Accelerating development of high-performance detector and imaging technologies for science and markets

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www.attract-eu.org

What is ATTRACT?

- ATTRACT is a new, open, pan-EU initiative to accelerate the development of high-performance detector (sensor) and imaging technologies for both scientific and industrial use.

- It involves European Research Infrastructures (ERIs), European research institutes and RTOs, small and medium enterprises (SMEs), companies, universities and business and innovation specialists.

http://www.attract-eu.org/

Focus on detection and imaging technologies

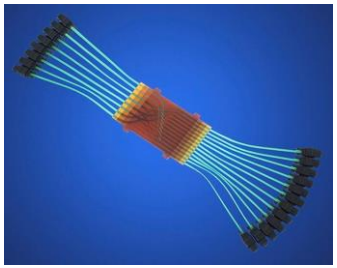
- European Research Infrastructures (ERIs) - as well as the R&D communities associated to them - treasure an enormous and underexploited *know-how* on detection and imaging technologies.
- Detection and Imaging technologies are at the core of future industrial developments applications and business.
- Detection and imaging technologies allow for the emergence of fast innovators especially SMEs and Start-Ups.

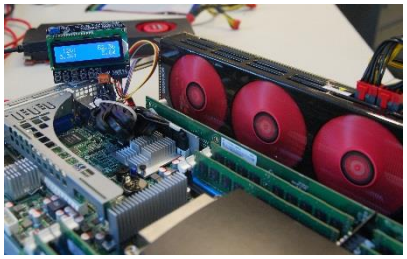
Science Connects to Markets

- Frost & Sullivan Top 50 Technologies (TechVision 2020) estimate annual sensor & imaging market(s) at over 100 b$
- ATTRACT is a 1 b$ Program to create an Innovation Ecosystem in detection & imaging technologies

Examples of Projects for ATTRACT?

- (Integrated) 3D detectors for photon and electron identification (<< 1 ps, 1micron spatial resolution) for e.g. telecom
- Fast (< 1ps, 100Mcounts/s) preamplifiers and TDC electronics, with potential for medical imaging
- New Additive Manufacturing tools for integrated manufacturing of detector/sensors support structures, with potential for compact (customized) electronic systems for e.g. avionics





What type of ATTRACT technologies?

Requirements amongst fields using radiation detectors

ERDIT

	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 ^{12} 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^{8} g/mm^{2}/s, General X-ray: 10^{8} g/mm^{2}/s Angiography: 10^{8} g/mm^{2}/s Mammography: 10^{7} g/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 mm General X-ray: 150-200 mm Angiography: 150-200 mm Mammography: 85 mm	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}

European Radiation Detectors and Imaging Technologies

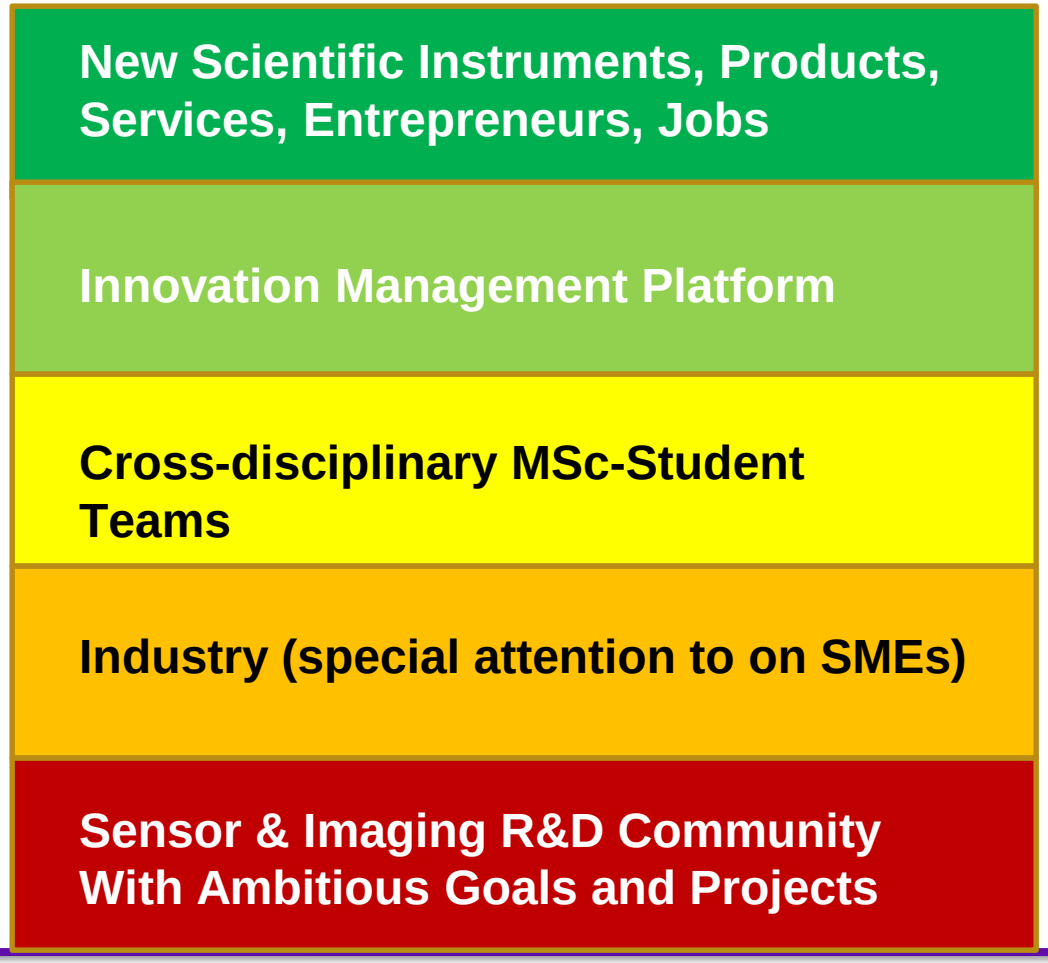
Cinzia Da Via, ERDIT – Freiburg im Breisgau 7-8 April 2014

http://erdit.eu/ . Courtesy of Cinzia da Via

Why ATTRACT?

- There is a need from both ERIs and industry to make better use of the R&D platforms and co-develop path breaking innovations
- 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 the 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

ATTRACT Is About Need to Create an Ecosystem…



Contributing to …

Connecting through …

Engaging …

Co-developing with …

Being driven by …

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Implementing “Mini-ATTRACT”

Phase 1

- A wide scope of technologies with breakthrough potential (TRL 2 to 4). Plant the “Flowers”.
- Selection process based on excellence (scientific merit, industrial scalability and social added value).

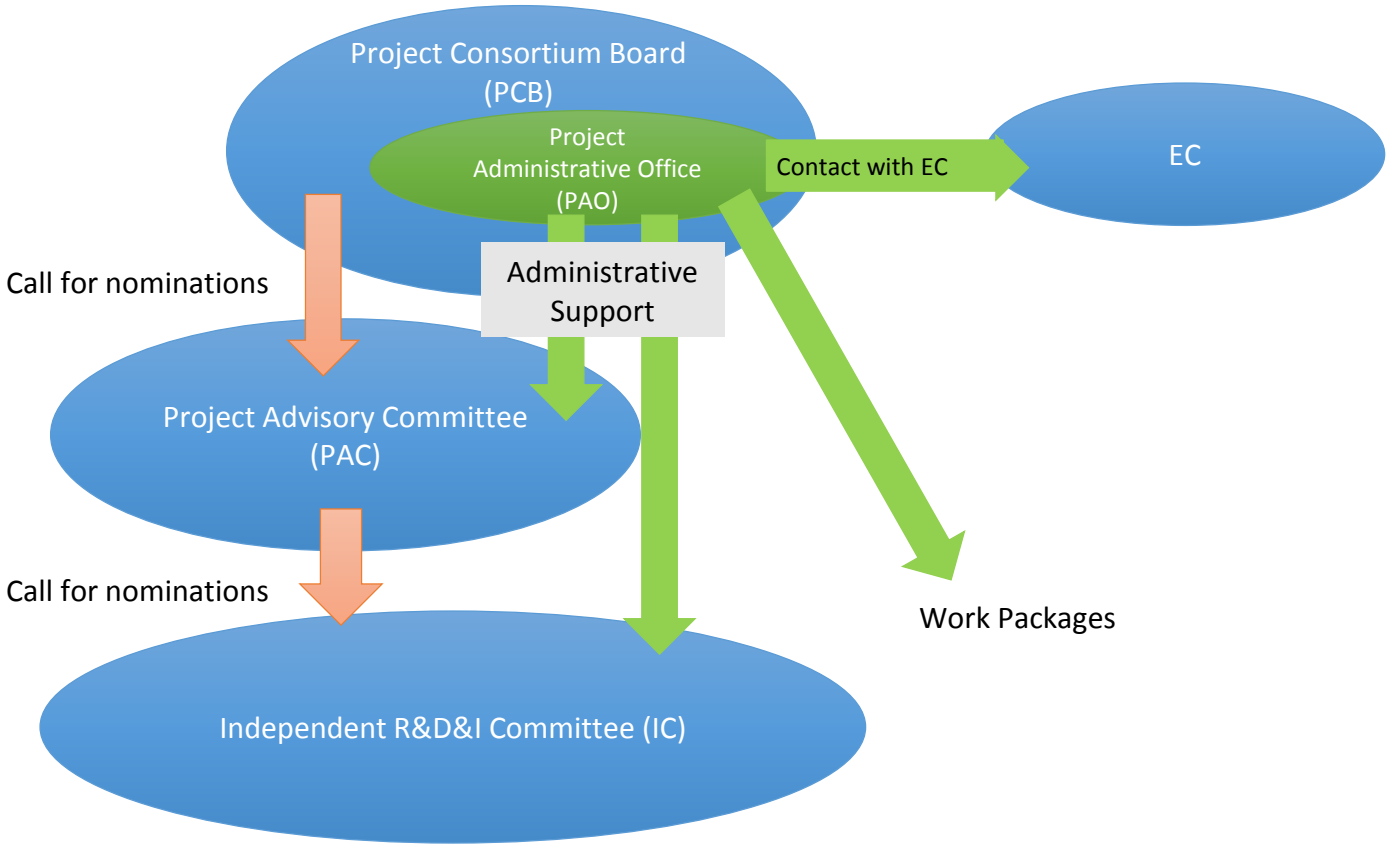
Phase 2

- Scalability of Phase 1-selected technologies towards industrial deployment (TRL 5 to 9). Select and fund 10% of Phase 1 projects.
- Construction and establishment of a self-sustained initiative (“Maxi” ATTRACT).
- Preparing to repeat the “Flowers” in parallel.

Mini-ATTRACT Submission H2020 WP 16-17 Call

- Core Consortium created to administrate the ATTRACT call(s), to be launched late 2017 or early 2018, depending if/when EC awards the *INFRAINNOV-1-2017* call to ATTRACT
- 18 ME will be redistributed in 100 kE grants, based on received and selected short, few-page proposals
- Max 2 ME will be used for administrating the call(s)
- Proposals selected by independent scientific advisory committee
- Some 20 distinguished identified members, supported by reviewers selected by the members (but not made public)
- Funded projects have 12 months to develop their ideas/prototypes for the next funding stage. Big event in Brussels
- An ad-hoc advisory body has been set up to prepare the way for “Maxi“, plan to merge with Mini-ATTRACT Project Advisory Committee (PAC). Connections with private investors

“Mini” ATTRACT Phase 1: Proposed Governance



Funding “Mini-ATTRACT” Phases 1 and 2

Phase 1 (2017-2018): Research and Innovation Action (20 M Euros EC funding) with autonomy to launch open calls with the following objectives:

- Identification of a wide spectrum of technology opportunities with breakthrough potential across the 28 EU Member States and Associated Countries.
- Assessment of the feasibility and scalability of the identified opportunities.
- Selection and clustering of those opportunities with potential for industrial implementation (transition towards Phase 2).

Phase 2 (2018-2019): Candidate FPA (>30 M Euros) with autonomy to launch open calls with the following objectives:

- Continuation with the selected opportunities from Phase 1 towards industrial applications having societal value.
- Advancement towards a strategic model for a sustainable ATTRACT initiative.

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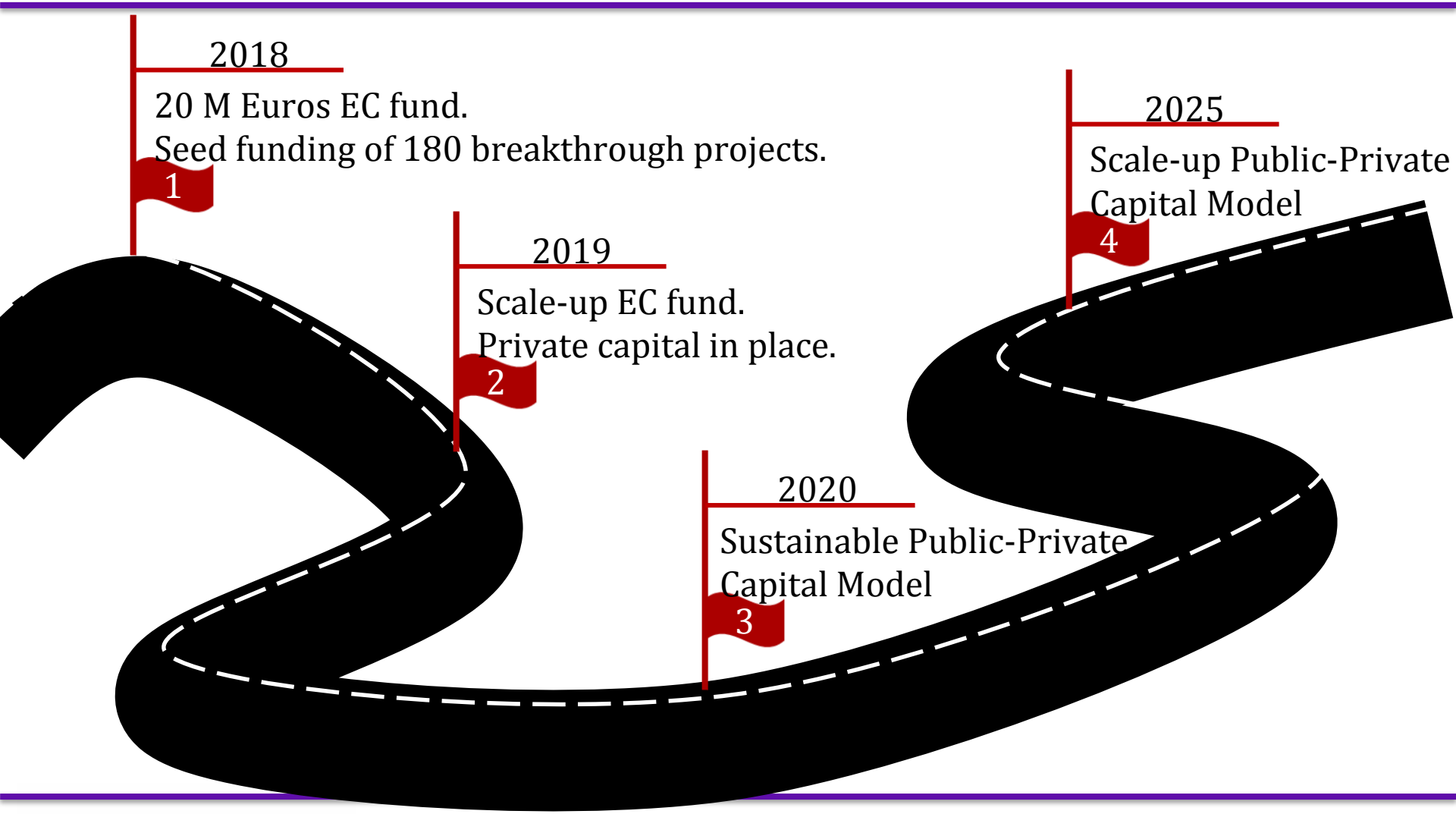
Path Ahead for ATTRACT



Thanks