Progress and Plans for APS-DPP Community Planning Process

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Goals

- To produce strategic recommendations for each of four topical areas and four cross-cutting areas, generated from community input

- Recommendations for pre-conceptual designs and initiatives are the goal
  - Recommendations for specific facilities are probably not feasible due to time constraints

- To the extent possible, to prioritize among these recommendations with community consensus

- To deliver these recommendations to FESAC before March 1, 2020

We fully recognize the opportunity that this activity represents for FES, and we are enthusiastic to make this process successful!

What Have We Done So Far?

- Consulted with organizers of the High Energy Physics and Nuclear Physics planning processes

- Announced the basic outline of this process and solicited nominations for program committee members

- Chosen and contacted program committee members
  - Approved by APS subcommittee
  - Most members have accepted

- Planned the organization of the Community Planning Process (DPP-CPP)

- Started to plan events
  - We have asked for and received commitments from several institutions for logistical support

Community Outreach

- Announcement describing process and seeking program committee nominations
  - Sent to APS-DPP, ANS, IEEE, HEDSA, UFA, ECFS, and USBPO mailing lists

- Google group
  - Acts as mailing list for interested individuals
  - https://groups.google.com/forum/#!forum/dpp-cpp

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

Activities Already Planned

- Town hall at Transport Task Force (TTF) workshop in Austin, TX (March 20)

- Town hall at Sherwood Fusion Theory Conference in Princeton, NJ (April 17)

- Joint activities with NAS Decadal Survey meeting in Princeton, NJ (April 18)

- Town hall at SOFE in Ponte Vedra Beach, FL (June 2019)

Relation to NAS Decadal Survey

- It is critical that the DPP-CPP and Decadal Survey processes yield consistent results!

- Communication and collaboration is ongoing
    - Invited presentation by Earl Scime to decadal survey committee

- Joint events
    - Planning joint event at decadal survey meeting at PPPL on April 18

- Both processes must be consistent with NAS Burning Plasma Report

Relation to NAS Burning Plasma Report

- For MFE planning, we see DPP-CPP process as a continuation of the Madison / Austin process

- We want the NAS BP Report to serve as the framework for MFE strategic planning
  - Our planning must be consistent with main recommendations of NAS report
  - Initiatives proposed in this process should contribute to the goals laid out in the NAS report

- We will assess community reaction to this approach at upcoming Town Halls and webinars

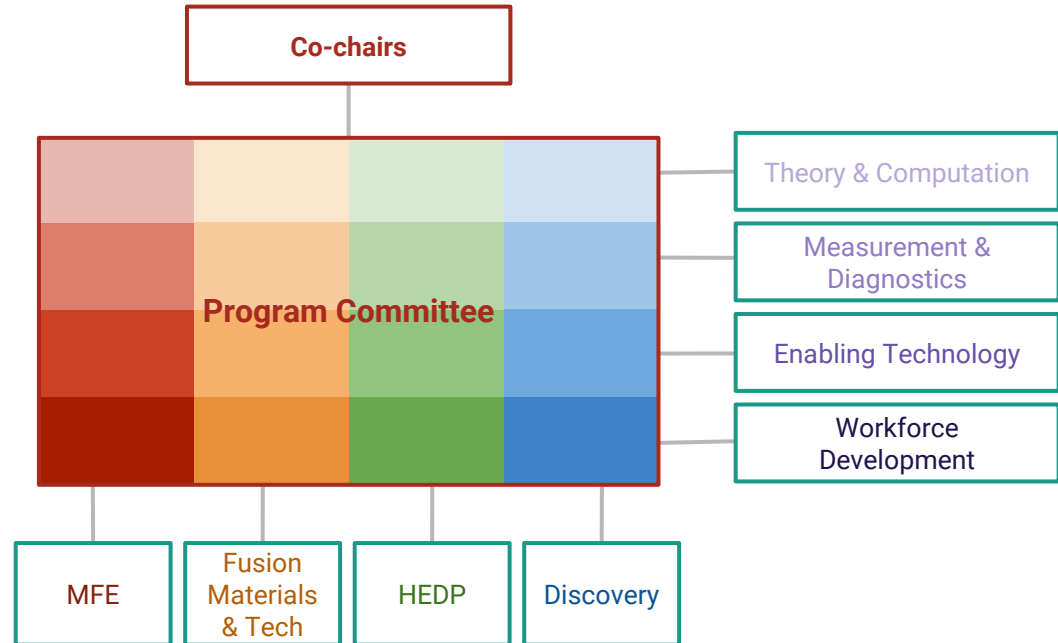- We are optimistic that the NAS BP report can form a consensus framework

Organization

Organizational Structure

The **Program Committee** will work in independent subgroups to produce **recommendations** in eight topical and cross-cutting areas

Co-chairs

Program Committee

Theory & Computation

Measurement & Diagnostics

Enabling Technology

Workforce Development

MFE

Fusion Materials & Tech

HEDP

Discovery

Process for Choosing Program Committee

- Broad representation among stakeholder institutions
  - Universities, national labs, private industry
- Representation among subfields in topical areas
  - In MFE: core plasma, power handling, materials, alternate confinement concepts
- Representation among cross-cutting areas in each topical group
- Range of seniority
- Tried to avoid having strong advocates on program committee
  - We want these people to be able to present their cases at the workshops
  - **No one will be excluded from the process!**
- People who will be enthusiastic, involved, inclusive, and work well together
- Chose among nominated individuals except where gaps were found
- Smallest group that could check all these boxes and do the job
- Names were vetted by APS-DPP subcommittee

Responsibilities of the Program Committee

- PC members will
  - Organize and lead workshops
  - Recruit people for sub-groups etc. as needed
  - Solicit white papers
  - Synthesize community input into reports

- PC members in different topical areas will work in parallel or together to organize topical workgroups

- PC members will work together across topical areas to provide input for cross-cuts

- Some PC members will focus on organizing topical areas; others will focus on organizing cross-cuts

MFE Program Subcommittee*

Brunner, Dan	CFS	Magee, Rich	TAE
Collins, Cami	GA	Mordijck, Saskia	William and Mary
Grierson, Brian	PPPL	Navratil, Jerry	Columbia
Guttenfelder, Walter	PPPL	Petty, Craig	GA
Hegna, Chris	Wisconsin	Reinke, Matt	ORNL
Holland, Chris	UCSD	Shumlak, Uri	Washington
Hughes, Jerry	MIT		

* Confirmed; not finalized. Awaiting one more response.

HEDP Program Subcommittee*

Arefiev, Alex	UCSD	Hansen, Stephanie	SNL
Ditmire, Todd	UT Austin	Pickworth, Louisa	LLNL
Frenje, Johan	MIT	Rocca, Jorge	Colorado State
Gleason, Arrianna	Stanford/SLAC	Schaeffer, Derek	Princeton

* Confirmed; not finalized. Awaiting one more response.

Fusion Materials & Tech. Program Subcommittee*

Donovan, David	UT-Knoxville	Radel, Ross	Phoenix Nuclear
Humrickhouse, Paul	INL	Tynan, George	UCSD
Nygren, Richard	SNL	Winfrey, Leigh	Penn State

* Confirmed; not finalized. Awaiting four responses.

Discovery Plasma Sci. Program Subcommittee*

Baalrud, Scott	Iowa
Ji, Hantao	Princeton
Sinars, Dan	SNL

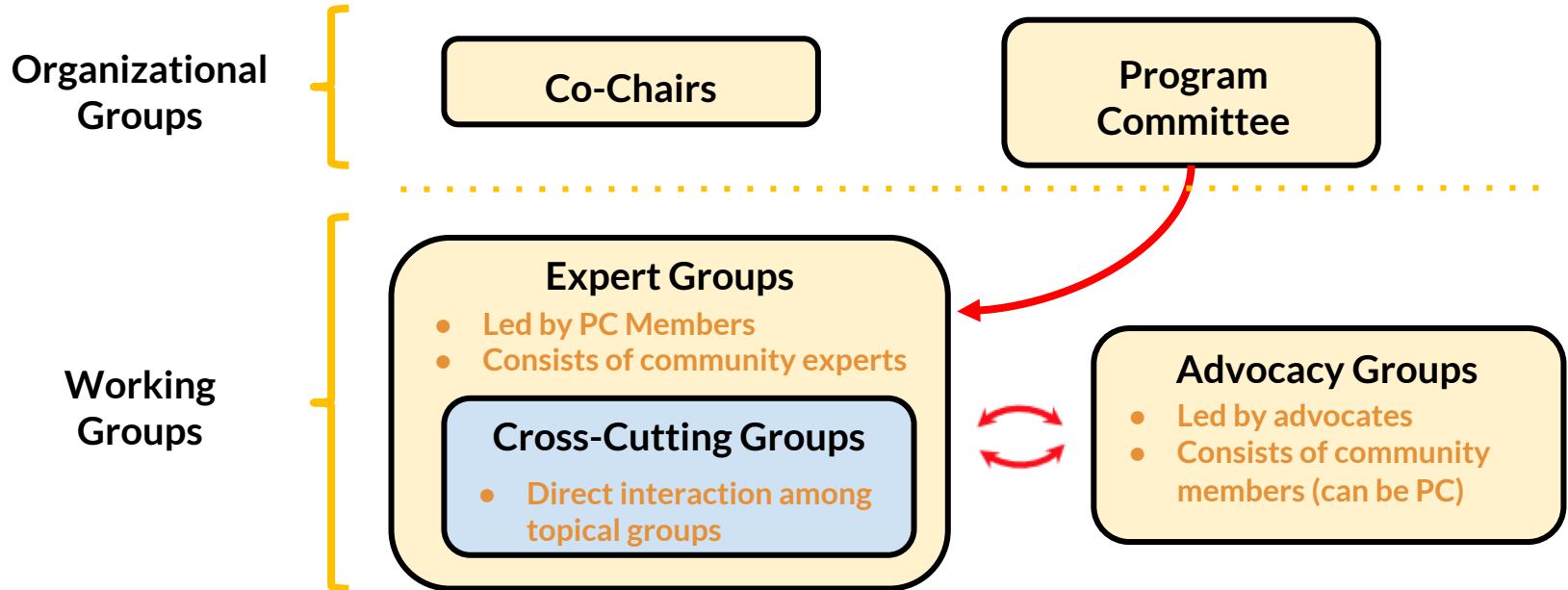* Confirmed; not finalized. Awaiting three responses.

Cross-Cut Leaders*

Theory & Computation	Measurement & Diagnostics	Enabling Technology	Workforce Development
Holland	**	Brunner	Shumlak
Baalrud	Frenje	Ditmire	**
**	**	**	**
**	**	Nygren	Donovan

* Proposed; not yet confirmed. ** Awaiting responses.

Organizational Structure

Organizational Groups

Co-Chairs

Program Committee

Working Groups

Expert Groups
- Led by PC Members
- Consists of community experts

Cross-Cutting Groups
- Direct interaction among topical groups

Advocacy Groups
- Led by advocates
- Consists of community members (can be PC)

Roles Across the Organizational Structure

1. **Co-Chairs**
2. Program Committee
3. Topical Expert Groups
4. Cross-Cutting Groups
5. Advocacy Groups

- Coordinate among topical and cross-cutting areas
- Lead PC to organize workshops, etc.
- Lead PC to prepare input to FESAC
- Oversee of entire process to ensure completeness and fairness

The co-chairs should not advocate for initiatives at any point during the process

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Roles Across the Organizational Structure

1. Co-Chairs
2. **Program Committee**
3. Topical Expert Groups
4. Cross-Cutting Groups
5. Advocacy Groups

- Organize and lead workshops
  - Set dates / locations
  - Help define expected output
  - Invite speakers, advocacy groups, white papers
  - Run working group sessions
- Lead expert groups
- Summarize output from workshops, expert groups, etc.

PC members can participate in advocacy groups, but should recuse themselves from evaluating or leading summaries of initiatives they advocate.

Roles Across the Organizational Structure

1. Co-Chairs
2. Program Committee
3. **Topical Expert Groups**
4. Cross-Cutting Groups
5. Advocacy Groups

Composition
- Led by PC members or designees
- Consist of community experts in pre-defined technical areas
- Community members can volunteer to join

Roles
- Review and refine high-priority gaps and relevant metrics
- Evaluate merits of proposed initiatives
  - Ability to achieve proposed mission
  - Feasibility of proposal
- Generate feedback for advocacy groups

Candidate MFE Expert Groups

- Power handling

- Steady-state operation

- Transients

- Control

- Burning plasma physics

- Global context (including ITER)

Expert groups will be defined with input from PC, and may evolve during the process if necessary.

Candidate HEDP Expert Groups

- Inertial Fusion Energy
- Warm Dense Matter
- Magnetized High Energy Density Plasmas
- Relativistic HED Plasmas and Intense Beams
- Radiation Hydrodynamics and Atomic Physics
- Hydrodynamics

- Laboratory Astrophysics
- MEC Facility
- Brightest Light Initiative
- LaserNet

Candidate FM&T Expert Groups

- Structural materials
- Plasma-material interaction and high heat flux
- Tritium fuel cycle
- Blankets
- Reactor Maintenance
- HTS Magnets
- System design

Candidate DPS Expert Groups

- Low Temperature Plasmas
- User facilities
- Astrophysical Plasmas
- Industrial Plasmas
- Space Plasmas

Roles Across the Organizational Structure

1. Co-Chairs
2. Program Committee
3. Topical Expert Groups
4. **Cross-Cutting Groups**
5. Advocacy Groups

Composition
- Led by PC members
- Consist of community experts across topical areas
- Community members can volunteer to join

Roles
- Lead working groups at workshops
- Coordinate across topical areas
- Help identify proposals that can contribute to multiple topical areas

Cross-Cutting Areas

- Theory & Computation
- Measurement & Diagnostics
- Workforce Development
- Enabling Technology

Members of the cross-cutting groups will interact directly with their counterparts across topical areas to identify synergies across the FES portfolio and opportunities for collaboration.

Cross-cutting areas represent the "glue" between different topical areas in FES.

Roles Across the Organizational Structure

1. Co-Chairs
2. Program Committee
3. Topical Expert Groups
4. Cross-Cutting Groups
5. **Advocacy Groups**

Composition
- Individuals, groups, or institutions who want to promote an initiative
- **Not organized or led by PC**

Roles
- Develop proposals for strategic initiatives
- Present proposals in whitepapers and at workshops
- Address feedback from working groups

Examples of Possible MFE + FM&T Advocacy Groups

- High power density facility
- Quasisymmetric stellarator
- Innovative confinement concepts
- Liquid metal initiative
- Neutron irradiation facility
- Materials test facility
- Whole device modeling initiative
- Model for public / private partnership

Proposals can be "pre-conceptual" to facilitate achieving consensus

- Proposals could emphasize scope rather than design
- Proposals could remain agnostic on whether they require new or upgraded infrastructure

We must have Advocates for existing facilities if we want continued support for them

How Can the Community Get Involved?

- Submit white papers for initiatives

- Join advocacy groups and expert groups

- Provide technical expertise to evaluate proposals

- Advance maturity of initiatives

- Participate in workshop discussions

Strawman APS-DPP Community Planning Process (DPP-CPP)

Motivation of the Process

We are seeking to create a process that will:

- Build upon the NAS Burning Plasma report and other prior community activities and reports

- Create a forum for presenting strategic element proposals (facilities, initiatives) in which all voices can be heard

- Enable technical assessments of these proposals by community experts in a way that is open, transparent, and quantitative

- Publically document technical assessments and summaries of workshop discussions

- Deliver a consensus strategic plan with technically assessed, prioritized recommendations

Strawman Schedule for Each Topical Group

Spring

- Pre-workshop activities
  - Town Halls
  - Communicate and get buy-in on our process and goals

Summer

- Workshop #1
  - Hear proposals for initiatives and launch working groups to evaluate proposals

Fall

- Workshop #2
  - Hear revised initiatives and prioritize proposals

- "Snowmass" (All topical groups together)
  - Coordinate across topical areas, respond to feedback, and finalize report

Winter

Before Workshop #1

- Outreach to communicate our process and assess consensus around NAS BP report and other prior reports
  - Town halls, announcements, webinars
  - Possibility of additional NAS BP webinars

- Formation of expert groups and cross-cutting groups

- Call for white papers containing specific information
  - Scope of initiative
  - Identification of mission need
  - Pre-conceptual design / initiative description

Template will be provided

- Development of plans and submission of white papers by Advocacy Groups

Possible issue: uneven capability for developing designs / initiatives.

It would be helpful if FES would provide support for conceptual design.

Workshop #1

- Plenary presentations by Advocacy Groups
  - Must address questions in "template"
  - Initial questions and feedback from community

- Expert group sessions
  - Agreement on process by which to evaluate initiatives
  - Update and report on gaps and research opportunities that need to be addressed
  - Initial evaluation of proposed initiatives

- Cross-cutting group sessions

Homework after workshop #1: Evaluate and refine proposals
- Expert groups will generate chits for Advocacy Groups
- Advocacy Groups will address chits and refine proposals, including ballpark cost estimates

Workshop #2

- Advocacy groups will present updated proposals

- Expert groups will present their assessment of proposals within each expert area

- Sessions for cross-cutting issues

- Attempt at coarse prioritization among proposals

Homework after workshop #2: Write up findings
- PC and expert groups will summarize findings
- Prioritized list of recommendations
- Coordinate across topical areas for cross-cutting issues
- Composition of narrative for strategic plan
- Summaries will be made available for comments and feedback

"Snowmass"

- This is the opportunity for all topical areas to come together to craft a coherent plan

- January 2020 seems like most feasible time

- Topical areas should already have rough strategic plans developed, written, and reviewed before Snowmass, due to late date

- Present plans, tweak them to forge consensus, and merge them

- Build consensus around recommendations and prioritizations

Wrapping Up: After Snowmass

- PC prepares final report
  - Recommendations for initiatives in each topical area (MFE, HEDP, FM&T, DPS)
  - Sections discussing opportunities and recommendations in each cross-cutting area
  - Summaries of expert-group report and discussion of areas of consensus

- Co-chairs prepare Executive Summary

- Report distributed to community by mid-February 2020

- Presentation of report to FESAC late February / early March

Next Steps for Us

- Convene program subcommittees
  - Get feedback / buy-in on plans presented here
  - Start planning workshops

- Announce process to community
  - Town halls
  - USBPO webinars
  - Mailing lists / DPP-CPP website

- Solicit input from community
  - White papers
  - Requests / nominations for presentations at workshops

This is a critical opportunity for Fusion Energy and Plasma Physics.

We are excited and committed to success!