

DRD1 Survey

Eraldo Oliveri (CERN) on behalf of the DRD1 Working Group
team and the WG session organizers

ECFA

European Committee for Future Accelerators



Outline

- **Schedule**
- **Survey overview**
- **Preliminary (general) outcomes**

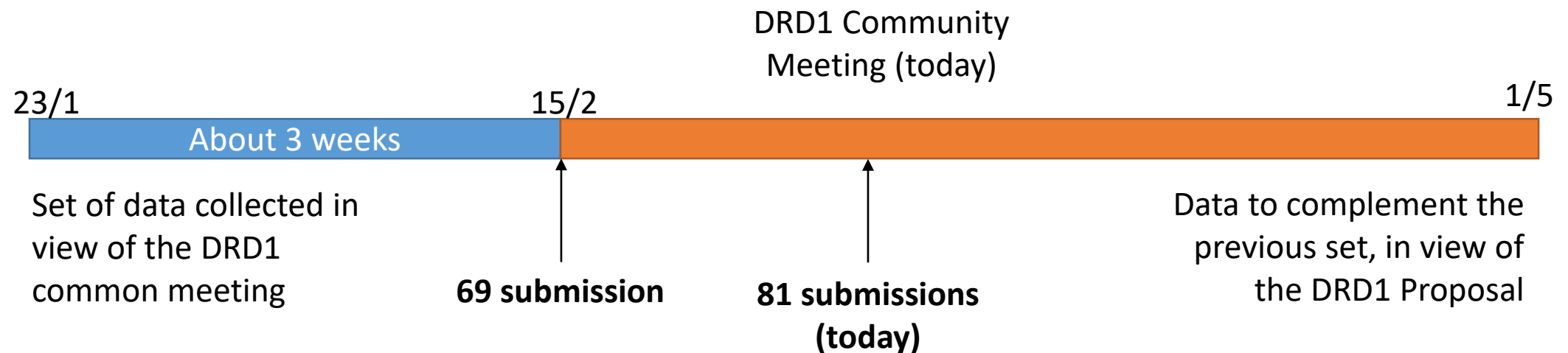
Important comments

- **The survey should not be considered as a complete representation of the community. The DRD1 Working Group team and the WGs “conveners” (both in charge of the formation of the new collaboration) play the major role in this context. The survey helps in collecting information and reduces the risk of omitting something in the community.**
- **We are in the initial phase of the survey analysis. Not all the information we want/need can be extracted unambiguously. This will be most likely reflected in (not relevant) differences in the results that will be presented in these days when analyzed by different persons. This will require iterations and additional contacts with the groups.**
- **For clarity: survey is neither a commitment nor a sine-qua-non for becoming a member of DRD1.**
- **A list of institute (group) representatives has been created. The list is not static and in continuous evolution, open to groups interested in DRD1. Only members of this list have access to the survey. Please contact us if you are not in this list or if you encountered problems in accessing the survey (link at the end).**

Survey schedule

- Opening date: 23 January
- Intermediate closing date: 15 February
- DRD1 Community Meeting: 1-3 March
- Final closing date: 1 May 2023

Institute contacts that did not submit yet but want to provide information in view of the proposal will have time till the 1st of May (though earlier you do better it is)



Survey Skeleton (I)

DRD1 Survey

Please take note that surveys can be saved and answers can be recovered before going to final submission. The final submission is expected by Wednesday 15th of February 2023.

Institute*

url (url of the institute)

Country*

Contact person:*

Contact Person email*

Research Activities

Short description of the research activities (technologies, applications, goals and achievements):
(Maximum 12 lines)*

Facilities

Please list facilities (laboratory, workshops, production, irradiation, beams...) that are present at your institute or accessible to your group in the context of your research institutions.

Available Facilities (pick-up list)

- Detector Characterization Laboratory
- Manufacturing and Production Workshop
- Assembly Facilities
- Clean Rooms
- Gas system design and production
- Mechanical Workshop
- Electronics Workshop
- Analysis Laboratory
- Metrology Laboratory
- Radioactive Sources (active, passive)
- Irradiation Facilities
- Test Beam
- Other

Available Facilities (free text)

Provide more information about the selected facilities and specify if access to external users is possible and according to which modality.

Survey Skeleton (II)

Personnel (Optional)

Feel free to indicate approximate personnel power in FTE/year, and split the personnel (FTE/year) into staff and temporary (students, postdocs, and researchers with limited-duration contracts).

Note that the information concerning the personnel and resource will remain confidential and in the public documents, only the aggregated form will be provided.

FTE/y (Permanent)

FTE/y (Temporary)

Additional Personnel (Optional)

Feel free to indicate if your group is planning to request additional personnel in the context of activities that are connected to DRD1.

Note that the information concerning the personnel and resource will remain confidential and in the public documents, only the aggregated form will be provided.

Additional FTE/y (Permanent)

Additional FTE/y (Temporary)

List of participants (already contracted personnel, as to appear on the DRD1 proposal):

Name, email

Budget Profiling (Optional)

In case you foresee to apply for more resources to your funding agency to address strategic DRD1 activities over the years [2024-2028], feel free to indicate it. In such a case, please provide a rough estimation of a budget profiling over the years [2024-2028] needed for your R&D and if there is any plan to submit a request for new strategic R&D budget.

Note that the information concerning the personnel and resource will remain confidential and in the public documents, only the aggregated form will be provided.

Budget Profiling [2024-2028] in kCHF

Please estimate in kCHF the operational budget (consumables, investment into detector production, and operation of equipment ...) required to support your wished detector R&D researches

Please indicate if there is a plan to submit a request for a new strategic R&D budget

Funding Programs and Agencies

Please indicate funding programs and agency for your research activity connected to DRD1

Survey Skeleton (WG1)

1. Technologies of interest

Please select one or more technologies of interest for your group and add in the comment section more information or remarks and notes if needed.

Technologies of interest*

- MPGD
- RPC and MRPC
- Wire chambers (incl. Straws, TGC, CSC...)
- Large Volume Detectors (drift chambers, TPCs)
- New amplifying structures
- Other | ...

Survey Skeleton (WG2)

2. Applications

Provide general research topics and when possible more specific lines carried out by your group of planned for future activities. If not included in the list, please add them in the comment/notes section.

Select application areas connected to the research activity of your group*

- (Muon) Tracking and Triggering Systems
 - Inner and central tracking with particle identification capability (drift, straw, TPC...)
 - Calorimetry
 - Photon detection
 - Time of Flight
 - TPCs for rare event searches
 - Fundamental research and applications beyond HEP (including ind
 - Other
- Comments/Notes

(Muon) Tracking and Triggering Systems

- Radiation hardness and stability (aging, discharges) of large area up to hundreds of C/cm² of integrated charge.
- Stable and efficient operation (rate, occupancy) up to ~10 MHz/cm².
- Manufacturing or large detectors and large systems at low cost. Technological transfer to the industry.
- Eco-friendly gas mixture and optimized operation with high WGP gas mixture (tightness, recuperation, accessibility)
- Study of resistive materials (RPC and MPGD): high gain in a single multiplication stage (beneficial for assembly, production and costs)
- New material and production techniques for resistive layers for increasing the rate capability
- Thinner layers and mechanical precision over large area
- Other

Survey Skeleton (WG3)

3. Gas and material studies

Please select relevant topics for your current and future research activities

Select relevant topics for your group on gas and material studies

- Gas Properties (e.g. cross-section, chemical characterization, measurements)
- Eco-gases studies
- Light emission in gases
- Gas recuperation and recirculation systems
- Gas systems
- Sealed detectors and systems
- Resistive electrodes
- Solid converters
- Photocathodes (novel, ageing, protection)
- Novel materials (e.g. nanomaterials)
- Material properties for detector and infrastructures
- Light (low material budget) materials
- Precise mechanics
- Ageing
- Outgassing
- Radiation hardness
- Other

R&D equipment, Infrastructures and service for Gas and material studies at your Institute

Please, list any relevant equipment, infrastructures and service at your Institute and if they are:

1. Existing
2. Planned via new strategic R&D programs at your institute
3. Needed but not available or foreseen in future at your institute

Please specify if external groups can access them at your institute.

Would you be willing to contribute or support common developments in the context of the DRD1 collaboration?*

If the answer is yes, please add more information in the Comments/Notes section if your team can take charge of specific tasks, or if member of your team are willing to supervise common developments or if member of your team are willing to take part of ongoing efforts or if you can financially support common developments of interest for your work.

Survey Skeleton (WG4)

4. Detector physics, simulations, and software tools

Research interests and activities

- Detector Physics (modelling and simulations)
- Detector Performance Studies (modelling and simulations)
- Software development and maintenance
- Gas Properties Databases (e.g. cross-sections) - Use and/or Maintenance
- Detector design
- Other

Please select the activities of interest for your group and specify in the comments if the interest is as user and/or developer

Relevant simulation and software

Which software/simulation development do you consider necessary on a term of 5-10 years to improve your work or, as users, to make progress in the field?

Development of and access to simulation and software

List, if any, relevant problems you experienced or you would expect on doing software work with your team, both as developers and as users...

Software Development*

Is your team involved in software development? If the answer is yes, please specify in the comments section the activity and the number of involved people.

Would you be willing to contribute or support common developments in the context of the DRD1 collaboration?*

If the answer is yes, please add more information in the comments section if your team can take charge of specific tasks, or if members of your team are willing to supervise common developments or if members of your team are willing to take part in ongoing efforts.

Survey Skeleton (WG5)

5. Electronics for gaseous detectors

Research interests, activities and needs

- Analog Electronics
- Digital Electronics
- Discrete Readout Front End Electronics
- Multichannel Integrated (ASIC) Readout Front End Electronics
- Pixels
- FE input protection
- Spark Quenching
- Charge readout
- Photon readout
- Waveforms and Digitizer
- Cluster Counting
- Signal Processing
- Timing
- High rate
- Low noise
- Wide Dynamic Range
- Grounding and shielding
- Calibration
- Trigger-less systems
- General purpose Data Acquisition systems
- SoC based sensor readout
- FPGA based readout/trigger
- High Voltage Systems and High Voltage distribution schemes
- High resolution floating ammeters
- Monitoring and control systems
- Dedicated lab instrumentation
- LV Powering
- Cooling
- Other

Please select research interests for your group. Add more information in the Comments/Notes session if needed.

Relevant electronics

What development in electronics do you consider necessary over a term of 5-10 years to improve your work or, as users, to make progress in the field?

Development, use and access to electronics

List, if any, relevant problems you experienced with electronics, both as developers and as users.

Electronics Development*

Is your team involved in electronic development?

If the answer is yes, please specify in the Comments/Notes section the activity and the number of involved people.

Would you be willing to contribute or support common developments in the context of the DRD1 collaboration?*

If the answer is yes, please add more information in the Comments/Notes section if your team can take charge of specific tasks, or if member of your team are willing to supervise common developments or if member of your team are willing to take part of ongoing efforts or if you can financially support common developments of interest for your work.

Do you have access at your institute to experts and services that can support common activities in the collaboration?*

If the answer is yes, please provide more information in the Comments/Notes section.

Add comments in case the answer is no but you plan to (or you would like to) ask for some support at your institute.

Do you have experience and industrial contacts for custom made electronics production?*

Survey Skeleton (WG6)

6. Detector Development, Manufacturing and Production

Provide your interest in facilities for prototype production and/or contribution to new production methods and/or industrialization aspects. If not included in the list, please add them.

Do you have production capabilities at your institute?*

If yes, please list them in the facility section at the beginning of the survey and specify if they are accessible to external users.

Is your group planning to produce detectors (components) or to support facilities (in your institute or external) that can do it?*

If yes, please add in the comment section more information

Interest in existing or potential production and facilities*

- CERN EP-DT Micro Pattern Technology (MPT) Workshop
- Saclay MPGD workshop
- RPC/MRPC workshop
- Wire chambers workshop |
- Novel detector production methods
- CERN EP Thin Film & Glass service (photocathodes, coatings, ceramic)
- Other

Please select production facilities that are of interest for your group. Specify in the following Comments/Notes section if your group is planning to access the manufacturing facilities as simple users or if you may consider contributing and supporting the facility.

Clarify whether the workshop or the production process of your interest do not exist yet, but it would be desirable for common activities and needs (e.g. common facility for RPC gaps).
Are you interested in financially supporting the development of existing or future facilities?*

Interest in manufacturing and production processes.

Please indicate if your team would like to develop some learning regarding the manufacturing and/or industrialization of detectors? (Definition of specifications, CAD, QA/QC)

Knowledge Dissemination

- Seminar
- Courses
- Training from industrial partners
- Other

If of interest, select potential ways to improve the knowledge transfer to your research group. Please add in the next Comments/Notes section if not listed.

Relationships of your group with industry*

- Development of new manufacturing processes
- Responsible of Technology Transfer
- Production
- Other

Please, if possible, specify which type or interest or relationship with industry your group has.

Survey Skeleton (WG7)

7. Common Test Facilities

Includes development of common detector characterization standards. If applicable, provide the relevant test facilities for your detector characterization or interest in development of common detector characterization standards.

Please select Detector Characterization Facilities of interest for your research*

- General purpose detector development laboratories
- Ageing Study Facility
- Gas studies facility
- Irradiation facility
- Test beam facility
- Chemistry and material laboratory
- Clean Room
- Instrumentation for common detector characterization (e.g. gas, DAQ, HV systems)
- Other

Access and use of common facilities and services

List, if any, positive experiences and advantages or difficulties and relevant problems you experienced accessing and using common facilities and services.

Outline facilities and services present at your institute (that could be used by DRD collaborators):*

Please explain the facility modus operandi: schedule, availability, accessibility, costs to users ...)

Is your institute interested in contributing to the management and operation of existing/planned facilities/services?*

If the answer is yes, please add in the Comments/Notes section more information.

Is your institute interested in contributing and/or financially supporting the development/construction of specific services for existing or new facilities?*

If the answer is yes, please add in the Comments/Notes section more information.

Is your institute interested in contributing and/or financially supporting the usage of specific services that you may need?*

If the answer is yes, please add in the Comments/Notes section more information.

Survey Skeleton (WG8)

8. Training and dissemination

Training and dissemination Activities your group could be interested in

- Schools and trainings
- Topical workshops
- Knowledge transfer
- Other

Please select where your team is involved. If not included in the list, please add them.

Training and dissemination Target

- Bachelor and Master Students
- Doctoral students
- Postdoc
- Senior

Training and dissemination

List examples of existing or potential training and dissemination activities that you would like to have in the context of the DRD1 collaborations?

Is your group interested in organising training and dissemination activities?*

If the answer is yes, please provide more information in the Comments/Notes section

Strategies to recognize and sustain the careers of R&D experts

Please indicate strategies to recognize and sustain the careers of R&D experts already settled at your institute or suggest potential ones that could be implemented in the context of the DRD1 collaboration.

Young Researchers

Please indicate the number of young (<5 years postdoc) researchers in your team.

Preliminary results

Disclaimer: what follows should be considered for the moment as a set of examples of information that we can extract from the survey.

Community Response

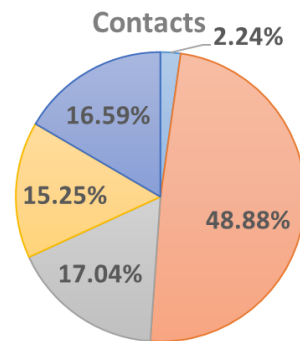
Survey Submissions (technology defined by contact list)

Submissions	
LDC	2
MPGD	38
RPC	13
TPC	11
WIRE	10

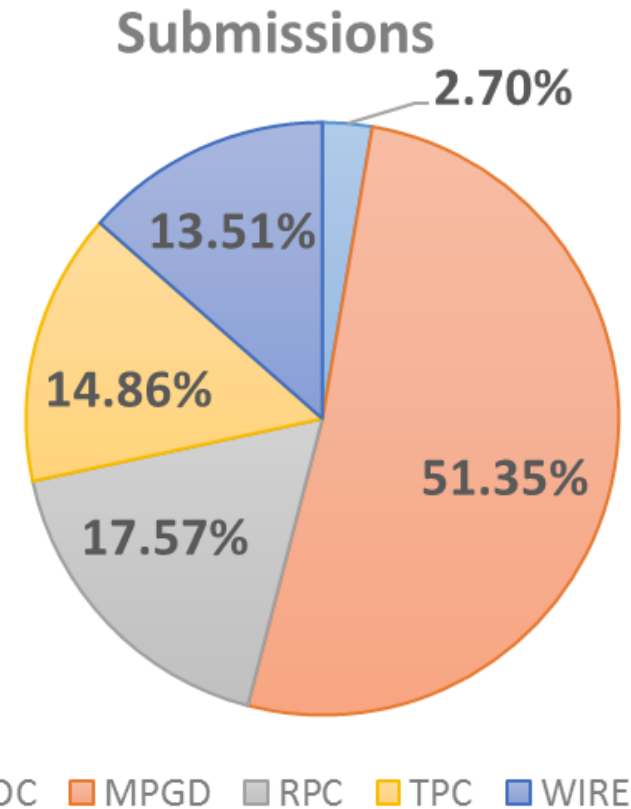
Total = 74

(Contacts = 223)	
LDC	5
MPGD	109
RPC	38
TPC	34
WIRE	37

33%



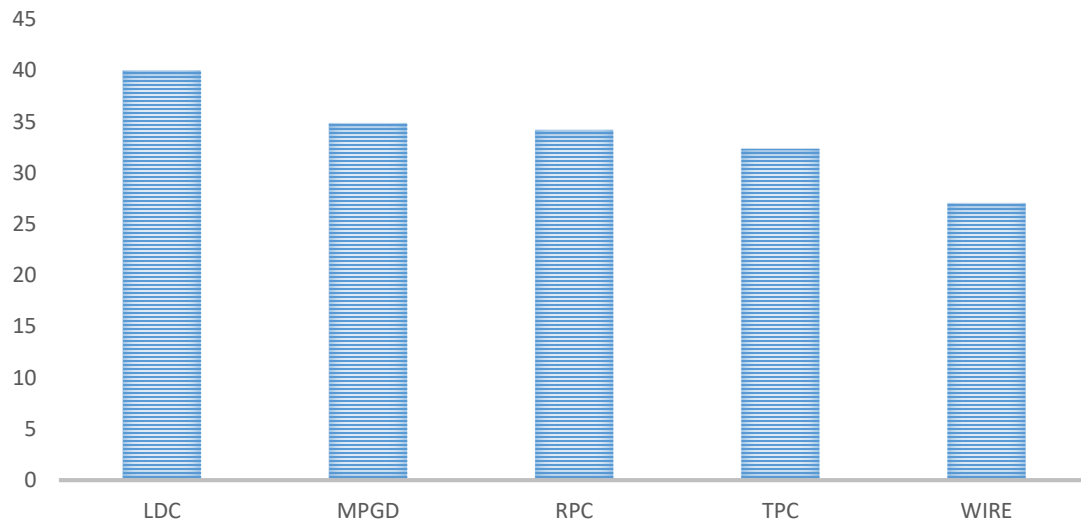
■ LDC ■ MPGD ■ RPC ■ TPC ■ WIRE



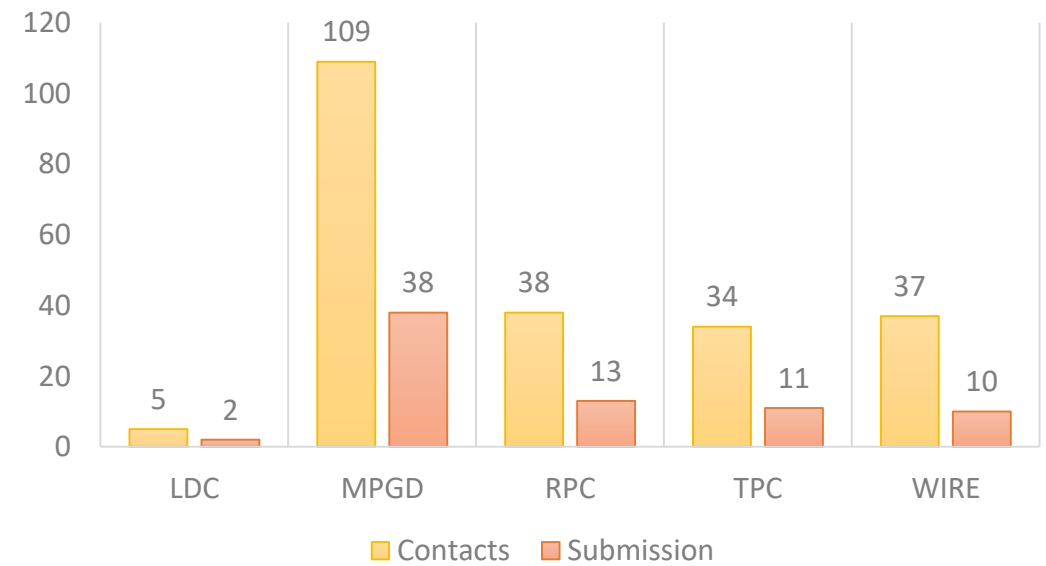
■ LDC ■ MPGD ■ RPC ■ TPC ■ WIRE

Survey Response (per technology)

RESPONSE [% OF CONTACT PERSONS]



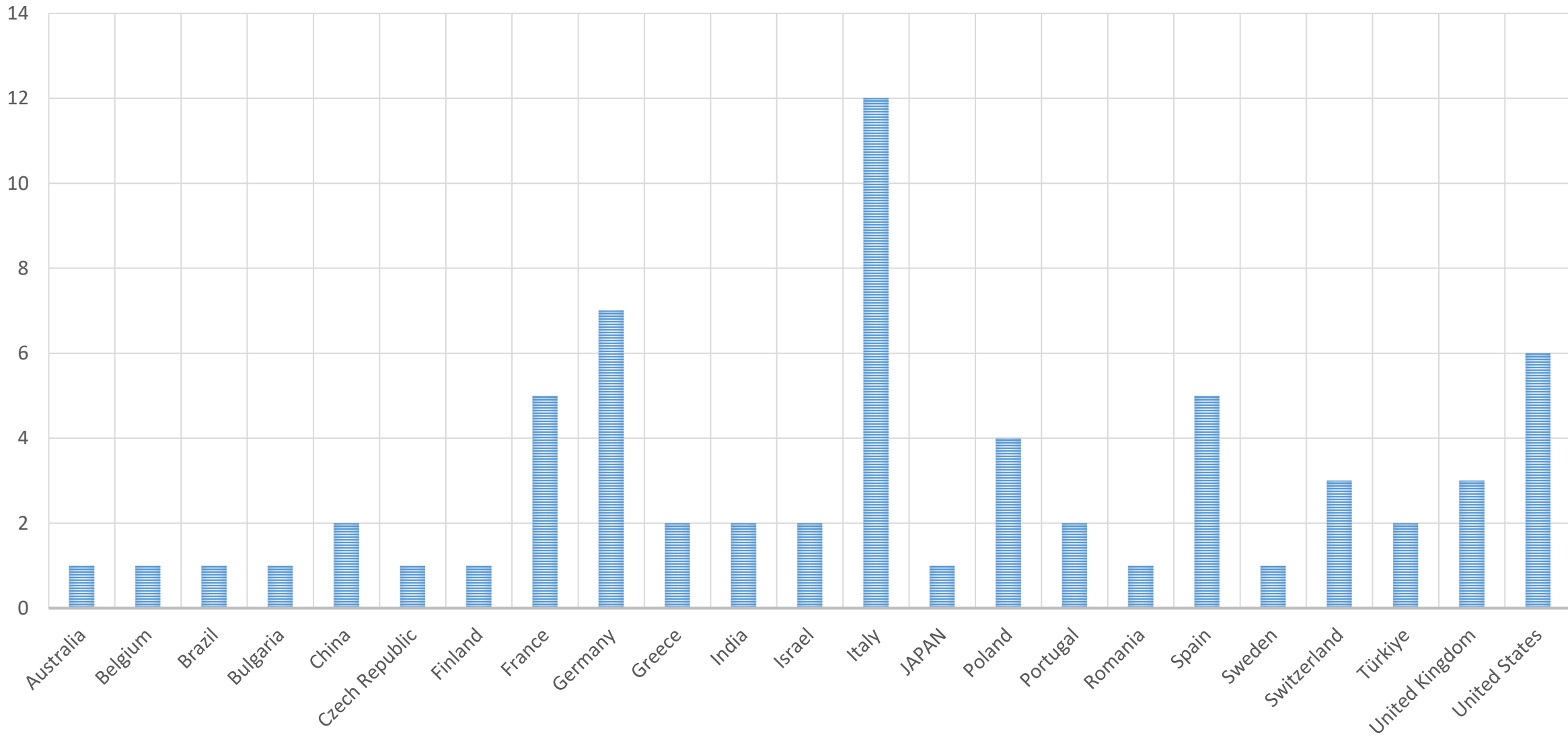
Number of Contact and Submission



Geographical distribution of the submissions



Number of Analyzed Submissions : 74

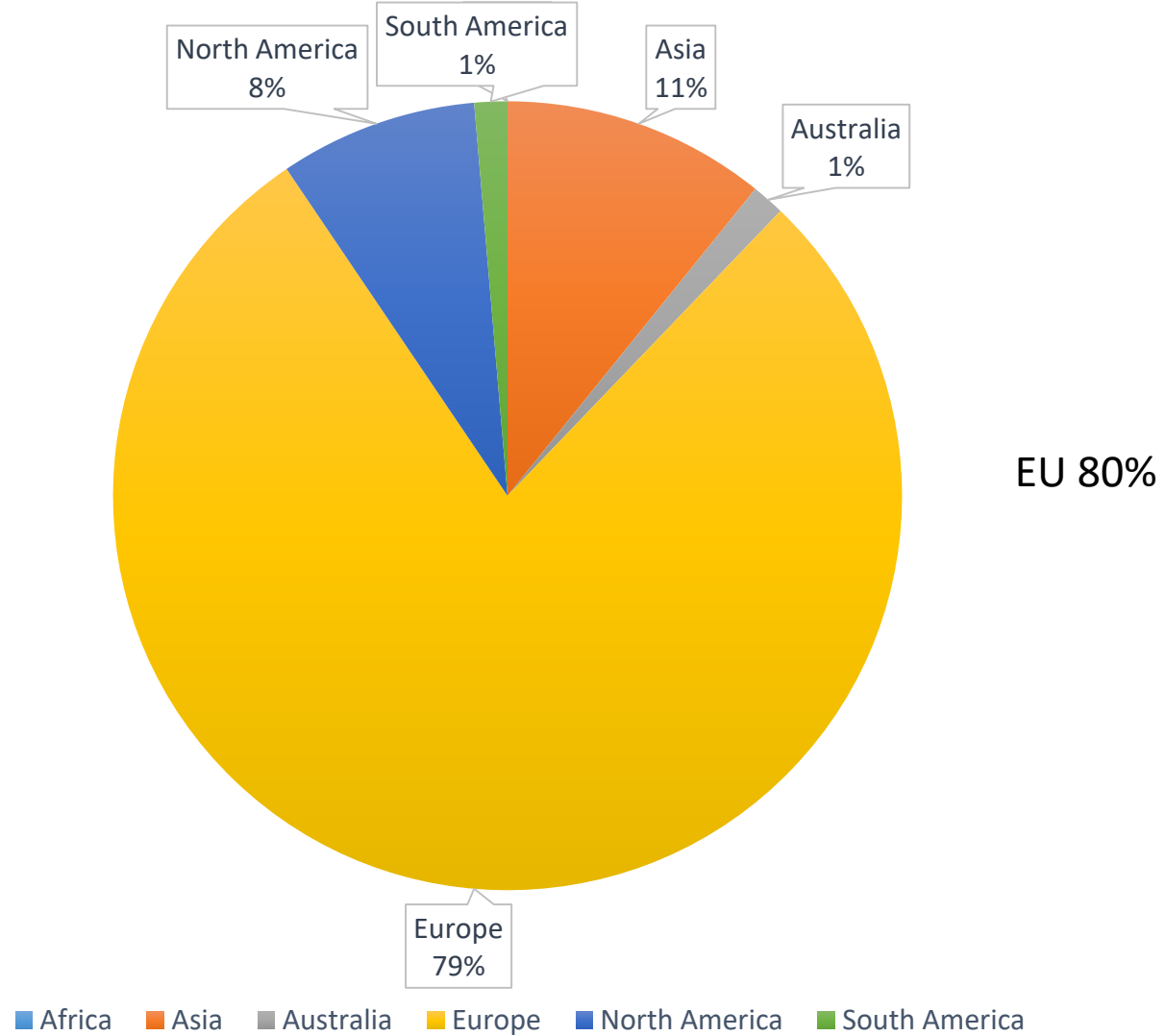


Duplicates (most likely) Removed

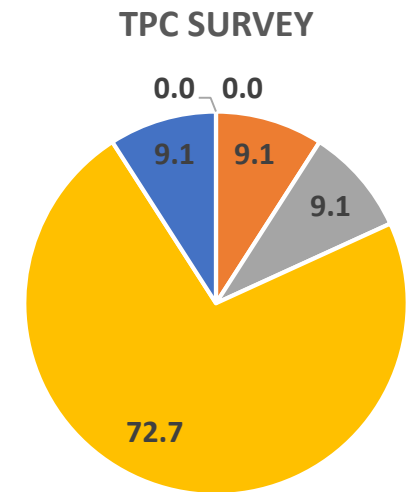
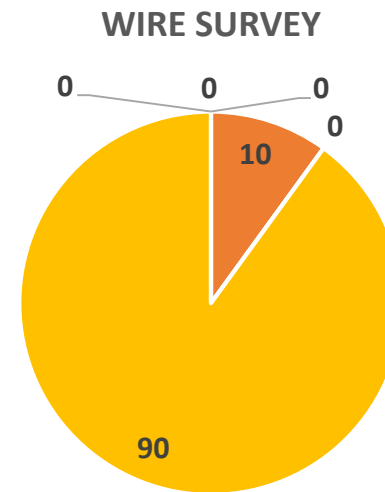
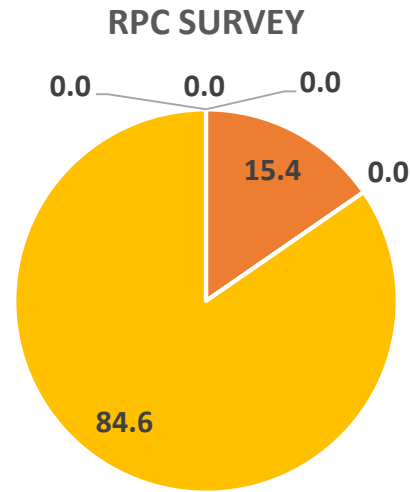
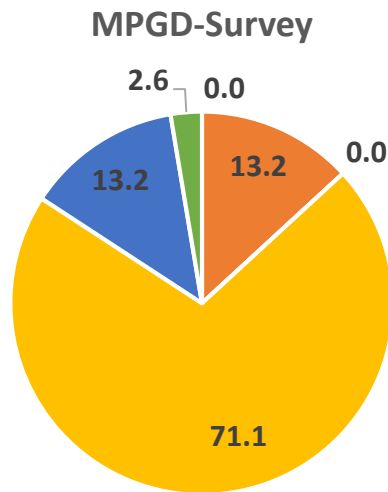
Distribution in the Different Continents

Africa	0
Asia	8
Australia	1
Europe	58
North America	6
South America	1

Total = 74



Geographical Submissions (technology defined by contact list)

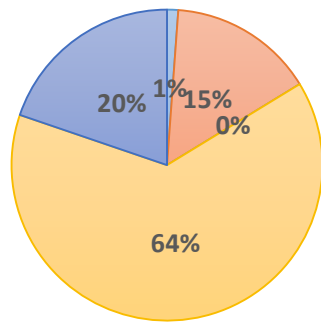


■ Africa ■ Asia ■ Australia ■ Europe ■ North America ■ South America

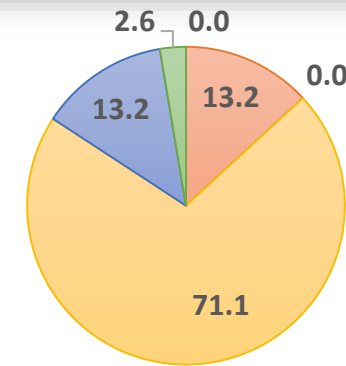
RD51 as pre-DRD1 reference for MPGD technology

84 Institutes

38 submissions



■ Africa ■ Asia ■ Australia ■ Europe ■ America



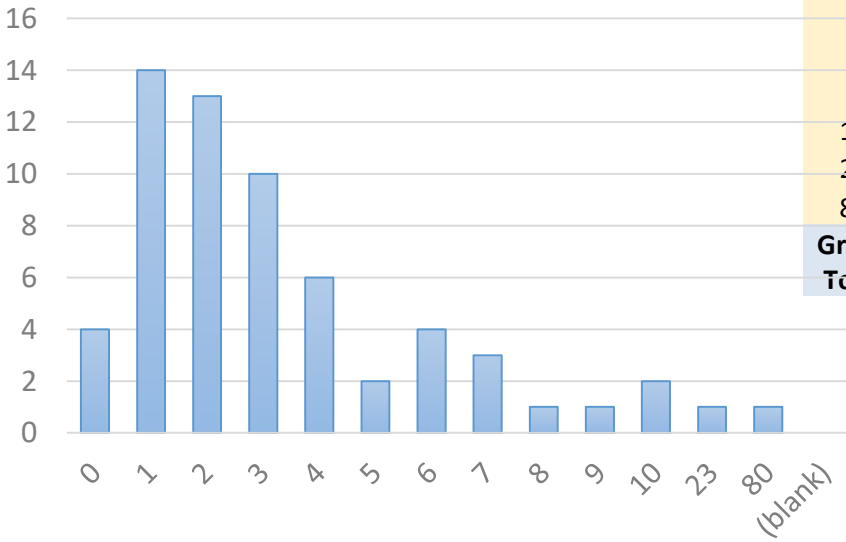
■ Africa ■ Asia ■ Australia ■ Europe ■ North America ■ South America

Number of Analyzed Submissions : 74

Personnel (optional question)

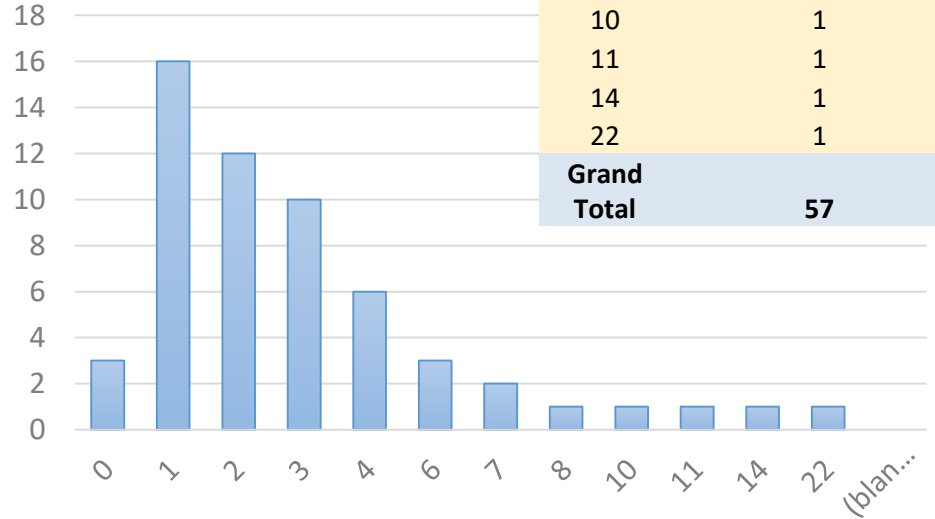
Permanents/Temporary FTE/y

~3.5 FTE/y in average
(removing the largest numbers)



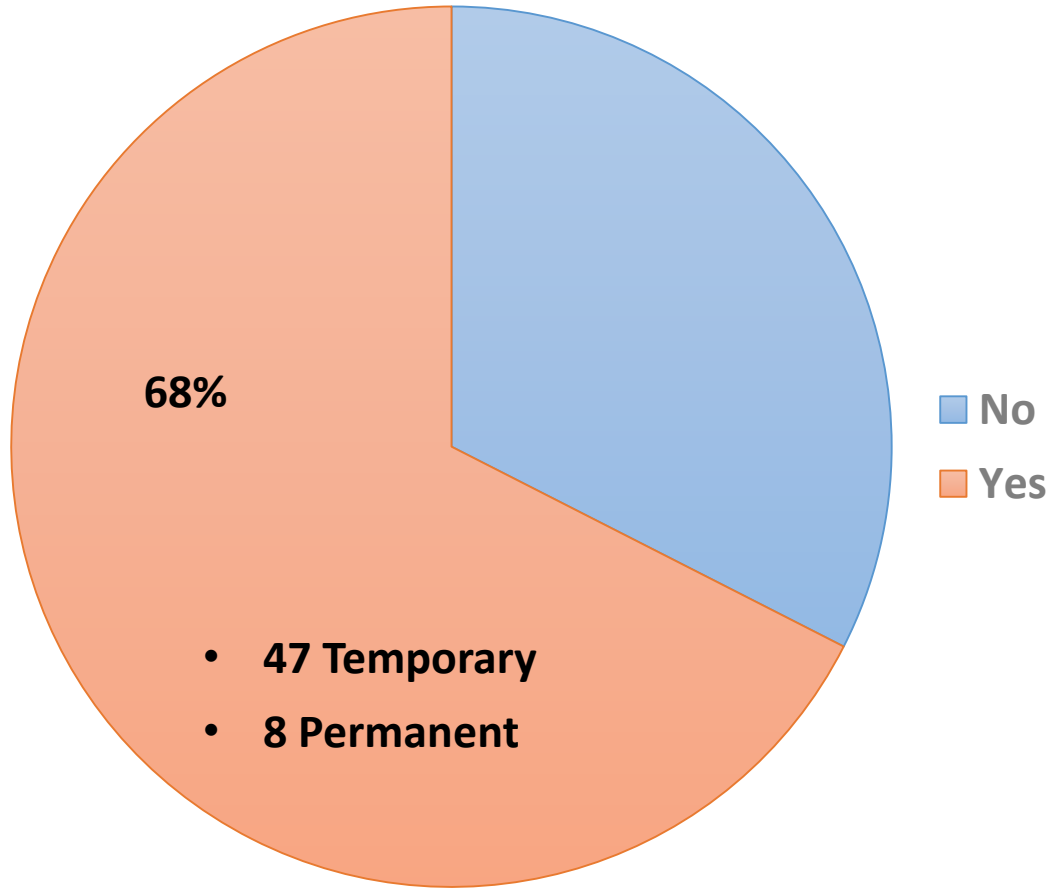
Row Labels	Count of Personnel (Optional): FTE/y (Permanent)
0	4
1	14
2	13
3	10
4	6
5	2
6	4
7	3
8	1
9	1
10	2
23	1
80	1
Grand Total	62

~3.5 FTE/y in average



Row Labels	Count of Personnel (Optional): FTE/y (Temporary)
0	3
1	16
2	12
3	10
4	6
6	3
7	2
8	1
10	1
11	1
14	1
22	1
Grand Total	57

Interest on asking for new personnel



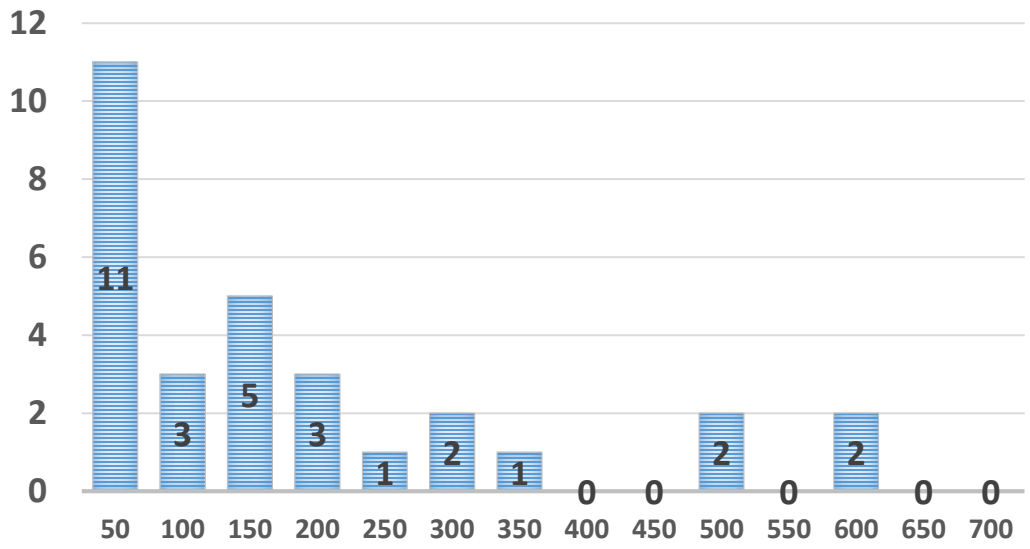
Count of Personnel (Optional): Additional	
Row Labels	Personnel (Optional)
No	13
Yes	27
(blank)	
Grand Total	40

Resources (optional)

Please estimate in kCHF the operational budget (consumables, investment into detector production, operation of equipment, ...) required to support your wished detector R&D researches

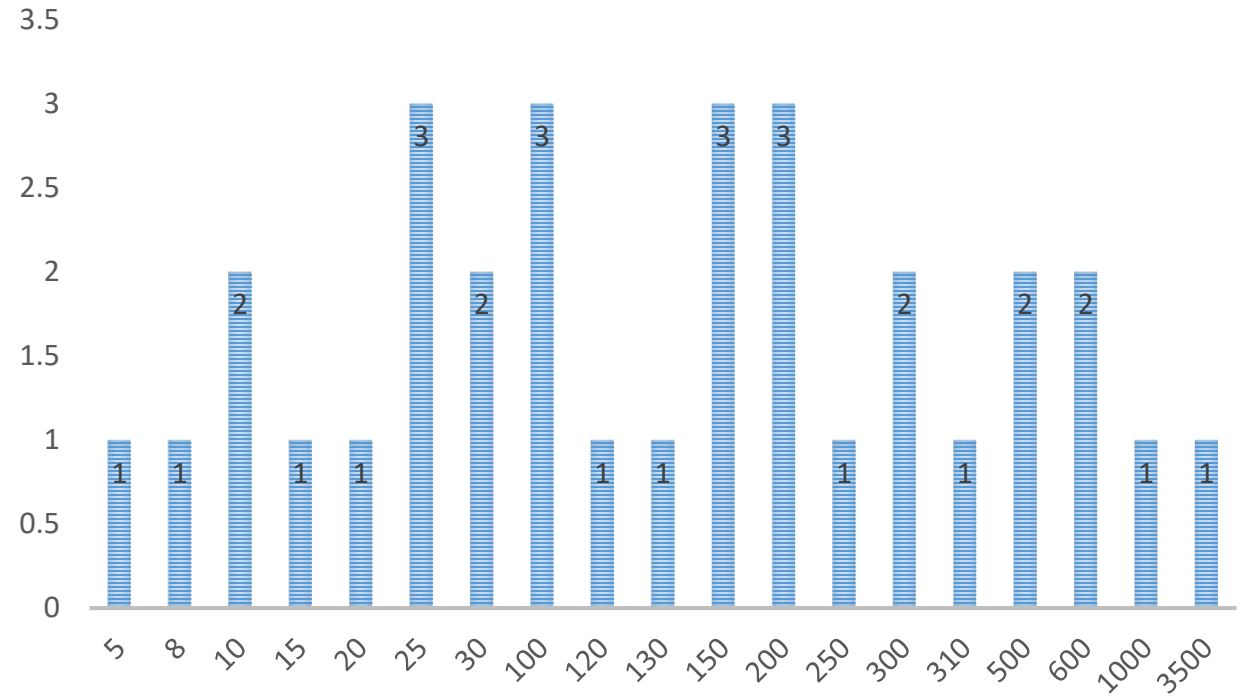
Budget Profiling [2024-2028] in kCHF

AVERAGE ~ 170k (removing two highest)

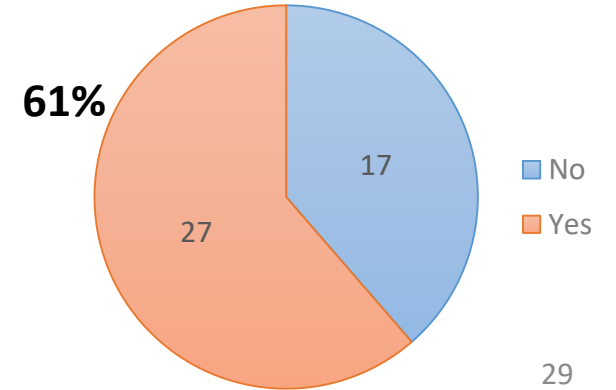


43% (32) Answering

Further iterations (and contacts with groups) required.



Plan to submit a request for a new strategic R&D budget



Funding Agencies (I)

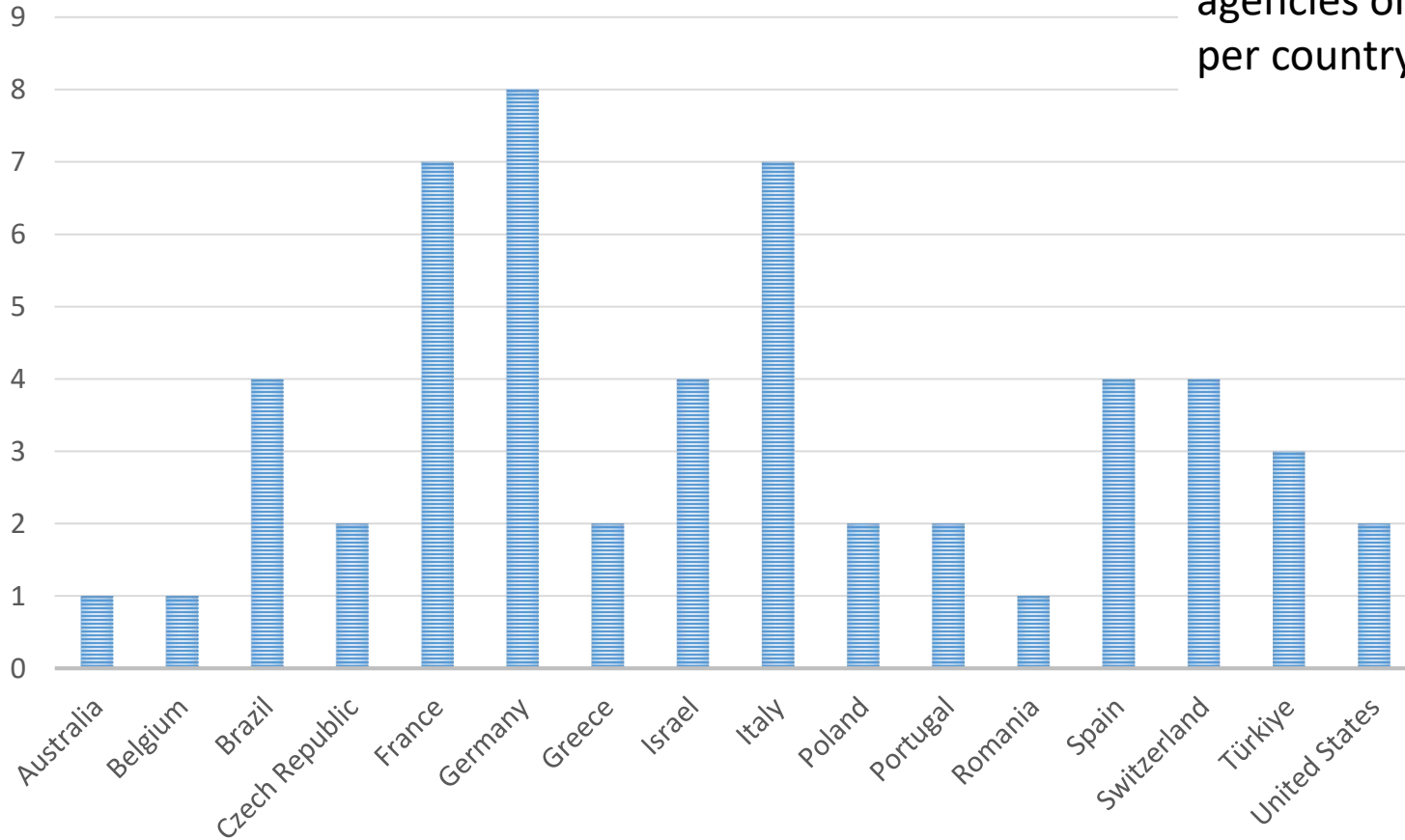
Submitting Institutes per Country at page 21

Country	
Australia	Australian Research Council programs
Belgium	FWO Flanders (Belgium)
Brazil	FAPESP
Brazil	CNPq
Brazil	CAPES
Brazil	CNEN
Czech Republic	GAČR - Czech Science Foundation
Czech Republic	TAČR - Technology Agency of the Czech Republic
France	French research ministry
France	CEA internal funds
France	IN2P3
France	ANR
France	Normandy region
France	FEDER
France	French national funds
Germany	BMBF
Germany	BMBF ERuM
Germany	DFG
Germany	European Research Council
Germany	DPG
Germany	Helmholtz
Germany	Land Hessen
Germany	Max-Planck Society

Greece	Demokritos local Research and Educational activities funding
Greece	GSRT Greece
Israel	BSF
Israel	ISF
Israel	European Research Council
Israel	Pazy
Italy	INFN
Italy	MUR, Ministry of University and Research
Italy	AIDA-Innova
Italy	EC (European Comunity)
Italy	European projects
Italy	MAECI (Ministero degli affari esteri e della cooperazione internazionale)
Italy	PRIN-MUR
Poland	National Science Centre, Poland
Poland	Polish National Science Center (Narodowe Centrum Nauki)
Portugal	FCT - Fundação para a Ciência e Tecnologia
Portugal	RD51 Common Funds
Romania	Romanian CERN-RO Programme - MCID/IFA
Spain	Ministry of Science and Innovation, Spain
Spain	National Plan for Particle Physics
Spain	European Research Council
Spain	European Training Network
Switzerland	SNF
Switzerland	EU Funding Programs (e.g. AIDAInnova)
Switzerland	CERN EP-DT
Switzerland	CERN EP-RD
Türkiye	The Scientific And Technological Research Council Of Türkiye (Tübitak)
Türkiye	Turkish Energy, Nuclear and Mineral research Agency (TENMAK)
Türkiye	Bursa Uludağ University
United States	USA department of Energy (DOE)
United States	NSF

Funding Agencies (II)

Number of funding agencies or program per country



Row Labels	Count of Country
Australia	1
Belgium	1
Brazil	1
Czech Republic	1
France	5
Germany	5
Greece	2
Israel	1
Italy	7
Poland	2
Portugal	2
Romania	1
Spain	2
Switzerland	2
Türkiye	2
United States	4
(blank)	
Grand Total	39

Number of groups per country answering to the question

Research Activities

**Research Activities: Short description of the research activities (technologies, applications, goals and achievements):
(Maximum 12 lines)**

We are performing detector R&D for CYGNUS-Oz, as part of the CYGNUS directional dark matter proto-collaboration. To this end, we have developed a small gas TPC prototype to study gas properties, readout technologies, and reconstruction methods. More broadly within CYGNUS-Oz, we have an active theory program to develop a physics case for directional detection of rare events. Over the next few years we hope to expand our experimental activities to an underground detector deployment at the 1 m3 fiducial volume scale. We are also interested in technology ...

Technologies: RPC/mRPC, GEM, thick-GEM

Applications: CMS Muon system, mainly Phase-2 upgrade (chamber design, development, production, integration and operation, ecogas studies); muon radiography (high performance gaseous detector based muon telescopes, mainly for geoscience and

The group at IFUSP, in collaboration with colleagues of local Engineering School (Escola Politécnica/ EPUSP), the IPEN (Instituto de Pesquisas Energéticas e Nucleares), and from UFABC and UniCamp Universities acts on several research line related to MPGD: development of readout eletrônicos (the group was the design os SAMPA ASIC); study and development of MPGD-based soft X-ray detectors; study and development of MPGD-based ...

....

***Blue Sky R&D
Generic R&D
Strategic R&D
Application Driven R&D
Technology Driven R&D***

Working Groups specific questions

They will be discussed in each working group session

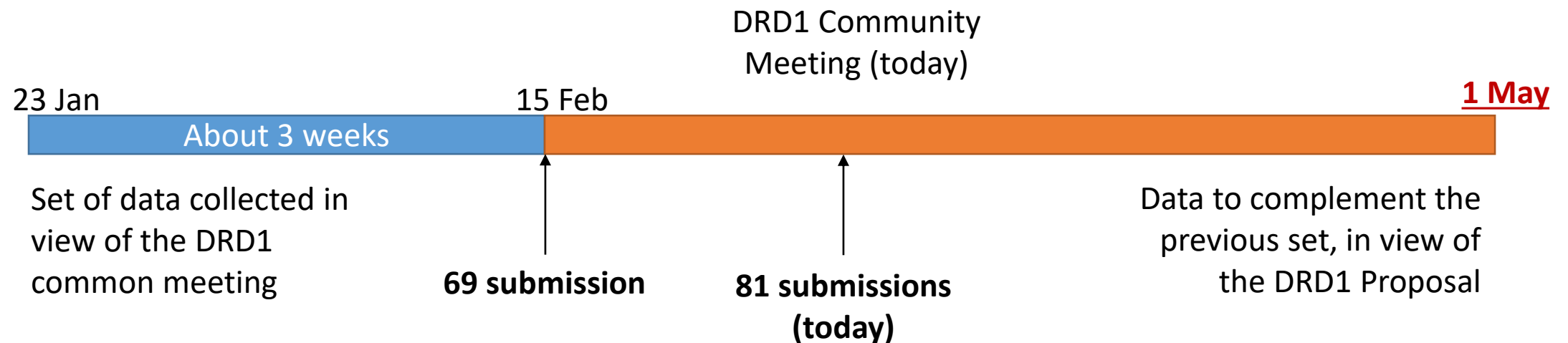
Survey schedule

- Opening date: 23 January
- Intermediate closing date: 15 February
- DRD1 Community Meeting: 1-3 March
- **Final closing date: 1 May 2023**

Institute contacts that did not submit yet but want to provide information in view of the proposal will have time till the 1st of May (though earlier you do better it is)

IF YOU WANT TO PROVIDE YOUR INPUTS, SUBMIT (*)

<https://indico.cern.ch/event/1235070/>



**(*) Representatives on institutes can submit.
Please contact us if you have no access**