

# Yellow Report Goals and Plans

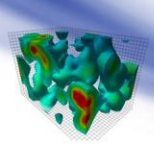
Note: Yellow Report Goals and Plans were presented at

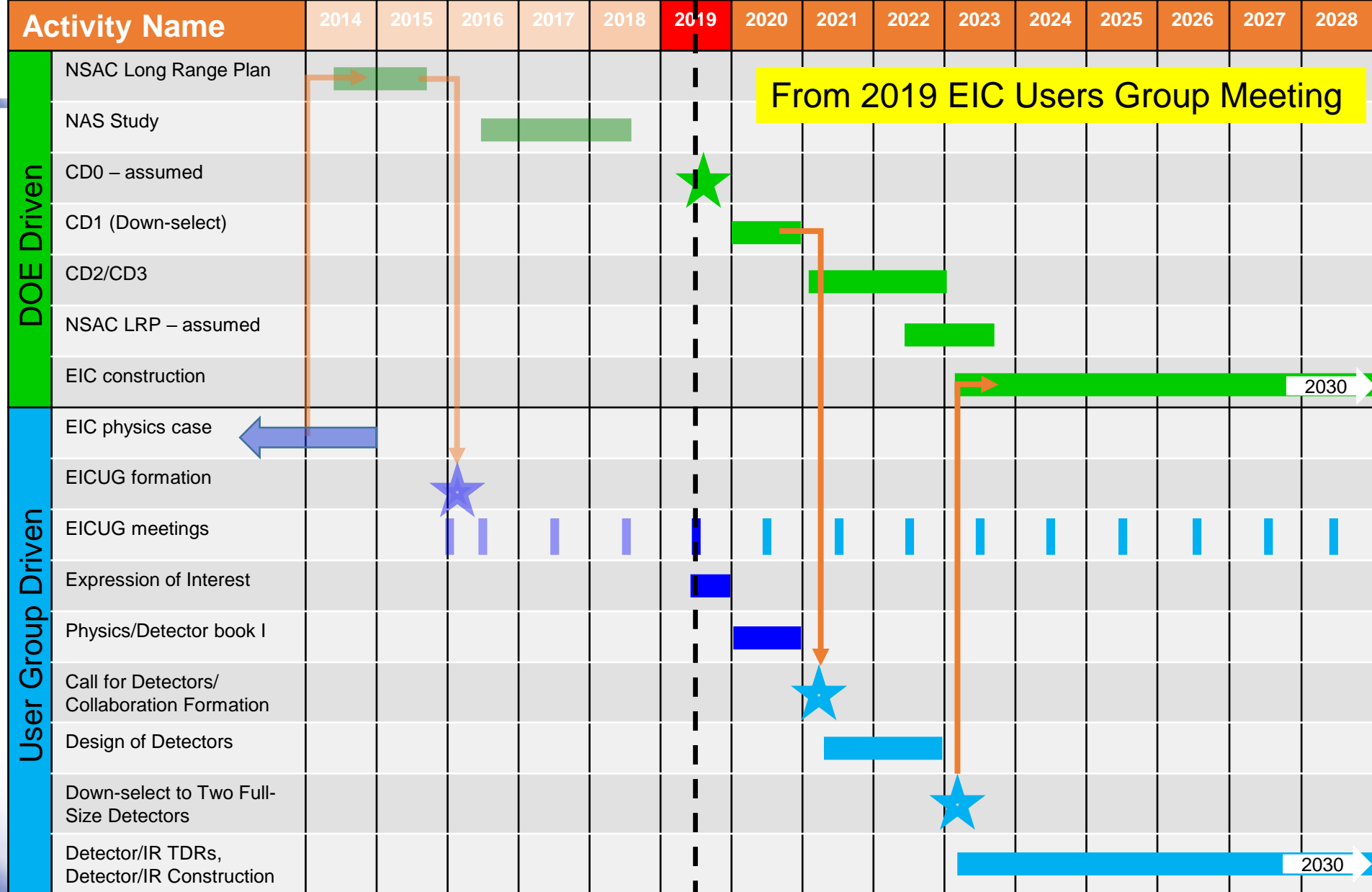
- EICUG Institutional Board meeting of 10/10/2019 (as early draft)
- EICUG Remote Meeting of 10/24/2019
- EICUG Remote Meeting of 01/23/2020 (folding in requests from MIT Kick-off meeting on audience, timeline, and YR draft outline)

Here, we will mainly concentrate on the **timeline, folding in lab/project planning**

Rolf Ent and Thomas Ullrich  
on behalf of the EIC User Group Steering Committee

Major input from Elke Aschenauer, Jim Yeck and others on  
lab/project planning





**CD0** = DOE “Mission Need” statement; **CD1** = design choice and site selection

**CD2/CD3** = establish project baseline cost and schedule



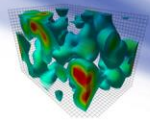
*At the kick-off meeting we aim to finetune all sub-groups and how to best structure in detail the study towards the Yellow Report(s). Similarly, we expect the EICUG Software Group to have presented a finalized and documented EIC software package with flexibility to adjust magnet strengths, geometries, detectors and interaction regions.*

*After the kick-off meeting one could envision the following activities:*

- Send a finalized short “task list” to the sub-conveners for each sub-group, on what we want out of each WG, as a start/direction.
- Offer one or two remote software tutorials around early- to mid-January, such that sub-groups can jumpstart activities.
- Conveners start their regular meetings via video/conference.
- Sub-conveners submit an outline of their foreseen (<15 page) contributions to the conveners.
- The goal is to have by the end of January 2020 all activities well underway.

**Further finetuning of this plan will occur as part of the Kick-Off Meeting.**

Not exactly followed, but the idea/essence was captured!



# YR Timeline (I)

From 01/23/2020 EICUG Remote Meeting

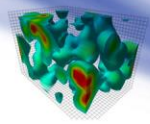
January 2020	Software tutorials are given, all activities are underway
March 19-21	First workshop at Temple University – Philadelphia <i>Goal: present progress for various groups and sub-groups, with much discussion and work time, initiate detector complementarity study based on detector technologies</i>
May 22-24	Second workshop at U of Pavia – Pavia, Italy <i>Goal: present initial physics measurements and detector requirements following five chosen processes/tools (inclusive measurements, semi-inclusive measurements, jets and heavy quarks, exclusive measurements, diffractive measurements &amp; tagging), present detector concepts and implications for physics measurements. Complete detector requirements table including segmentation needs.</i>
August 3-7	Status reports at EICUGM @ FIU – Miami, FL <i>Goal: Conveners/sub-conveners inform community about status and progress. Conveners identify possible issues (if any) in meeting with EICUG Steering Committee.</i>
September 17-19	Third workshop at CUA – Washington, DC <i>Goal: present mature studies of detector requirements from physics processes, balance detector concepts versus impact on physics measurements. Discuss possible systematics reduction among complementary detector choices. Complete final “to-do” list for YR(s).</i>
November 19-21	Fourth workshop at UCB/LBL – Berkeley, CA or Final Meeting (assembly of Yellow Report(s)) <i>Goal: distribute draft YR sections before meeting</i>
January 2021	(optional) Final Meeting

## 2021 January

- After assembly of Yellow Report(s), in parallel:
  - ▶ Period of web-based EICUG community input.
  - ▶ Independent review team reads and comments.
- Final Yellow Report(s) to be released after folding in input. Goal is April 2021 (or, expedited January 2021).
- E.g., if fourth workshop at UCB/LBL is final meeting, a possible timeline could be:
  - ▶ November 22 – November 29
    - Editing by Conveners and Steering Committee.
  - ▶ November 29 – December 20
    - In parallel, period of web-based EICUG community input and independent review team reads and comments.
  - ▶ December 21 – January 11
    - Final editing of Yellow Report(s)

NEW: Now fold in lab/project planning!

Concentrate on the next two years  
which are the defining phase.





# Main objectives for the next 2 years

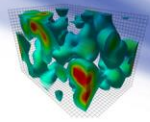
- Detector requirements and design as driven by EIC Physics program defined by Community

- EICUG Yellow Report activity

Different Physics (5) and Detector (7) WGs

- |                    |  |
|--------------------|--|
| • December 2019    | Kick-off meeting at MIT                |
| • March 2020       | 1 <sup>st</sup> meeting at Temple      |
| • May 2020         | 2 <sup>nd</sup> meeting at Pavia/Italy |
| • August 3-7 2020  | EIC-UG Meeting at Miami                |
| • September 2020   | 3 <sup>rd</sup> meeting at CUA         |
| • November 2020    | 4 <sup>th</sup> meeting at UCB/LBL     |
| • January 2021     | completion Yellow Report               |
| • July/August 2021 | EICUGM at Warsaw/Poland                |

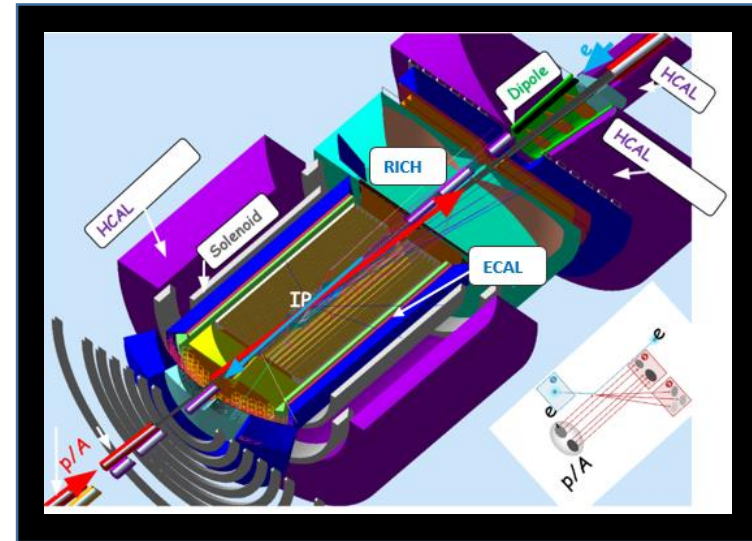
→ critical input for detector proposals



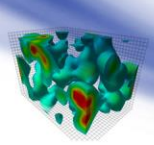
# Main objectives for the next 2 years

- **Detector Scenarios:**

Any general purpose EIC Detector  
is complex



- Large rapidity ( $-4 < \eta < 4$ ) coverage, and beyond ( $-7 < \eta < 7$ )
  - Electromagnetic and Hadronic Calorimetry
  - Particle ID detectors (positive  $\pi$ , K, p identification)
  - Tracking: small ( $\mu$ -vertex) and large radius (gaseous-based) Tracking
  - detector extends along the beam line: Roman Pots, ZDC, .....
  - Ancillary Detectors: electron & hadron Polarimetry, luminosity monitors
- Need to understand national and international contributions





# Main objectives for the next 2 years

- National and International Contributions:

*(non-binding)* Expressions of Interest (Eol) to get *guidance on detector scope*

- Discussion Call for Eol for contributions to EIC Detectors during EIC-UG Meeting August 3-7 2020

*(assume discussion session at EICUGM)*

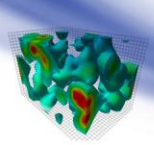
- Call for Eol for contributions to EIC Detectors August 2020  
*(issue call after folding in feedback of EICUGM)*

- Deadline Eol for contributions to EIC Detectors November 2020  
*(Status report at 4<sup>th</sup> (final) Yellow Report meeting)*

- Evaluate Eol and inform Call for Detector Proposal(s) February 2021  
*(complete after assumed January 2021 Yellow Report completion, Eol can give guidance on detector scope)*



**More on this in Detector Complementarity Discussion session and Elke's intro to this tomorrow!**

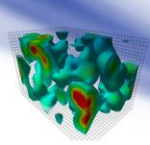


# Detector Scope

- Comprehensive general-purpose detector: rough costs (US accounting) = \$300M
- Costs included in project are roughly \$200M, with \$100M assumed to be in-kind.
- Costs for one Interaction region included in accelerator scope = ~\$200M
- If we assume two general-purpose detectors where each has some components that are recycled, costs may be ~\$200M each
- 2<sup>nd</sup> Interaction region costs (accelerator scope, US accounting) = ~\$200M
- I.e., if we assume we want two general-purpose detectors (and a 2<sup>nd</sup> IR) we need to
  - Use the \$200M project costs to guarantee a successful EIC project (need to deliver on any Key Performance Parameters)
  - Assume some recycling of components/detectors in each detector
  - Rely on roughly \$400M non-DOE scope (NSF, international engagement)
- The upside is that in non-US accounting, this is more like \$150-200M.\*

\* See backup slide

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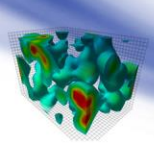
# Main objectives for the next 2 years

**Assumption:** CD-1 aligned with accelerator timeline

**Goal:** CD-2 & CD-3 also aligned!

## Form EIC Collaboration(s)

- Issue Call for Detector Proposals March 2021  
*(consistent with EICUGM assumptions of early 2021)*
- Form Detector Review Committee June 2021  
*(to guide work in TEC phase)*
- Deadline for Proposals September 2021  
*(roughly in phase with projected CD-1 date)*
- DRC Meeting for Detector Proposal down select November 2021
- Selection of Detector(s) December 2021  
*(one or two, pending Expression of Interest response)*
- CD-2 September 2022
- CD-3 September 2023  
*(CD-2 and CD-3 dates assumed for planning purposes)*



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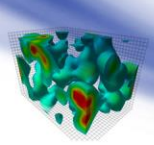
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# Summary

- It is crucial to complete the Yellow Report January 2021 to stay in phase with the hoped-for EIC early-CD dates.
- We are better off completing a Yellow Report and later making a “v2” or revisiting (parts) of the Yellow Report ~1 year later than running late. Do what you can.
- My view:
  - At CD-1 we need a plausible scenario reference design for any general-purpose\* detector.
  - At CD-2 we need a reference design for a general-purpose detector with some of the equipment components known in detail.
  - At CD-3 we need to have completed >80% of the full engineering & design of at least one general-purpose detector.
- The labs are planning to, in collaboration with the EICUG SC and the DOE/NP, ask for an Expression of Interest to obtain guidance for the detector scope (the expected in-kind contributions, international engagement, one or two detectors, possible accelerator scope in-kind contributions, etc.).

\* The scope assumption for the EIC was for one full detector to do the NSAC/NAS Report science, i.e., not a limited day-one detector





# US Project Accounting 101

Assume a detector project in the US with a total project cost of \$100M

- US projects include contingency – assume about 35%
- US projects include costs for R&D (small for detector projects), Project Engineering & Design (10-15%), and pre-operations (few-%) – assume 15%
- For the construction phase of the project, a very typical split is:  
50-60% is procurements, and 50-40% is labor – assume 60-40 for this example
- US projects include (reduced) overhead, assume here 10%

Net this means that, assuming no contingency and no overhead on procurements, a \$100M project corresponds roughly to a \$35M cost in detector procurement in the construction phase.

If one assumes the DOE project always has to take care of engineering & design and pre-operations, it changes the above arithmetic, so let's assume \$40M-\$45M. Still, it “pays” to have equipment contributed by others.

Similar, to have labor provided as in-kind contribution could also make a large difference in project costs, in the above example ~\$30M.

