

CPAD R&D Collaborations Community Kick-off Meeting

July 5th, 2023

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Welcome!

- Thank you attending this kick-off meeting
- We are at the initial stages of formulating what a CPAD coordinated detector R&D strategy can be and forming the Research and Development Collaborations (RDC's)
 - ***Hearing from the community and responding to your input is key!***
- Setting up the structure and functions of these RDC's is one of the key tasks ahead for the next year, and your input and contributions will help shape these collaborations and set them up for success in the future
- In the coming slides, we hope to articulate:
 - A vision for what these RDC's will be
 - Setup some ideas/goals for the next year
 - Define the immediate next steps

Caveat

The ideas we are expressing are based on previous experiences such as the [CERN RD collaborations](#) and guided by ongoing community efforts (e.g. [DOE Detector R&D Basic Research Needs](#), [Snowmass](#), [ECFA Detector R&D Roadmap](#), etc..)

One of the reasons we are holding this meeting is to help shape these RDC's into something useful for the community

R&D Collaborations

RDC	Topic	Coordinators
1	Noble Element Detectors	Jonathan Asaadi, Carmen Carmona
2	Photodetectors	Shiva Abbaszadeh, Flavio Cavanna
3	Solid State Tracking	Sally Seidel, Tony Affolder
4	Readout and ASICs	Angelo Dragone, Mitch Newcomer
5	Trigger and DAQ	Jinlong Zhang, (TBN)
6	Gaseous Detectors	Prakhar Garg, Sven Vahsen
7	Low-Background Detectors (incl. CCDs)	Noah Kurinsky, Guillermo Fernandez-Moroni
8	Quantum and superconducting Detectors	Aritoki Suzuki, Rakshya Khatiwada
9	Calorimetry	Marina Artuso, Minfang Yeh
10	Detector Mechanics	Andy Jung, Eric Anderssen
11	Fast Timing	Gabriele Giacomini, Matt Wetstein

Snowmass IF Recommendations

- IF-1** Advance performance limits of existing technologies and develop new techniques and materials nurture enabling technologies for new physics, and scale new sensors and readout electronics to large, integrated systems using co-design methods.
- IF-2** Develop and maintain the critical and diverse technical workforce, and enable careers for technicians, engineers and scientists across disciplines working in HEP instrumentation, at laboratories and universities.
- IF-3** Double the US Detector R&D budget over the next five years, and modify existing funding models to enable R&D consortia along critical key technologies for the planned long term science projects, sustaining the support for such collaborations for the needed duration and scale.
- IF-4** Expand and sustain support for blue-sky R&D, small-scale R&D, and seed funding. Establish a separate agency review process for such pathfinder R&D, independently from other research reviews.
- IF-5** Develop and maintain critical facilities, centers and capabilities for the sharing of common knowledge and tools, as well as develop and maintain close connections with international technology roadmaps, other disciplines and industry.

These are where the CPAD RDC's come in

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Principal Ideas behind the RDCs

Detector R&D in many different technology areas is essential to realize many of the future planned experimental efforts spanning all of the frontiers in High Energy / Nuclear Physics

Much of the efforts needed require **collaboration** and **coordination** in order to realize the technologies required

- **Collaboration**: The required expertise/resources/new ideas often live within multiple people, institutions, labs and only by bringing these pieces together can we hope to realize the technological challenges
- **Coordination**: We live in a resource limited funding environment and so we need efforts to be coherent, minimize duplication, and to build off of progress happening elsewhere (both in other technologies and in other places)

Principal Ideas behind the RDCs

Detector R&D in many different
of the future planned experiments
High Energy / Nuclear Physics

Collaboration

Where the RDC's can work to identify
needed R&D, put together work-packages,
and aid in the execution of the work

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Principal Ideas behind the RDCs

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Coordination

This is what CPAD is meant to help
provide and why these collaborations are
being formed within our structure/charge

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What will the RDC's do?

Long term goal:

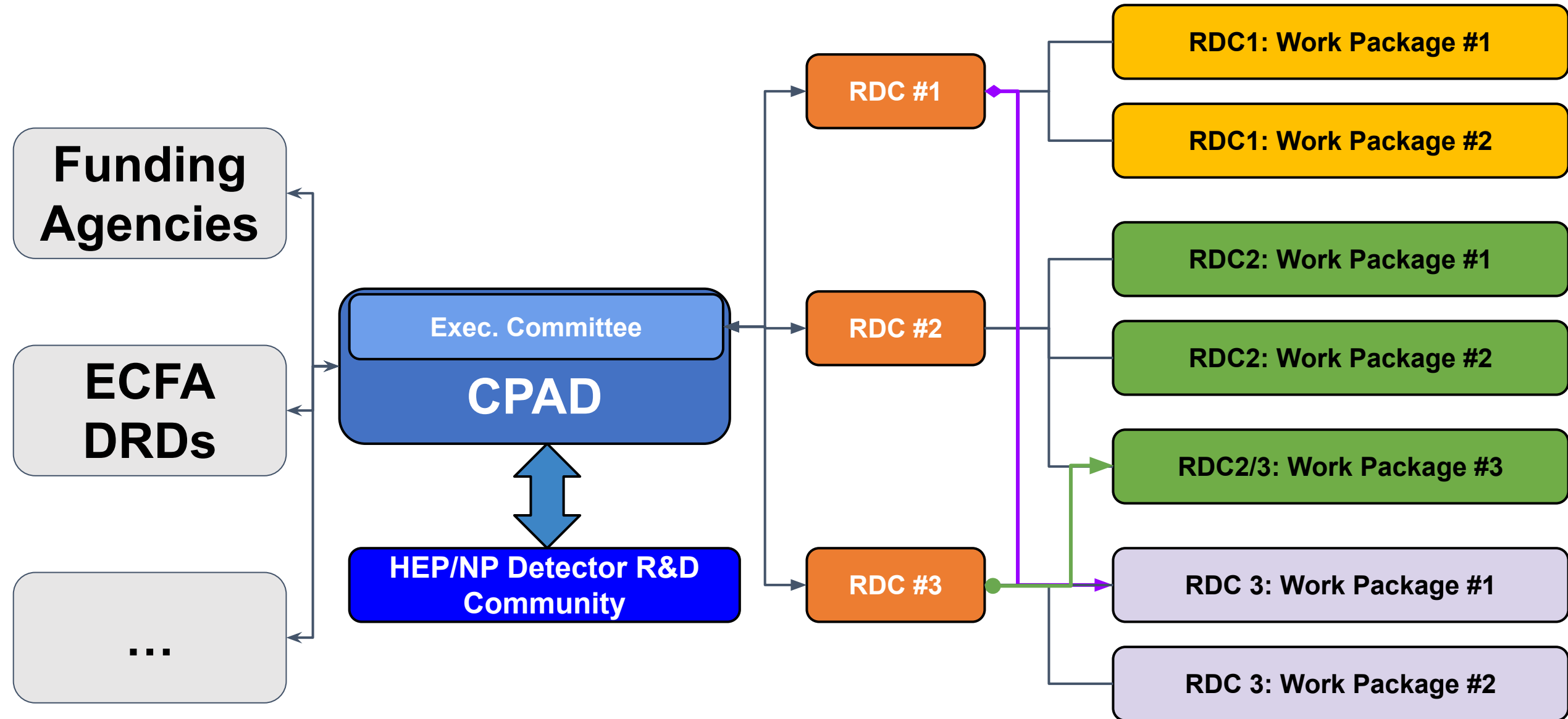
- Provide a collaboration which can link together facilities, expertise, people, and experience to tackle technology challenges across HEP/NP
- Facilitate new funding mechanisms for R&D related to a specific technology area which will take place as part of the collaborations' activities
- Work with the CPAD executive committee, ECFA DRDs, and the broader R&D community to foster a collaborative, supportive, and coordinated environment for new ideas, blue sky efforts, and non-project specific R&D

What will the RDC's **NOT** do?

The RDC's will **NOT**:

- **Discourage single/small team efforts in R&D**
 - We still need for individual PI's to be able to work in their labs on their favorite ideas and leave room for innovation and unexpected solutions
- **Break up existing collaborations / structures**
 - We already have communities within HEP/NP which coordinate on specific technological challenges (e.g. HEP-IC) and we want to utilize/leverage these efforts and communities to help make the CPAD-RDC's successful
- **Discourage project specific R&D**
 - There is some R&D which will/has reach(ed) a level of maturity that it is time to realize it for a specific implementation and the RDCs should encourage this transition from generic to specific R&D

What is the envisioned structure (one idea)



What is the envisioned structure

- **Each RDC has two coordinators who work with CPAD executive committee and the community to define the R&D goals**
 - These need to align with the BRN and Snowmass efforts
 - These should be sufficiently generic to allow for new/unforeseen ideas
- **The RDC coordinators will work with the community to put together “work packages” which bring together a collaboration to tackle some idea / technology**
 - These can be university- or lab-lead
 - Should have associated timelines and milestones
- **These work packages can then be turned into proposals for funding**
 - In the short-term future, these may be responses to the comparative review funding announcements or reallocation of lab-based (KA25) funds
 - In the long term, this hopefully becomes a new funding mechanism with dedicated FOA and a new funding stream

Some comments on funding

- **CPAD and the DOE (e.g. Helmut) recognize that realizing these collaborations will require funding**
 - This is the “carrot” which will help attract the community to participate and engage
- **However, the timing for all this isn’t ideal**
 - P5 is still in process and won’t release its recommendations until later in the year
 - The European effort (ECFA DRDs) is proceeding NOW with the aim to have things kick off in 2024
 - The DOE budget exercise for 2024 is already in progress, so no new funding mechanisms can show up before 2025
 - *But, we can’t wait for the perfect time...we have to start now*
- **We hope to target some small number (2-3) test cases for collaboration proposals we might consider putting together for this fall**
 - FOA anticipated Oct 2023
 - Great opportunity for some 3 year, university-led efforts
- **This means we need to get the organization and structure for the RDCs in place over the next few months**

What's needed next

- **For each RDC:**
 - **We need to define the broad R&D goals of each RDC (e.g. translate the [DOE BRN Priority Research Directions \(PRD's\)](#) into R&D goals**
 - These should be generic, aspirational, and defined in such a way as to leave room for new ideas and efforts
 - **RDC's might create surveys to community to see which groups want to work on what, what expertise and facilities are available, what pre-existing R&D funding there is, etc.**
 - We will use the [RDC email lists](#) to send out surveys
 - This information may already be known because of other coordination efforts (Snowmass, ECFA DRD's, etc...)...so we don't expect every RDC to need a survey
 - **Organize dedicated RDC meetings**
 - Define roadmaps, milestones, and timelines
 - Identify opportunities to apply for specific funding (backed by these roadmaps)
 - **First "in-person" meeting of these RDC's should be at the upcoming CPAD workshop**
 - Workshop will be November 7-10 at SLAC: [indico page](#)

Questions / Comments / Feedback

- We realize there isn't enough time here to hear all opinions, so we've created a Google Doc where you can write your thoughts/questions/suggestions
 - Linked to the indico page
 - https://docs.google.com/document/d/1QuoY1Y3MULAtMSUu17hejdWy_oFjT8WNL6OIA2a3DYI/edit?usp=drive_link
- Not all RDC coordinators were able to be here today, so technology specific questions which aren't covered should be addressed to them
- Please sign up to the RDC technology email lists, this will be the tool we use to communicate with everyone
 - Instructions in the coming slides and on the [CPAD Website](#)