

FSP Mission Statement

- **The Fusion Simulation Program (FSP) will provide the capability to confidently predict toroidal magnetic confinement fusion device behavior with comprehensive and targeted science-based simulations of nonlinearly-coupled phenomena in the core plasma, edge plasma, and wall region on time and space scales required for fusion energy production.**

See: <http://www.pppl.gov/fsp/>

for more details; e.g., it will produce a framework, it will couple codes,

See also Bill Tang's FSP TCC Seminar

Fusion Simulation Project (FSP)

- It's happening: October 2011 money will flow
- \$8M first year from FES (\$5M new money)
- Ramping up to \$15M/year
- ASCR funding still somewhat uncertain, but hope for:
 - \$3M/year to start (continuation of protoFSP money)
 - ramping up to \$10M/year
 - ProtoFSPs being reviewed by ASCR first week of September @PPPL

FSP is driven by Science Drivers

- Core turbulence on transport time scales
- Wave Particle Resonances
- Integrated Whole-Device Modeling
- Integrated Boundary Layer (SOL), Divertor, Plasma Wall Interactions
- Structure, Size and Stability of H-mode Pedestal
- Disruptions
- History:
 - Science drivers determined in September 2009
 - First reports: December 2009
 - March meeting in Boulder
 - Task for creating “Conceptual Design Documents” in June
 - Reports submitted at end of October

Management team appointed teams to create “conceptual design”

Bill Nevins (LLNL) *Team Leader*
Stan Kaye (PPPL) *co-Leader*
Pat Diamond (UCSD)
Jeff Candy (GA)
Chris Holland (GA/UCSD)
Scott Parker (U. Colorado)
Scott Klasky (ORNL)
Weixing Wang (PPPL)
Xianzhu Tang (LANL)
Vincent Chan (GA)

R. Nazikian (PPPL) *Team Leader*
P. Bonoli (MIT) *co-Leader*
Nikolai Gorelenkov (PPPL)
Bill Heidbrink (UC-Irvine)
Herb Berk (IFS)
S. Wukitch (MIT)
Randy Wilson (PPPL)
Ed D'Azevedo (ORNL)
Don Spong (ORNL)
John Cary (TechX)

Tom Rognlien (LLNL) *Team Leader*
Dennis Whyte (MIT) *co-Leader*
Darren Stotler (PPPL)
Brian Wirth (UC-Berkeley)
Jeff Brooks (Purdue)
John Canik (ORNL)
Martin Greenwald (MIT)
Xianzhu Tang (LANL)

Chuck Kessel (PPPL) *Team Leader*
Ron Prater (GA) *co-Leader*
G. Bateman (Lehigh) (V. Pankin as alternate)
Doug McCune (PPPL)
Lang Lao (GA)
Linda LoDestro (LLNL)
Arie Shoshani (LBNL)
John Cary – (Tech-X)
Arnold Kritz (Lehigh)

Phil Snyder (GA) *Team Leader*
Rajesh Maingi (ORNL) *co-Leader*
X. Xu or Umansky (LLNL)
C.S. Chang (NYU)
Tom Osborne (GA)
Jeff Hittinger (LLNL)
Martin Greenwald (MIT)
Arnold Kritz (Lehigh)

S. Kruger (TechX) *Team Leader*
J. Menard (PPPL) *co-Leader*
Allan Reiman (PPPL)
Dave Humphreys (GA)
Luis Chacon (ORNL)
Vincent Chan (GA)
Bill Tang (PPPL)

Disruption report has evolved as moving into conceptual design

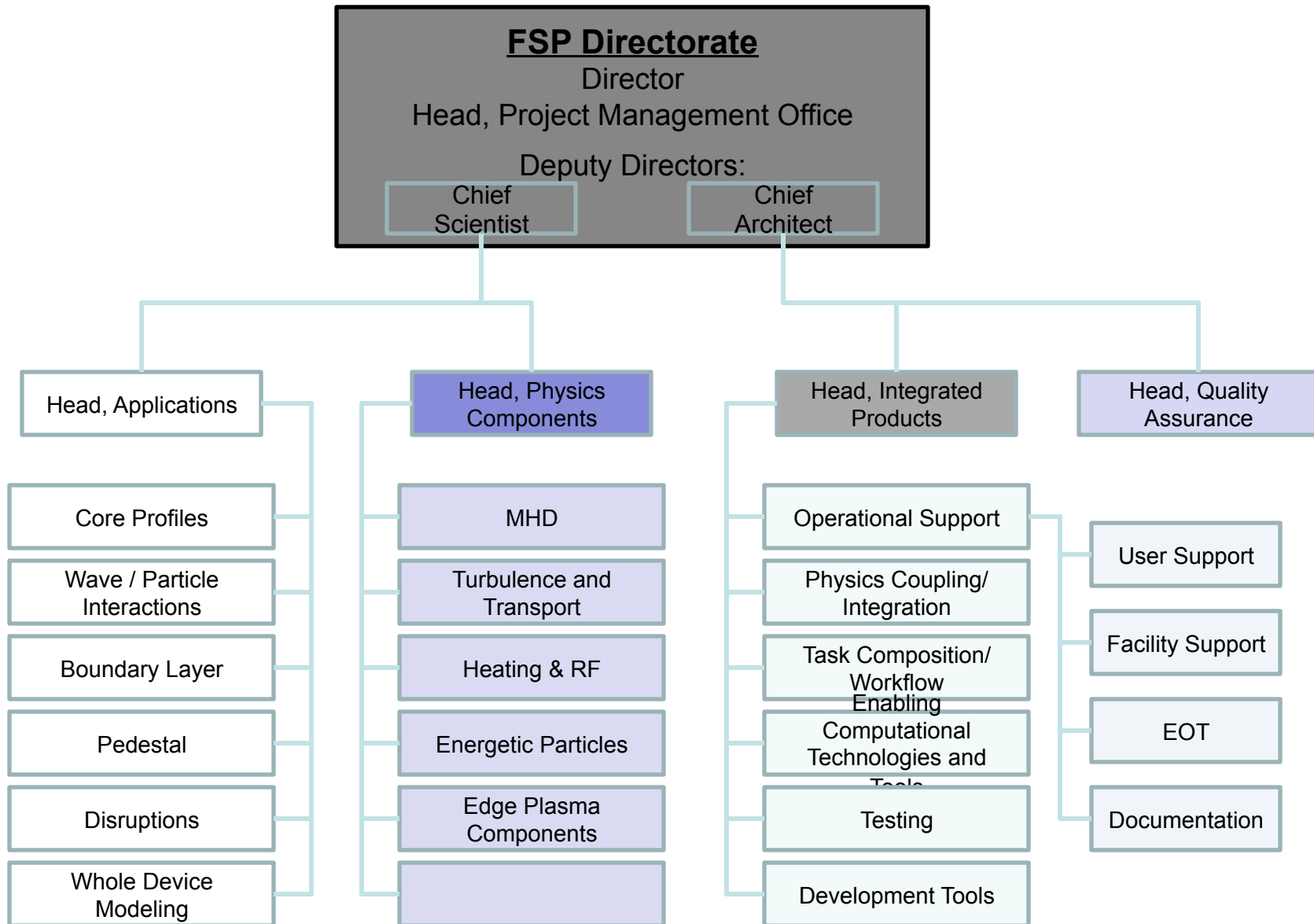
- Broadened considerably to include “disruption prevention”
- This gives extremely broad mandate:
 - NTMs, sawteeth, feedback control, etc.
 - MHD/Kinetic coupling
- New mandate motivated by:
 - Feedback from FSP advisory committee
 - Feedback from FSP management committee

Summary of Integration Efforts		Development Campaigns		
Physics Campaigns		WDM Modeling	Extended MHD	
Onset Prediction and Avoidance	Transport events	Neutrals, radiation, impurities		Advanced Components
	Ideal Instabilities	Linear MHD codes	None	
	Saturated instabilities	Advanced components	Transport models	
	Feedback control	PCS	RF/MHD, PCS, 3D coil control	
Consequence Prediction and Mitigation	Runaway electrons	FP codes, reduced models	Limited FP, advanced components	
	Material wall	Material wall codes, sheath boundary conditions, neutrals, radiation		
	Structural forces	Simplified wall model codes	3D structural wall analysis codes	
	MGI, Pellet	Reduced models	Impurity delivery systems	

Science driver report is finished

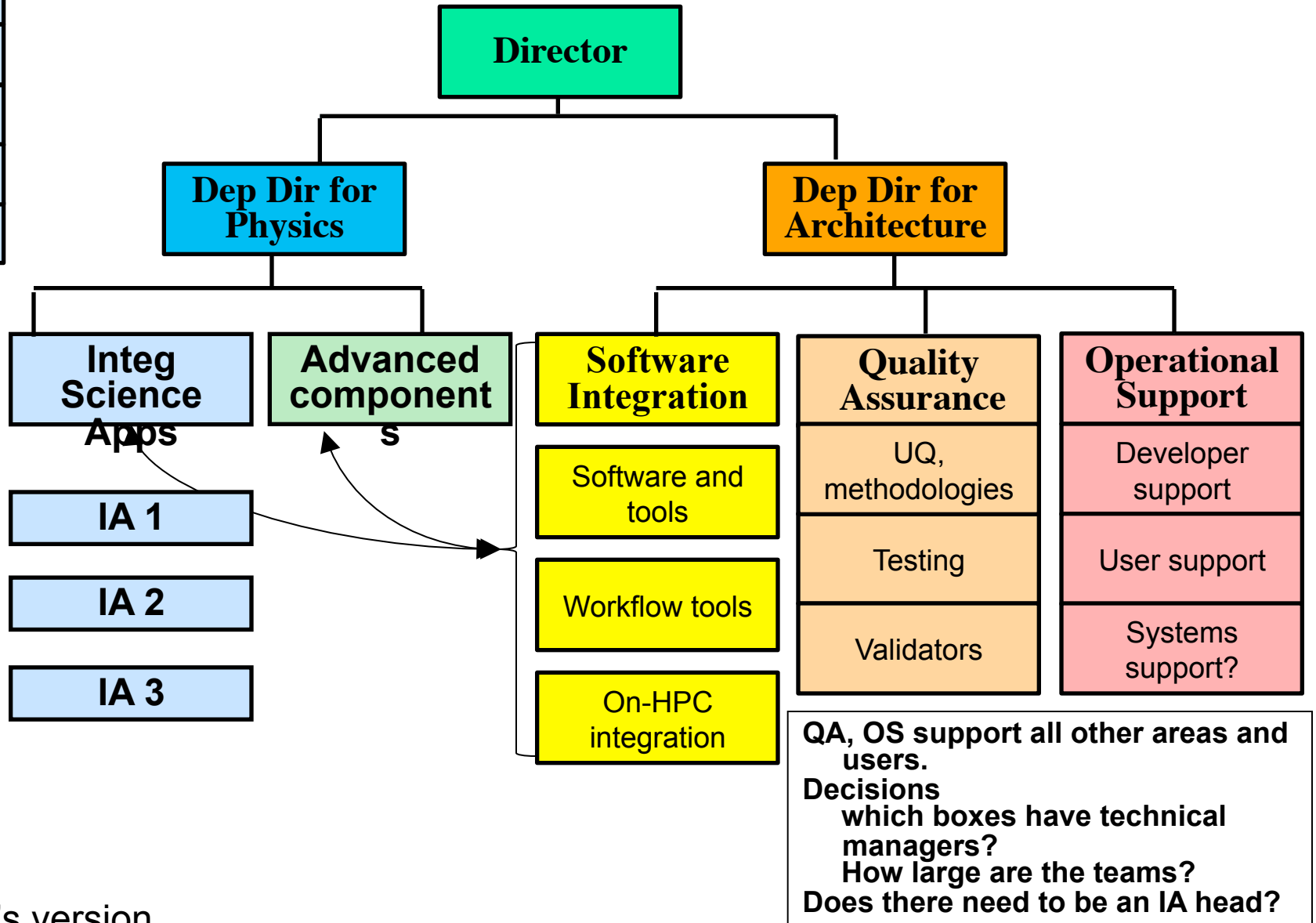
- Next steps for Disruption SD committee:
 - Make into report (add references, etc.)
 - Refine if requested
- Next steps for management committee:
 - Take 6 reports and make into a plan consistent with the new organization of the FSP (as of October PAC review)

Organization Chart - Core FSP



Current view of responsibilities

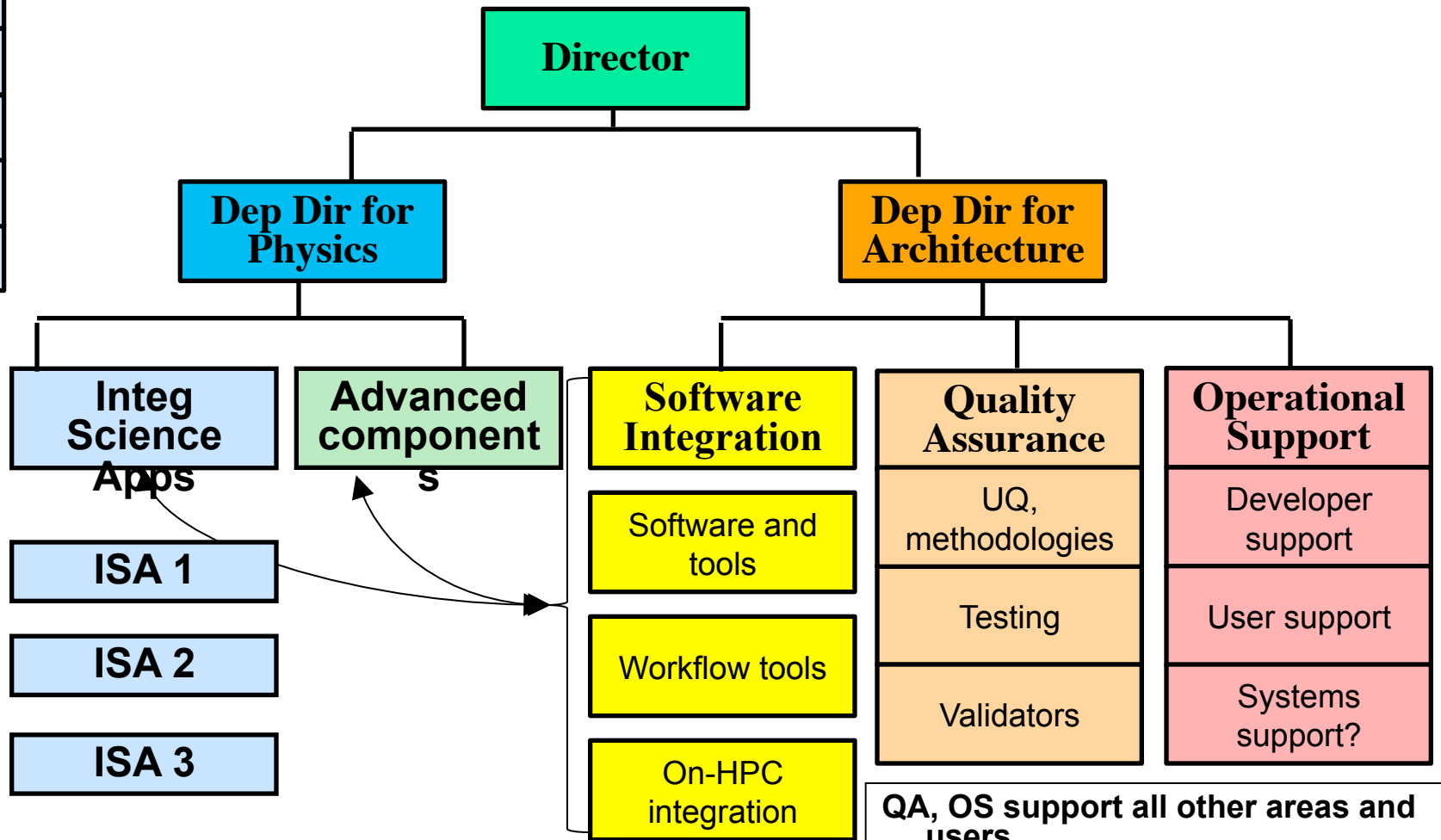
Science Drivers
Boundary Layer
Pedestal
Core Profiles
Wave -Particle Interactions
Disruptions
Whole Device Modeling



John Cary's version

Current view of responsibilities

Science Drivers
Boundary Layer
Pedestal
Core Profiles
Wave -Particle Interactions
Disruptions
Whole Device Modeling



What will be the 3 applications?

John Cary's version

QA, OS support all other areas and users.
 Decisions which boxes have technical managers?
 How large are the teams?
 Does there need to be an IA head?

Our place in the time line

- PAC review (Sep 10) highly favorable
- Science driver reports in
 - http://fspscidri.web.lehigh.edu/index.php/Main_Page (final reports)
- Next step: comment, improve, prioritize. Management team to start discussing in November.
- Possible management plans presented to PAC
- Next steps:
 - Comment, improve
 - Select persons for management positions (~January)
 - Present to community (Feb 7-11)
 - Select IA heads and teams (March/April)

Integrated application team heads/ teams selected in March/April

- Proposals to FSP Definition Team
- Evaluation based on
 - Credibility to deliver on Science Driver
 - Team making use of those in community

Personal thoughts on disruptions making it as a ISA

- The good:
 - Generally liked by:
 - Management committee
 - PAC Committee
 - Waelbroeck, Strait
- The bad:
 - Most controversial SD (management committee received more complaints about report and leadership than any other SD by far)