

American Linear Collider
Physics Group

Report of the ALCPG

- ALCPG Objectives
- Detector Concepts Report
- Beyond the DCR
- Detector R&D



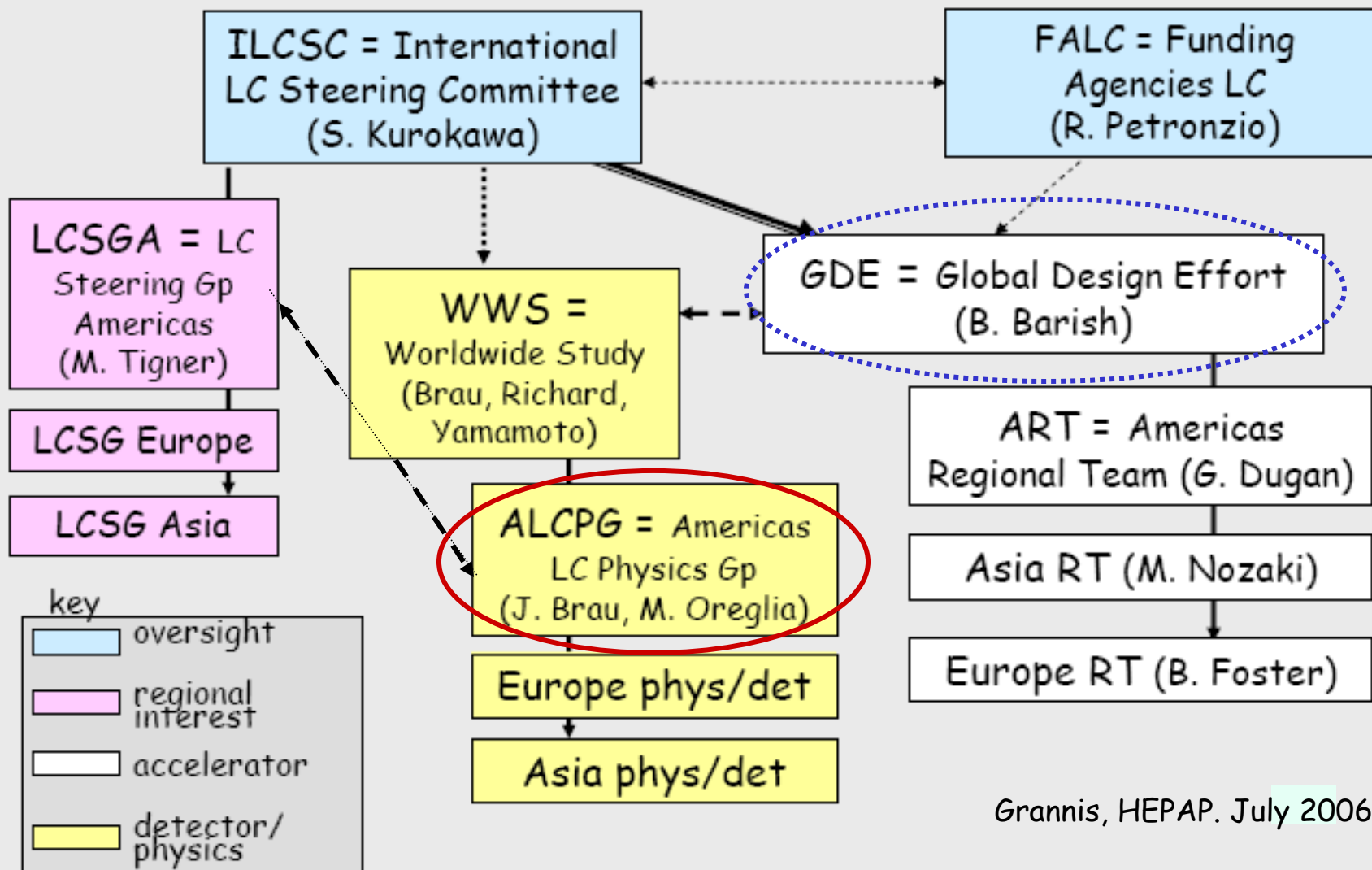
ALCPG Charge

Charge of May, 2002 (update language – see ALCPG web page)

- establish and manage process
 - toward experimental program at the ILC
 - demonstrate that physics program is feasible
 - ensure collaboration with larger global effort
 - coordinate working groups
1. Define physics program – study benchmark reactions
 2. Define detector requirements of physics program
 3. Evaluate detector options
 4. Establish documentation system
 5. Set milestones and hold regular meetings
 6. Encourage and facilitate participation

ALCPG is physics and detectors subcommittee of the LCSGA

Alphabet Soup



Grannis, HEPAP. July 2006



ALCPG Executive Committee

Jim Brau (Oregon), co-chair	Mark Oreglia (Chicago), co-chair
Jim Alexander (Cornell)	Marcel Demarteau (Fermilab)
JoAnne Hewett (SLAC)	Dean Karlen (Victoria)
Young-Kee Kim (Fermilab)	David MacFarlane (SLAC)
Hitoshi Murayama (Berkeley)	Bruce Schumm (Santa Cruz)
Rick Van Kooten (Indiana)	Harry Weerts (Argonne)

Responsible for carrying out charge of May 2002 (updated language)

- establish and manage process toward experimental program at the ILC
- demonstrate that physics program is feasible
- ensure collaboration with larger global effort
- coordinate working groups

ALCPG is physics and detectors subcommittee of the LCSGA



ALCPG Detector Working Groups

Detector and Physics Simulations:

Norman Graf, Michael Peskin

Vertex Detector:

Marco Battaglia, Jim Brau

Tracking:

Bruce Schumm, Dean Karlen, Keith Riles

Particle I.D.:

Bob Wilson

Calorimetry:

Dhiman Chakraborty, Jose Repond, David Strom

Muon Detector:

Gene Fisk, Paul Karchin

Data Acquisition and Trigger:

Usha Mallik

Interaction Regions, Backgrounds:

Tom Markiewicz, Stan Hertzbach

IP Beam Instrumentation:

Mike Woods, Eric Torrence, Dave Cinabro

Test Beams

Gene Fisk, Jae Yu

Parallel sessions
at VLCW06 organized
by these conveners

Executive Committee
will be renewing
the charge to these
working groups in the
coming weeks



ALCPG Physics Working Groups

New structure created for VLCW06

Terascale Physics:

Heather Logan, Hooman Davoudiasl, Tim Barklow, Keith Riles

Precision:

Doreen Wackerroth, Aurelio Juste, Frank Petriello

Cosmology:

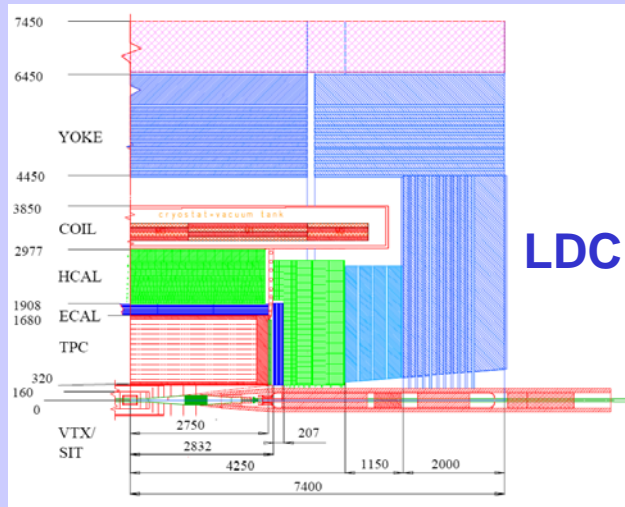
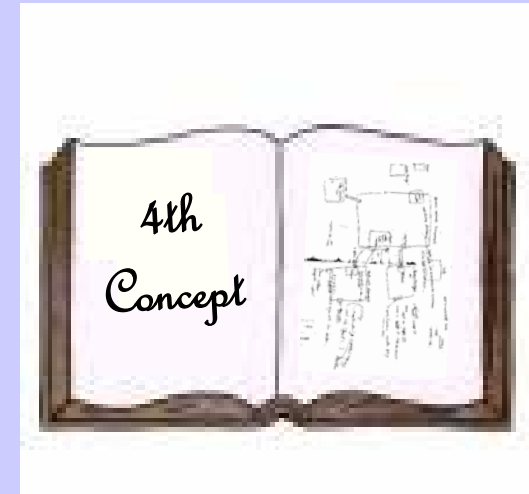
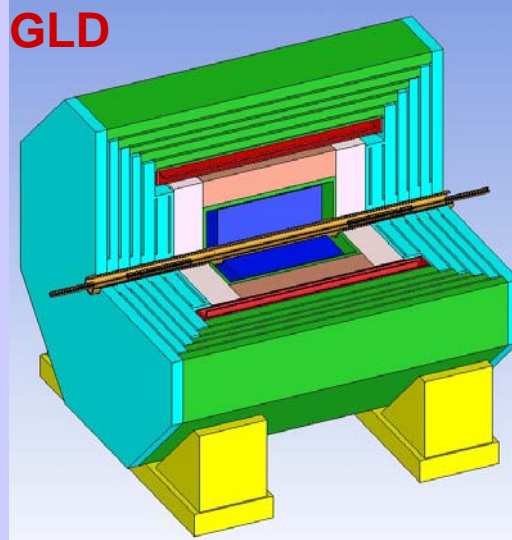
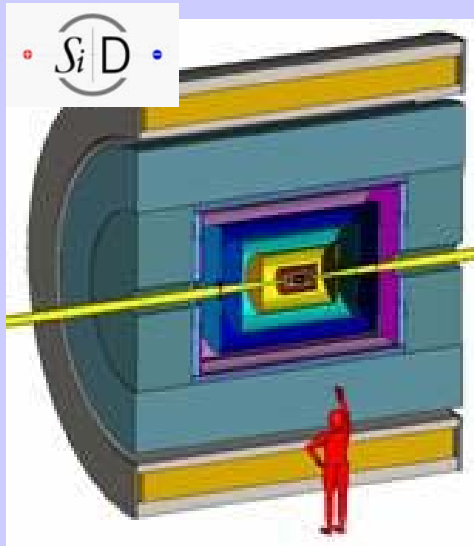
Dan Hooper, Ted Baltz, Rene Ong

Parallel sessions
at VLCW06 organized
by these conveners

ILC/LHC:

David Rainwater, William Trischuk, Tim Tait, Jim Alexander

Concept Efforts are Developing



Current set of concepts formed
beginning in 2004

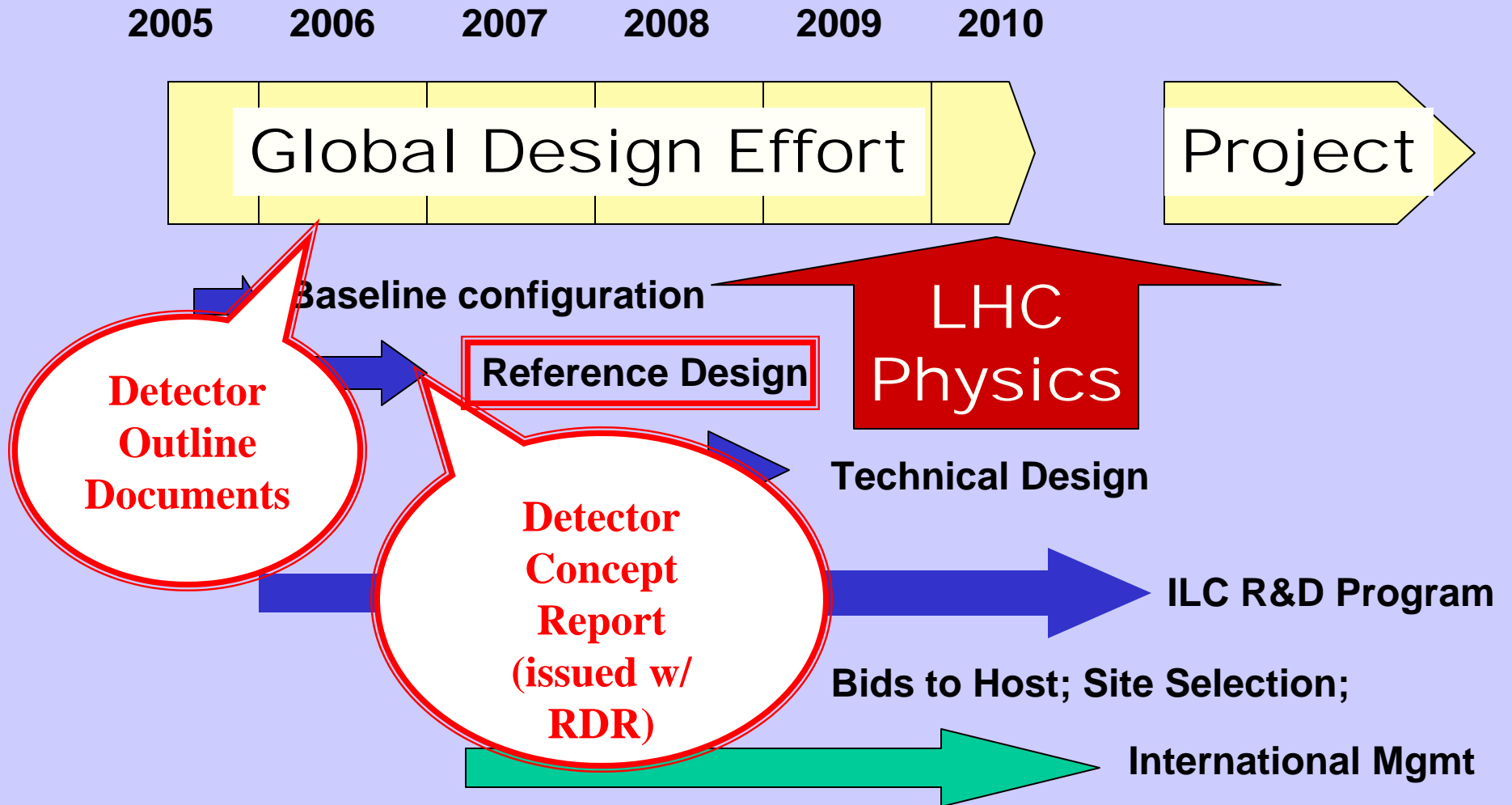
<http://physics.uoregon.edu/~lc/wwstudy/concepts>

Detector Outline Documents

- 4 Outline Documents were prepared in Spring 2006 leading up to the Bangalore LCWS
- **Contents**
 - Description of the detector concept
 - Performance estimates w.r.t. physics benchmarks
 - Required R&D and its status
 - Rough costing estimate

See <http://physics.uoregon.edu/~lc/wwstudy/concepts>

The GDE Plan and Schedule



Detector Concept Report

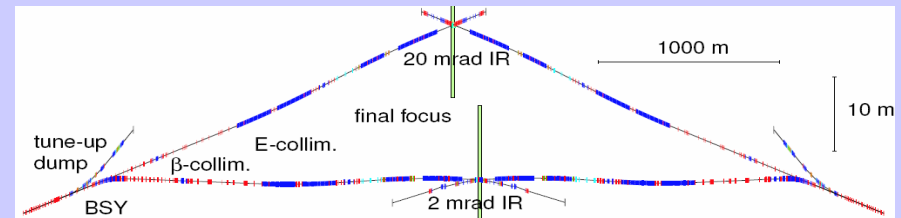
- WWS has established teams of editors for the companion volume, the DCR
 - Physics editors - K. Moenig, A. Djouadi, M. Yamaguchi, Y. Okada, M. Oreglia, J. Lykken
 - Detector editors – T. Behnke, C. Damerell, J. Jaros, A. Miyamoto
 - Cost analysis of the concepts – M. Breidenbach, H. Maki, H. Videau – interacting with GDE Cost Board
- Active during VLCWS06

<http://www.linearcollider.org/wiki/doku.php>

Detector Concept Report

- Physics
- Concepts
 - Based on four detector concept DOD's
- The goal:
 - We can do the ILC physics
 - We have different and complementary solutions
 - We have a clear vision on how to reach the goals (R&D)
 - We have some understanding on the cost for these detectors
- Integrated presentation of Concepts
- Case for Two Detectors/IRs

Case for Two Complementary Detectors



- Confirmation and Scientific Redundancy
- Complementarity, Collider Options
- Competition
- Efficiency, Reliability, Insurance
- Sociology, Scientific Opportunity
- Historical lessons

<http://www.slac.stanford.edu/econf/C0508141/proc/papers/PLEN0059.PDF>

Beyond the DCR

- GDE plans TDR at end of 2009
- Experiments must remain on same timeline as machine \Rightarrow Detector TDRs ~2010 ?
 - “synchronize” detectors with the machine
- TDRs require significant resources over time
 - 2 years? or more?
- How do we get there?
 - Downselect of detectors?
 - Authority to do this?
 - Intermediate step? CDR?

 - Discussion in WWS-OC and with GDE

Detector R&D - WWS

- WWS created the Detector R&D Panel
 - collect information on projects world-wide
 - strengthen coordination and prioritization
 - J-C. Brient (IN2P3), [CJS Damerell](#) (RAL), R. Frey (Oregon), HankJoo Kim (Kyungpook Natl), W. Lohmann (DESY), D. Peterson (Cornell), Y. Sugimoto (KEK), T. Takeshita (Shinshu U), H. Weerts (ANL)
- R&D Panel prepared the R&D report to accompany the GDE machine Baseline Configuration Document early this year
 - supported by concepts and R&D teams

Detector R&D - WWS

- R&D Panel Report
 - Draft circulated beginning in January
 - Report updated in April & posted on WWS web page
 - [http://physics.uoregon.edu/~lc/wwstudy/R&D Report-final.pdf](http://physics.uoregon.edu/~lc/wwstudy/R&D%20Report-final.pdf)
 - Urgent needs require \$32M and 1870 man-years over next 3-5 years - globally
 - Established support over 3-5 years \$15M and 1160 man-years - globally
 - Translating man-years to dollars (\$100k/man-year)
 - \$33M/yr established over 4 years, \$22M/yr more required
 - Support notably behind in North America and Japan
- Discussing now review of R&D
 - With GDE R&B Board and WWS-OC



University Detector R&D in US

This year was the fourth year of support for detector R&D from the agencies since it was first organized by the LCSCGA (formerly USLCSG) and the ALCPG

FY05 LCDRD funds

\$700,000 – DOE

\$117,000 – NSF

24 projects

25 universities

FY06 LCDRD funds

\$1,048,000 - DOE

\$ 300,000 - NSF

34 projects

26 universities/labs

<http://physics.uoregon.edu/~lc/lcdrd/fy05-awards.html>

<http://physics.uoregon.edu/~lc/lcdrd/fy06-awards.html>



FY07 University Detector R&D in US

We are organizing ourselves in anticipation for increased funding in FY07 – discussed \$3M
(5 year R&D plan being developed by ALCPG)

Encouragement led to developing a proposal early for a few (9) high priority, urgent efforts (~\$1M)
followed by annual round for another \$2M

Supplemental proposal

- 1 – call for abstracts (received 22)
- 2 – selection of highest priorities/urgent needs (9)

<http://physics.uoregon.edu/~lc/lcdrv/supplement-06a.html>



Supplemental LCDRD Proposal

Process under the auspices of the LCSGA

- 1 – abstracts (received 22)
totaling about \$10M over 2 years
- 2 – selection of highest priorities/urgent needs (9)
selection made by Oreglia/Weerts/White/Karlen,
chaired by Brau
consensus by four made it unnecessary
for chair to “vote”

Proposal will be submitted to DOE/NSF
review to decide on funding of projects

<http://physics.uoregon.edu/~lc/lcdrd/supplement-06a.html>



Supplemental LCDRD Proposal

SELECTION CRITERIA

- 1. Is the focus of the R&D project addressing a critical need of the ILC detectors?**
 1. critical, very high priority
 2. important, priority
 3. useful
 4. irrelevant
- 2. What does this project provide which is unique to the ILC detector R&D effort?**
- 3. How urgent is the planned R&D with the support proposed? Consider a realistic level of support that might come from the supplemental program over 2 years, as well as the base support. Are there urgent steps being taken by this R&D?**
 1. extremely urgent
 2. important, but only mildly urgent
 3. needed eventually
 4. not needed at all
- 4. Deliverables - will the R&D supported with the funding result in significant deliverables?**
What deliverables?
- 5. Rating - overall quality of the research plan and goals, and the strength of the team to carry out the objectives**
 1. excellent
 2. good
 3. satisfactory
 4. poor

<http://physics.uoregon.edu/~lc/lcdrd/supplement-06a.html>



Supplemental LCDRD Proposal

- High Performance Digital Hadron Calorimetry for the International Linear Collider
PI - J. Repond
- Development of a Silicon-tungsten Test Module fo an Electromagnetic Calorimeter
PI - R. Frey
- TPC Development
PI - D. Peterson
- Pixel Vertex Detector R&D for Future High Energy Linear e+e- Colliders
PI - C. Baltay
- Energy Spectrometers for the International Linear Collider
PI - E. Torrence/M. Hildreth
- Pixel-level Sampling CMOS Vertex Detector for the ILC
PI - G. Varner
- Detector to Measure the Beam-strahlung Gammas
PI - W. Morse
- Long Shaping-Time Silicon Microstrip Readout
PI - B. Schumm
- Scintillator Based Muon System R&D
PI - P. Karchin

2 VXD

2 TRK

3 CAL

1 Muon

1 LEP

This resulting
distribution was
not by design

<http://physics.uoregon.edu/~lc/lcdrd/supplement-06a.html>



FY07 LCDRD Proposal

FY07 proposals will be accepted for continuing and new projects from DOE/NSF funding

One year proposals (third year of 3 year cycle)

Anticipated timeline

December 15, 2006 – status reports
and new project descriptions due

May – awards announced - revised budgets/descriptions

September, 2007 – funded year begins

details will be posted on ALCPG web page

comments are welcomed by all members of the ALCPG exec comm

Tale of Two Colliders

- There are continuing discussions here on the relationships between the LHC and the ILC
- The success of the LHC will be a big boost to our field and to our ILC aspirations
- How do the different first LHC discovery scenarios impact the decision on the ILC?
- Workshop on this topic being planned for fall at Fermilab

Future Meetings



- **Valencia** November, 2006
– ECFA/GDE
- **Beijing** February, 2007
– ACFA/GDE
- **Hamburg** June, 2007
– LCWS 2007 (joint with GDE)
- **Fermilab** Next summer/fall
– Joint GDE / ALCPG meeting

COMMUNICATIONS WORKSHOP

- Tuesday the communications workshop here in Vancouver explored our common understandings of many aspects of the communications effort
- We need to all use the common message
- LCSGA Communications Committee (chaired by J. Bagger) developing this effort
- Resources will be available to support our efforts

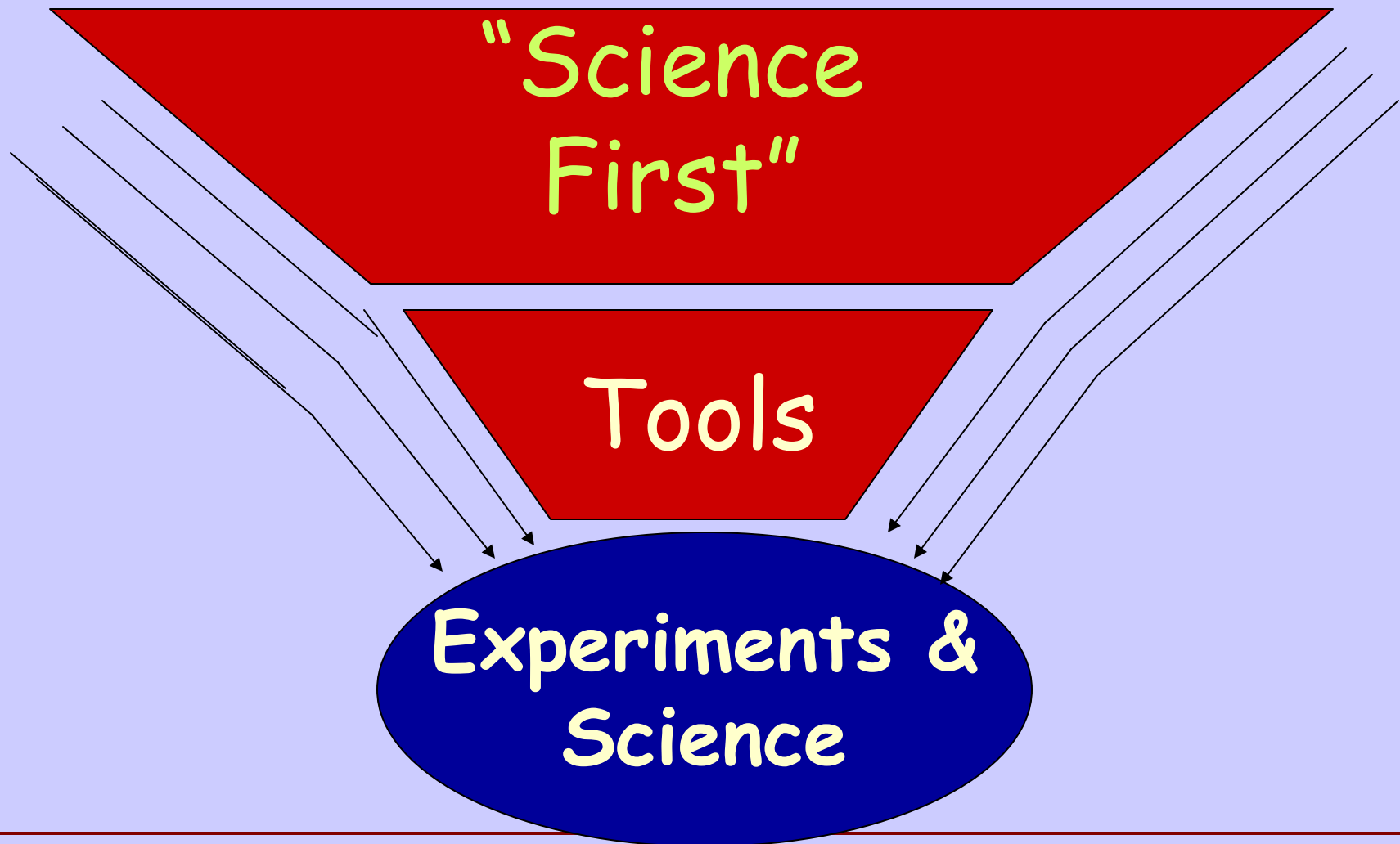
B. Barish,
July 18, 2006

ILC Communications

- **We must communicate the ILC story very effectively if we are to succeed with this ambitious undertaking**
 - We must convince our colleagues in HEP; the broader scientific community; the funding agencies; policy makers and the general public of the reasons for and benefits of building the ILC
 - The communications program must be totally INTERNATIONAL
 - TOOLS: We will need hand-out materials; talk materials; write articles; make personal presentations, etc.
 - Our “campaign” will begin in earnest when the ILC Reference Design is released early next year. It must be aimed at communicating the excitement and value of the project, with the goal of making a successful funding proposal in about 2010
- **So, what's the ILC story we want to tell ???**
 - Our story is the same at all levels! The level of detail is different.

The Elements of our Story

Begins and ends with the Science



CHARGE to the WORKSHOP

- Study and advance the compelling physics case
- Advance plans for experiments through discussions of detector R&D and concept design issues
 - LCTPC meeting – Tuesday
 - GLD meeting - Wednesday
 - LDC meeting – Saturday 12:30, SUB 212A
 - SiD meeting – Sunday 9-1, SUB 205
- Consider schemes to move from DCR to TDR
- Learn to engage broader community through communications, education and outreach
 - Communication workshop - Tuesday
- Joint GDE / WWS discussions
 - R&D, MDI, 2 IRs/Detectors, Costs, TDRs