



Summary of the Community Planning Process (Phase I)

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Overview of the Process



Goals of the CPP

- Produce strategic recommendations for each of four topical areas and four cross-cutting areas, generated from community input
- Provide both near-term actionable recommendations and a long-term strategic outlook (**strategic plan**), highlighting opportunities for US leadership
- To the extent possible, Prioritize among these recommendations with community consensus
- Deliver these recommendations to FESAC by March, 2020

The community came together to deliver a successful outcome!

<https://sites.google.com/pppl.gov/dpp-cpp>



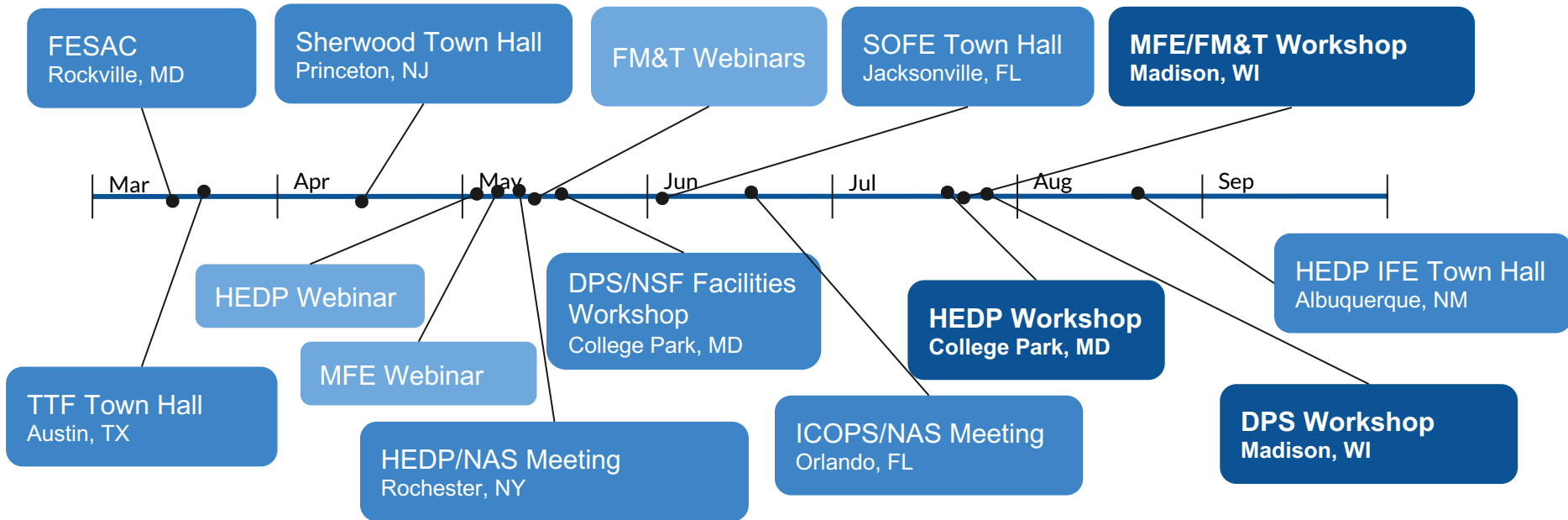


We Tried to Ensure All Voices Were Heard

- Announcements sent to [DPP-CPP Google Group](#) as well as APS-DPP, GEC, USBPO, UFA, and ANS mailing lists
- >100 expert group meetings, open to anyone interested
- 5 focus groups
- 15 webinars
- 6 Town halls
- 5 dedicated workshops

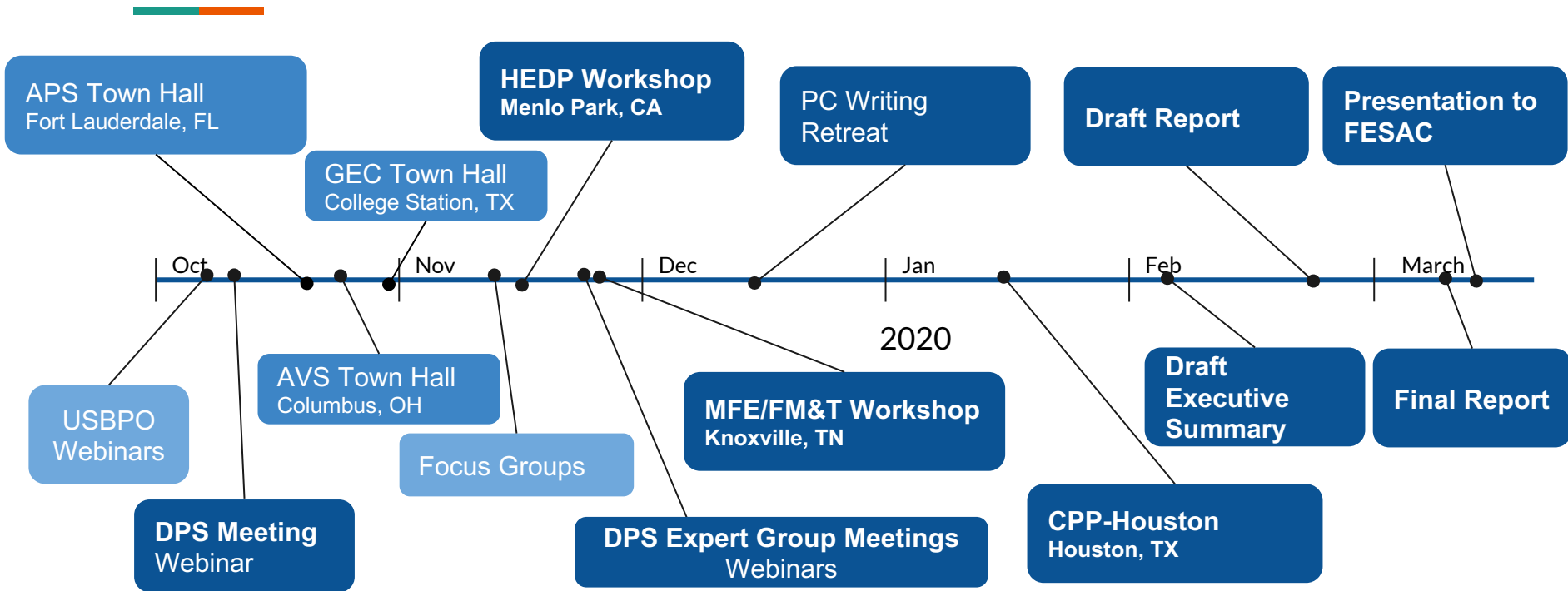


Events During the CPP





Events During the CPP (cont'd)



Structure of Plan



The Plan Is Organized into Three Main Parts

- **DPS: Discovery Plasma Science**
 - Primarily based on input from GPS and HEDP topical areas
- **FST: Fusion Science and Technology**
 - Primarily based on input from MFE and FM&T topical areas
 - Includes IFE (from HEDP topical area)
- **CC: Cross-Cutting Opportunities**
 - Input sourced from all topical areas

Executive Summary

Statement on DEI

**Discovery Plasma
Science**

**Fusion Science and
Technology**

**Cross-Cutting
Opportunities**



Science Drivers

- DPS and FST have each identified major *Science Drivers* that motivate research

Discovery Plasma Science

Explore the Frontiers of Plasma Science

Understand the Plasma Universe

Create Transformative Technologies

Fusion Science and Technology

Control, Sustain, and Predict Burning Plasmas

Handle Reactor Relevant Conditions

Harness Fusion Power



FST and DPS Are Inextricably Linked and Synergistic

- FST and DPS are critical and complementary areas that must work together to achieve ambitious goals
 - FST research is driven by the mission for a low-cost fusion pilot plant
 - DPS research is broader, and addresses science beyond the FST goal
- These areas have strong intellectual ties, a shared history, and can coexist harmoniously and constructively within FES

“We very much have a strong opinion that this is both a discovery science and an applied energy, and there’s no reason to say it’s either-or, and I mean that very strongly. ... We want the community to realize that it is not a zero-sum game between any of those topics”¹

– Under Secretary of Energy for Science, Paul Dabbar

¹Remarks to FESAC, reported in AIP Bulletin, Dec. 18, 2018

Main Takeaways Informing FESAC LRP Subcommittee



Community Embraces a Mission-Driven Program

- Burning Plasmas remain a top priority
 - ITER is the best opportunity to participate in burning plasma experiment at the scale of a reactor
 - Private ventures may also provide opportunities to access burning plasmas
 - Existing facilities (DIII-D, NSTX-U, international), and theory and modeling, are important to help us prepare for and extrapolate to burning physics regimes
 - A new tokamak facility (NTUF) is needed that is capable of handling power exhaust at conditions typical of an FPP while simultaneously demonstrating the necessary plasma performance
- Fusion materials and technology research needs to be rapidly expanded
 - Required for nearly any FPP, likely set the timescale on which any FPP could be successful
 - Immediately begin design and construction of a Fusion Prototypic Neutron Source (FPNS)
 - Expand structural materials programs and target investments in blankets and PFCs
- Embrace innovations
 - Focus on developing solutions to well-known challenges in fusion energy, emphasizing potentially transformative science and technologies



Prioritization within FST

- Discussion of prioritization began during the CPP Knoxville workshop and at CPP-Houston the attendees applied Prioritization Assessment Criteria (PACs) to the FST program.
- PACs, were derived from the 2017 Austin workshop values, discussed at CPP Knoxville, finalized by the MFE+FM&T PC, presented and discussed at CPP Houston, and ranked in their importance by the Houston attendees

- 1. Importance to FPP Mission***
- 2. Urgency***
- 3. Impact of Investment***
- 4. Using Innovation to Lower Cost***
- 5. U.S. Leadership and Uniqueness***

See Appendix A for the definition of PACs presented at Houston and results of this prioritization



DPS Aims to Understand Plasmas & Develop New Technology

- Programmatic themes to build, support, collaborate
 - Invest in new facilities, upgrade current facilities
 - Ensure steady funding of plasma science research
 - Expand networks and partnerships

- These programmatic themes supported the activities within the Science Drivers
 - Explore the Frontiers of Plasma Science
 - Understand the Plasma Universe
 - Create Transformative Technologies



Diversity, Equity, and Inclusion (DEI) Statement

“The Discovery Plasma and Fusion Science and Technology community recognizes that having a healthy climate of diversity, equity and inclusion is critical to solve the challenges we face in our field. We acknowledge, as a community, that our current (and historically) unhealthy climate is a serious problem and we commit to taking immediate action to achieve equitable, diverse, and inclusive outcomes ...”

- The Workforce, Diversity, and Inclusion cross-cutting section provides greater detail and makes recommendations to improve DEI in fusion and plasma science

Summary



Summary

- There is community consensus to pursue *all* recommendations in the report in the long-range strategic plan as part of an unconstrained scenario
- FST: focus on science and technology that leads to the construction of a Fusion Pilot Plant
- DPS: realize the potential of plasma science to deepen our understanding of nature and provide the scientific underpinning for plasma-based technologies that benefit society
- Report contains many recommendations that can be enacted in the near term, by FES and with partners, and focuses on activities within a 10 year horizon
- This process brought the community together
- Achieving ambitious goals will require united action across many disciplines
- Community planning should be repeated every 5–7 years to adjust plan as necessary and to maintain community involvement

Next: FESAC LRP Subcommittee



Artwork by Jennifer Hamson LLE/University of Rochester, concept by Dr. Jeffrey Levesque, Columbia University.

Roll Credits: Program Committee!



Program Committee

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Program Committee

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David Schaffner, Bryn Mawr
Steven Shannon, NC State
Dan Sinars, SNL
Stephen Vincena, UCLA



Program Committee was Integral to Success

- The program committee put in a tremendous amount of work to enable a successful outcome in a short amount of time
- Weekly (or more) meetings of the program committees occurred in the main topical areas
- Frequent Expert Group and Cross-cut Group meetings (~weekly)
- Periodic check-ins with David Newman and Don Rej
- Weekly meeting of all co-chairs
 - Biweekly meetings with Facilitator
 - Almost daily meetings among MFE +FM&T co-chairs
 - Facilitator provided training sessions for the PC on how to moderate discussions



Avenues for Community Input

Advocacy Groups

- Self-organized groups of community members (not led by Program Committee)
- Provide input to process by submitting informational **white papers** or **initiative proposals**

Expert Groups

- Groups of technical experts, led by Program Committee members
- Open to participation from any and all interested community member
- Provide community review of initiative proposals