

# Status of the U.S. Burning Plasma Physics Program

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by  
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# Caution: This is Work in Progress!

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- Describes activities in forming a new community-based U.S. Burning Plasma Organization (USBPO)
- A very new and rapidly evolving activity
- Eager to obtain input and ideas from the U.S. fusion research community

# What is the USBPO?

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- A U.S. fusion research community-based organization with the mission:

*Advance the scientific understanding of burning plasmas and ensure the greatest benefit from burning plasma experiments by coordinating relevant U.S. fusion research with broad community participation.*

# Why do We Need a USBPO?

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- **Increase in BP issues requiring programmatic activities**
  - Community interaction with ITER physics team
  - U.S. ITER Project Office physics and technology R&D Tasks
  - ITPA priority research
  - BP-related Priorities for U.S. research activities
  - Inquiries on U.S. activities on BP Program and ITER support

# Why do We Need a USBPO? (cont'd)

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- Recognized need to organize and coordinate burning plasma science studies in the U.S. program
  - NRC BP report emphasized need to fully integrate BP research program into U.S. fusion community activities
  - Burning Plasma PAC recommendations
- Optimize our participation in BP experiments on ITER
  - Develop national task groups to address specific topics
  - Start process now with domestic program activities
- Foster community ownership of BP research and ITER participation
  - Help find entry points to BP research activities for interested parties

# OFES Looking to Community to Help Organize and Guide BP Program

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- Community was effective in defining need for BP research and helping to establish US participation in ITER
  - UFA Workshops
  - Snowmass Meetings
  - FESAC and NAS reviews
- Responding to community recommendations
  - BP PAC “Guidelines for the US Burning Plasma Program”

# Establishing a U.S. BP Organization will be an Evolutionary Community Activity

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- USBPO will evolve as activities grow and we progress through a stream of ITER decisions in coming year
- Be flexible in adjusting to evolving program
  - Now: 'Burning Plasma' support R&D in experiments, modeling, and technology
  - Eventually: Plan for and pursue specific experiments in ITER, validate models of D-T plasma, test relevant technologies
  - USBPO will work with community and OFES to develop process/structure for this activity
- Generally analogous to VLT

# U.S. MFE Program is Rich in Activities Related to BP and ITER

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- Major facilities - DIII-D, C-Mod, NSTX (e.g., earlier Facilities discussion)
- ITPA activities
- Theory and Modeling
- Advanced Computing
- Diagnostics
- VLT support of ITER R&D
- TTF and basic confinement studies
- IEA international collaborations and bilateral agreements
- etc.

# Expectations for USBPO: Bring a Coherence to BP Activities

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- Enhance coordination and guidance as needed
  - Major facility programs, international collaboration, ITPA and joint experiments
  - Theory and integrated modelling
  - VLT, TTF, SciDac, etc.
- Advocate for BP program activities
- Assist ITER Physics and technology tasks
- Plan for ITER research program
- Integrate ITER participation with the broader domestic program

# Evolution of the US Burning Plasma Organization

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- OFES engaged in discussion with ad-hoc ‘Stake Holders’ group for ~ past 8 months
  - Outgrowth of BP PAC and earlier discussions
  - Individual and small group meetings: proposed mission, charter, goals, structure etc.
  - Full meeting at IAEA Villamoura in Nov 04
  - Group conference calls
  - Presentation & Discussion at 2005 Budget Planning Meeting
    - Allen, Fonck, Marmar, Meade, Milora, Navratil, Prager, Sauthoff, Taylor, VanDam, Willis, Oktay.
- May 05: OFES appoints BPP Leader to get the process started

# Principles Guiding USBPO Development

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- Success of ITER; maximize benefits
- Facilitate broad community participation, ownership, engagement
- Responsive to community
- Responsibility for completing BP tasks
- Attract the best people
- Close working relationship with U.S. IPO
- Facilitate U.S. participation internationally
- Utilize existing structures and activities

# Goals of the USBPO

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- Coordinate and advocate U.S. Burning Plasma research
- Provide a U.S. organizational structure for participation in BP program
  - Individual investigator and larger groups
- Optimize U.S. ITER participation and address issues beyond ITER
  - Promote and coordinate activities on existing experiments, theory and simulation, diagnostics, etc.
  - Identify and develop US areas of excellence and interest in BP program (including staff)
- Educate and advocate BP science to the wider scientific community
- Closely coordinate U.S. activities with US ITER Project Office
  - ITER Physics R&D
  - Maximize US exploitation of ITER
- Facilitate strong interactions with international partners
  - e.g., ITPA, IEA collaborations, etc.

# USBPO Council: Community Governance of BP Program

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- Sets Policy Direction
- Overall coordination, oversight, and guidance to USBPO activities
- Advises BPO leader (director)
- Insure fair and open process for all U.S. BP activities
- Provide fusion community input on resource needs and priorities w.r.t. BPS
- 12 members + 3 ex officio (Director, 2 IPO reps)
  - Chosen with community input

# USBPO Directorate: Implement & Manage BPO Activities

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- Use advice and guidance from Council
- Lead U.S. fusion community in discussion and execution of BP research activities
- Represent BP program in U.S. fusion community affairs
- Establish and manage structure for implementing BP research in U.S.
- Provide points of contact for information on BP research activities
- Develop communication and outreach activities to community members and outside science communities
- Report to OFES and community on progress and resources needed in BP research activities
- Develop Interface with IPO, ITPA, TTF, SciDac, etc.

# USBPO Research Committee: Lead Tasks Execution

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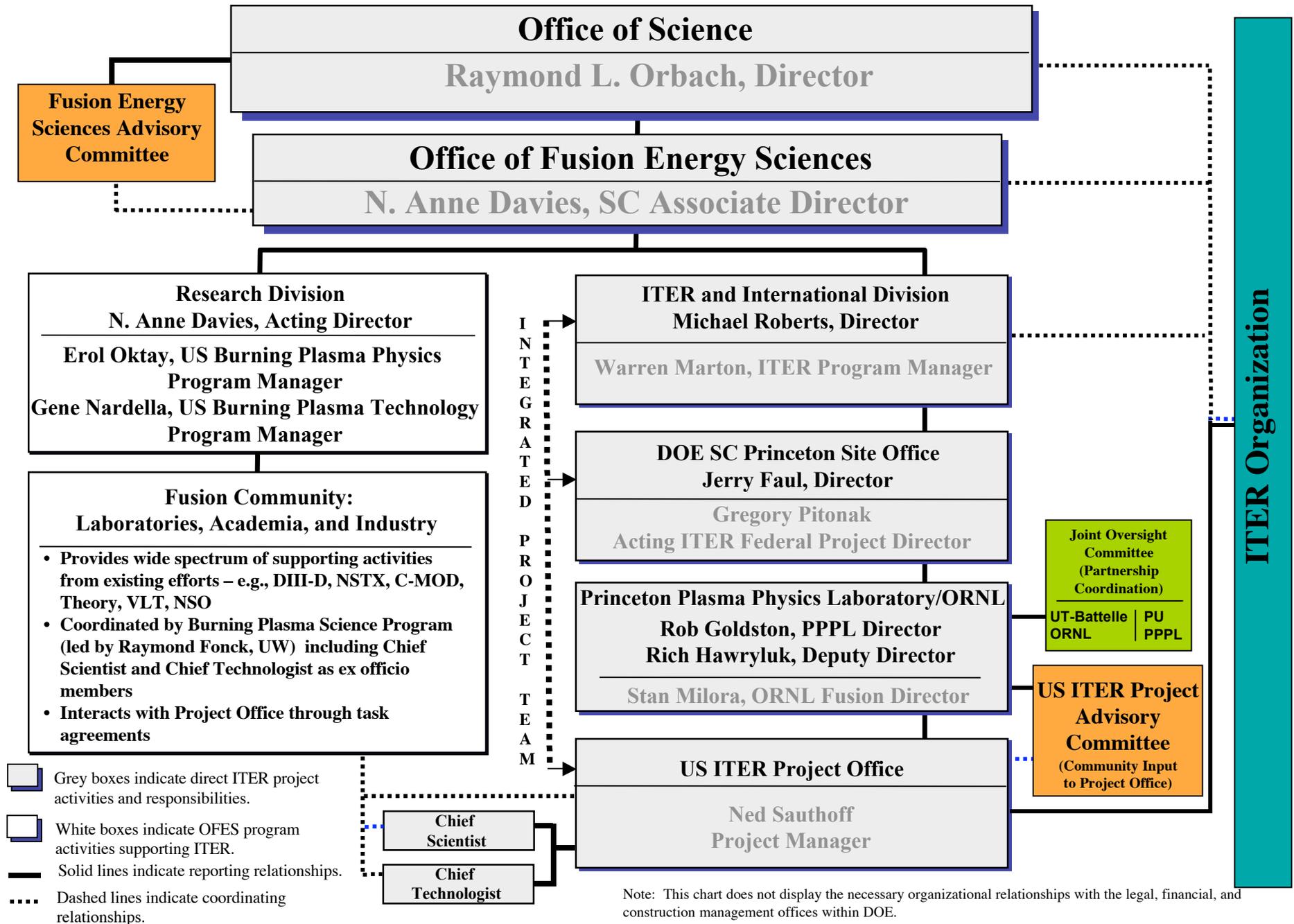
- Task areas leaders
- Working management group for BP research activities
- Identify resources needed to execute BP research tasks
- Lead task groups in executing specific BP research tasks
- Regular meetings to coordinate and monitor research activities
- Identify and recruit participants from community

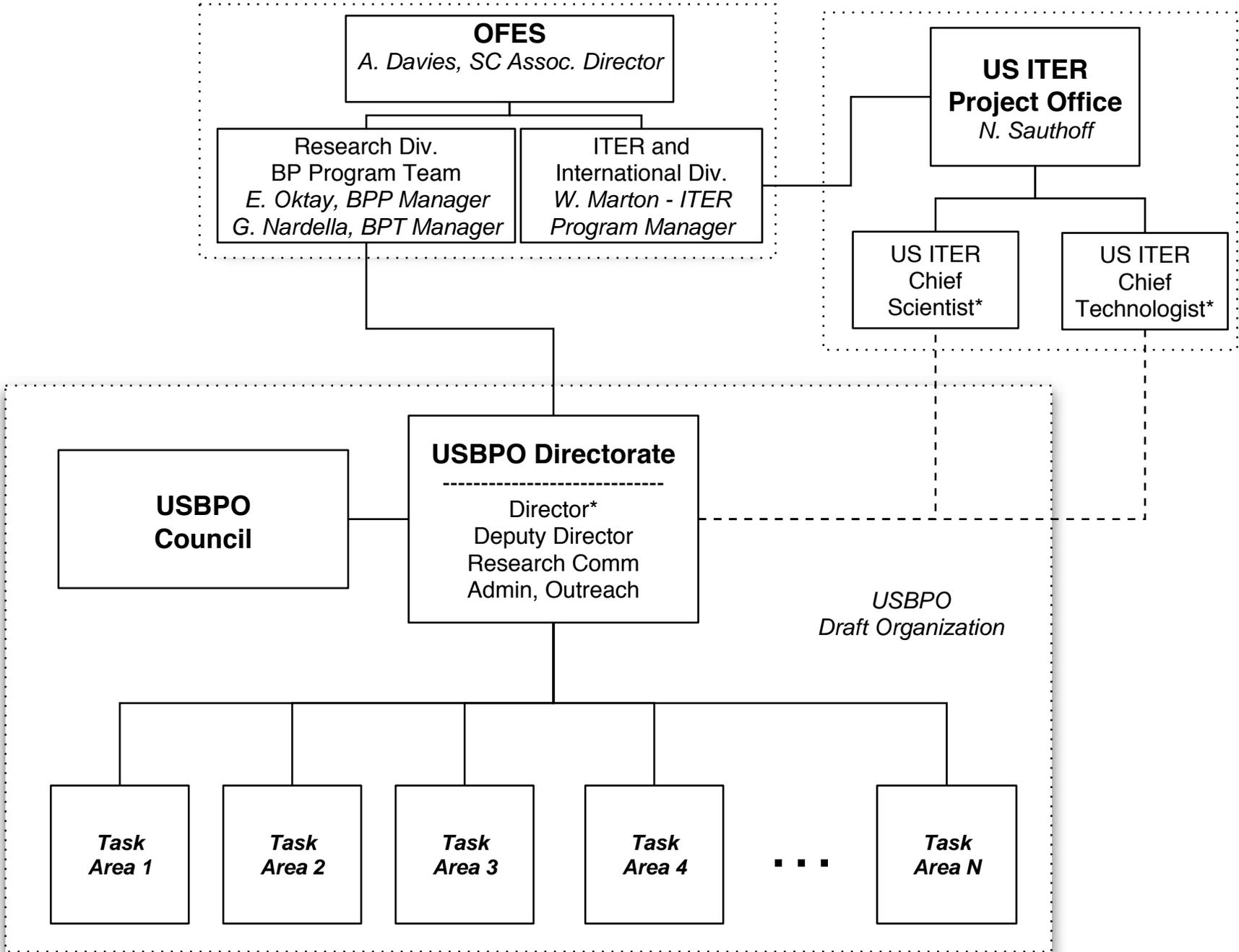
# Exploit Communications Tools to Support Broad Participation

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- Extensively use video and tele-conferencing
- Sponsor national BPS seminar (bimonthly)
- Web site; e-mail list servers - [www.burningplasma.org](http://www.burningplasma.org)
- e-News
- Sponsored workshops
- Research Committee
  - biweekly management meeting
  - On-site meeting 1 or 2/yr
- Council meetings
  - 1-2/yr; more at beginning...
- Other ideas?

# Management Structure for the US ITER Project and Program





— Reporting Relationship  
 - - - Coordinating Relationship

\* ex-officio Council members

# Task Groups will Evolve Dynamically

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- Examples of possible Task Groups
  - Boundary Physics and Surface Science (ITPA,VLT)
  - Scenarios & Steady State (ITPA)
  - Energetic Particles (ITPA)
  - Plasma Control (ITPA)
  - MHD Equilibrium and Stability (ITPA)
  - Integrated Modeling & Confine Database (ITPA)
  - Diagnostics (ITPA)
  - Transport (ITPA,TTF)
  - Pedestal (ITPA)
  - Heating & Current Drive (VLT)
  - Materials Science (VLT)
  - BP Technology (VLT)
  - BP Issues in Alternate & Future Concepts
  - Nuclear Science / Neutronics (VLT)
- Consider groups that cut across established areas

# USBPO Immediate Activities: Contribute while Forming Organization

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- Heating and CD tools evaluation for ITER baseline and advanced operation scenarios
  - Meade, Navratil, Murakami, Kessel, Greenfield, Hubbard, Batchelor, Bonoli, Wade, +
- Diagnostics evaluation for ITER control and advanced scenarios
  - Allen, Wade, +
- Aid ITER Project Office as requested
  - 2005 ITER Physics Tasks - Uckan, Fonck
    - Address high priority tasks such as RWM analysis (Navratil, Bialek)
- Community BPS Workshop planning
  - Marmar, VanDam, Meade
  - Post-APS, pre-ITER Design Review
- Organization development
  - Fonck, Navratil, Prager, Taylor
  - Mission, Goals, Charter ...

# Summary

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- A U.S. Burning Plasma Organization is being formed
- Fusion research community-based effort to advance Burning Plasma Science and optimize benefits from participation in ITER
- Foster fusion community coordination of, participation in, and ownership of BP program activities
- Develop areas of focus and excellence to prepare us to compete in the ITER era, and look beyond...
- Need active participation from community to succeed
- Planning a community BP Workshop for near-future