

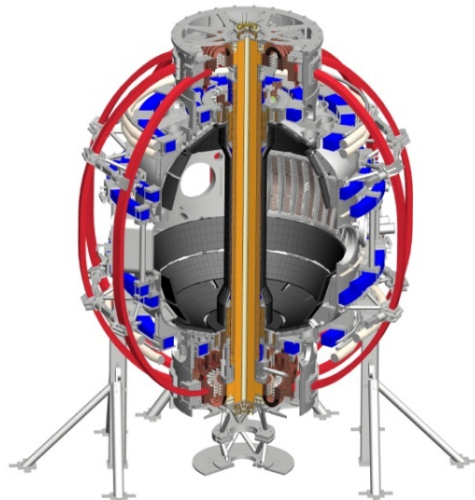
New organization, issue discussion, roles and responsibilities, and so much more...

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J. Menard

For the NSTX-U Research Team

NSTX-U Pre-Forum Meeting #1
PPPL LSB B318
December 16, 2014



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 Fukui U
 Hiroshima U
 Hyogo U
 Kyoto U
 Kyushu U
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 NIFS
 Niigata U
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 Chonbuk Natl U
 NFRI
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 FOM Inst DIFFER
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 ASCR, Czech Rep

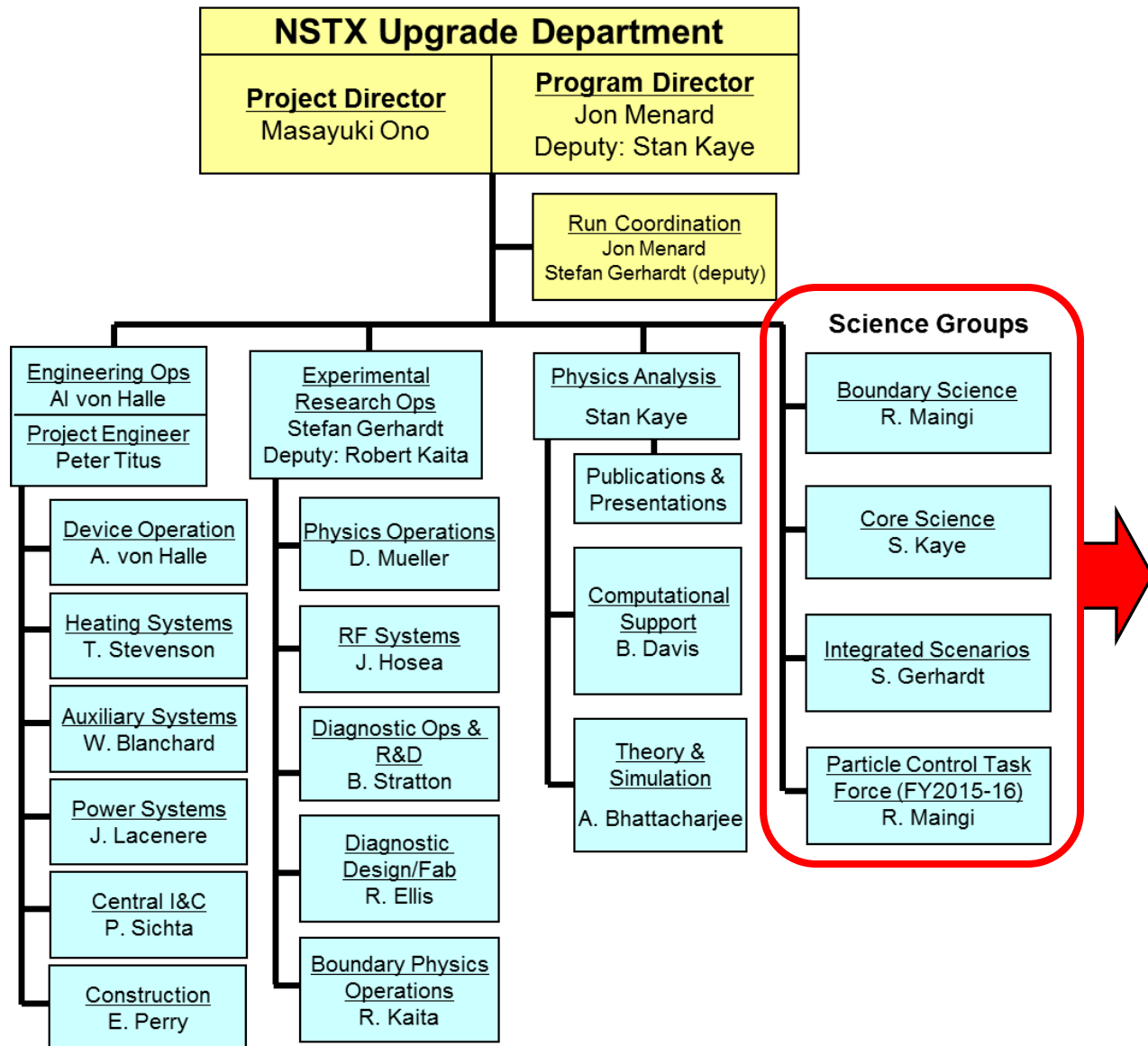
Upcoming meetings / events

- Pre-forum meeting #1 – December 16, 2014 (i.e. today)
 - Discuss new SG/TSG structure, roles, responsibilities, “other issues”
 - Discuss actions/experiments needed for restart, initial physics-ops
- Pre-forum meeting #2 – January 28-29, 2015 (Wed, Thu)
 - Goal: Provide up-to-date operations status to aid scheduling
 - Day 1: Diagnostics/operations readiness meeting
 - Status updates and projections for all systems needed for research ops
 - Day 2: Update from SG/TSGs on XMP/XP solicitations
- Research Forum – Feb 24-27th (Tue-Fri) at PPPL
 - Plenary session, TSG break-outs, SG sessions, team joint session, summary (also safety session and team photo)
- CD-4 / first plasma – Mid March
- Research operations – Mid May (12-14 run weeks)
- NSTX-U PAC-36 – Sept/Oct 2015 (end of/after FY15 run)

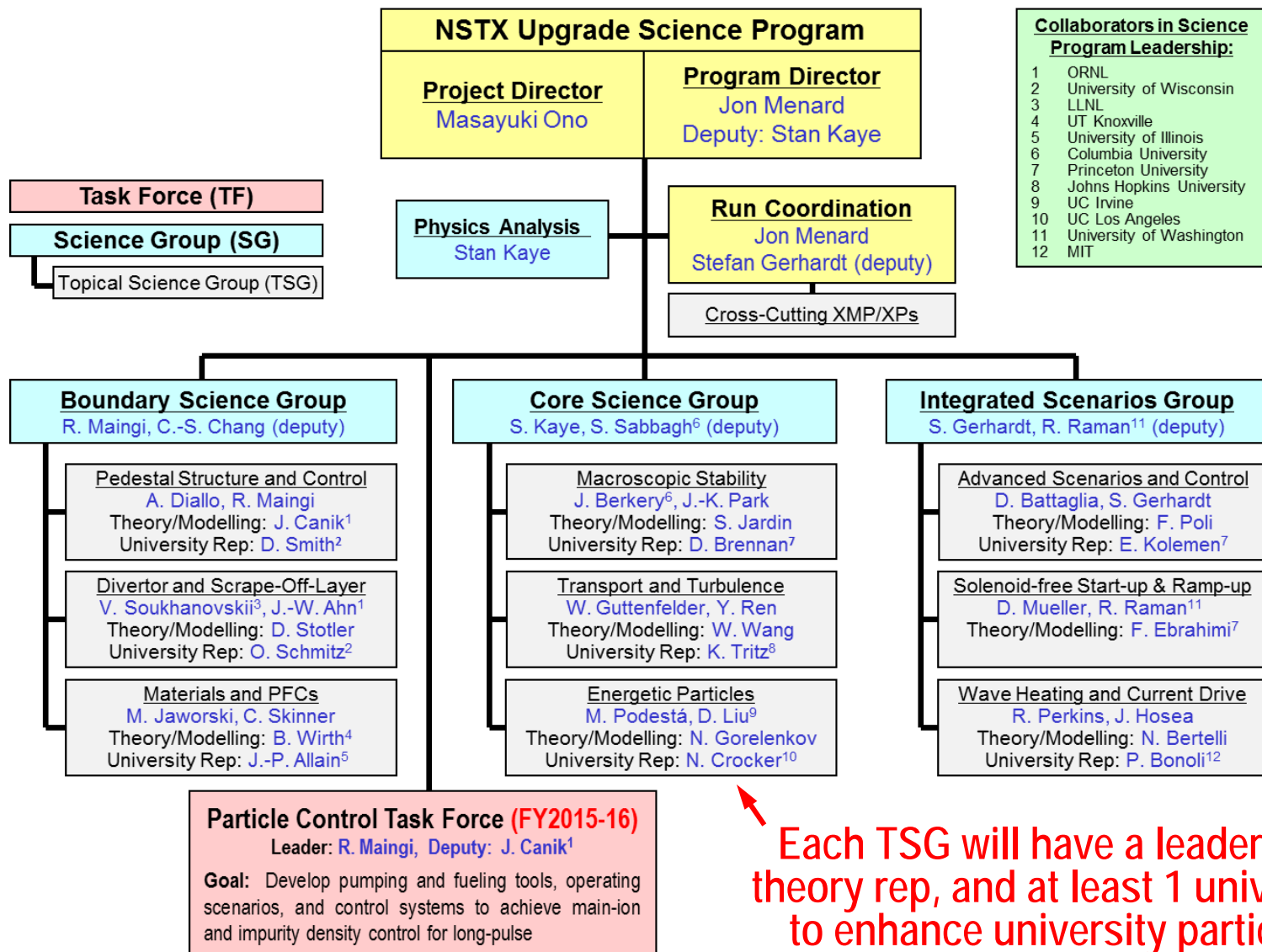
Agenda

- NSTX-U organizational structure
- Roles and responsibilities of various groups
- Discussion of issues raised during 1-on-1's
- Preparation for Research Forum
- XP approval and execution - S. Gerhardt
- XMP/XPs for restart, 1st run month – TSGs/TF

NSTX-U Organization for FY2015



NSTX-U research program will be (re-)organized along 3 “Science Groups” starting with FY15 run



Motivations for restructuring science program

- TSGs provide expertise in broad range of topics, but program would benefit from better coordination between TSGs
 - SG leader responsibility: Coordinate TSG physics research plans, experimental/shot plans, diagnostic coverage & usage
- Experiments that engage more than one TSG will receive increased priority for run-time
 - Example: experiment on 3D fields generating data for: plasma response, turbulence, energetic particle loss
- Efficient shot usage especially important during first run year (many systems need to be re-commissioned)
- Incorporate much wider set University researchers/PIs in planning + coordination of research program (FES/PPPL goal)
- NEW: Task-force for long-pulse particle control → cross-cutting goal supporting entire research program

Roles and Responsibilities for Science Groups

- Coordinate research of TSGs within the SG – promote experiments / plans that achieve multiple scientific goals
 - Critical to maximizing scientific output per shot
 - “Coordinated” XPs will receive higher priority / more run time
- Inform Run Coordinator when XP is ready for final review
- Provide summaries and highlights of scientific progress at/for NSTX-U team meetings, FES/quarterly reviews, other venues
- Aid dissemination of results with Physics Analysis Division
 - Journal publications, invited talks, seminars, colloquia, conferences, ITPA, BPO
- Coordinate / down-select milestone ideas from TSGs in SG
- Provide feedback / comment on annual Field Work Proposal
- Assist / report to the NSTX-U Program and Project directors

Roles and Responsibilities for Topical Science Groups

- Lead brainstorming, organization, writing of 5 year plan topics
- Determine and address highest priority scientific issues through discussion and consensus at open meetings
- Organize the NSTX-U Research Forum sessions for the TSG
- Draft scientific milestone ideas utilizing expertise of the TSG
- Propose and execute experiments to achieve milestones and address priorities
- With SG leaders, define facility and theory resources to achieve research goals
- Assist / report to the NSTX-U Science Group leaders

Roles / Responsibilities for University Representatives (1)

- Contribute to prioritization within TSGs
 - Help decide/draft milestones, XMP/XP prioritization
 - Help identify how your tools/codes/diagnostics/personnel can contribute to the group and the larger NSTX-U program
- Advocate for your own research (up to a point...)
 - We understand that data, presentations, publications, participation are important for achieving grant deliverables
- If you are willing and able:
 - Be an advocate and resource for the research of your TSG outside of NSTX-U
 - i.e. seek input/interest from those not funded by NSTX-U, particularly from your own University and other universities

Roles / Responsibilities for University Representatives (2)

- Help identify best tools for remote participation
 - The TSGs will hold many, many meetings
 - We want feedback on what works, and what doesn't
 - Zoom vs ReadyTalk vs Google chat vs. other
 - Zoom can provide videocon, slide sharing, and telecon
 - JEM: TSGs should probably migrate towards Zoom...
 - Help identify best tools for remote experimentation
 - If you are interested, help develop/prototype a “remote control room” to run experiment(s) from your institution
 - Employ multiple/key control room stations with web-cams + Zoom (?)
 - On-site deputy session leader arguably essential for this to work...
 - Expect best implementation will come from the users of these tools
- Summary: In short, help lead and manage your TSG

Roles for Task Forces

- Wikipedia: “A **task force** (TF) is a unit or formation established to work on a single defined task or activity. Originally introduced by the United States Navy, the term has now caught on for general usage and is a standard part of NATO terminology. Many non-military organizations now create "task forces" or task groups for **temporary activities** that might have once been performed by ad hoc committees.”
- For NSTX-U:
 - Focus on specific goal that cuts across SGs / TSGs
 - Must be very high priority goal within research program
 - Finite duration - nominally 1-2 years (maybe up to 3 for PC-TF)
 - Receives dedicated run-time, session at Forum – similar to a TSG
 - But reports directly to Program / Project (at least for Particle Control TF)

May be beneficial to have an additional NSTX-U organizational structure: “Working Groups”

- FESAC-SPP Priorities (and Tiers):
 1. Control of deleterious transient events, Taming plasma-material interface
 2. Experimentally validated integrated prediction, FNS sub-program
- FES will soon announce follow-on “workshops” on:
 - Transients, PMI, Integrated Simulation, (+ Plasma Science Frontiers)
- “Working Groups” will be needed to organize/present NSTX-U vision/plans at FES workshops, FESAC, ITPA, other venues
 - “PMI” arguably already well covered by Boundary SG / LM initiative
 - “Transients” WG could help organize/present disruption PAM plans
 - “Integrated Simulation” WG could help organize/present validation plans, build upon and/or prioritize NSTX-U/Theory partnership/CPPG activities
- Working groups would not have dedicated run-time, but would:
 - Hold periodic meetings to assess progress, recommend next-steps
 - Make recommendations on XP/milestone priorities to SGs/TSGs/Program
 - Solicit input/XP ideas from team, domestic & international collaborators

Other governance issues / ideas

- There were some inquiries whether it would be valuable to have something like a:
 - “Collaborator Council”
 - “Research Council”
 - “Board of Directors”
- Most of these ideas aim at giving collaboration PIs (more) meaningful input into NSTX-U management
- Pros:
 - Could increase collaborator actual/apparent influence on Program
- Cons:
 - Yet another committee/group (already have NSTX-U PAC, PPPL AC)
 - Dividing into collaborator and non-collaborator potentially divisive
- Present position: Try new SG/TSG structure, include SG leader input to FWP, focus on WGs/workshops, revisit in 1yr

Comments / queries from one-on-one meetings (1)

- Would it be beneficial to have diagnostic “tsar”?
 - i.e. someone tasked with helping to ensure diagnostics are fully functional for the XPs that require them
 - FY15 XP form has explicit comment that XP author needs to check with responsible diagnostic physicist or research operations management to ensure diagnostic coverage
 - Beyond that, NSTX-U should have updated list of diagnostic capabilities, responsible personnel, and up-to-date e-mail/phone number
 - <http://nstx-u.pppl.gov/diagnostics>
 - Hasn't been updated since 2011 – will task B. Stratton to update
 - Automated e-mail reminders for diagnostic coverage would be useful, but need to get DAQ, MDS+, etc. functional first...

Comments / queries from one-on-one meetings (2)

- Substantial NSTX data remains unanalyzed, and could be made more available to team, and public
 - Should some NSTX / NSTX-U databases (team and “private”) be more publicly available?
- Crowd-sourced code library for data access, analysis, and visualization could be valuable
 - Manage with modern software development practices, i.e. have feature request tracking, bug tracking mechanisms
 - Have not historically viewed such software as a “research product”, but should we change this paradigm?
 - Reduce “reinventing the wheel”, enhance efficiency and scientific productivity
 - Need help from advocates, CS/IT to ID best tools for this...

Comments / queries from one-on-one meetings (3): Paraphrasing: “Should Science Groups map to FNSF goals?”

Answer: SGs map well to NSTX-U missions, which include FNSF goals

Mission Elements and 5YP 5 Highest Priorities

NSTX-U Science Groups:

- Advance ST for FNSF
 1. Demonstrate 100% non-inductive sustainment at performance that extrapolates to $\geq 1\text{MW/m}^2$ neutron wall loading in FNSF
 2. Develop and understand non-inductive start-up and ramp-up (overdrive) to project to ST-FNSF with small/no solenoid
- Develop solutions for PMI challenge
 3. Develop / utilize high-flux-expansion “snowflake” + radiative detachment to mitigating high heat flux
 4. Begin to assess high-Z PFCs + liquid Li to develop high-duty-factor integrated PMI solutions
- Explore unique ST parameter regimes to advance predictive capability - for ITER and beyond
 5. Access reduced ν^* + high- β + varied q and rotation to dramatically extend ST understanding

Integrated
Scenarios

Boundary
Science

Core
Science

Research Forum Overview

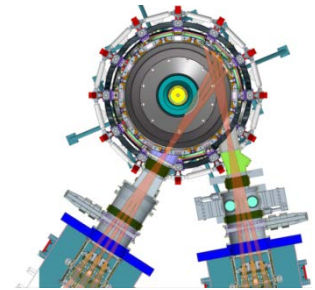
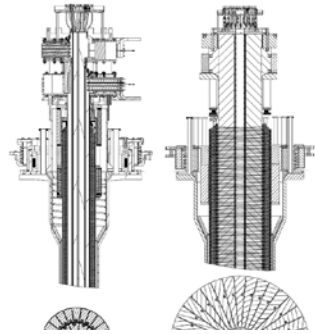
- Science groups will nominally follow priorities/detailed plans developed for 5 year plan (until they are obsolete...)
- Abbreviated eXperimental Proposals (XPs) (developed in Dec-Jan) will be presented at the forum
 - Motivation, goal, shot plan, # of run days, diagnostics, analysis...
- Prioritization carried out at forum using abbreviated XPs
- ~70-90% of prioritization completed by end of forum
 - Highest priority research in research milestones / task forces
 - Proposals that address milestones will receive the most run time
 - If abbreviated proposal idea is “priority 1”, the author is asked to develop full proposal for operational + program review/approval
- Expect ~1/3 of all XPs for year to be approved, ready at start of physics campaign (April/May 2015), then roll forward
 - Typically schedule XPs ~1-2 months in advance

FY2015-16 research milestones target exploitation of new capabilities, exploration of new regimes

Incremental (full ops)

Expt. Run Weeks:

Previous center-stack New center-stack



Present NBI New 2nd NBI

Boundary Science

Core Science

Integrated Scenarios

FES 3 Facility Joint Research Target (JRT)

FY2015

12 14

R15-1

Assess H-mode confinement, pedestal, SOL characteristics at higher B_T , I_p , P_{NBI}

Develop snowflake configuration, study edge and divertor properties

IR15-1

R15-2

Assess effects of NBI injection on fast-ion $f(v)$ and NBI-CD profile

R15-3

Develop physics + operational tools for high-performance discharges (κ , δ , β , EF/RWM)

NSTX-U leads JRT

Quantify impact of broadened $J(r)$ and $p(r)$ on tokamak confinement and stability

FY2016

16 20

R16-1

Assess scaling, mitigation of steady-state, transient heat-fluxes w/ advanced divertor operation at high power density

R16-2

Assess high-Z divertor PFC performance and impact on operating scenarios

IR16-1

Assess confinement and local transport and turbulence at low v^* with full range of B_T , I_p , and NBI power

R16-3

Assess fast-wave SOL losses, core thermal and fast ion interactions at increased B_T , I_p

R16-4

Develop high-non-inductive fraction NBI H-modes for ramp-up & sustainment

C-Mod leads JRT

Assess disruption mitigation, initial tests of real-time warning and prediction techniques

Draft FY2015 Research Forum Agenda

		Tuesday	Wednesday	Thursday	Friday
AM	Plenary	Speaker	TSG Parallel	Team-wide	SG summary
	Forum goals / priorities	Menard	MS	PCTF	Core
	Facility / diagnostic status	Ono	RF	Safety	Boundary
	MAST-U status, collaboration ideas	CCFE	MP	Team Photo	Scenarios
	DIII-D/C-Mod status, opportunities	GA / MIT			
	TSG agendas for Boundary SG	Maingi			
	TSG agendas for Core SG	Kaye			
	TSG agendas for Scenarios SG	Gerhardt			
PM		TSG Parallel	TSG Parallel	SG Parallel	
		Ped	DivSol	Core	
		EP	T&T	Boundary	
		ASC	SFSU	Scenarios	