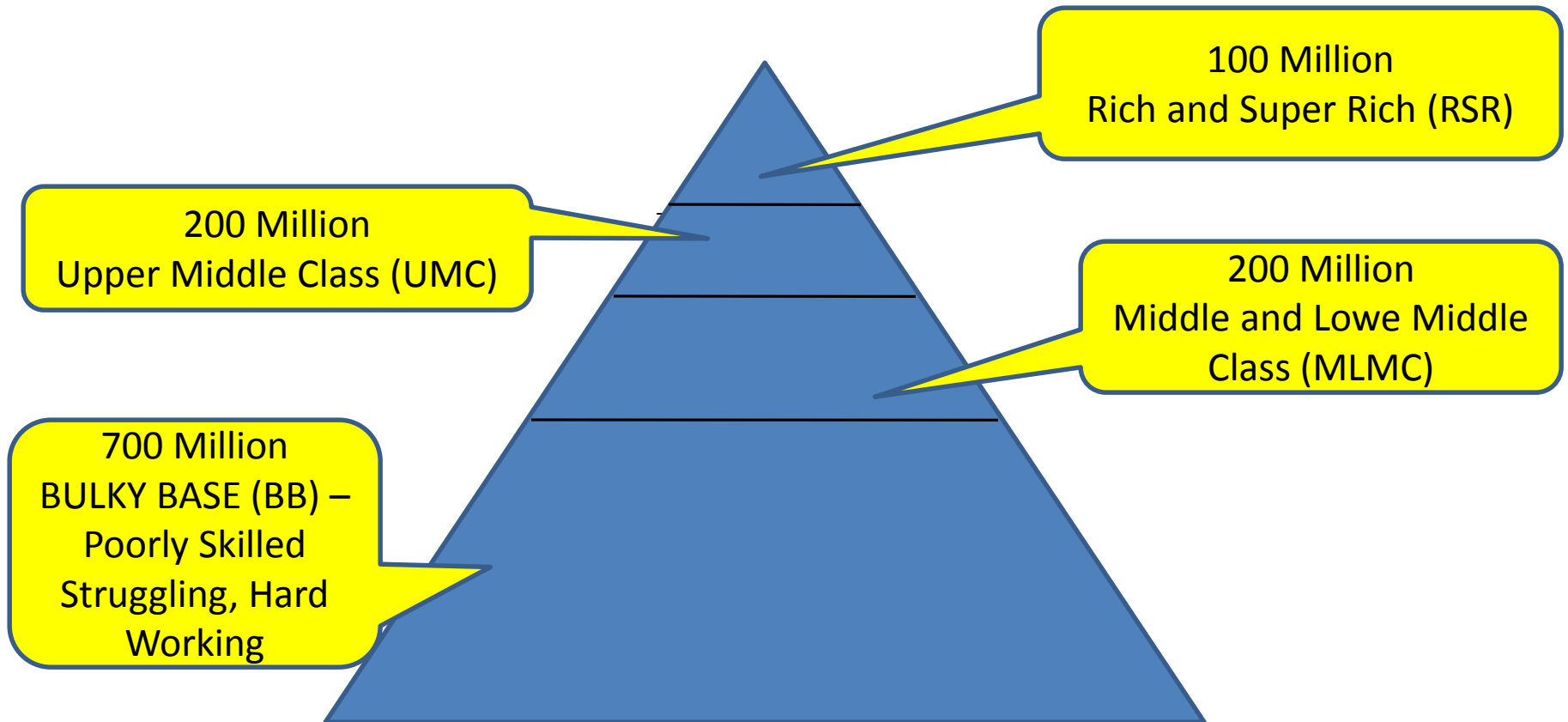


Indian Society : Many Strata



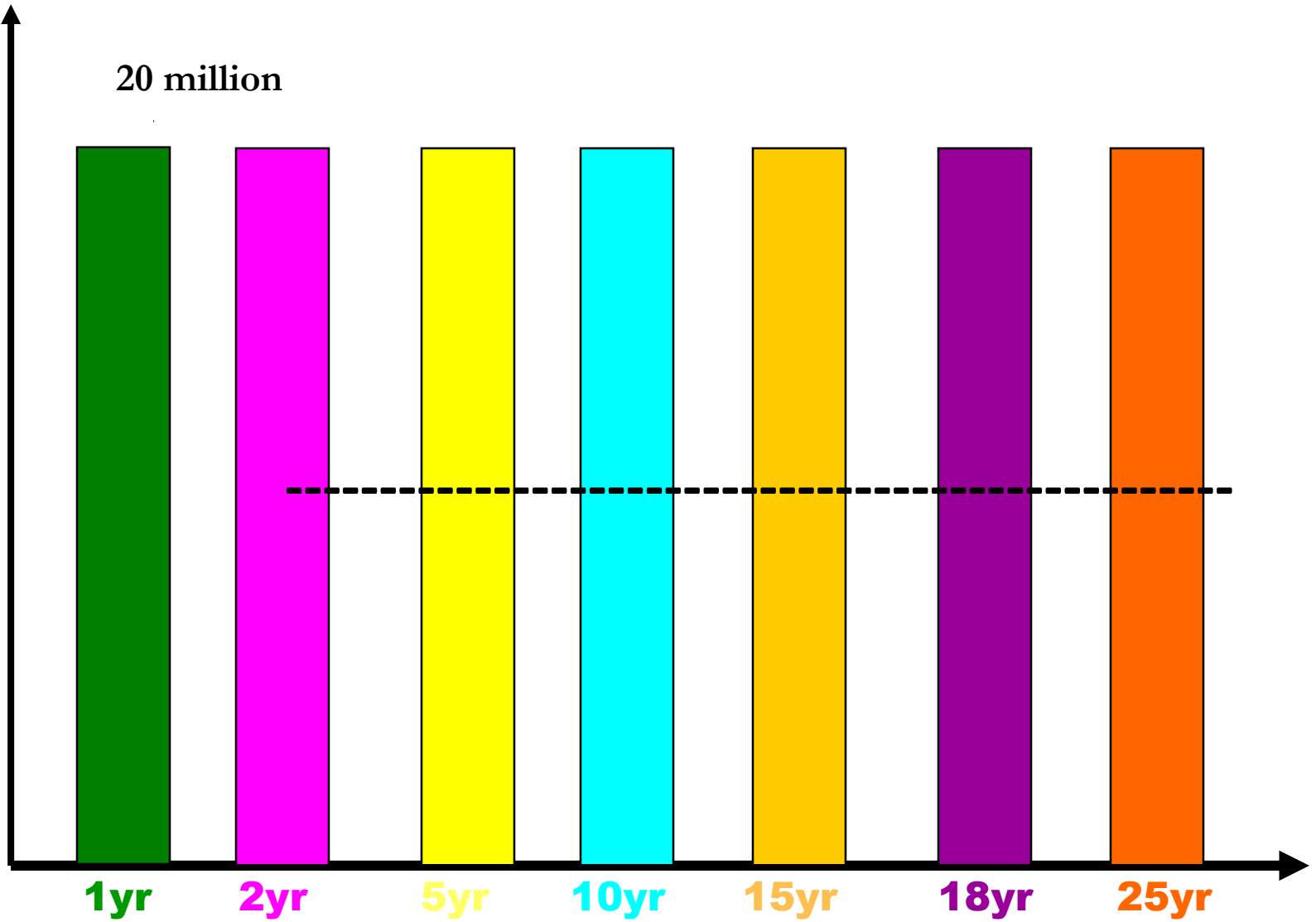
SWINGING EXTREMES

- **EUPHORIC ABOUT:** YOUTH POWER;
DEMOGRAPHIC DIVIDEND; INDIAN HUMAN
CAPITAL; ETC
- **SELF FLAGGELATION ABOUT:** POOR QUALITY;
GLOBAL INDEXES; “MUSHROOMING”, CRAZE FOR
“FOREIGN PATTING”. ETC
- **RESULTANT:** ONE POINT SOLUTIONS!

..... **REALITY IS COMPLEX**

2005 A.D

NUMBER

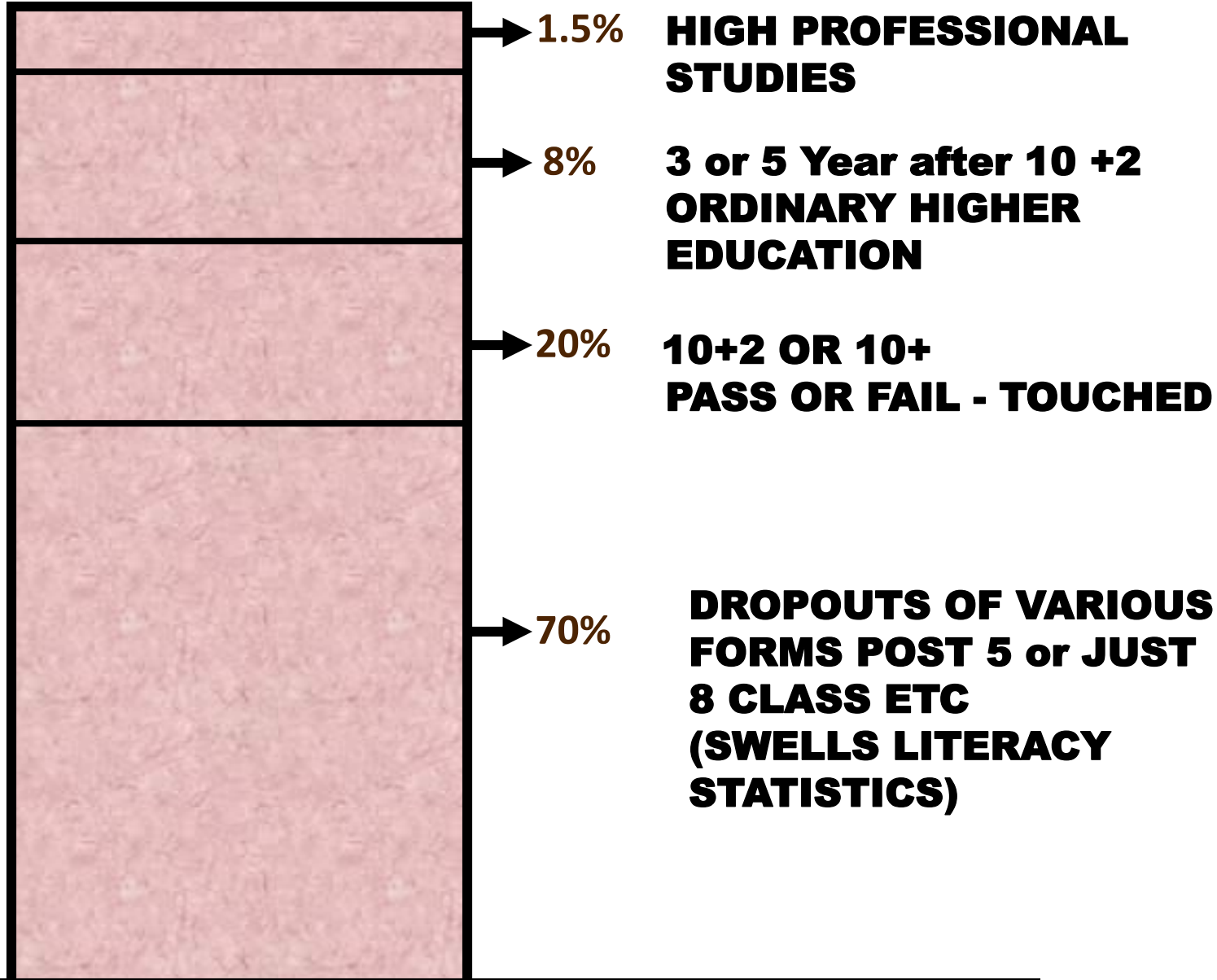


AGE

YOUNGEST NATION

- **20 million each Bogie newly added during past 25 years being pulled by the Steam Engine**
- **New 20 million Bogie Every year**





SCIENCE, TECHNOLOGY AND ENGINEERING

- ❖ It will be good therefore to recall the definitions of the above terms and how they relate to economy society and people? Also how they are interlinked. It is better to see a few quotes from the address of Sir David Davies (“Engineering as an Innovator of change in Society and the Role of Engineering Academies”, address by Sir David Davies, CBE, F Eng. FRS, Chief Adviser to the Ministry of Defence, UK and President, the Royal Academy of Engineering, at the annual function of the Indian National Academy of Engineering (INAE). New Delhi, December 3, 1998). (Ref 5)

SCIENCE, TECHNOLOGY AND ENGINEERING

Continues.....

About Science: “Science is unquestionably a search for a better understanding of the laws of nature described in the broadest possible sense from astronomy to medicine and from engineering to genetics. Despite massive steps forward in each field, the understanding always remains incomplete....”

SCIENCE, TECHNOLOGY AND ENGINEERING

Continues.....

About Engineering: “Engineering on the other hand is about innovation, design and the construction of new products and new capabilities. We must take care not to define this solely in terms of physical products since engineering can also often offer new services often without the need for additional hardware..... However, whatever the form of the new innovation its design is inevitably a compromise between many different parameters. The success of the products is therefore bound up with the efficiency of the design process which has the role of matching the design to the requirements in as efficient a way as possible...” .

SCIENCE, TECHNOLOGY AND ENGINEERING

Continues.....

What is innovation?: “In terms of an engineering product or service an innovation enables it to offer some new advantage in capability or performance (including cost) that there is a strong coupling between engineering and science but this does not necessarily mean that this engineering innovation derives directly from the latest improvements or understanding in scientific theories.....”.

SCIENCE, TECHNOLOGY AND ENGINEERING

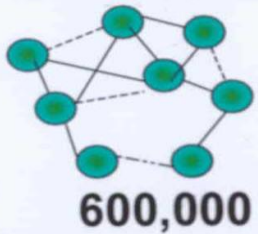
Continues.....

An example: “Perhaps the most obvious example here is the steam engine. That innovation arose from experimental observation but it was not based upon any current understanding a theory of heat at the time. Indeed the whole subject of thermodynamics was developed afterwards. It provided better understanding of the performance of heat engines and was further evolved in order to aid the design of improved equipment”.

GLOBALISATION, MARKET FORCES AND POVERTY



Poorly Connected Villages

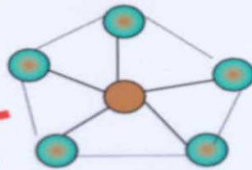


Also Low Productive Agriculture, Crafts etc.,

One Way for Primary Products

Knowledge ??
Skills, Investment

City Urban Nuclei



5000

(About 10 Metros)

Market & Employment Opportunities

URBAN SLUMS ??

Global Market :



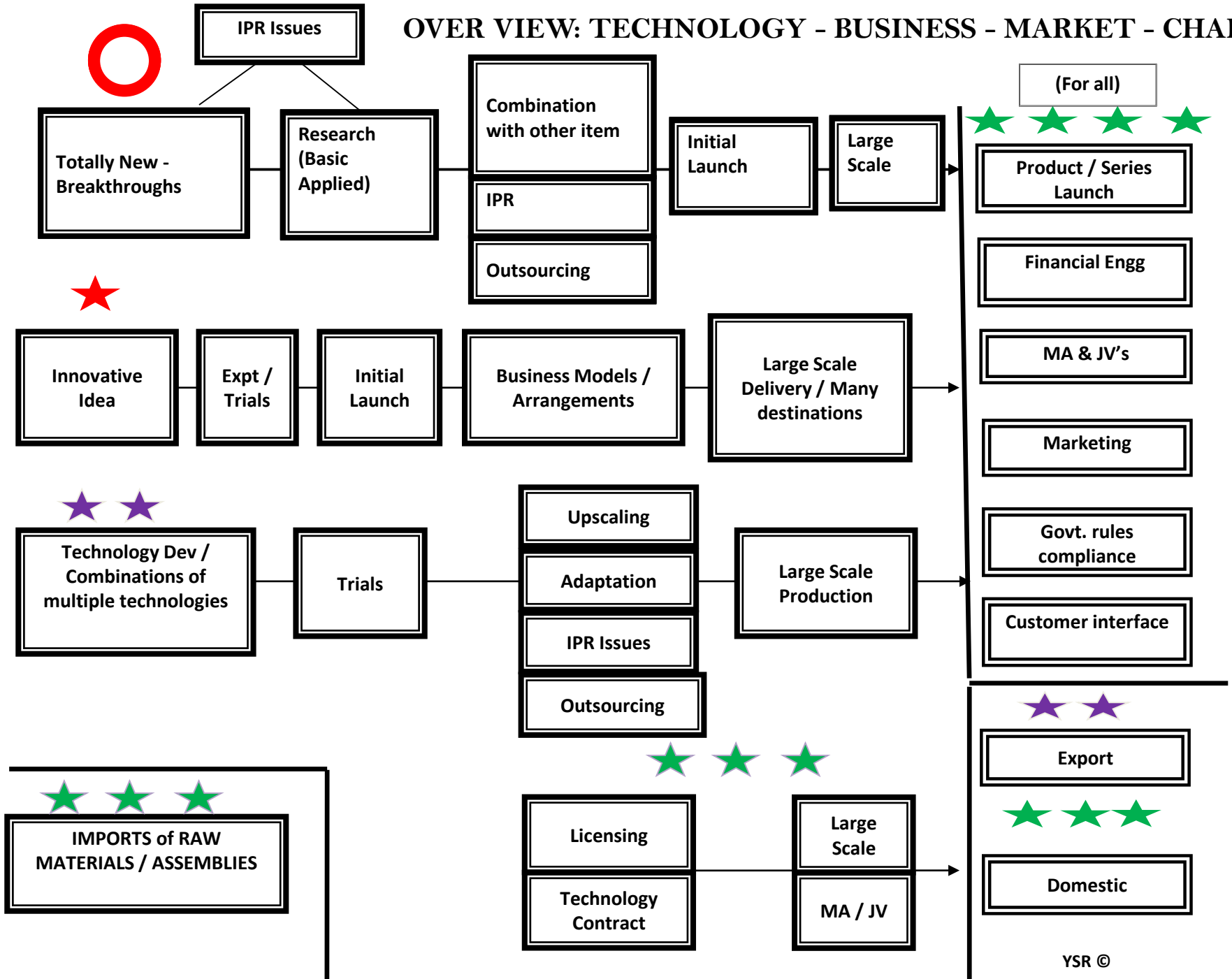
Exports & Imports

Reasonable Two Way Interaction of Market Forces



RICH Indians

OVER VIEW: TECHNOLOGY - BUSINESS - MARKET - CHAIN



INNOVATION, TECHNOLOGY TRANSFER, ETC

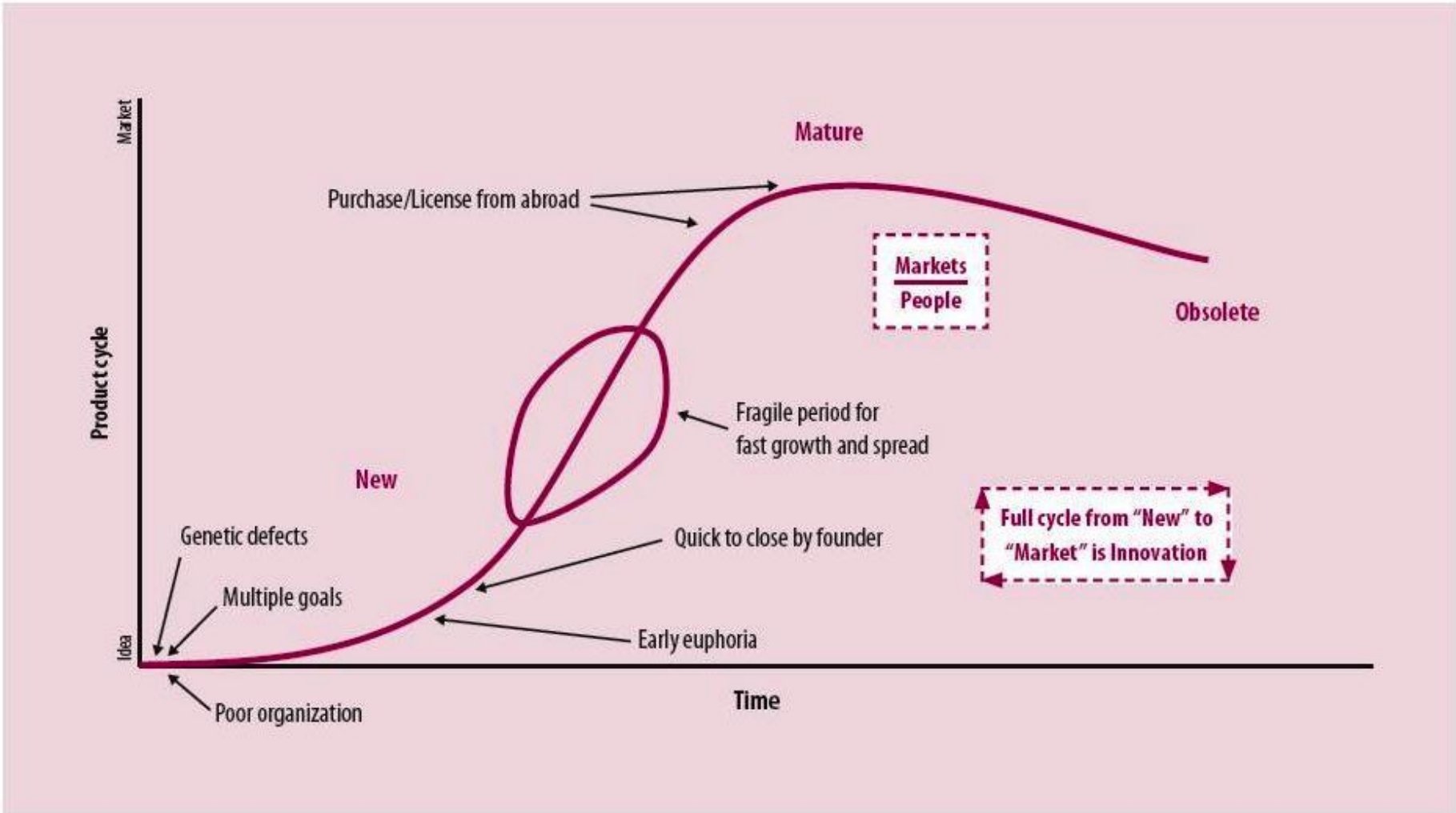
- **IDEA(S) TO MARKET**
- **INNOVATION STEPS :**
 - **FALTER OR FAST FORWARD?**
- **WHAT ARE KEY PROCESSES :**
 - **POLICY, SUPPORT SYSTEMS,**
 - **INTERMEDIATE OUTCOMES**
 - **FINAL OUTCOMES (SPREAD IN MARKETS)**

Table 1: Idea-to-market curve

Drivers (Block 1)	Facilitators (Block 2)	Intermediate Outcomes (Block 3)	Final Outcomes (Block 4)
<p>1. Policy</p> <p>2. Procedures for implementation</p> <p>3. Knowledge inputs/access</p> <p>4. Finance</p>	<p>1. Government funding bodies <i>Examples:</i> DST, DBT, TDB, TIFAC, NSTEDB, SIDBI, and NABARD. Ministries have some upgraded funds.</p> <p>2. Technology R&D centres <i>Examples:</i> Central government-funded national laboratories such as CSIR, ICAR, DAE, DRDO, ISRO, CPRI, CMTI, and so on. About 300 such centres exist in India. Industrial R&D centres including in-house R&D units, SIROs (NGO), foreign R&D units or centres, elite institutions, such as IITs, IISc, NITs, and central universities</p> <p>3. Certification/standard approval and other formal accreditations <i>Examples:</i> BIS, RDSO, food and drug controllers, national testing laboratories, IPO (for patent, design, and other IP components)</p>	<ul style="list-style-type: none"> • Publications • Patents • New designs • Performance improvement in existing products/services • Start-ups • Skill upgrades • Joint R&D projects • Prototypes • Demonstration services • Technology-intensive products and services made in India 	<p>Production of solutions (products and services) that are affordable and accessible to:</p> <ul style="list-style-type: none"> • People with very low incomes • People in the middle class • People in aspiring upward mobile classes <p>Products and services distributed to global markets</p>

Note: See Annex 1 at the end of this chapter for all acronyms.

Figure 1: Idea-to-market curve



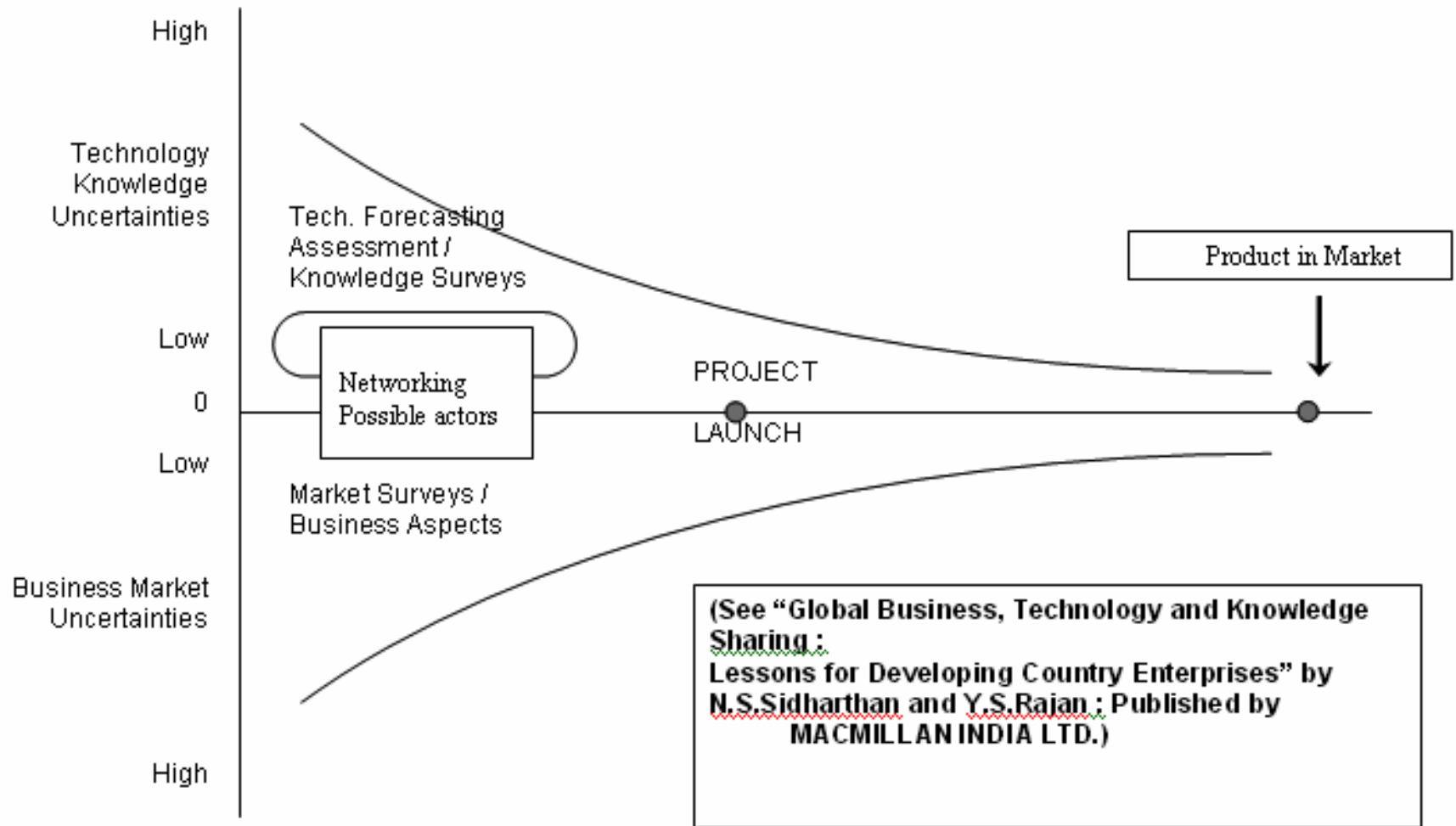
IN THE OVERALL

- We need to accept that all is not well with the output delivery of our vast and well funded National Laboratory system, in terms of INNOVATION and resultant products/services in the Market place.
- Our Industry is predominantly depending on IMPORTED TECHNOLOGY, KNOWHOW, and MACHINERY- leading to severe EXPORT-IMPORT IMBALANCE
- HOW TO CHANGE.....Starting from S&T policies to the rest of Indian Innovation System (IIS)

WAY FORWARD

- **Time constants in the Indian systems are very slow. 7-10 years is the Indian Time Rate of Interaction (see a chapter by Y S Rajan in Administrative Reforms by Indian Council of Social Science Research ICSSR (2001))**
- **Continual Push through The Intermediation Funnel –paid rich dividends in the early stages for space applications or in TIFAC through HGT, Missions, Vision 2020 etc.,**
- **That is upto a point of initial commercialization/ operation**
- **To SPREAD TO ALL THE POTENTIAL MARKETS there are SYSTEMIC CONSTRAINTS of IIS.**

Technology, Knowledge Intermediation







An Einstein Quote

THANK YOU