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# DRD1 Extended R&D Proposal

<https://cernbox.cern.ch/s/BKQsu6oiuhPWDaa>

A few points to address

Working Group Team, Working Group Conveners, Editors, Reviewers, Community  
(feedback to proposal and community meeting)

# WG1

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- Add **objectives** table highlighting relevant technological developments (connection to WP important though not mandatory)
- **New Amplification Structures** -> Removed (given examples not representatives of what new amplification structures could cover)

# WG2

- **Ambiguous comments (\*)**
- Add explicit **long-term perspective** together with 3y plans (?) to support the path to long-term and stable funding
- **Trackers/Tracking in WP1 and WP2:** Try to clarify/simplify the presence of tracking in 3.2.1 and 3.2.2
- Timing: (Large area) **detector at <ns or ns.**
- Timing (et al.): **Precision Mechanics.** Note: Currently covered in **WG3**. Potential synergies with **TF8**

#	Task	Performance Goal	DRD1 WGs	ECFA DRDT	Comments	Deliv. next 3 y	Interested Institutes
T1	New resistive RPC materials and production techniques for resistive layers	- Develop low-cost resistive layers - Increase rate capability	WG3 (3.1C, 3.2D), WG6, WG7 (7.1-5)	1.1, 1.2	- HPL, low resistivity glass - Semiconductors - Printed resistive patterns - DLC-sputtered electrodes for surface-dissipation in RPCs	- Design, construction and test of prototypes with new production techniques	INFN-RM2, INFN-PD, INFN-BO, U Kobe, INFN-PV, WIS, INFN-LNF, CERN, IPPLM, U Bolu-Abant, U Cambridge, HYU
T2	New resistive MPGD structures	- Stable up to gains of $\mathcal{O}(10^6)$ - High gain in a single multiplication stage - High rate capability (1 MHz/cm <sup>2</sup> and beyond) - High tracking performance	WG3 (3.1C, 3.2D), WG4, WG6, WG7 (7.1-5)	1.2	- High-rate DLC layout for micro-RWELL	- Design, construction and test of prototypes with new resistive materials - Modelling and Simulation (signal induction) - MPGD prototypes based on resistive elements for tracking	USTC, INFN-PD, INFN-NA, INFN-RM3, INFN-LNF, INFN-FE, INFN-PV, INFN-BO, U Kobe, WIS, IRFU/CEA, IPPLM, LMU, U Bolu-Abant, CERN
	2D readout optimization	- Development of low-granularity 2D-readout with high tracking performance			- Layouts based on low resistivity DLC film and charge sharing	- Design, construction and test of prototypes with low-granularity 2D-readout	INFN-LNF

(\*) Remove/Modify comments if misleading.

In this case a comment linked to few groups/activities can be read as the unique or main activity of this task.

# WG3

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- **Photocathodes**

1. Review/Database.. of existing facilities for PC deposition and characterization →WG3
2. Setup for Quantum Efficiency and PC Ageing studies → WG7

- **Material Studies and Analysis (Ageing,...)**

# WG4

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- Remark in the proposal the use of modelling tools for gaseous detectors (namely Garfield++) for **other detector technologies** (i.e. Silicon, Diamond,...).
- Add potential and **additional Funding Options** (Marie Curie Training Network)

# WG5

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- Hybrids, integration of pixels

# WG6

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- Interest on Competencies/Infrastructures/Equipment/Space of **completed projects**
- **Raw Material / Equipment** → now under “Common Investment”

## *6.1.3 COMMON INVESTMENTS*

*Major common investments, such as raw materials and infrastructure, within the DRD1 Collaboration will follow a similar mechanism to Work Packages (WPs). Drawing inspiration from the RD51 Collaboration model, the participating parties in DRD1 have the flexibility to collectively agree on cost-sharing for these common investments. This cooperative approach allows for the sharing of expenses related to essential requirements like base material, production or testing equipment, large scale electronics production or other procurement activities.*

# WG7

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- **Photocathodes**

1. Review/Database.. of existing facilities for PC deposition and characterization →WG3
2. Setup for Quantum Efficiency and PC Ageing studies → WG7

- Access to CERN test beam and Irradiation Facilities to be **explicitly required** (test beam of RD51 were granted because RD51 was a LHCC reviewed collab.)

- **Facilities other than the ones at CERN:** clarify better in the document and in the objectives (database of facilities & facilities with local DRD1 support)

*Identify Other Test Beam Facilities: The aim of this task is to identify other test beam facilities that have a local support group that could be accessed by members of the collaboration. This way DRD1 collaborators may have alternative testing sites: (i) for periods that CERN beam facilities are not available (e.g. periods of long shutdowns) or (ii) in case of difficulty to bring their equipment to CERN and therefore prefer a local test beam site.*

# WG8

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**Recognition and Support for young R&D Experts:** The Collaboration will promote proper recognition and support for the careers of instrumentation R&D experts. This support will be facilitated through the member institutes and their interface with the scientific community and institutions.

## See 4.8.3 Career Promotion

- Invite young researchers to leadership roles within the collaboration (e.g. WG (co-)convenorship, organising topical workshops)
- Awards for young (as well as experienced) researchers presented during the collaboration meeting
- Visibility through presentations in collaboration meetings and topical workshops
- Promote opportunities through blue-sky RFD in Common Projects with dedicated funding for young researchers.
- Favour new career development opportunities through expanded collaborative networks, training events such as summer schools and workshops, and DRD1 visiting scientist programs.
- Monitor the work related to experiments needs, associate stimulating and innovative detector physics R&D aspects to, sometimes unavoidable, repetitive work which often does not require intellectual effort, therefore scarcely considered.

Moreover, opportunities must be advertised on DRD1 web pages:

- Share information about job opportunities.
- Availability of training periods in the DRD1 common facilities and laboratories.

In addition to the actions under the direct control of DRD1, attention must be given to promoting the implementation of longer-term measures at research institutes and universities including the following:

- Increase the availability of high-level PhD thesis fully dedicated to detector developments.
- Include gas detector activities in university courses.
- Engaging trainee students in the development of detectors, as they evolve to achieve their undergraduate/diploma/PhD degree.
- Academic positions or longer term contracts for courses on detector developments.
- Correct evaluation of detector-dedicated activities in CVs.
- Responsibility roles for R&D within collaborations.

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Involvement of groups in  
collaboration activities/efforts  
(WG objectives)

# Working Group Objectives(I)

## WORKING GROUP 6

### Production and Technology Transfer

Reference	Description	Deliverable Nature
D6.1.1	Production Needs: detector type and size, production volumes and quality	Report with estimation for each technology
D6.1.2	Production Capabilities: detector type and size, production volumes and production quality	Report with inventory for each technology
D6.1.3	Needs and Capability Matching (costs)	Report with required resources in terms of equipment and personnel
D6.1.4	Identify Resource Pooling strategies for the creation or the upgrade of production facilities	Resource Requests

Table 19: WG6 - Objective 6.1: Development and maintenance of common production facilities and equipment, list of tasks and deliverables

Reference	Description	Deliverable Nature
D6.2.1	QA/QC protocols for each technology	Report
D6.2.2	Inventory of missing but required instrumentation for QA/QC	Report

Table 20: WG6 - Objective 6.2: Quality controls and large volume productions, list of tasks and deliverables

Reference	Description	Deliverable Nature
D6.3.1	Technology transfer checklist	Report
D6.3.2	Technology transfer database (project, industrial partner)	Database

Table 21: WG6 - Objective 6.3: Collaboration with Industrial Partners

Reference	Description	Deliverable Nature
D6.4.1	Establishment and support of a forum for sharing experiences, knowledge, and best practices on gaseous detectors	Online Forum

Table 22: WG6 - Objective 6.4: Establishment and support of a forum for sharing experiences, knowledge, and best practices on gaseous detectors

# Working Group Objectives(II)

## Collect the interest of the groups on contributing to common activities/objectives

### WORKING GROUP 6

#### Production and Technology Transfer

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Table 22: WG6 - Objective 6.4: Establishment and support of a forum for sharing experiences, knowledge, and best practices on gaseous detectors

- Identify a set of objectives
- While asking the confirmation of being part of the collaboration, requiring to express intention on contributing in the listed objectives

WG	Objective	Inst. A	Inst. B	Inst. C	Inst. D	Inst. E
WG3	Gas Properties Measurement	■				■
WG3	Eco-friendly Mixtures					
WG3	Ageing and Outgassing					
WG3	Gas systems					
WG3	Resistive Materials				■	
WG3	Precision Mechanics					
WG4	Garfield++					
WG4	Simulation of Large Charges and Space Charge					
WG4	Simulation of Detectors with Resistive Elements					
WG4	Modelling and Simulation of ECO-Gases	■				
WG4	Simulation Optimization (time, resources)		■			
WG4	Electroluminescence					
WG5	Front-End Electronics for Gaseous Detector					
WG5	Modernised Readout Systems (DAQ): high performances	■				
WG5	Modernised Readout Systems (DAQ); FE Integration				■	
WG5	Modernised Readout Systems (DAQ): portability					
WG5	Instrumentation ( HV,LV, monitoring )					
WG6	Common Production Facilities and Equipment	■				■
WG6	QA/QC					
WG6	Collaboration with Industrial Partner				■	
WG6	Gaseous Detector FORUM (know-how)					
WG7	Detector Laboratories Network					
WG7	Test Beam					
WG7	Irradiation Facilities					
WG7	Specialized laboratories (outgassing/ageing, gas analysers)				■	
WG7	Common instrumentation and software					■
WG8	Knowledge Exchange and Facilitating Scientific Collaborations			■		
WG8	Training and Dissemination Initiatives					
WG8	Career Promotion					
WG8	Outreach and Education		■			