ATTRACT – From Open Science to Open Innovation

Information Sharing Meeting
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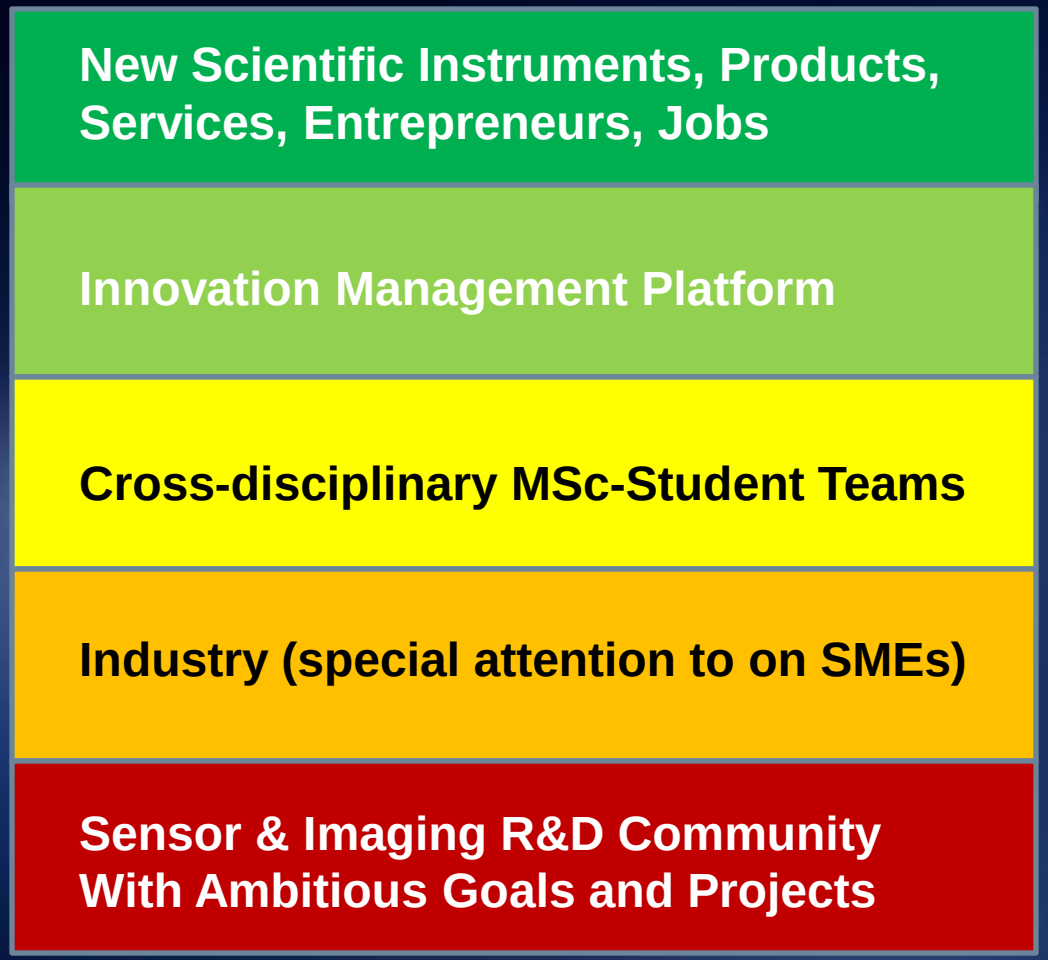
ATTRACT (breAkThrough innovaTion pRogrAmme for deteCtor / inrAstructure eCosysTem)

- A proposal for a dedicated, interdisciplinary program within H2020 to co-develop with scientists and industry breakthrough sensor & imaging technologies
- The purpose is to address demanding, parallel challenges in both science and societal needs in the domains of health, sustainable materials and information and communication technologies
- Involving detector R&D community from many fields including eg. physics, astronomy, space exploration, nuclear engineering, medical imaging, related computing (ICT) and others
- European Research Infrastructures (ERIs) and contributing labs are to play a crucial facilitating role
- Co-developing technologies together with industry, with special attention to Small and Medium sized Enterprises (SME)
- Part of the Horizon2020-programme, cutting across several EU Directorate domains (research, connect, enterprise …)
- Creating an Ecosystem by connecting Open Science to Open Innovation
- Note: This is not a CERN-specific initiative

ATTRACT Is About an Ecosystem…



Why ATTRACT?

- The detector R&D community has many ideas of potential suitability of its technologies for other use, but often have limited contacts and mechanisms available to properly exploit this options space
- Developing new technologies for both improved research capabilities and new applications could make good use of complementary, fertile R&D funding possibilities potentially offered by H2020 to further enhance R&D capacities
- The European industry, in particular SMEs, find it difficult to tap into the necessary supporting (scientific) infrastructure offered by ERIs and associated labs to absorb and shorten time to money
- SMEs, in turn, are often better equipped to interface towards MNEs than researchers
- The European detector R&D community has the experience and expertise to help but there is no coordinated effort to assist them, while maintaining their primary research motivation

Example: Needs of the Detector R&D Community…

	HEP	SYNC	Neutron ESS	Beam monitoring	Astronomy	Hadron Therapy	Medical Imaging Pre-clinical Imaging	Electron Microscopy	Environmental radiation monitoring IAEA
Radiation type	p, n, γ	X-rays	n	p, n, γ, e^-	λ=300nm to 28μm	N, p, γ, light ions (protons to oxygen)	X-rays	e	γ
Max Intensity	12x10 ^{15} ncm^{-2}	2700 pulses	10 ^{8} ncm^{-2}	10 ^{17} ncm^{-2} (p, n) 10MGy (e^-)	from 1 photon/hour/pixel to 1E9 photons/s/pixel	conventional accelerator up to 10^10 ions /s Laser > 10^7/cm2 (ps pulses, low repetition rate ~ 1/s)	CT: 10^9 γ/mm^2/s, General X-ray: 10^8 γ/mm^2/s Angiography: 10^8 γ/mm^2/s Mammography: 10^7 γ/mm^2/s	20 Mrads	100 μSv/h (~100,000 cts/s)
timing	25ns	4.5 MHz	1us	Sub ns	from 2000 frames/s to 1 frame/hour	Up to MHz (singles rate)	CT: 5000 frames/s General X-ray: - Angiography: 1-60 frames/s Mammography: -	1000 frames/s	
Pixel size (Min)	50x50 um^2	10x10um ^{2}	50x50 um^2	50x50 um^2	10μmx10μm	50 um	CT: 1000 μm General X-ray: 150-200 μm Angiography: 150-200 μm Mammography: 85 μm	10x10um^2	
Spectral resolution	yes	yes	no	yes	no , moderate possible with APD	yes	Today: not used, Future: yes	yes	< 1.5% @ 662 keV
Detector size (max)	2500m^2 (ILC cal)		80m^2	100 cm^2	Optical 9Kx9K NIR 4Kx4K	40x40 cm2	CT: 10 x 100 cm^2 (segmented), General X-ray : 43x43 cm^2 Angiography: 30x40 cm^2 Mammography: 24x30 cm^2	8k x 8k pixels	6 cm^3

ERDIT European Radiation Detectors and Imaging Technologies (CDV 2014)

Source: ERDIT http://erdit.web.cern.ch/ (Cinzia da Via)

How Does ATTRACT Work?

- ATTRACT consists of a number of specific, sensor & imaging related calls and then funded projects that the detector R&D community manages together with industry
- Calls are competitive, reviewed and assessed based on highest selection criteria
- Active cross-linkages are created between approved projects using student teams and socio-economic research teams
- Aims for simplification in funding and financing (i.e. H2020); engagement through (Technology Readiness Level-based) calls, submission-specific
- In collaboration with funding bodies, CERN could play an administrative role if requested, taking care of the admin, project compliance – but not deciding on the topics or allocation of funding

ERIs and Labs as Innovation Engines

- ATTRACT is a proposition to use ERIs and Labs as Innovation Engines as part of Open Science/Open Innovation strategy, in collaborative interaction with European Industry, with special attention paid to SMEs

- ATTRACT offers a collaborative framework where Industry and ERIs and associated Labs can act as co-creators of breakthrough ideas and innovation, pushing beyond the status quo of Industry as a passive “state of the art technology supplier” for ERIs.

- ATTRACT is a flexible and sustainable framework incorporating explicitly the training of future European scientists and entrepreneurs. A scalable demonstrator is currently starting at CERN (IdeaSquare)

- ATTRACT is an “in-situ” Innovation Management Experiment (new innovation KPIs, how to move from open to close innovation etc.)

Next Steps

- Continue discussions with the Commission
- Consolidate industry interest (establish an industry network)
- Collect sensor & imaging R&D community plans
- Organize a public event to invite and collect input from industry and scientific community
- Draft a Roadmap for a combined vision using network input from the community (eg. ERDIT, EIROforum) and industry
- Create Working groups engaging industry, R&D community, EC to define a Program
- Propose a Governance Structure (PPP?) to implement ATTRACT

We are Open, please join in our efforts

Summary

•ATTRACT is an initiative to fuel the sensor and imaging R&D engine to create new societal benefits, in parallel to creating scientific breakthroughs
•It is as a proposal to bring together industry and the detector R&D community from fields such as physics, research, astronomy, space exploration, nuclear engineering, medical imaging and ICT
•To be implemented within the scope of H2020
•ERIs and big labs will play a crucial facilitating role; the driver is the scientific community and industry (emphasis on SMEs who in turn interface with MNEs)
•It is about demonstrating the use and benefit of ambitious R&D projects as a platform of innovation
•It is about “colliding people” in the created options space
•It is about shortening the innovation cycle time, contributing to new products, services and jobs
•It is about creating a new Innovation Management Ecosystem for Europe