

Presentation at the Pak-Millennium Conference on Higher Education in Pakistan, Boston, 2002.

Towards a World-Class Research University in Science and Technology- Money is Critical but Not Enough

By

Nabeel A. Riza

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Boston, USA

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PAK-MILLENNIUM CONFERENCE 2002

Higher Education in Pakistan – Challenges for Reform

Hariri Auditorium
 Boston University School of Management
 595 Commonwealth Avenue, Boston, MA 02215

Sunday, April 14, 2002

8:30 – 9:00 a.m. REGISTRATION

9:00 – 10:30 a.m. SETTING THE STAGE

Dimensions of the crisis	Dr. Tariq Banuri Senior Research Director, Stockholm Environment Institute-Boston
Current reform efforts	Dr. Shamsh-Kassim Lakha President, Aga Khan University and Chair, Steering Committee on Higher Education
Moderator:	Hasan Usmani Axim Systems

10:45 – 12:15 p.m. REFORM AT THE UNIVERSITY LEVEL

People	Dr. Pervez Hoodbhoy Professor of Physics, Quaid-e-Azam University, Islamabad
Money	Dr. Nabeel Riza Professor of Optics and Electrical Engineering, University of Florida and CEO, Nuonics, Inc.
Governance	Dr. Hamid Kizilbash Ali Institute of Education, Lahore and Former Professor of Political Science, Punjab University, Lahore
Management of Reform	Dr. Tahir Andrabi Associate Professor of Economics, Pomona College
Moderator:	Duriya Farooqui Research Associate, Kennedy School of Government, Harvard University

12:15 - 2:00 p.m. LUNCH

Introduction	Bilal Zuberi Doctoral Candidate, MIT, and President, Pak-Millennium Conference
Keynote speech	Professor Dr. Atta-ur-Rahman Minister of Science and Technology, Government of Pakistan

2:00 - 3:30 p.m. REFORM AT THE SYSTEM LEVEL

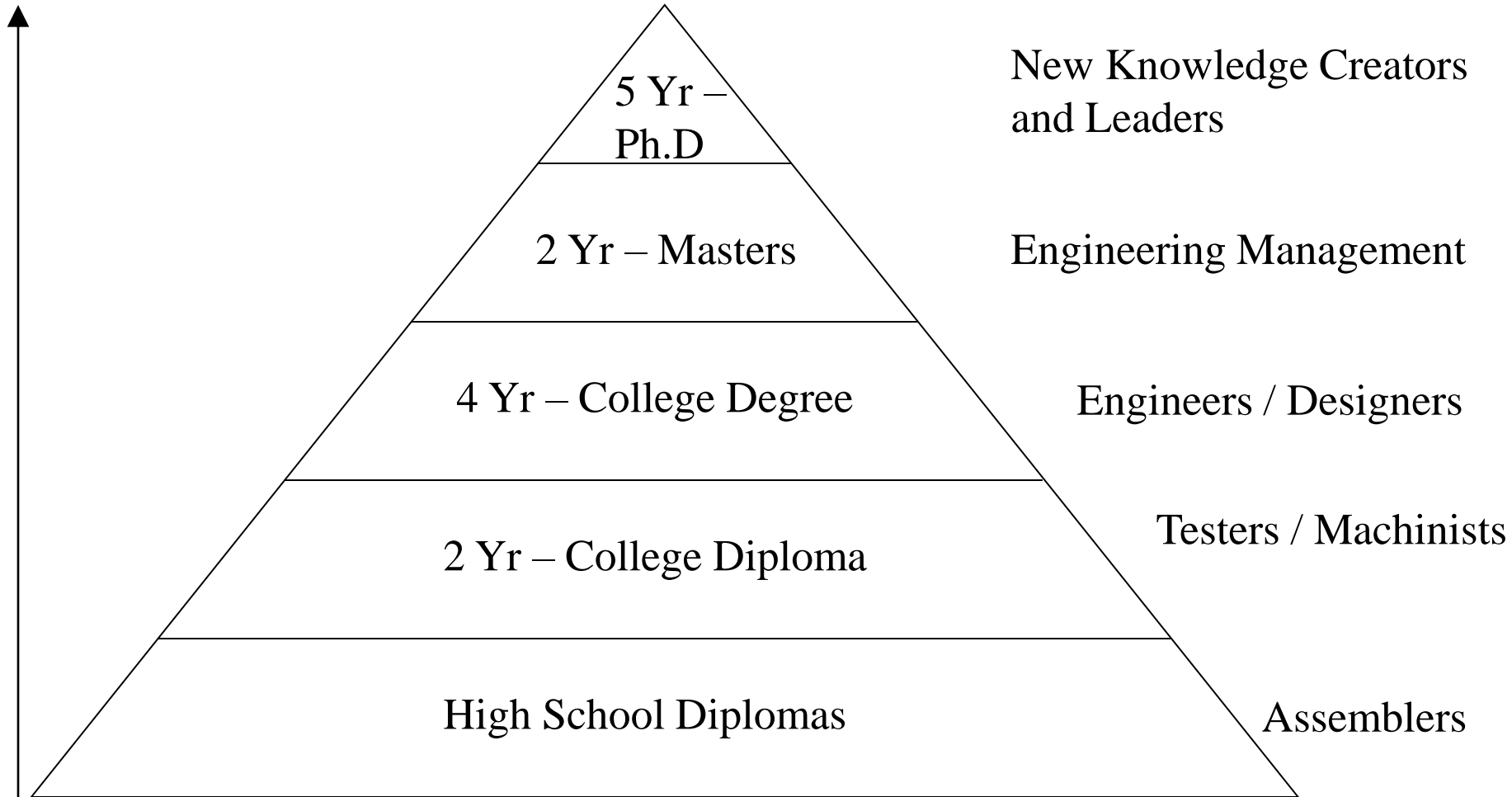
People	Dr. Sohail Naqvi Vice-President, Enabling Technologies and Former Dean, Faculty of Electronics, Ghulam Ishaq Khan Institute, Topi
Money	Dr. Ishrat Hussain Governor, State Bank of Pakistan.
Governance	Dr. Henry Rosovsky Dean Emeritus, Harvard University
Management of Reform	Dr. S. T. K. Naim Chairperson, Pakistan Council on Science and Technology
Moderator:	Dr. Atif Mian Assistant Professor of Finance, Graduate School of Business, University of Chicago

3:45 - 5:15 p.m. CHALLENGES IN IMPLEMENTATION

Panel discussion:	Dr. Syed Zulfiqar Gilani Vice-Chancellor, Peshawar University Dr. Zafar Saied Saify Vice-Chancellor, Karachi University Dr. Najma Najam Vice-Chancellor, Fatima Jinnah Women's University, Rawalpindi
Moderator:	Dr. Adil Najam Professor of International Relations, Boston University
Closing Remarks:	Syed Babar Ali Pro-Chancellor, Lahore University of Management Sciences

Educating the Technology Leaders and Sustainers: An Education/Output Model

Education
Level



Degrees by Area Size

Model of a Sustainable Research Engine

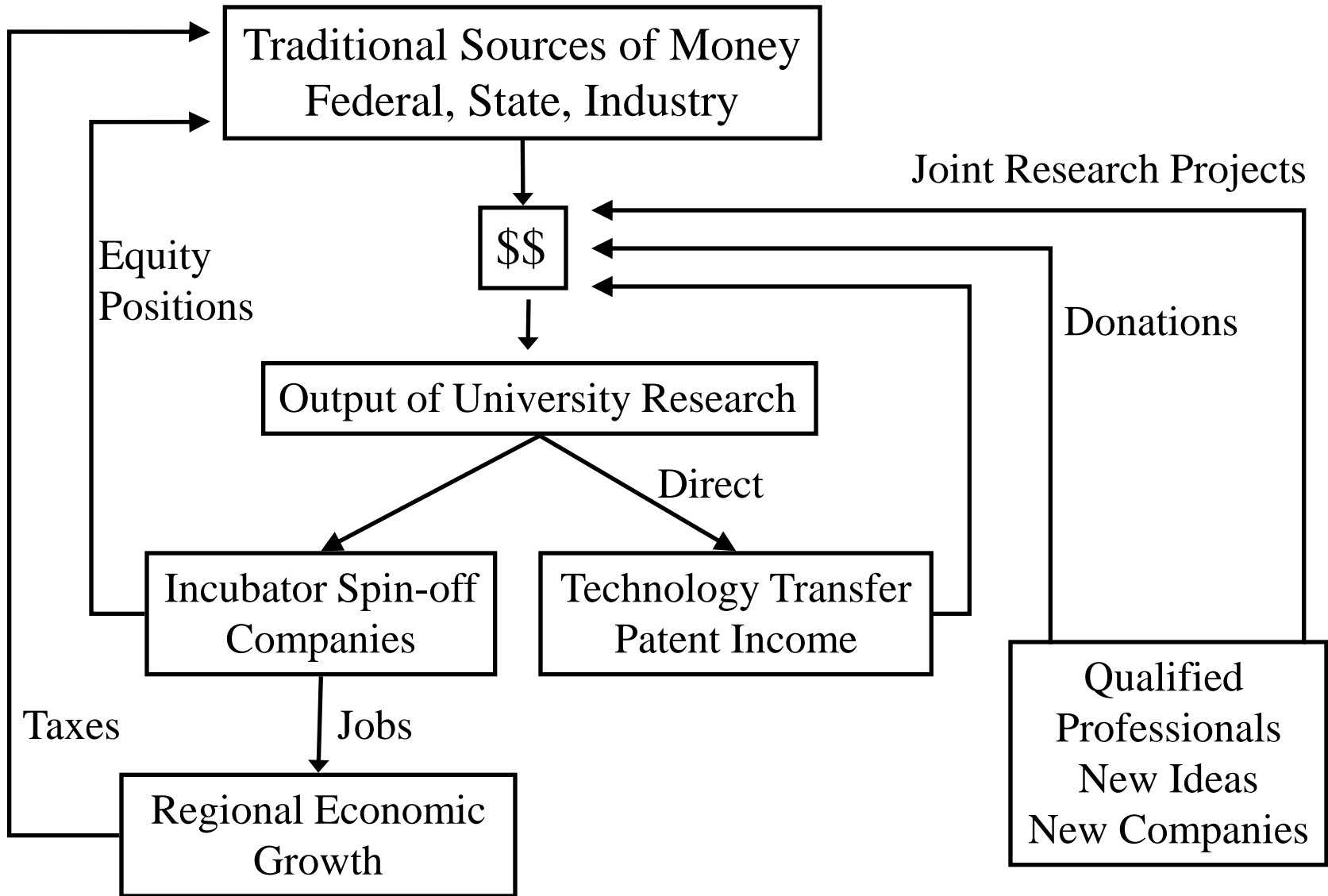
The Research University \longleftrightarrow **Institute of Science & Technology**

- Leadership – Management \rightarrow Active or Former Successful Scientist/ Engineer
- Low Classroom Teaching Load
(e.g., 1 course per semester)
- High Research Output Load
(patents, publications, \$\$, M.S./Ph.Ds)
- High Student, Staff (Research), Faculty Quality Control



**JEWEL OF THE NATION AND WORLD
TECHNICAL COMMUNITY**

Financial Engine of a Research University



Research \$\$ For

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graph TD; Root[Research $$ For] --> Basic[Basic]; Root --> Applied[Applied]; Basic --> BasicTime[Long Time Lines  
5-15 Years]; Applied --> AppliedTime[Short Time Lines  
1-5 Years]; BasicTime --> BasicOutcome[Fundamental Changes  
in Science]; AppliedTime --> AppliedOutcome[Advances in Technology  
and Applications];
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Basic

Applied

Long Time Lines
5-15 Years

Short Time Lines
1-5 Years

Fundamental Changes
in Science

Advances in Technology
and Applications

e.g. Gravity Waves via LIGO
Inv. > \$ 300 M.

Common Research Program Types

- Name: Multi-Year Balanced Programs

Sponsor: US DARPA

Level: \$1-10 M over 4 years

- Name: SBIR: Small Business Innovative Research Program

Sponsor: DOD, NASA, NSF

Level: Phase I \$ 100K 6-9 months.

Phase II \$ 500K – 1000 K 2 years

These are Phased Accelerated \$\$ Programs.

OBJECTIVE

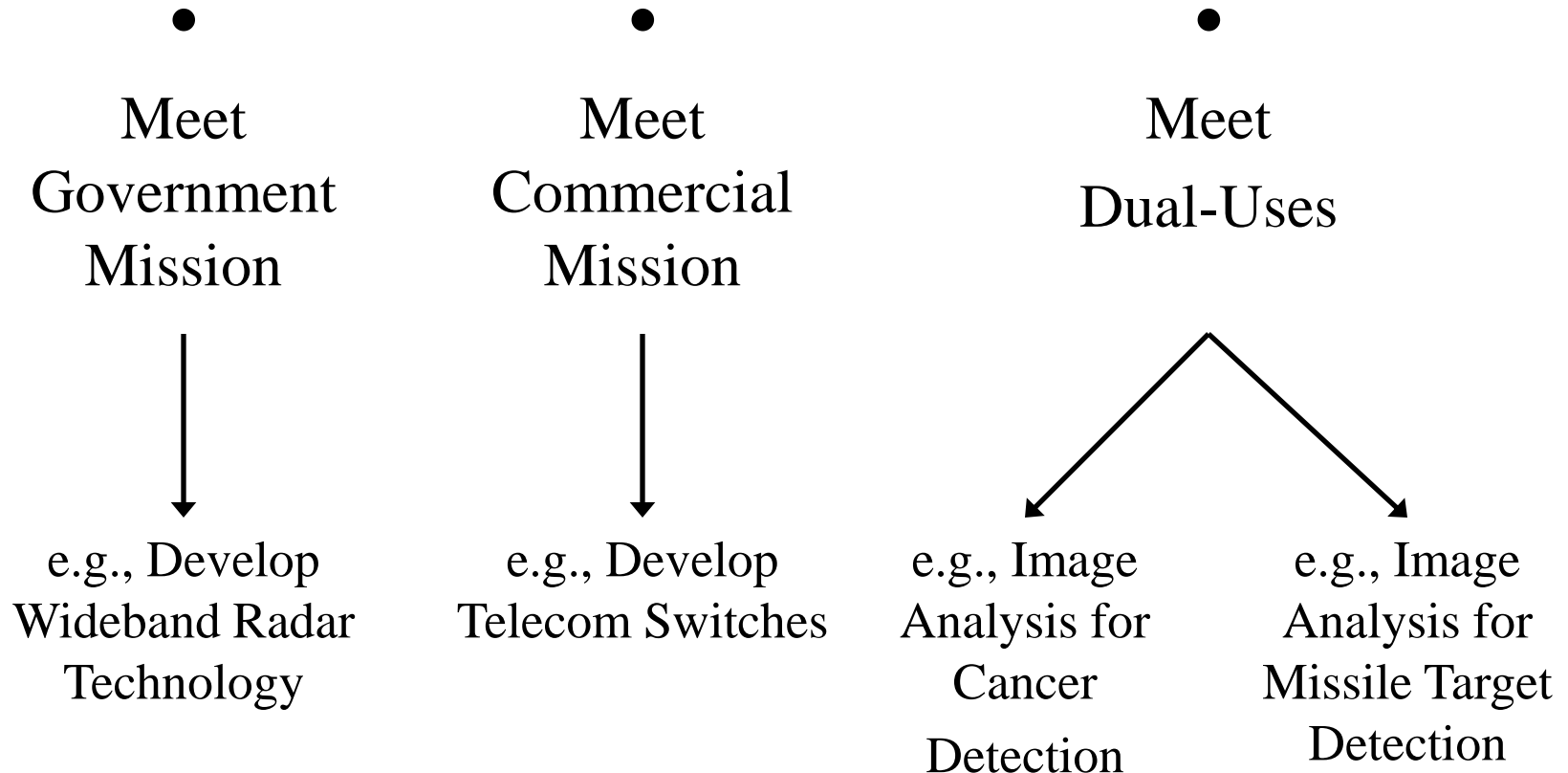
Balance \$\$ Risk vs. Time Used to Get Results

Other Types of Grants

- Money for Scholarships in a Focus Area:
e.g. Optical Communications.
- Cost Sharing Grants between University and Industry/Government Laboratory
 - University and Industry/Government Laboratory both providing matching funds to enhance budget of the project.
- Industry Sponsored Scholarships for Graduate Research
e.g. GE, IBM.

Business of Applied Research

BIG Investment \$\$ Need to Convert to Concrete Results



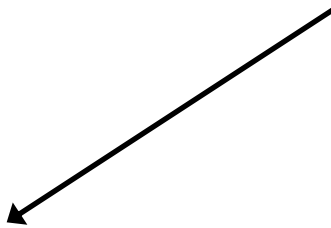
Multi-University Research Center



Focus on An Area of Technology
(Imaging, Biomedicine, Robotics)



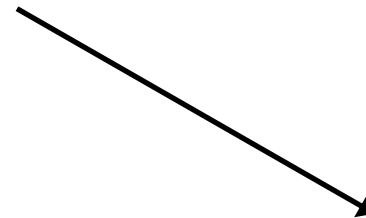
Lead University



Disadvantaged
University



Industry and Govt. Labs
(for Review only)



Other Major
Research
Universities

Where are the Research \$\$ Spent?

- Better Military
- Better Health

For the US/Western World.

Indirect Benefits of This Research

Internet

DARPA / ARPA-net
Military Network

Unmanned Space Exploration

NASA / JPL /
Air Force Rocket Programs

Spend \$\$ to make \$\$

Marketing of:

- University Technical Strength – Focus Center e.g. Optics
- Faculty International Awards
- Presence of International Conferences
- Attendance @ Govt. Sponsored Meetings
- Membership of Govt. Industry Research Review Panels
- Marketing Office / Lobbying Presence Near Sources of Power and Money – Washington D.C.
- Leveraging Precious Research Success Stories

Raising Research \$\$ \longleftrightarrow A Business Like-Approach is Required

Research \$\$ - Never Enough

Focus on Specific Area

Vital to Set the Right Initial Conditions:

- Choose the Right Qualified Leaders with Technical Vision
- Quality Attracts Quality
- Let the Technical Leaders Build the Institution
- Small in Size – More \$\$ Per Person → Giant Outputs
- Provide Seed Funds for 10 Year Period

TIME IS REQUIRED TO BUILD A GREAT TECHNICAL UNIVERSITY

Status of Proposed Vision: An Example

“ The LUMS School of Science & Engineering (SSE)”

Author Note:

Today, Mr Syed Babar Ali (LUMS Founder) and LUMS SSE Project Director Dr. Khurram Afridi are leading the way for Pakistan to build such a proposed research oriented university.

See <http://sse.lums.edu.pk/>