NEW FACILITY PLANS - A Perspective

VLHC ANNUAL MEETING

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U.S. Participation in the LHC

New Facility Plans - A Perspective

Observations - Office of Science (SC) Facilities

Recent SC Experience

Analysis by SC Program

- Fusion Energy Sciences
- Basic Energy Sciences
- Nuclear Physics
- High Energy Physics

Conclusions

OBSERVATIONS - Office of Science

Considerable Experience Constructing Large Facilities

Long Lead Times - Consensus (scientific & political) plus
R&D/Const. means ~20 years from concept to operations

Success Leveraging Existing Investments

Individual Program Success Varies - Poor to Excellent

Financial Limitations - Annual Program Funding

RECENT SC EXPERIENCE

Project	Total Project Cost	Completion
Relativistic Heavy Ion Collider	$616.5 M	Aug. 1999
B-Factory	$293.2 M	May 1999
Fermilab Main Injector	$259.3 M	May 1999
EMSL	$229.9 M	Sept. 1997
Advanced Photon Source	$798.8 M	Aug. 1996
Thomas Jefferson National Accelerator Facility	$513.1 M	Aug. 1994

Definitions

Total Project Costs (TPC) - Project funding during the period of construction (construction plus other project costs).

Annual Program Funding (APF) - Total funding for an Office of Science Program, e.g., fusion energy sciences.

TPC/APF - Ratio of Total Project Cost to the Annual Program Funding. Calculated using the average annual program funding during the period of construction.

FUSION ENERGY SCIENCES

FACILITY	YRS	TPC	APF	tpc/apf
Tokamak Fusion Test Reactor	77-85	$284M	$395M	0.7
Compact Ignition Tokamak	87-88	~$330M	$335M	1.0
• Canceled - Replaced by BPX.				
Burning Plasma Experiment	89-92	>$1,100M	$319M	3.5
• Canceled.				
International Tokamak (ITER)	88-95	>$8,000M		
• Canceled. U.S. Share		~$2,000M	$325M	6

BASIC ENERGY SCIENCES

FACILITY	YRS	TPC	APF	tpc/apf
Advanced Photon Source	89-96	$799M	$710M	0.9

- New facility at ANL site.
- APF before APS (86-89) ~$500M.
- Concurrent w/ other const. & upgrades .

Spallation Neutron Source	98-06	$1,412M	$710M*	2.0

- Replaced ANS (>$2B reactor).
- New facility at ORNL site.
- 2001 BES funding is $1,016M.

* Average annual program funding 1997 - 2000.

NUCLEAR PHYSICS

FACILITY	YRS	TPC	APF	tpc/apf
Jefferson Lab (CEBAF)	87-95	$513M	$292M	1.8
• New facility at a new site.				
• $TPC_{final}/TPC_{initial} \sim 2$.				
Relativistic Heavy Ion Collider	91-99	$616M	$320M	1.9
• New facility at BNL.				
• Facility valued at $1,000M (tpc/apf ~3.1)				
• In 1993 APF was $298M (CEBAF & RHIC)				
Future - Rare Isotope Beam	03?	~500M?	$370M*	<1.5

* Funding for 2001

HIGH ENERGY PHYSICS

FACILITY	YRS	TPC	APF	tpc/apf
Fermilab	68-75	~$250M	$182M	1.4
• New facility at a new site.				
SSC	90-93	8,249M	$591M	14
• Canceled. $TPC_f/TPC_i \sim 1.4$				
• (TPC_i = $5.893M)				(10)
Fermilab Main Injector	92-99	$260M	$639M	0.4
B-Factory	94-98	$293M	$645M	0.5
• Existing sites (combined tpc/apf ~0.9).				

HIGH ENERGY PHYSICS

FACILITY	YRS	TPC	APF	tpc/apf
Large Hadron Collider	96-05	~$2,500M	~$700M[1]	~3.6

- New facility at existing site.
- In-kind contributions (U.S., Russia, Japan, etc.)
- Facility value will be ~$5,000M (tpc/apf ~7.1)

Next Linear Collider	03+?	?	>$715M[2]
Very Large Hadron Collider	10+?		

1. CERN funding in 1999 at 1.3chf per $.
2. DOE HEP funding in 2001.

CONCLUSIONS

Long Range Planning - must be transparent and consistent.

Recognize Financial Limits

- Leverage Existing Investments
- Increase Effective Annual Program Funding
  - additional funding sources
  - absolute increase
- Target Total Project Cost/Annual Program Funding ~ 2

Other Models