THE TECHNOLOGY TRANSFER NETWORK FOR PARTICLE PHYSICS: STATUS ON MPGD PILOT OFFER

RD51 Collaboration Meeting, 26 May 2010

Hartmut Hillemanns

TTN in a nutshell

Purpose: Build "corporate identity"

- Establish a genuine partnership / collaboration amongst institutes active in Particle Physics in MS
  - Bridging the gap between the institutes members of the TT Network and industry
    - Be an attractive partner for industry
    - Enlarging the KT & TT Offer
    - Making the PP offer more visible
  - KT & TT/IP practices and tools
    - Exchange experience and practices
    - Improve capabilities amongst TT Network members
- Develop the image of the PP community as a source of knowledge that benefits society

Programme of work:

- 3-year project to develop tools and methods in order to support a permanent operation
- Elaborate structures for the TT network permanent operation

Financing

- During the execution of the project, the TT Network members will cover their own costs

Organisation & Composition

Organisation (during project phase):

- TT Network Board composed of one designated representative of each node to review the advancements of the programme of work and take all appropriate actions for its execution.
- Steering Committee composed of the work package conveners and the Network Coordinator to ensure the execution of the programme of work.
- NIKHEF and FZJülich interested

Institute	Member State	Category
CEA/IRFU	France	RI-HEP
CERN		RI-HEP
CHALMERS	Sweden	University
Copenhagen University	Denmark	University
CNRS/IN2P3	France	RI-HEP
DESY	Germany	RI-HEP
EPFL	Switzerland	University
GSI	Germany	RI-G
INFN	Italy	RI-HEP
JSI* Jožef Stefan Institute	Slovenia	RI-G
PSI Paul Scherrer Institute	Switzerland	RI-G
National Technical University of Athens	Greece	University
STFC*, Science & Technology Facilities Council	UK	RI-HEP
University of Sofia	Bulgaria	University
LIP	**Portugal**	University

(*) members since June 09

Results and Future Work Plans

Intellectual Property charter

- Intellectual Property policy, Knowledge and Technology Transfer policy, Collaborative and Contract research policy (while remaining compatible with open science)

Prototype version of the TT Network website for internal use and evaluation

- Make PP technologies & expertise more visible to industry
- PP Offer: Standard presentation of technologies, service capabilities & R&D opportunities
- Successful applications in research disciplines other than PP and in industry

Build Network corporate identity

- PP brand, concerted communication strategy, community building tools (web, training, mobility, ..)
- Development of Push/Pull mechanisms (incl. technology pooling) and Collaborative scouting
- Further exploratory actions for other possible pilots such as Si Strips sensors and Si photomultipliers

Set-up a programme of work to address socio-economic impacts of PP

Implementation proposal

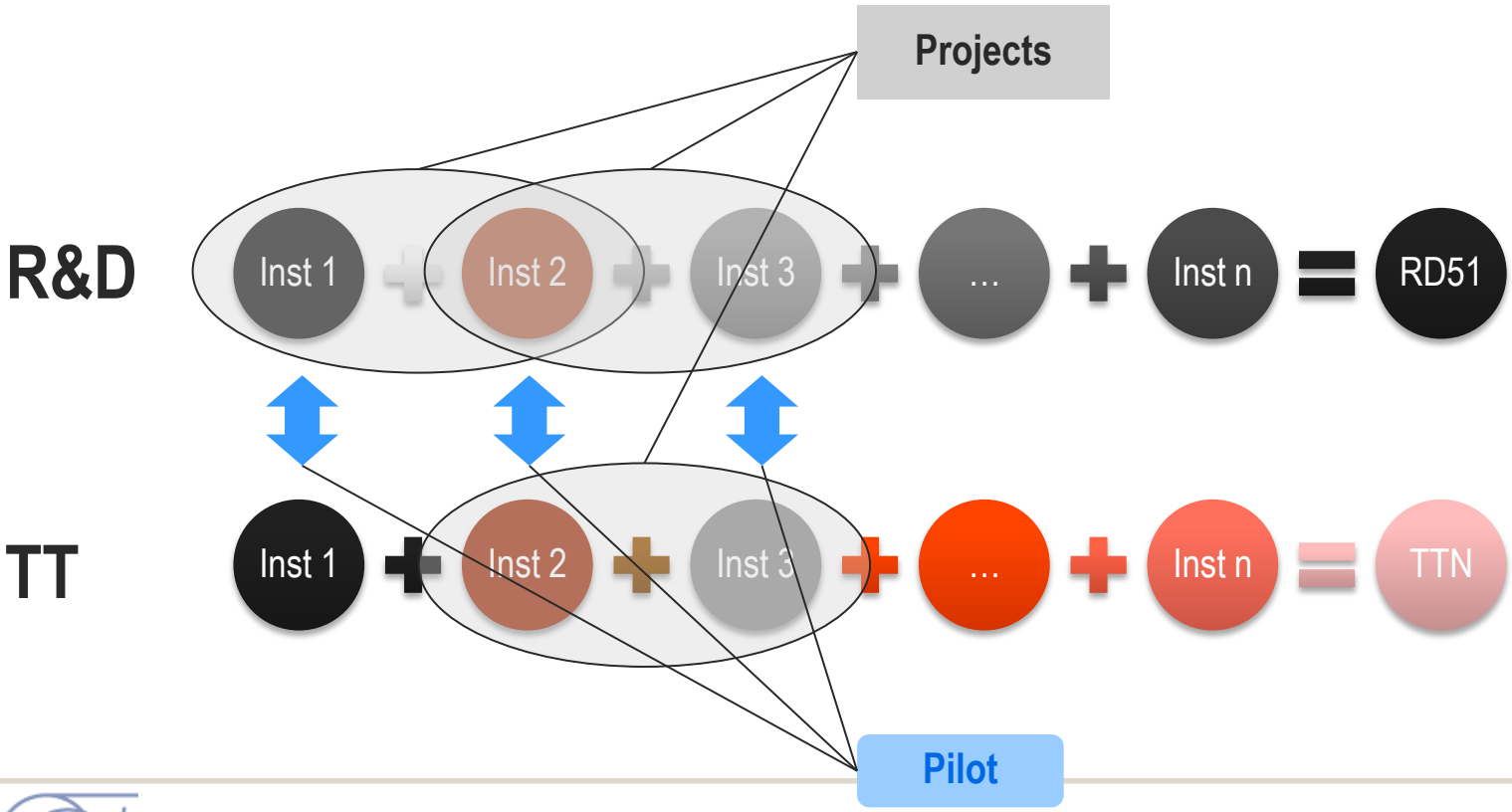
Implementation on practical cases that will be used as a pilots to develop and validate tools and methods necessary to build a PP corporate identity:

- PP specific technology
- Important and visible case with recognized TT potential
- Very good illustration of PP collaborative spirit
- Complex enough to address final goals: enhancing the attractiveness of PP technology
- General enough to trigger interest amongst TT Network members to validate/consolidate the results on other cases

RD51 and TTN

Some Similarities:

- Participating nodes share common vision, goals, strategy and projects
- Best practice exchange among participating nodes (TT is a sort of open science too …)
- Concerted communication and community building



Why a MPGD-Pilot Proposal ?

First pilot case: Micro Pattern Gaseous Detectors

- Large collaborative R&D efforts from PP community (RD-51, more than 60 institutions involved, not only PP institutes, important interest from industry);
  - Good case to define a collaborative scouting model
- Evidence for patent pooling (GEM, micromegas, front-end readout, software, etc.)
  - Very good case for the development of a collaborative push and pull model
  - First data to test community building tools; specify value and meaning of a PP brand
  - Test of concerted communication strategy
- Important and very visible case currently addressed by members of the TT Network individually with a limited collaboration at the TTO level
- TT Network member institutes participating in RD-51
  - CEA, CERN, CNRS, DESY, INFN, GSI
  - NTU, KFKI (TT Network Observer)

What are the benefits for RD51 ?

"The main objective of the R&D program is to advance technological development and application of Micro Pattern Gas Detectors." http://rd51-public.web.cern.ch/RD51%2DPublic/

- Increased visibility and awareness of RD51 technologies and expertise through concerted communication and building a MPGD community brand
- Image of an organised community:
  - More attractive R&D offer to industry in partnership
  - Concerted offer more attractive for industry to manufacture
- Promote and strengthen the image of RD51 as reference source for MPGD technologies
- Possibility to offer customer specific solution packages, expertise and services rather than raw technology components
- Simplified access to RD51 technologies, patent pool and expertise
- One SPOC (single point of contact) for facilitated identification of and access to RD51 technology offer

Achievements and To Do's

Achievements:

✓WP4 core team constituted

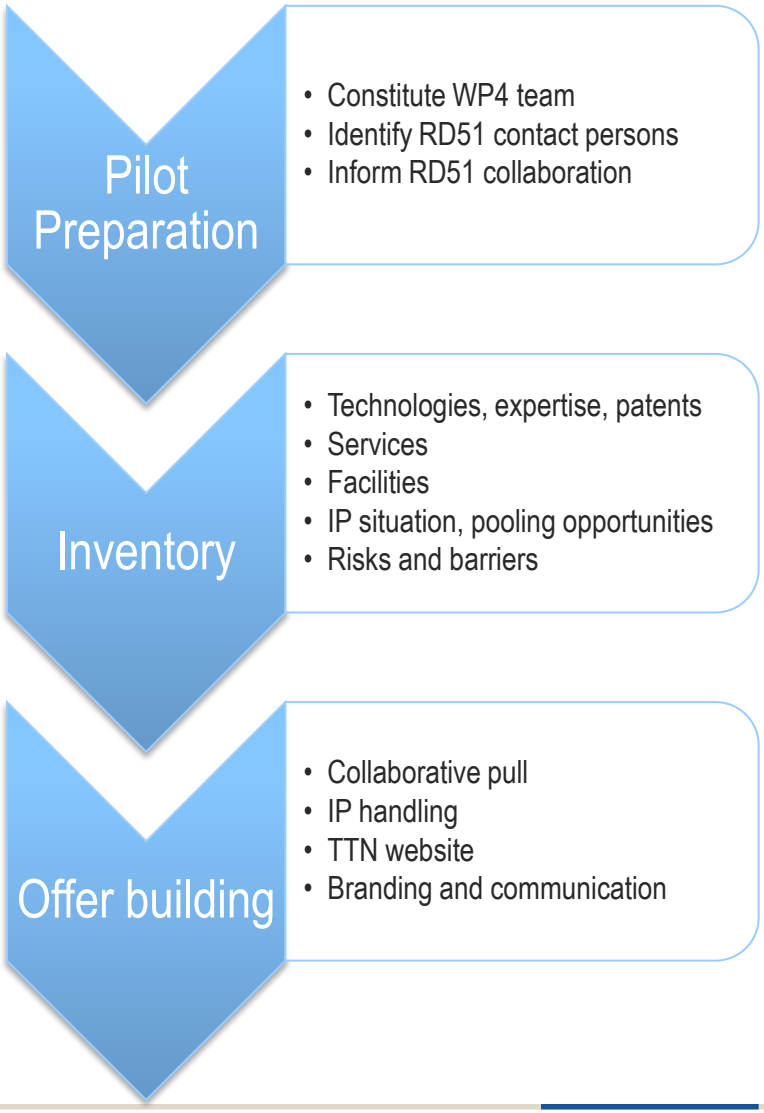
✓RD51 collaboration informed

✓TTN member contact persons for RD51 identified

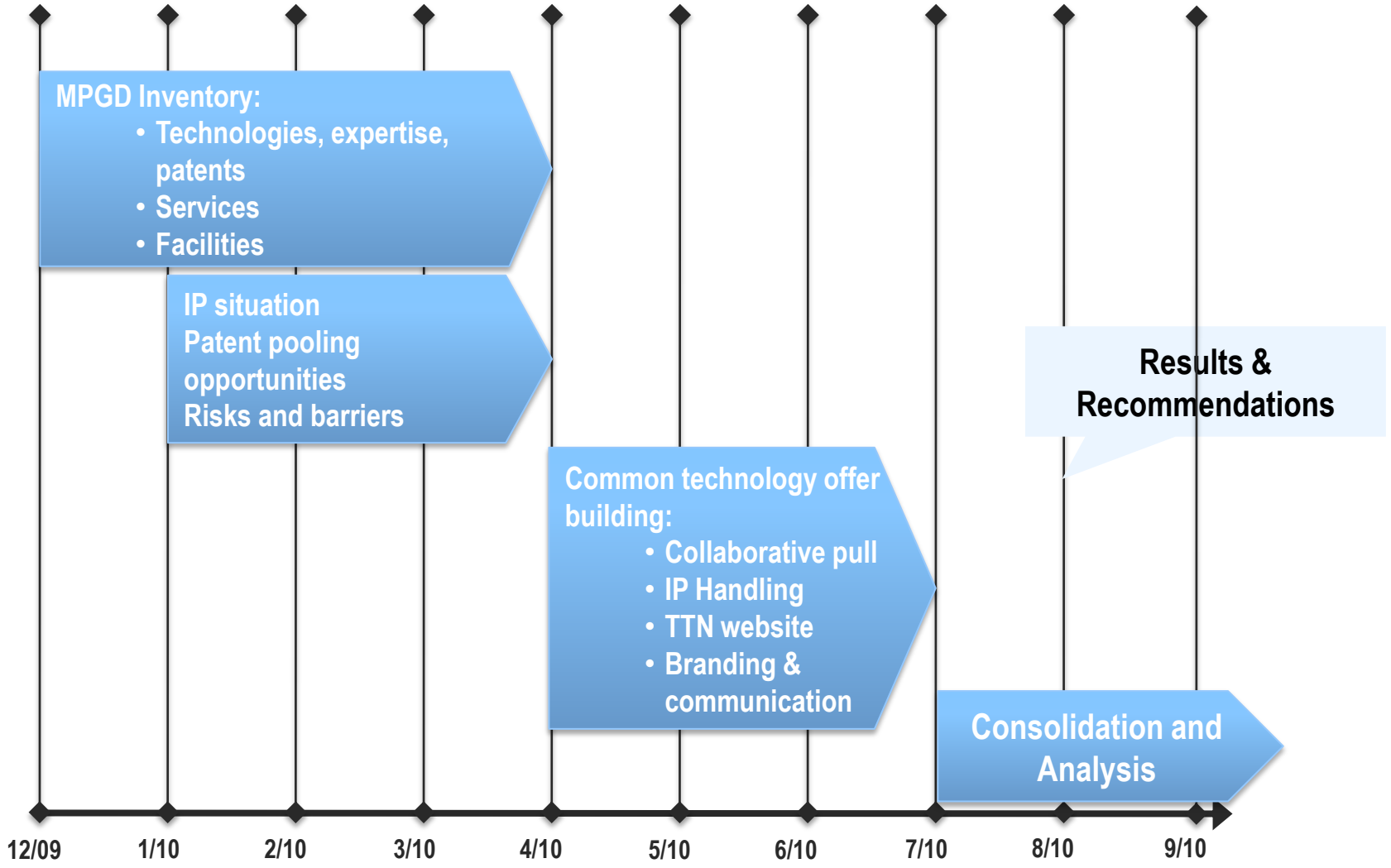
✓MPGD Inventory

To do's:

- MPGD Inventory Consolidation
- MPGD Offer building
- Offer presentation



WP4: High Level Work Plan

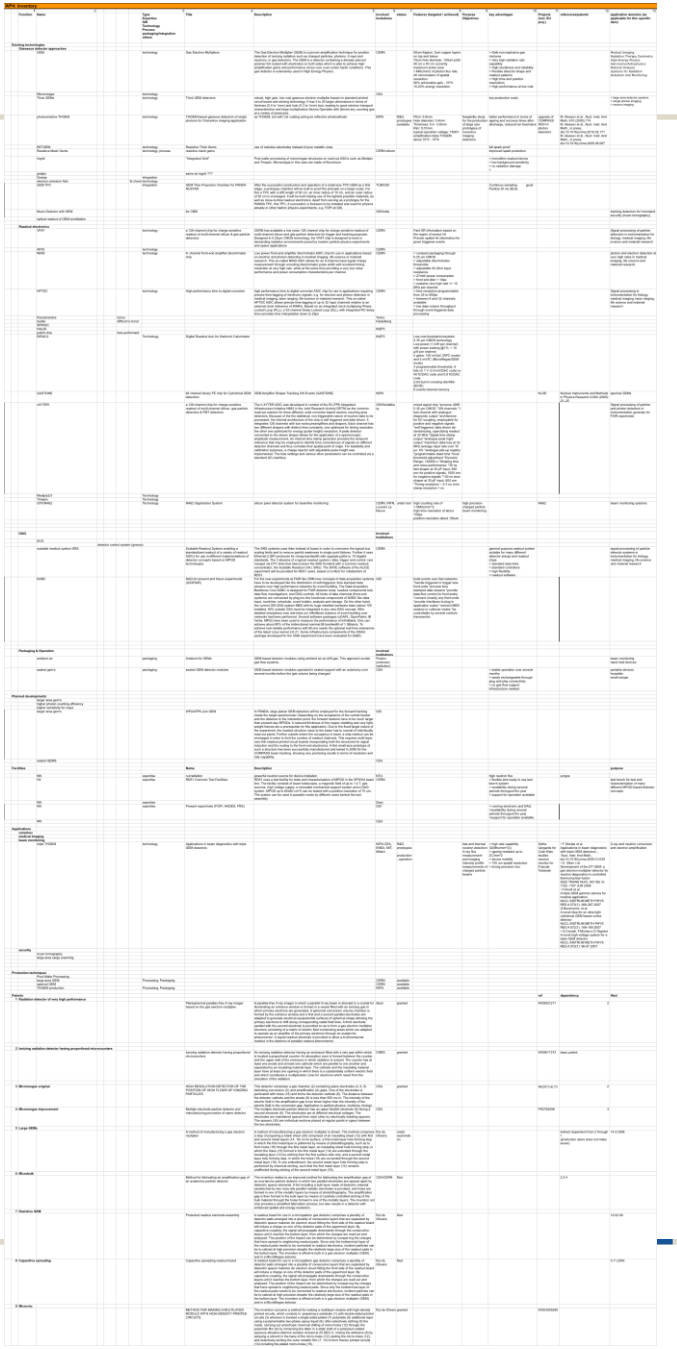


MPGD Inventory

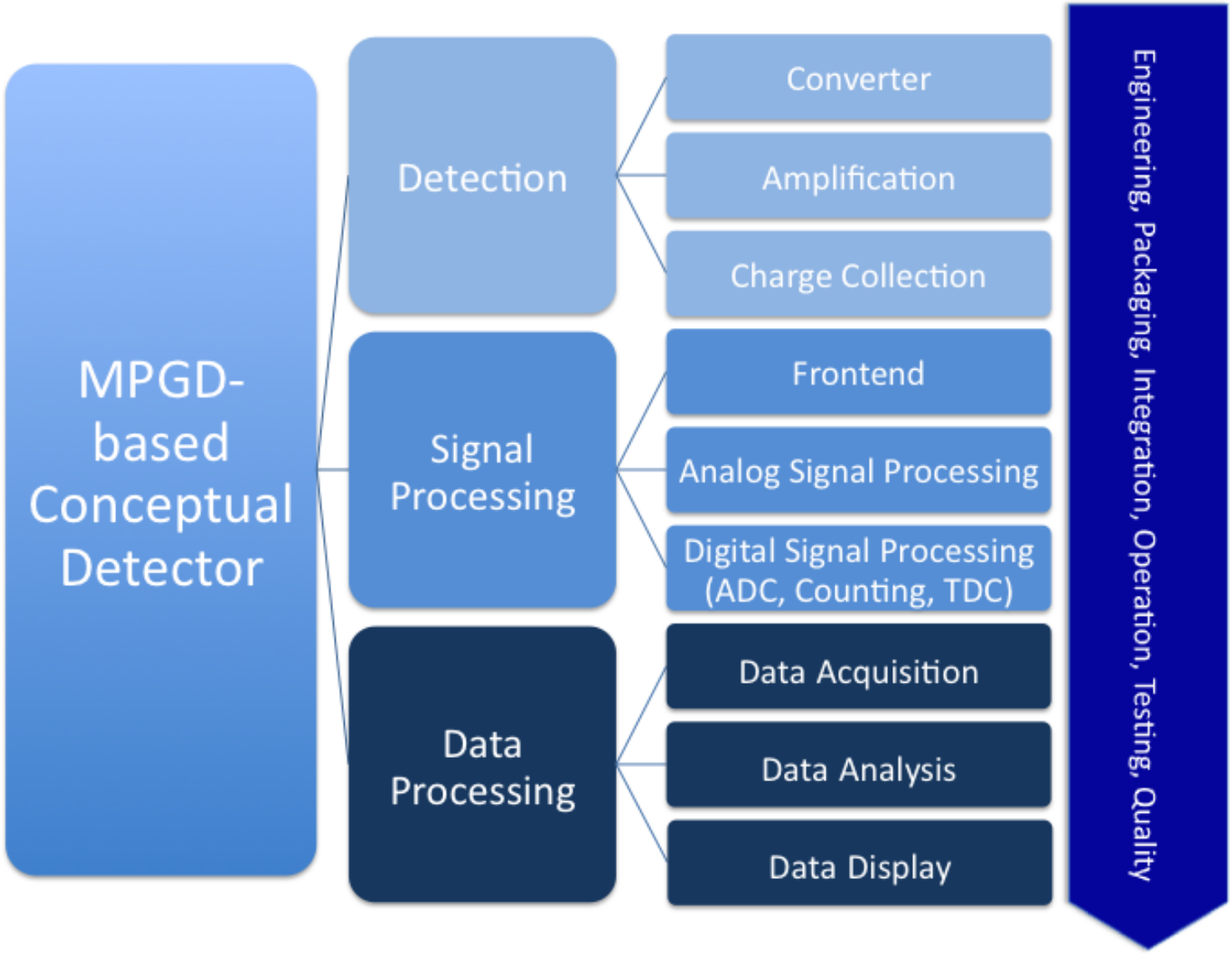
Collect information on MPGD related technology:

- GEM, Micromegas, THGEM, Ingrid, etc.
- Medipix, VFAT, NINO, HPTDC, etc.
- SRS, etc.
- Production of GEM, THGEM, etc.
- Applications
- Facilities
- Patents

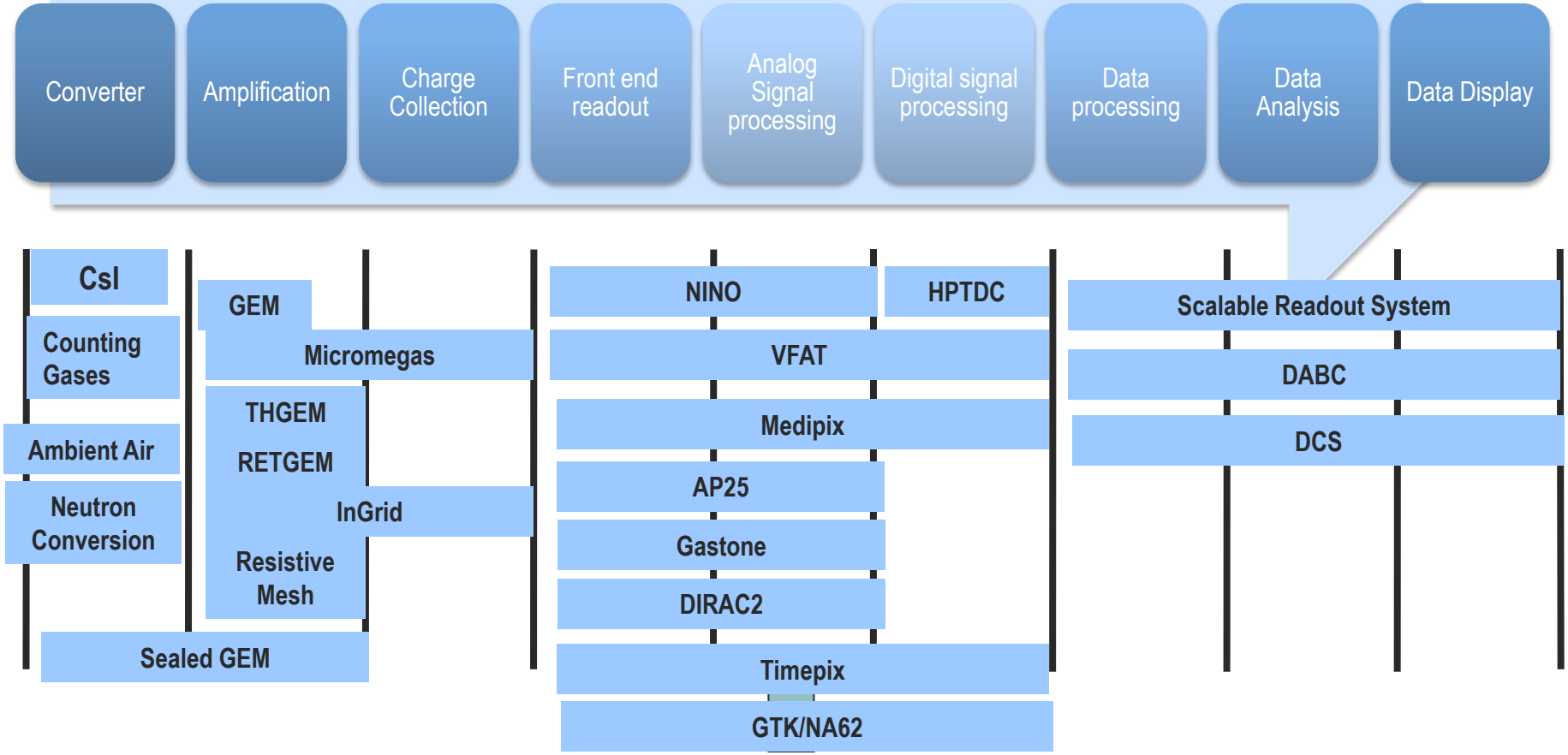
Classify along a conceptual detector scheme



MPGD Conceptual Detector



Classification of MPGD solution elements



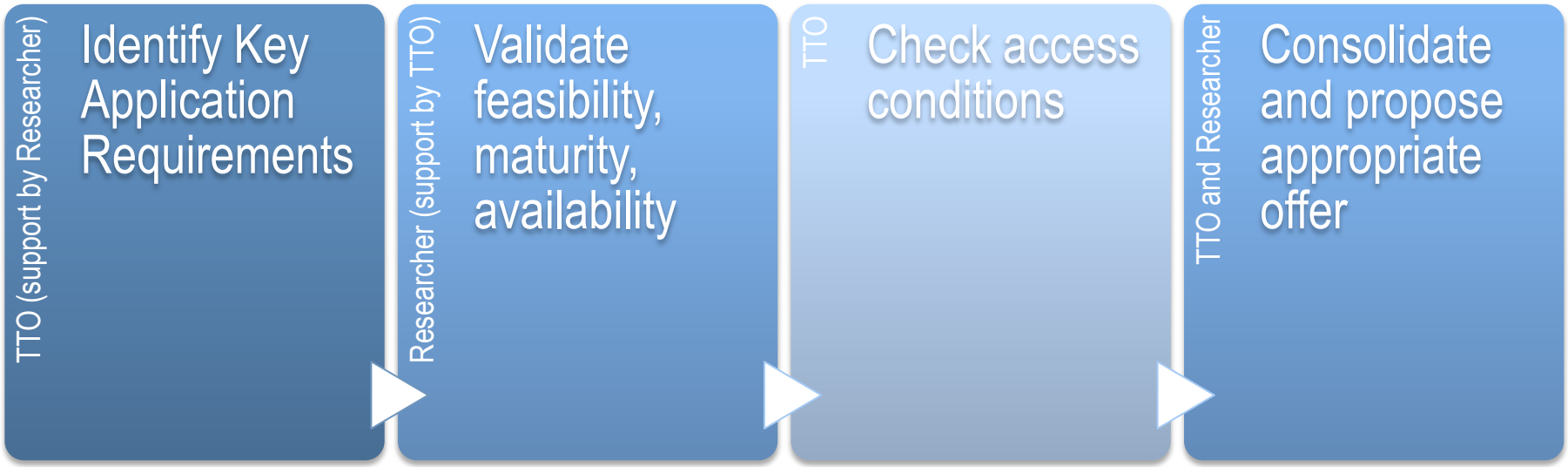
Key Requirements from Specific Applications (1/2)

Domains	Application	Converter	Amplification	charge collection	Frontend Readout	Analog Signal Processing	Digital Signal Processing	Data Acquisition	Data Analysis	Data Display	General Requirements
HEP research projects											
	Tracker systems										
	cerenkov detectors										
life science											
	Fluorescence Measurement										
health sector											
	digital radiography and CT	high detection efficiency (close to 100% to reduce patient dose rate)@140keV position resolution <0.5mm	>10^4 -10^5	< few ns	very fast signal shaping	fast discrimination	counting logic				dense conversion materials highly segmented photodetectors event rate: 100MHz/mm^2 (!) 1000 projections / s 10^5 readout channels
	PET imaging	high detection efficiency >90% position resolution <5mm no parallax error	>10^4 -10^5	< few ns	fast signal shaping: <10ns	signal discrimination with timing resolution <100ps	counting and/or time stamping (<100ps)	high bandwidth (some 10^5 readout channels !)	device specific	device specific	dense conversion materials highly segmented photodetectors 150 -200 detector modules per scanner 25cm^2 per module 100kHz typical single rate per module 1MHz maximum single rate per module 1MHz typical coincidence rate per scanner 4MHz typical coincidence rate per scanner
	beam monitoring	low material budget									
homeland security											
	Muon Tomography										
	combined gamma/neutron scanning in cargo scanners	high detection efficiency for high energy gammas (1MeV) and fast neutrons (14MeV)		pixel size: O(mm^2)			counting logic				short scanning time (1-2 minutes)
safety & environment											
	material inspection										
material science											
	X-ray Crystallography										
Neutron detection											
		detection efficiency 50% to 100% for thermal neutrons size: 0.1m^2 to 10m^2		Pixel size: 1mm^2 to 1cm^2	rate cap. >>100kHz	time resolution < 1us					Robustness Reliability Large scale manufacturability
cultural heritage											
Energy											
	neutron flux measurements										
	burning plasma diagnostics										

Key Requirements from Specific Applications (2/2)

Application	Converter	Amplifi-cation	charge collection	Frontend Readout	Analog Signal Processing	Digital Signal Proces-sing	Data Acqui-sition	Data Analy-sis	Data Display	General Requirements
PET imaging	high detection efficiency >90% position resolution <5mm no parallax error	>10^4 -10^5	< few ns	fast signal shaping: <10ns	signal discrimination with timing resolution <100ps	counting and/or time stamping (<100ps)	high band-width (some 10^5 readout channels !)	device specific	device specific	dense conversion materials highly segmented photodetectors 150 -200 detector modules per scanner 25cm^2 per module 100kHz typical single rate per module 1MHz maximum single rate per module 1MHz typical coincidence rate per scanner 4MHz typical coincidence rate per scanner
N-detection	detection efficiency 50% to 100% for thermal neutrons size: 0.1m^2 to 10m^2		Pixel size: 1mm^2 to 1cm^2	rate cap. >>100kHz	time resolution < 1us					Robustness Reliability Large scale manufacturability

From Technology Bricks to Solution Packages: How to Proceed ?



Role of TTO:

- MPGD inventory maintenance, market analysis, IP situation, MPGD technology offer

Role of Researcher:

- Validation of MPGD technology inventory, validation of key requirements, consultancy for technology offer

"The main objective of the R&D program is to advance technological development and application of Micro Pattern Gas Detectors."
http://rd51-public.web.cern.ch/RD51%2DPublic/

- ➜Increased visibility and awareness of RD51 technologies and expertise through concerted communication and building a MPGD community brand
- ➜Image of an organised community:
  - More attractive R&D offer to industry in partnership
  - Concerted offer more attractive for industry to manufacture
- ➜Promote and strengthen the image of RD51 as reference source for MPGD technologies
- ➜Possibility to offer customer specific solution packages, expertise and services rather than raw technology components
- ➜Simplified access to RD51 technologies, patent pool and expertise
- ➜One SPOC (single point of contact) for facilitated identification of and access to RD51 technology offer

Thank you for your attention

For more information and questions please contact:

Hartmut.Hillemanns@cern.ch