

Challenges in sensors for health applications

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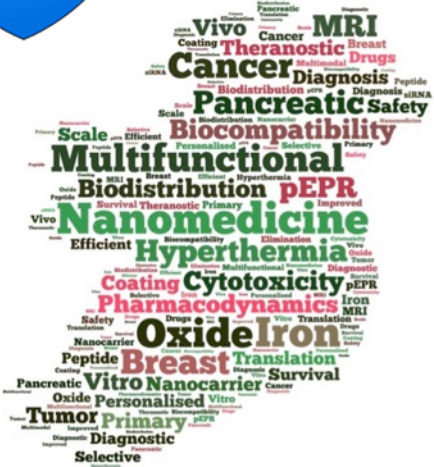
NANoREG Irish National Coordinator

Quality NANO Team Leader

**Characterization Cluster Workshop
Brussels, 27th November 2014**

European Commission, Covent Garden, Brussels, Belgium

My involvement into Healthcare and complementary areas



TARGETED NANO-PHARMACEUTICALS AND EARLY DIAGNOSTICS CLUSTER



EPOSS
European Technology Platform on Smart Systems Integration



CLINAM
European Foundation for Clinical Nanomedicine

CAN Celtic Alliance in Nanohealth

BEST Brokerage Event for Science and Technologies in NMBP



Research Infrastructure
QualityNano



Industrial drive/translation



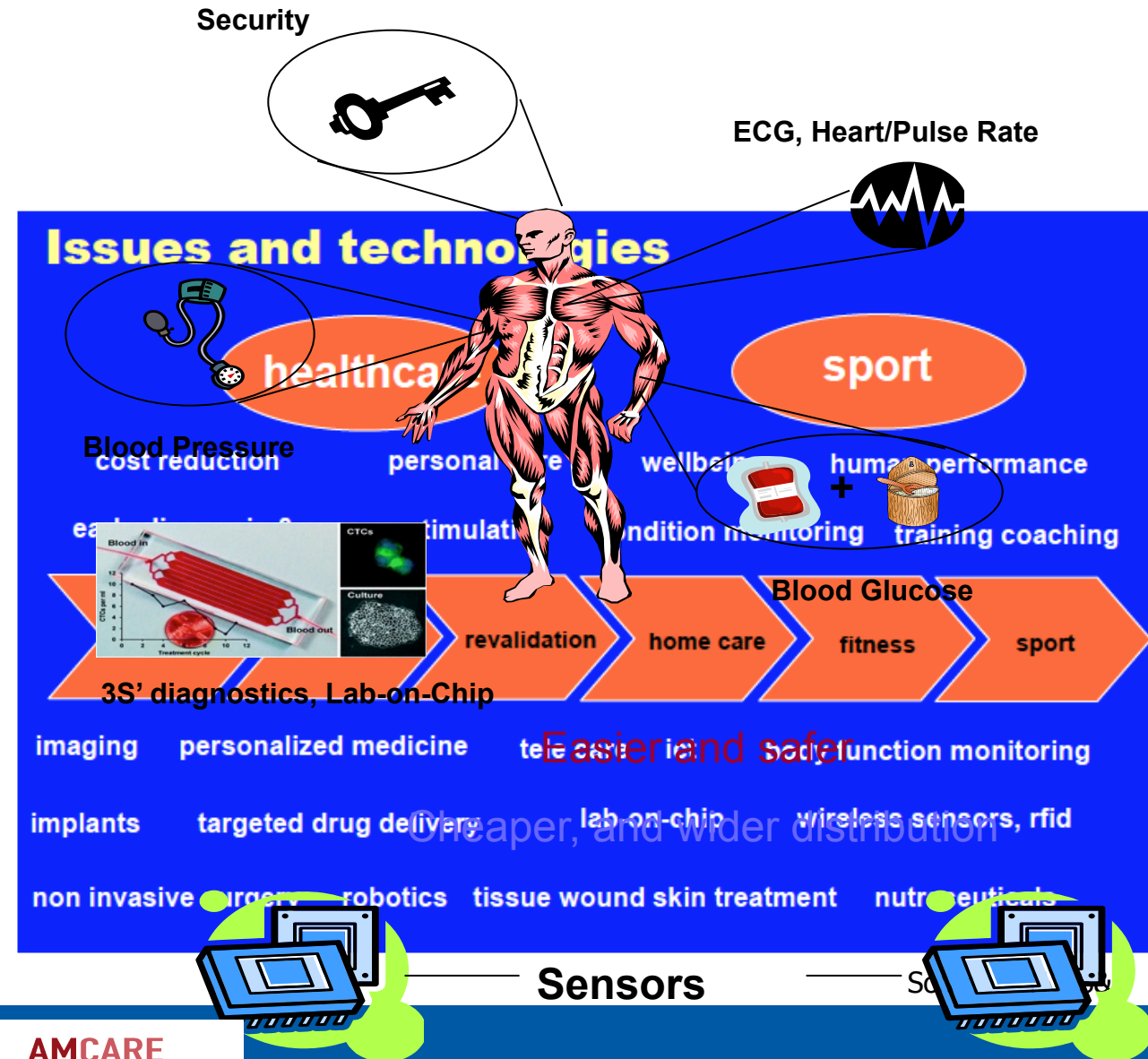
PART 1: Recommendations on Healthcare applications (1)

Size and Complexity:

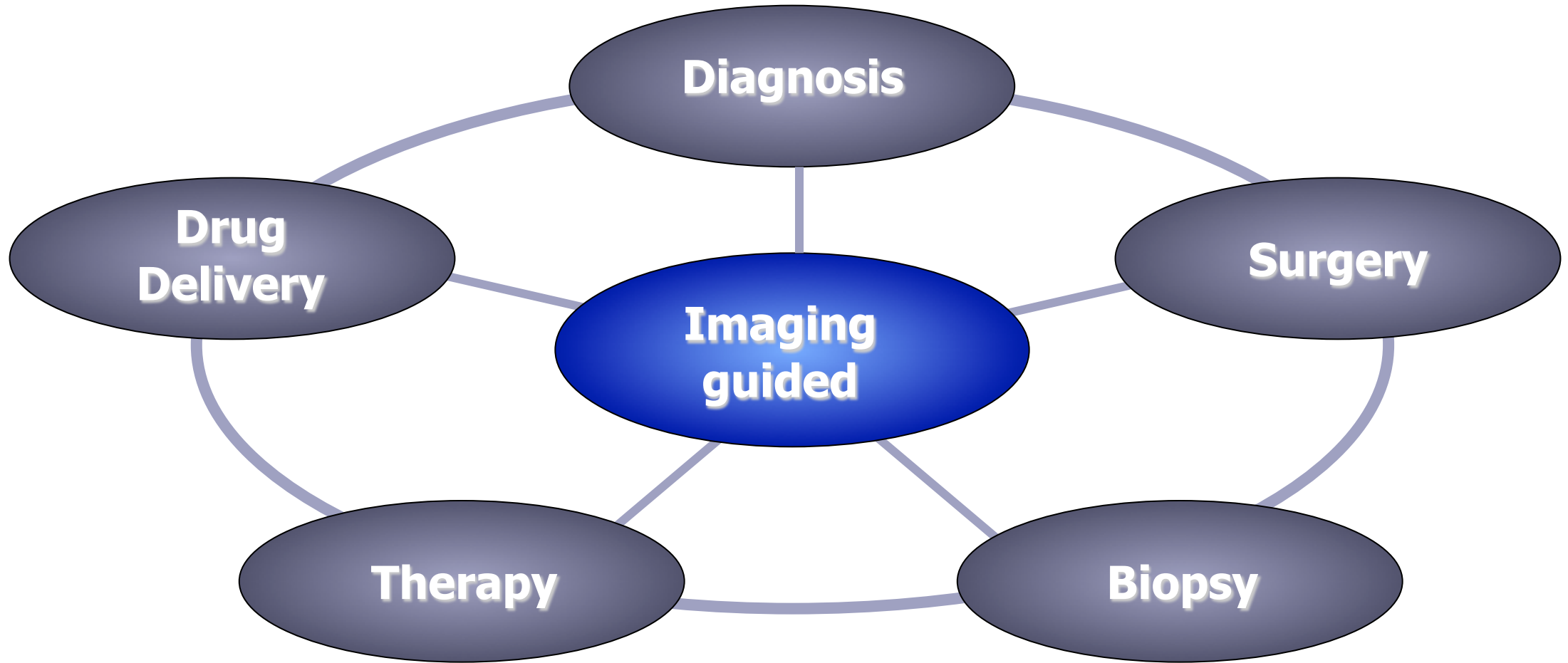
- Multifacet domain/market/strategy
- Strong economical interests
- Patient protection (end-users)
- Healthcare cost containment
- Worker/Consumer Safety
- Security

Solutions:

- Health IT
- Driving Healthcare decentralisation
- Encouraging Self monitoring / Homecare (POC and POCT)
- Regenerative Medicine
- **Nanomedicine**



NANOMEDICINE SRIA 2020 Strategic research priorities for in vivo imaging



NANOMEDICINE SRIA 2020 Strategic research priorities for in vivo imaging

RECCOMANDATIONS:

- Increasing the sensitivity and specificity of imaging modalities (e.g. new technologies and imaging probes)
- Developing new responsive **Vision for the field for 2015-2016 / 2017-2020 / beyond 2020**
- Developing imaging-guided
- Developing real-time imaging
- Developing multimodal (quantitative)
- Devices for combined structural and functional imaging

	2015-2016	2017-2020	2020-more
Magnetic Particle Imaging			X
Magnetic particles for MRI			X
PhotoAcoustic Imaging (PAI) (instrumentation)	X		
PAI nanodiagnostics		X	
Fluorescence-guided Surgery (instrumentation)	X		
NIR fluorescence nanoproboscopes		X	
Theranostic nanosystems		X	

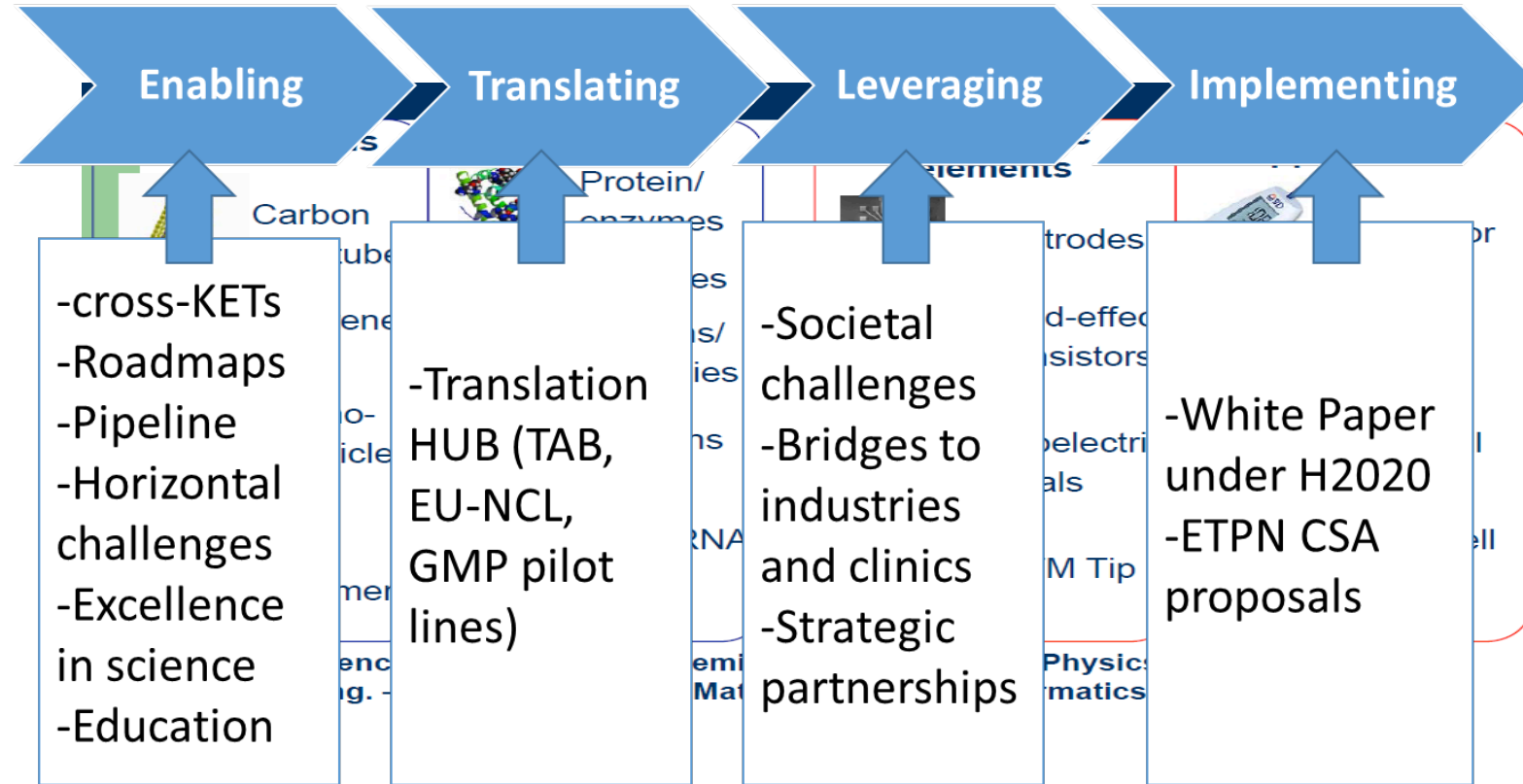
Recommendations on Healthcare applications (2)

Industry involved

- SMEs, MNs, Innovation & Services,
- Combined effort across the value chain to accelerate translation of effort into economical ROI

EU positioning

- Driver of the strategic value chain identification across ETPs, Industry and Stakeholders
- Gatekeeper for its implementation using all ETPs, flagships and High Value Initiatives

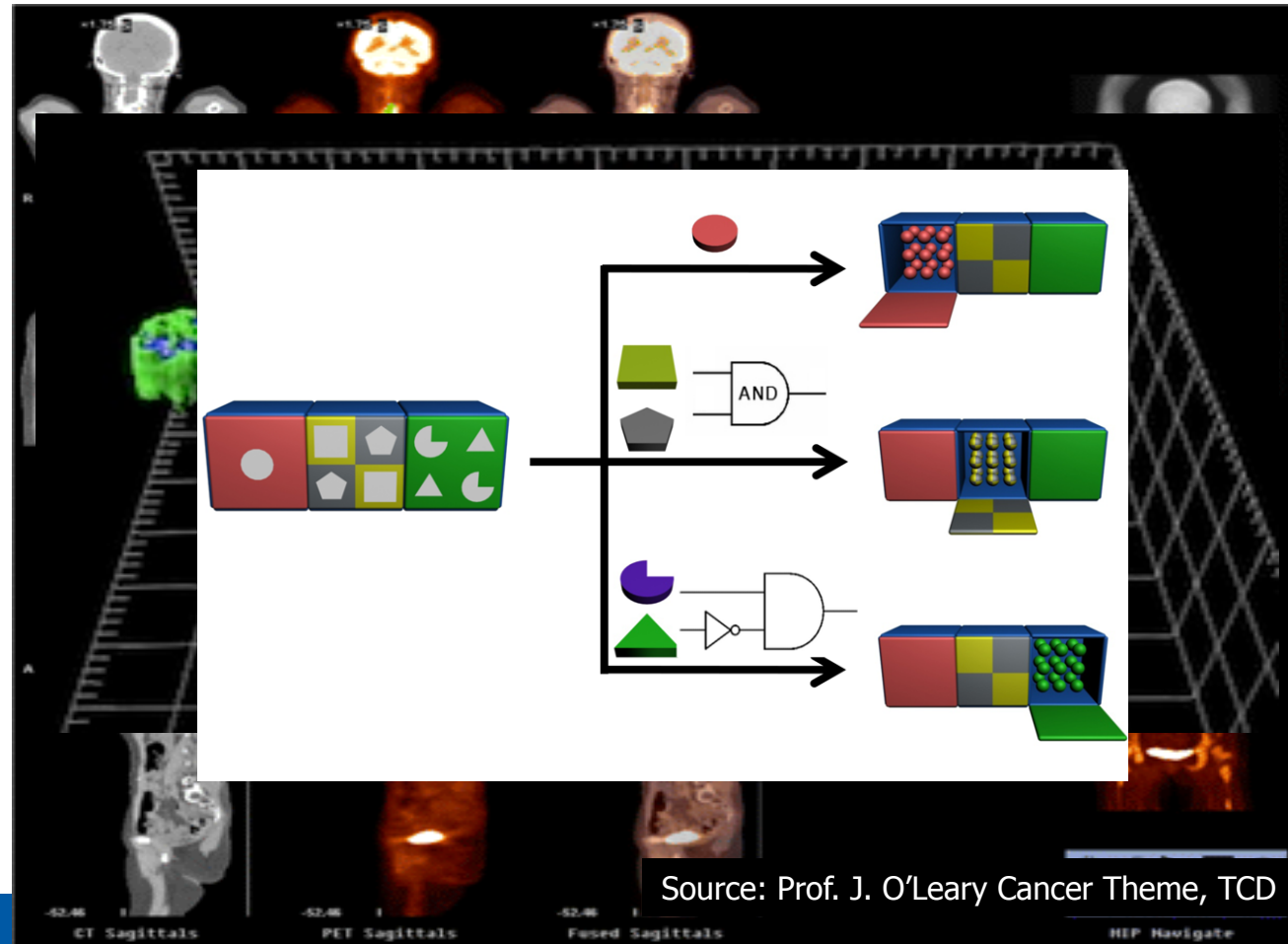


Source: ETPN White Paper
www.etpn-nanomedicine.eu

Recommendations on Healthcare applications (3)

Short, Mid and Long term action

Joint action or sub-clusters



Source: Prof. J. O'Leary Cancer Theme, TCD

Recommendations: Short, Mid and Long term action

More elderly demanding care: in 2030 is 25% of our population is > 65 yrs (now 17%)

Reduction of hospitalisation time, need for high efficient, high throughput hospital or clinic

- non or minimal invasive surgery
- personalized medicine
- Telemedicine
- after care via telemonitoring

Professional care shifts to homecare, need for efficient and professional homecare system

- care via GP
- diagnostic tools at the home
- self diagnostics and self treatment and rehabilitation
- telemonitoring

Cost reduction in healthcare system via:

- health IT
- electronic patient dossier
 - electronic medical dossier
 - telemonitoring
- early diagnosis and treatment
 - molecular imaging
 - point of care diagnostics, lab-on-chip
- dedicated treatment of specific chronic diseases (cardiovascular, mental, cancer, Alzheimer etc)
 - targeted drug release
- personalized medicine, genotyping of patients, bioinformatics
- prevention programs, sport and health promotion

Towards a consumer centric system:

- health shopping
- personalized medicine
- cosmetic surgery
- sport & fitness, wellness

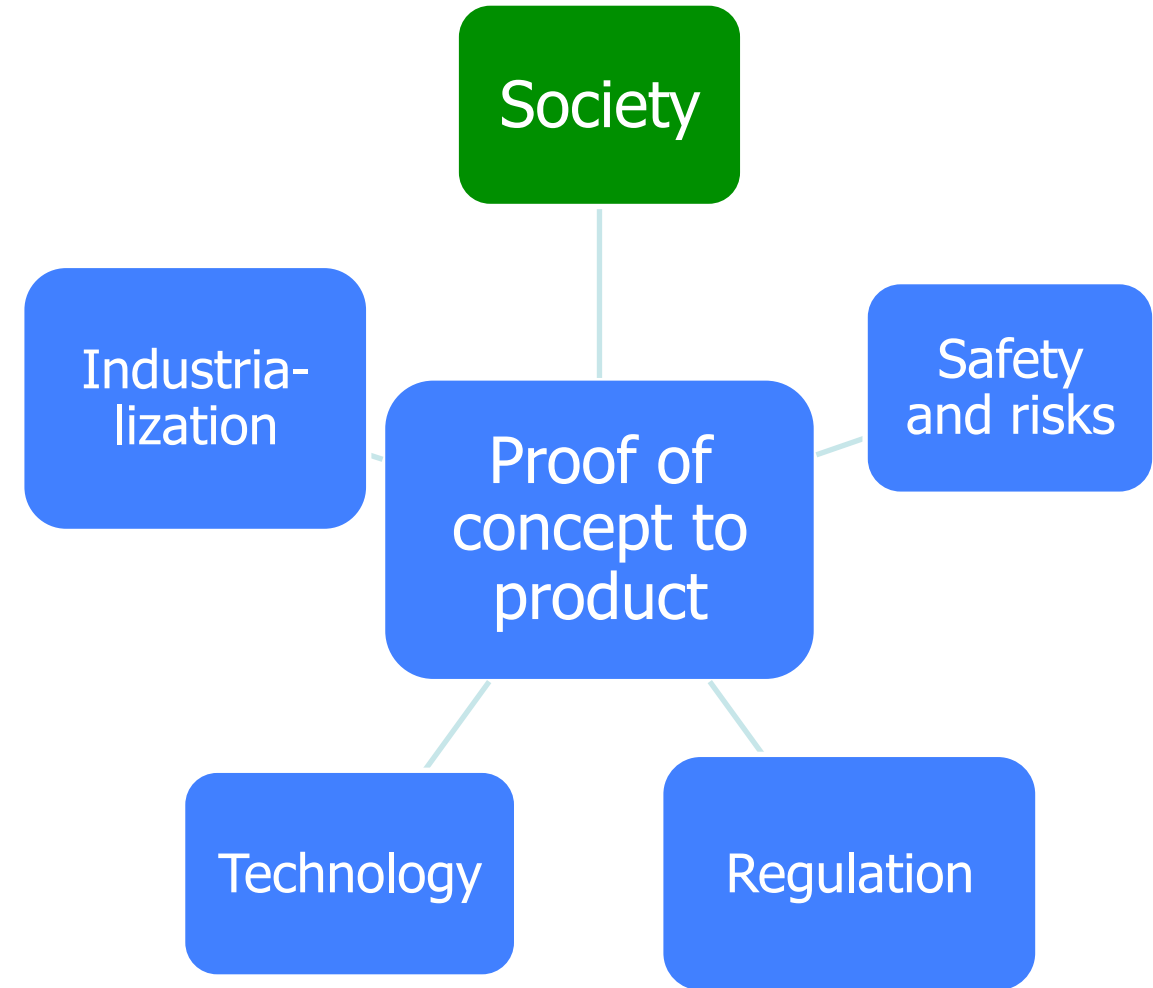
2015-2016 / 2017-2020 / beyond 2020

	2015-2016	2017-2020	beyond 2020
More elderly demanding care: in 2030 is 25% of our population is > 65 yrs (now 17%)	X	X	X
Reduction of hospitalisation time, need for high efficient, high throughput hospital or clinic	X		
Professional care shifts to homecare, need for efficient and professional homecare system		X	
Cost reduction in healthcare system via:	X		
Towards a consumer centric system:	X	X	X

Recommendations on Healthcare applications

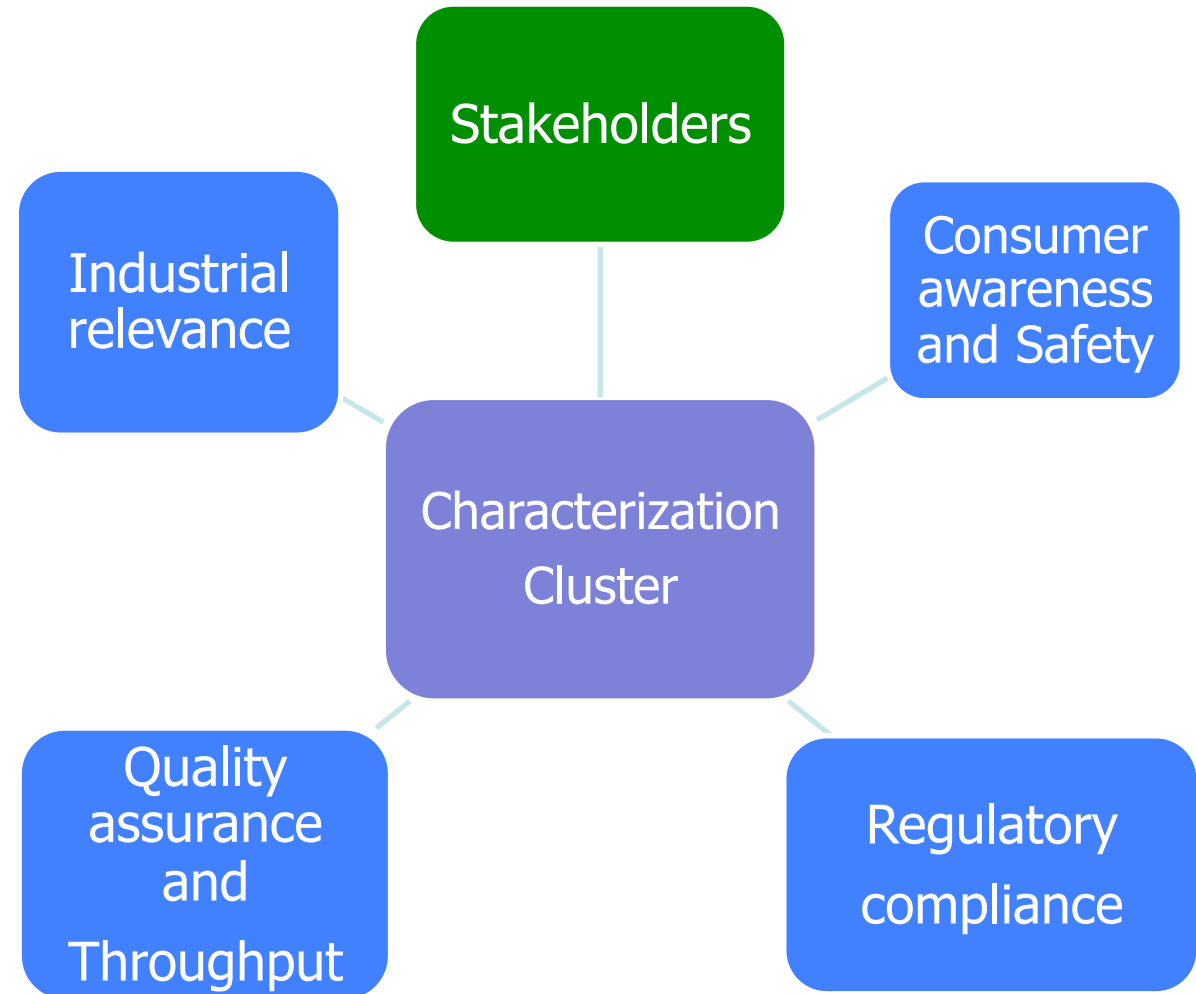
Joint action or sub-clusters

- Critical to have integrated view
- Characterisation, Metrology and Sensor are interconnected in healthcare in order to provide tools for industrialization and societal growth
- Initiate a grouping exercise centred on the cluster sections where to interlinks the activity of the many ETPs involved
- Develop a roadmap with ETPs and national representative groups where to provide guidance for future development



PART 2: Cluster Governance

- Identification of suitable cluster governance is at the basis of the cluster success.
- Hub and Spoke model is by far the most versatile and interconnectable model accepted.
- Grouping exercise centred on districts is then critical in order to create a suitable governance across the clusters and also the involved ETPs.
- Roadmapping is always a complementary exercise where to maximise the efficiency of each the cluster communication and exploitation



Cluster Governance

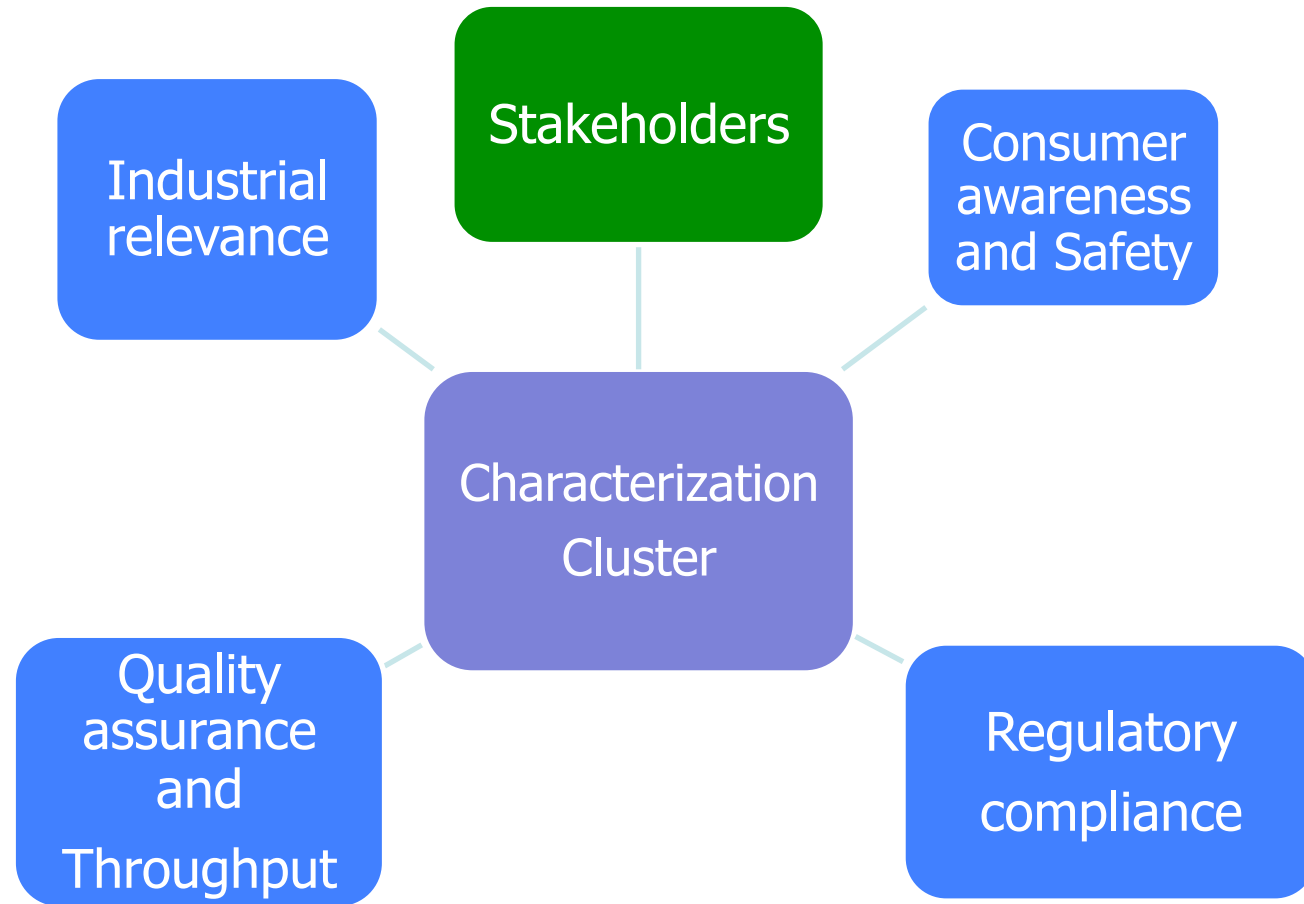
Setting up the governance

The players

- European Commission
- Global and International focused initiatives
- European, National, Regional Industry (MNs, SMEs)
- ETPs
- Existing clusters
- Networks of Excellence
- Lighthouse initiatives
- Flagship projects
- National agencies

Funding mechanism: CSA

Example from NANOMEDICINE: ENATRANS project



Acknowledgements

THANK YOU!!!

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Google scholars: [Adriale Prina-Mello](https://scholar.google.com/citations?user=AdrialePrinaMello)

Research Gate profile: [Adriale_Prina-Mello](https://www.researchgate.net/profile/Adriale-Prina-Mello)



European projects

- NAMDIATREAM EU FP7 Large (ref # 246469)
- MULTIFUN EU FP7 Large (ref # 262943)
- AMCARE EU FP7 (ref # 604531)
- NANOREG EU FP7 (ref # 310584)