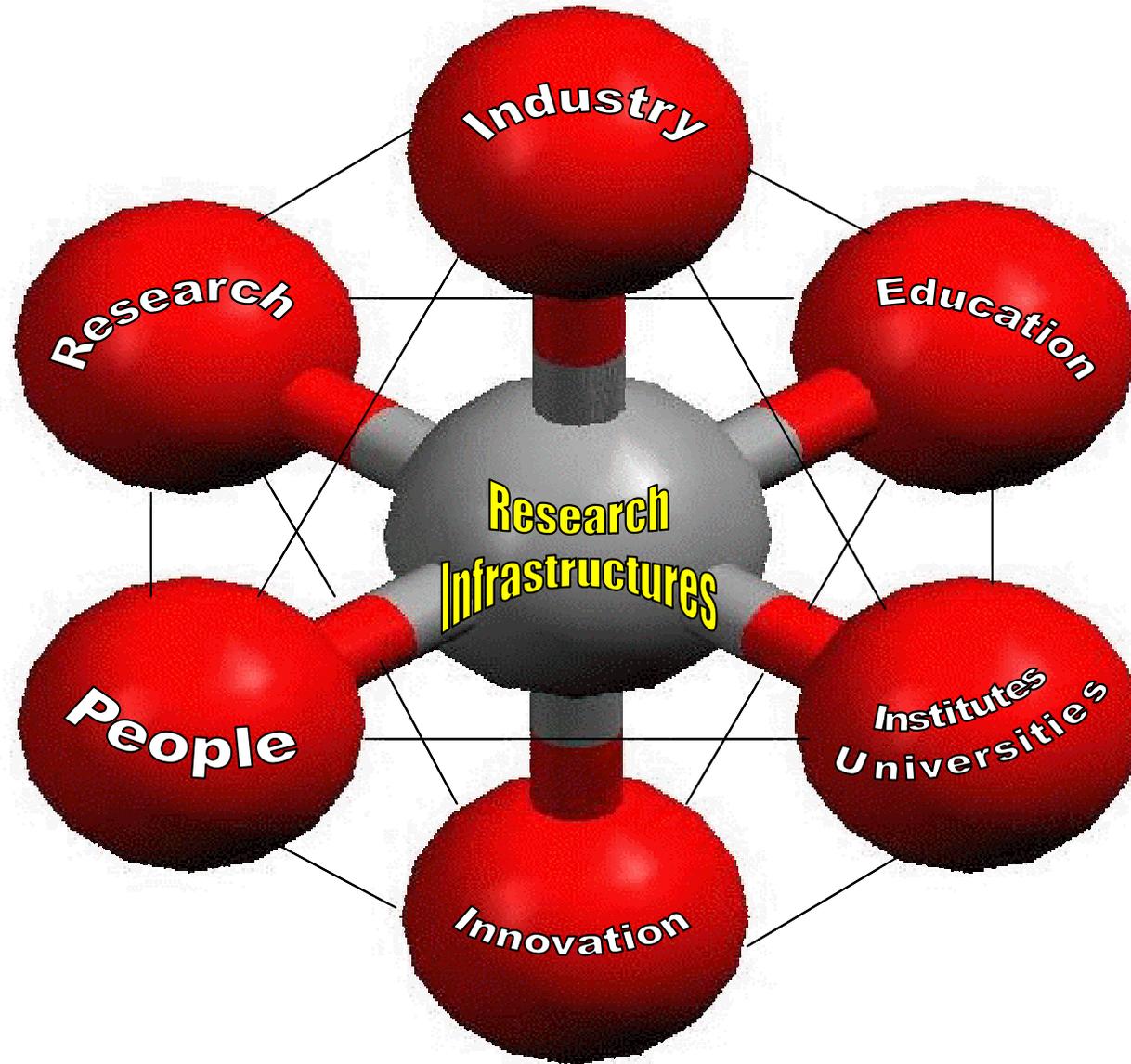
Threat and opportunity of a Pan-EU RI

- The “non economic aspect” is enhanced by the “agency” activity: hosting for free...= losing money?
- But R, as well as D and I, are enhanced by international evaluation and management: SAC, MAC, Users council, and international managers
- Management must address excellence in very diverse issues (e.g. Science, education & training, industry and tech-transfer, environment & energy, socio-economic returns, ...fund-raising, communication.....)
- Need a specific “narrative” (mission, vision...), addressing shareholders, stakeholders and public

RIs: dynamic Knowledge and Innovation Triangles

- ❖ RIs designed and operated to attract / host the best researchers in the world (trans-national access) play important roles in the advancement of knowledge and technology.
- ❖ To respond to challenges, they develop cross cutting innovation and world-level quality in all aspects of their activities: scientific, educational, technical and managerial.
- ❖ This liberates the creative and inventive potential of the staff, the users and the providers, from scientists to industries, and thus becomes a crucial socioeconomic driver

An overall picture



The ERA Challenges in RIs

- ❖ No single Country has enough resources to support all the needed RIs, only few EIROs
- ❖ Many EU Countries have some, effective or potential, Pan-EU RI (about 300) but fragmented and underused due to limited resources
- ❖ Open access is needed to ensure quality, but its additional costs $\approx 2 \div 3$ billion euro/year
- ❖ Pooling - improving existing resources is needed, but not enough, requirements are increasing
- ❖ Global agreements and efforts are also necessary (e.g. SKA, environmental RIs,)

ESFRI mission and approach...

Mission

“Support a coherent, strategy-led approach to policy-making and to facilitate multilateral initiatives, leading to better use and development of RIs”

An Incubator-Role approach, from 2002

ESFRI aims at providing EU with an integrated ERA-RI system: Roadmap with 44 RI to lead an estimated 300 RIs

ESFRI’s “incubation” has been added to the previous EC “catalysis”

Main achievements...

- Attracted new resources, by underlining the interplay RIs-Innovation (e.g. stimulus packages, structural funds, EIB,...)
- National Roadmaps now evolving in most EU Countries: 28 out of 33; 21 funded. Spreading evaluation and prioritization
- Realizing the Roadmap: 10 RIs started, 8 getting near, 11 maturing... out of 44, also thanks to the ERIC
- Increasing involvement of newer MS and regional resources, (e.g. “innovation ecosystems” , supporting “fifth freedom”...etc)
- Increased awareness of science communities
- ...and the G8 speaks about RIs...

The Virtuous Cycle

Increase of
quality of research

Increase of
new financial resources



Increased attraction of
human resources and ideas:
invent to discover!

More innovation and quality procurements:
economic and social returns

Can we aim at a self-sustaining cycle?

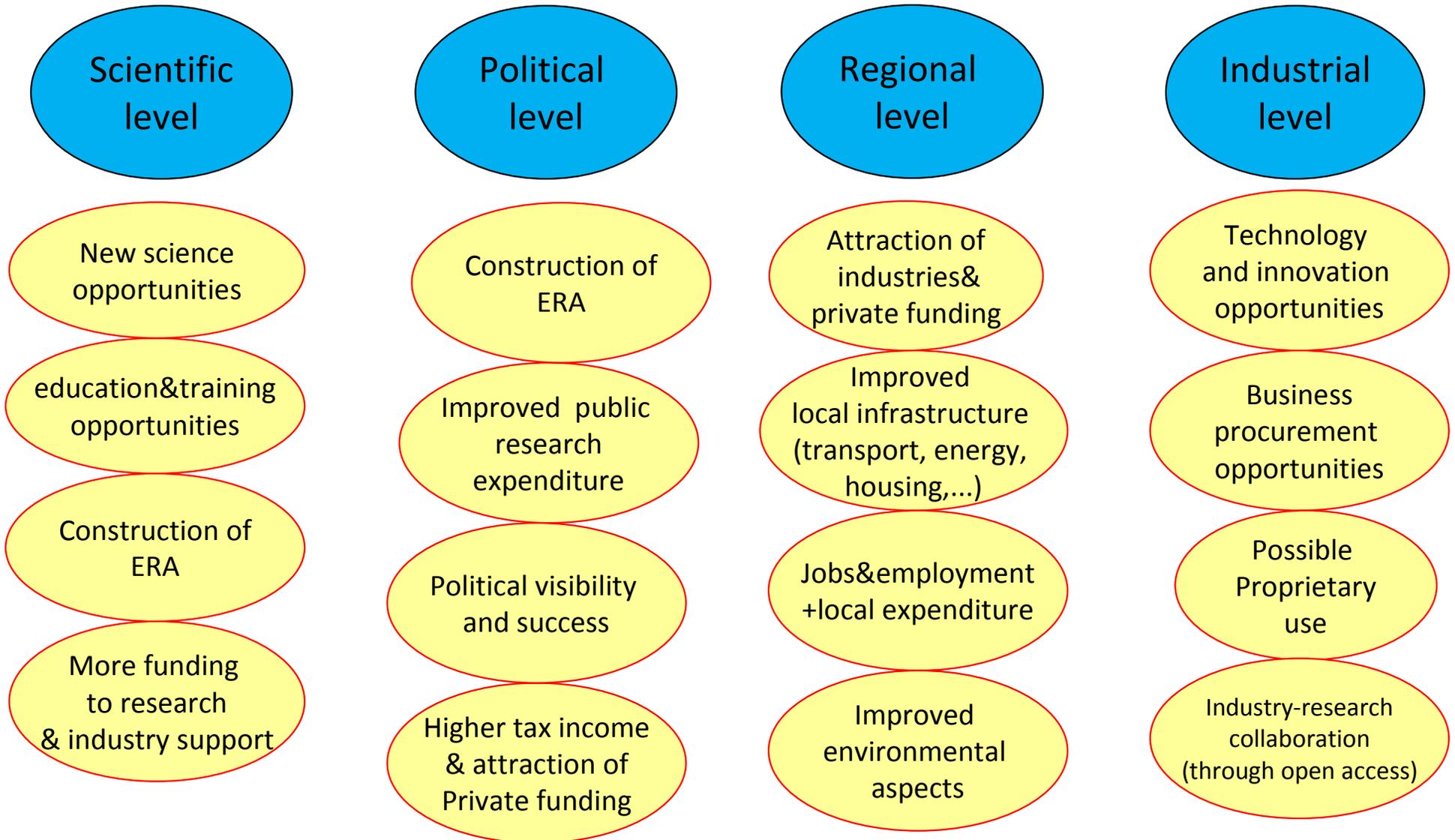
Management aspects

- To develop policies...
- To improve scientific quality
- To maximize socioeconomic returns
- To maximize fund raising
- To maximize industrial returns & aspects
- To improve social acceptance
- To decrease environmental impact
- To spend less (e.g. in energy)
- Personnel management: mobility, growth, staisfaction,....
- Project management,

Funding and returns

- Different during construction and operation:
- Procurements in construction can be “prepared” and steered by funding partners, less so during operation
- Expenditure during operation is largely local (\approx 50-70%): stipends, local infrastructures and taxes
- It is easier to attract local funding and private partnerships during construction
- Longer term operation costs mainly borne on research funding
- In all cases: returns depend on “absorptivity”, which, in turn, requires supporting coordinate actions (from scientific users to science parks)

Who aims at what?



Increasing economic motivation