Panofsky Prize:
Jonathan Dorfan
Designing, Building, Leading PEP-II

John T. Seeman
Deputy Associate Laboratory Director
Accelerator Directorate
SLAC
* In the PEP-II era (and now) Jonathan covered a large spectrum of responsibilities:

* International (Laboratories, governments)
* National (Congress, DOE, NSF, laboratories, universities)
* Laboratory (Upper management, finances, agenda, faculty)
* Projects (Vision, scope, timing, deadlines, planning, costs)
* Staff (Support, promotions, skill matching, compassion)
Early PEP-II

* The process started for a high luminosity B-Factory in 1987 when Pier Oddone suggested that an asymmetric energy e+e- colliders could probe CP violation in the b-quark sector. The accelerator physicists at LBL started working on “APIARY”.

* Shortly thereafter, Jonathan, just after finishing the MARK-II data taking at the SLC, formed at team at SLAC with the intent of building a B-Factory “PEP-II” in a 2.2 km tunnel at SLAC.

* SLAC, LBNL, and LLNL formed a collaboration (really a team) to design and build PEP-II, led by Jonathan.
PEP-II $e^+e^-$ Collider Overview

Circumference
= 2.2 km
= 1.4 miles

BaBar Detector
Jonathan introducing PEP-II: “Colliding Beams are like Gunslingers”
Dorfan: Introducing PEP-II: What is Unitarity?
Early Ring Concepts ~1989

Fig. 3.6-4
Cross section of the PEP tunnel with a second ring installed atop the existing PEP ring.

LER stacked on HER
recommendations, given the urgency of the other issues. Under the increasing budget scenario, the Subpanel did find that a B factory should be built once the technology is in hand. Under the constant budget scenario it could not so recommend, given its other recommended priorities. However, if and when the technology is in hand, HEPAP believes that the issue of a B factory should be examined again, with the hope that funds could be found to carry out its construction. I should again emphasize HEPAP's view, and that of the Subpanel, that e+e- colliders will remain an important tool of high energy physics and that they must continue to form an important part of the U.S program.

The remaining recommendations follow:

4. The Subpanel recommends significant enhancements in the support by the Department of Energy (DOE) and the National Science Foundation (NSF) of university groups in the areas of technical infrastructure and scientific manpower.

5. The Subpanel recommends that NSF substantially increase support for its HEP university groups, particularly for equipment.

6. The Subpanel recommends continuation of a vigorous program of R&D at Stanford Linear Accelerator Center (SLAC) for very high energy electron positron linear colliders.

7. The Subpanel recommends that the Division of HEP provide support for the SSC Laboratory physicists' basic research activities that lie outside the SSC project.

8. The Subpanel recommends that both non-accelerator and foreign-based experiments continue to be strongly supported.

9. The Subpanel recommends increased support for generic detector R&D.

The Subpanel was unable to recommend a viable program for the reduced budget case. If significant budget reductions must occur, the Subpanel urges that another Subpanel be convened to advise the DOE on specific actions to be taken.
PEP-II Mock-up in IR8: Visit of Sec. of Energy Adm. James Watkins ~1991
CDR Concept: Component Supports ~1991

* LER hung upside down
WE HAVE HELPED TO STIMULATE WORLDWIDE INTEREST IN
THE DESIGN OF AN ASYMMETRIC B FACTORY. STATUS OF
OTHER PROJECTS:

1) CERN /PSI: FEASIBILITY STUDY FOR MACHINE IN ISR
TUNNEL WAS COMPLETED IN 3/90. CERN APPEARS
UNINTERESTED IN PURSUING THIS DIRECTION. CONSIDERED
"DEAD."

2) DESY: A FEASIBILITY STUDY WAS DONE FOR UPGRADE
TO PETRA. VERY LIMITED ONGOING EFFORT. DESY SAYS
THEY WILL NOT TAKE A DECISION FOR SEVERAL YEARS
UNTIL HERA IS RUNNING.

3) NOVOSIBIRSK: A DESIGN FOR A MACHINE EXISTS.
THEY MUST FIRST COMPLETE THEIR φ FACTORY.
PROBABLY A LONG WAY OFF.

4) KEK: THEY HAVE DONE SEVERAL DESIGN STUDIES. THE
FIRST IMPLEMENTATION PLAN WAS REJECTED BY
JAPANESE GOVERNMENT (1990). THEY HAVE
RESUBMITTING THEIR PROPOSAL MARCH 1991.

5) CORNELL: PROPOSAL FOR UPGRADE OF CESR HAS
BEEN SUBMITTED TO NSF IN JAN 91.

FOREIGN COMPETITION COMES PRIMARILY FROM KEK, AND
POSSIBLY DESY IF U.S. HAS NOT MOVED ON B FACTORY
BY 1993/94.
Jonathan’s Words on the PEP-II Project

* “We are dedicated to responsible management of the three lab collaboration, both in the R&D phase and in the construction phase. SLAC and LBL have a long tradition of developing, designing, building frontier accelerators. LLNL adds additional strength with its excellent technical and scientific base.”

* “The process of expert reviews was very beneficial to the CDR. The reviews occurred early enough that we were able to benefit from them before finalizing the CDR.”

* “We fully recognize that it will take several years of running to achieve the design luminosity: the physics has a safe “soft landing” at a luminosity of 1/3rd of design which is where we expect to begin meaningful collisions.”

* “Don’t compromise the design to lower the cost.”
THE PROJECT COST ESTIMATE RECEIVED A THOROUGH TWO-WEEK GRILLING (REVIEW) AT THE DIRECTOR’S DEMAND. THIS ALSO HELPED TO IMPROVE THE LEVEL OF CONFIDENCE IN THE ESTIMATE.

THE WORKING ESTIMATE IS:

133.8 M$ FOR CONSTRUCTION
33.5 M$ CONTINGENCY (25%)
4.1 M$ INDIRECTS

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171.4 M$

THIS IS A 3% INCREASE SINCE THE CDR ESTIMATE. THERE ARE THREE CONTRIBUTIONS TO THIS: 1) OMISSIONS (ABOUT A THIRD) 2) "DEEPER" WBS AND 3) MORE UNIFORM APPLICATION OF STANDARD LABOR RATES.

EDIA AS A FRACTION OF (LABOR + M&S) = 36%
LABOR AS A FRACTION OF TOTAL = 22%

Final cost in 1998 = 177 M$
Schedule 1991:

* This schedule:
  * 4 years (1992-1996)

* Actual schedule:
First of several “PEP-Rallies” at SLAC, LBL, & LLNL (1992)
JD: Know your staff and help them when needed.

*
PEP-II First Annual Summer Barbeque (~1992)
PEP-II Construction Started finally in 1994

Laboratory Project Management Plan:
FIGURE C-2

PEP-II ORGANIZATION

Project Director
Jonathan Dorfan

Deputy Project Director
Tom Elloff

Deputy for Accel. Physics
John Seeman

Deputy for Eng. (Chief Eng.)
Lowell Klaiber

Deputy to Chief Engineer
Tom McCarville

Administration
Dona Jones
ES&H
Sandy Pierson
Quality Assurance
Sandy Pierson
Cost and Schedule
Richard Fischer

HER System Manager
[John Seeman]
HER System Engineer
Eric Reuter

LER System Manager
Mike Zisman
LER System Engineer
Ron Youd

HER Mags & Support
[Bill Davies-White]

HER Pwr Conversion
Alfredo Saab

HER RF
Heinz Schwarz

HER Vacuum
Charles Perkins

HER Diagnostics

HER Bunch Feedback
Gerard Oxoby

HER Installation
Thomas Taylor

HER Alignment
Matt Pietryka

LER System Manager

HER Mags & Support
Tom Henderson

LER Pwr Conversion
Terry Jackson

LER RF
Heinz Schwarz

LER Vacuum
Don Hunt

LER Diagnostics
James Hinkson

LER Bunch Feedback
Walt Barry

LER Installation
Thomas Taylor

LER Alignment
Matt Pietryka

IR System Manager
Hobey DeStaebler
IR System Engineer
Bob Yamamoto

IR Mags & Support
Johanna Swan

IR Pwr Conversion
Dan Shimer

IR RF
Heinz Schwarz

IR Vacuum
Lou Bertolino

IR Diagnostics
James Hinkson

INJ System Manager
Elliot Bloom
INJ System Engineer
Bruce Feick

INJ Mags & Support
Bruce Feick

INJ Pwr Conversion
Tony Donaldson

INJ RF

INJ Vacuum
Julia Weinberg

INJ Diagnostics
Gary Godfrey

INJ Installation
Patrick Smith

INJ Alignment
Matt Pietryka

Cntls System Manager
Tom Himel
Cntls System Engineer
Dave Nelson

Util. System Manager
Burl Skaggs

July 1994

[] = Acting

Rev. 2 7/8/94

16
DOE Representatives worked well with PEP-II

John O’Fallon and David Sutter
The PEP-II Collider
IHEP (Beijing) and BINP (Novosibirsk)

* China:

* Russia:
How the beams enter and exit the PEP-II Interaction Region

M. Sullivan, S. Ecklund, H. DeStaebler
PEP-II tunnel with Sec. of Energy Hazel O'Leary ~1996
At Mark-II BaBar Beach Party about 1996

*
JD: Make frequent workshops and field visits
Interaction Region Support Tube

- Be chamber
- Silicon Vertex Tracker
- SVT

SLAC
PEP-II RF Cavity (Schwarz, Rimmer, Pederson)

Early design and testing at LBL.

High power production cells.

Fully fitted cavity units with HOM dampers.
SLAC B-Factory RF Klystrons (1.2 MW)
David, Jonathan: Finished Drift Chamber at TRIUMF
Inspecting Final Drift Chamber (1997) (D. Rogers)
Stew Smith and David MacFarlane: Drift Chamber
Two beams collided July 23, 1998
PEP-II Dedication (October 26, 1998)  
With Energy Sec. Bill Richardson

*
A Private Conversation
Dedication for First Collisions on July 23, 1998

*
PEP-II Peak Luminosity by Month (1999-2008)

Peak PEP-II Luminosity (x1E33) per Month

* Design
PEP-II Reaches $10^{34}$ Luminosity October 2005
Jonathan called within a few minutes!

*
PEP-II and Rugby

* Jonathan very much enjoyed his rugby during his early school years, discussed often the strategy of rugby.
* He quoted his coach saying: “Play hard in the first half but I want you guys to play harder in the second half, scoring more goals than the first.”
PEP-II total integrated luminosity: 557 fb$^{-1}$
First half 140 fb$^{-1}$. Second half 417 fb$^{-1}$.
PEP-II Accelerator Records

* PEP-II held the overall world luminosity record \((1.2 \times 10^{34})\)
* for three years. Now second to KEKB \((2.1 \times 10^{34})\)

* PEP-II Present: World highest stored electron current \((2.1 \text{ Amps})\)
* PEP-II Present: World highest stored positron current \((3.2 \text{ Amps})\)
* PEP-II Present: Largest number of colliding bunches \((1722)\)
Last day April 8, 2008
PEP-II 1998-2008: Jonathan is at the Focus!
Jonathan: Congratulations and Thank You!