report of the

Burning Plasma Program Advisory Committee

S.C. Prager

FESAC meeting

July, 2003

BP PAC Mission

advise on

- **planning and direction of U.S. burning plasma activities**
- **all aspects of U.S. burning plasma activities including ITER, FIRE, and supporting physics and technology.**
- **achieving effective US participation in a burning plasma experiment through a community-based organization of fusion scientists from multiple institutions.**

Near term focus is on ITER

Burning Plasma PAC Charter: Scope

- preparation of cost-estimates for ITER contributions …and other technical and programmatic inputs for the U.S. ITER Negotiators
- organizational structures…during both construction and research phases
- activities supporting U.S. participation in the ITER Project and Program
- FIRE design and construction activities (recognizing the existence of the NSO PAC to provide more focused advice to FIRE)
- activities supporting FIRE design and construction
- activities supporting future U.S. research on ITER and/or FIRE (possible IGNITOR collaborations may also be considered)

Burning Plasma PAC Membership

Móhamed Abdou	(UCLA)
Rejean Boivin	(GA)
Harold Forsen	
Jeffrey Freidberg	(MIT)
Richard Hawryluk	(PPPL)
E. Bickford Hooper	(LLNL)
Stan Milora	(ORNL)
Gerry Navratil	(Columbia)
Stewart Prager	(U. Wis.) (Chair)
George Tynan	(UCSD)
James Van Dam	(UTex)

Activities to Date

- Identified levels of programmatic interest in procurement packages
- Ranked criteria for US interest in procurement packages
- Assessing management structures for a burning plasma program

BPPAC Programmatic Priorities: Heating and current drive (1 of 1)

Procurement Package			Direct Capital Cost	Spares deferred Invest-ment	Level of US interest (high, medium, low, none)
			(M$)	(M$)	
	No.				
IC H&CD	1	Antenna Arrays and Vacuum Transm. Lines	6.5	0.0	High
	2	Main Transm. Line and Matching System	6.9	0.0	High
	3	RF Power Sources & RF Monitoring Control	23.0	2.9	Medium
	4	Power Supply	9.9	0.0	Low
EC H&CD	1A	Equatorial Launcher	10.5	0.0	High
	1B	Upper Launcher	12.8	0.0	High
	2	Transmission Line	25.7	0.0	High
	3	RF Power Sources and Controls	42.3	4.3	High
	4	Power Supply	19.9	0.0	Low
NB H&CD	1	Assembly and Testing	5.5	0.0	None
	2	Beam Source and High voltage Bushing	13.6	0.0	None
	3	Beamline Components	5.6	0.0	None
	4	Presssure/Vacuum Vessels, Drift Duct and Passive Magnetic Shielding	17.1	0.0	None
	5a	Active Corr./Compensation Coils	6.3	0.0	None
	6	Power Supply	89.7	0.0	None

Levels of Programmatic Interest

Diagnostics	mostly high
Magnet systems	mostly medium and high
IC H & CD	high and medium
EC H & CD	mostly high
Control/data acq	medium/high
Divertor	medium and high
Tritium plant	medium
Vacuum pump/fuel	mostly low, pellet high
Remote handling	mostly low, some medium
Cryostat	low
Vacuum vessel	low
Power supply	low
Blanket system	mostly low
NBI	none
Machine assembly	none
Buildings	none

Criteria for Procurement Packages

1. US research positioning

Priority: High

Metric: Extent to which activity positions the US for key science/technology roles in ITER

Comment: recommend that the ITER project adopt a policy in which future research participation of an ITER party does *not* depend on the type (as opposed to the level) of contribution to the construction activity. Even so, there might remain a de facto linkage.

2. ITER-value per dollar

Priority: High

Metric: ITER value/(US cost of full scope of R&D + design + fab + contingency

Comment: The contingency should incorporate the degree of risk.

3. Relative strength or leverage of US contribution to ITER

Priority: High/Medium

Metric: High relative strength to meet critical need of ITER project

Comment: Example of high relative strength: divertor cassettes (in which the US already invested substantial R & D); superconducting strand (for which the world supply is limited).

4. Contributions to US fusion program

Priority: Medium

Metric: Enhancement of US capability for activity both in ITER and outside ITER

5. Enhancement of fusion-relevant capability of US industry

Priority: Medium/Low

Metric: Extent activity increases industrial capability in fusion areas

6. Development of US fusion workforce

Priority: Low

Metric: Extent to which activity builds a suitable US fusion science and technology work force.

The US Burning Plasma Management Structure

A BPX is different than past experiments

Past: design, planning, project representation, execution mainly in one institution

BPX: transcends the interests and responsibility of any individual institution

Need an organizational structure for multi-institutional US participation and successful project management

The PAC is beginning to assess the management issue,

Briefed extensively on the US LHC management structure,

Short briefing on two astronomical projects

Today:

show initial results
(circulated to a subset of senior fusion scientists)

have not yet incorporated feedback received,

welcome comments from FESAC members

US Burning Plasma Program Organization

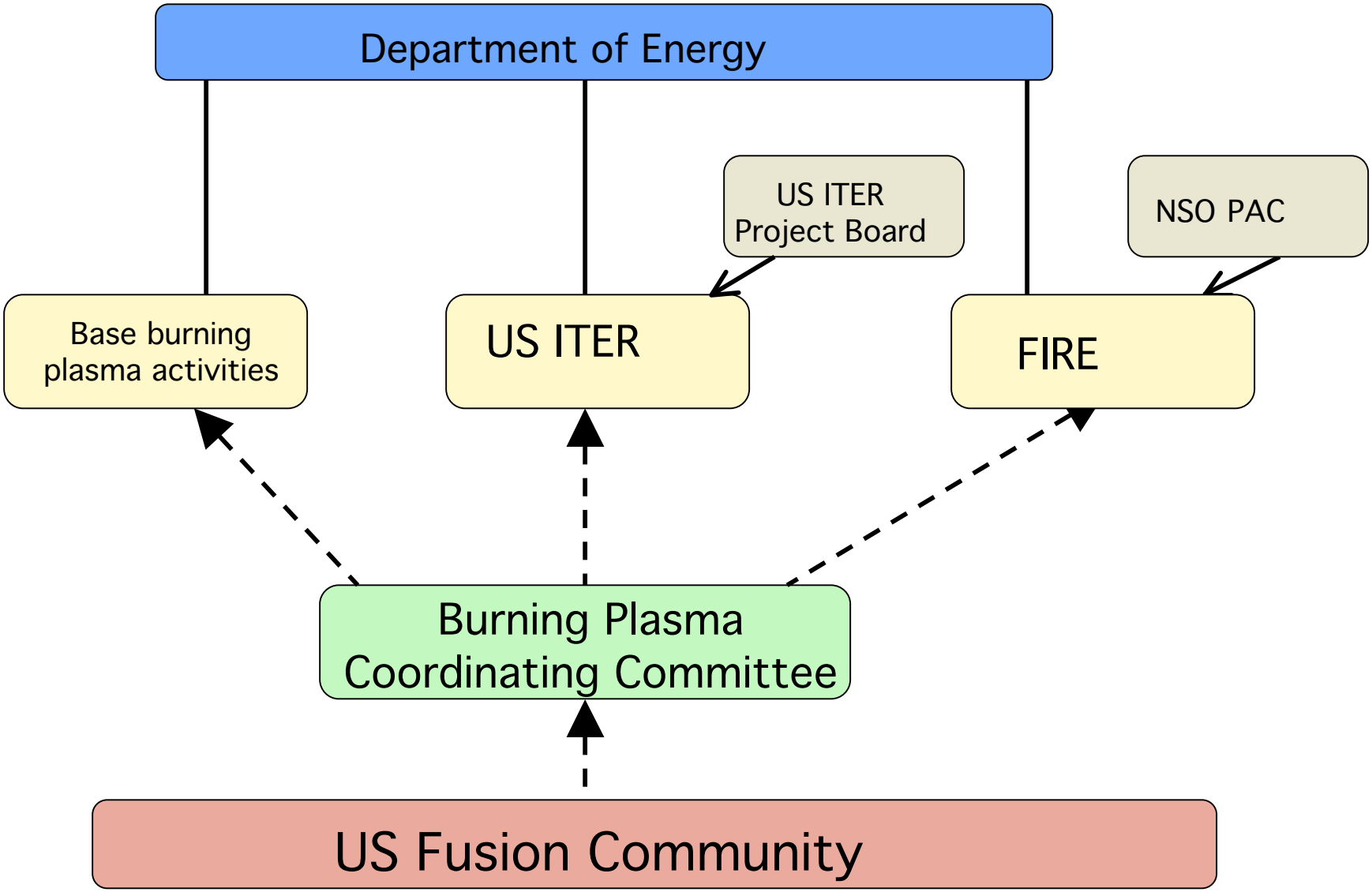

Fig 1

The Burning Plasma Coordinating Committee

Oversee all three burning plasma activities

(ITER construction and R&D, FIRE, base program)

- Coordinate US burning plasma activities
- Identify issues and priorities
- Recommend ongoing strategy for BP expts and research
- Represent US BP effort within and beyond fusion community
- Prepare for scientific and technological participation in ITER
- Enhance the ITPA

The ITER Project Board

- Provides programmatic and management advice to US ITER project
- Appointed by director of host institution, in consultation with DOE

US ITER Organization

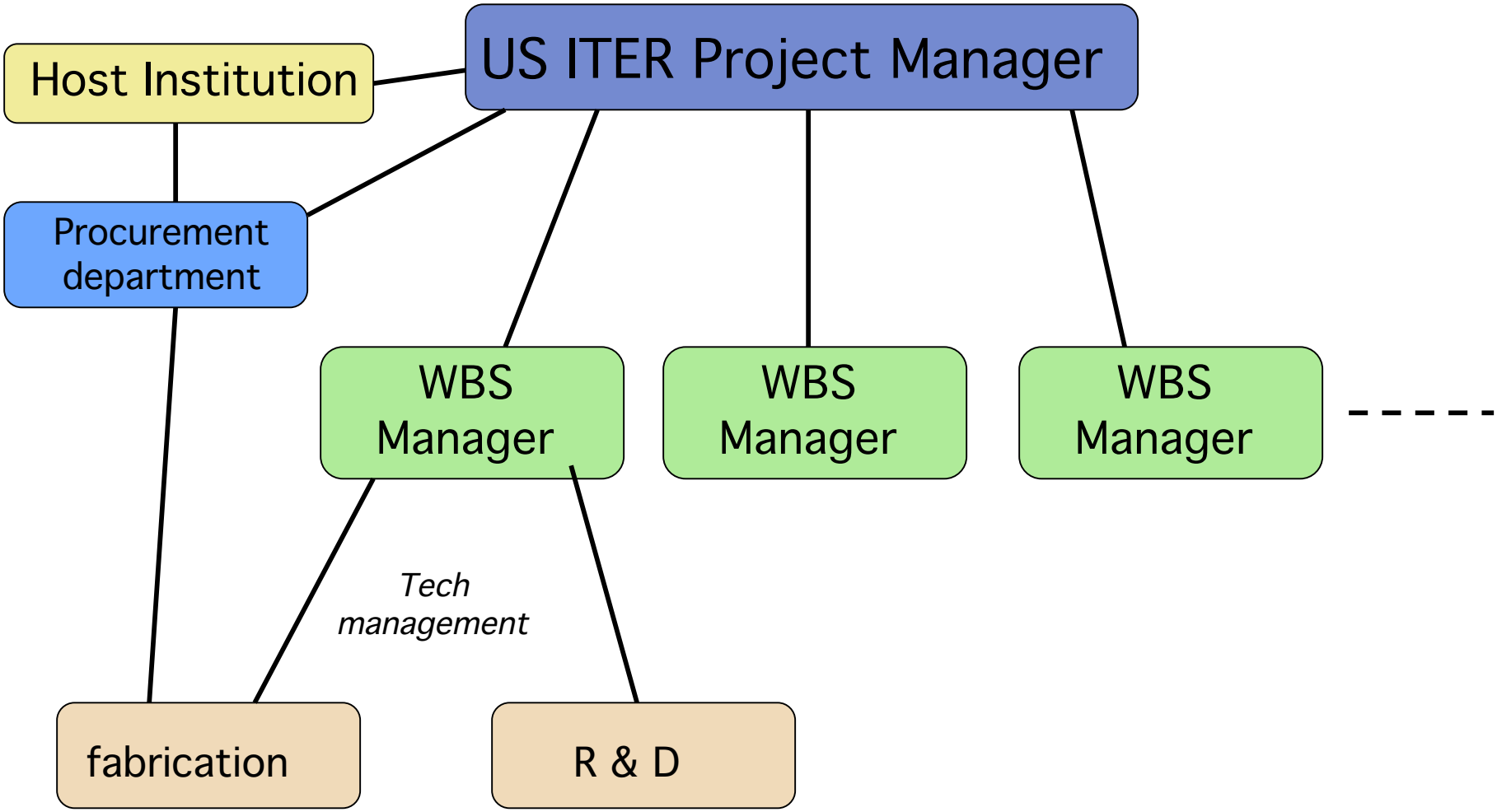

Fig 2

The US ITER Project Manager

- Provides cost/schedule control, technical oversight and management, single point inteface to international ITER team, project representation to govt and other communities
- Not employee of a funding agency
- Will reside, with support team, at host institution
- Not necessarily employees of host institution
- Functions as a national officer, reporting programmatically to DOE project manager
- Appointed by director of host institution, in consultation with DOE

The Host Institution

Purpose:

- Provide management support of US ITER activity
- Process all major procurements

Requirements:

- Should have experience in integrated program management
- Should have strong commitment of its laboratory management to the ITER project
- Is desired to have experience with management of large science projects

Selection process:

- Should be a fair and open process
- DOE should establish selection criteria (which should include cost minimization, as well as the above attributes)

Work Breakdown Structure Managers

- Will manage individual technical activities
- Distributed nationally
- Responsible for technical management of procurement and R&D
- Procurement and staffing processes should be fair and open

Some Feedback received

Strengthen ITER Project Board

- board should appoint ITER Project Manager, prepare PD
- should be appointed by and report to DOE

Strengthen Burning Plasma Coordinating Committee

- call co-laboratory
- place at top of chart

Choose host institution through competition

- competition process with clear criteria
- could be a university (don't refer to "director" of lab)

next,

will consider feedback already received,

then circulate to a larger part of the fusion community for comment