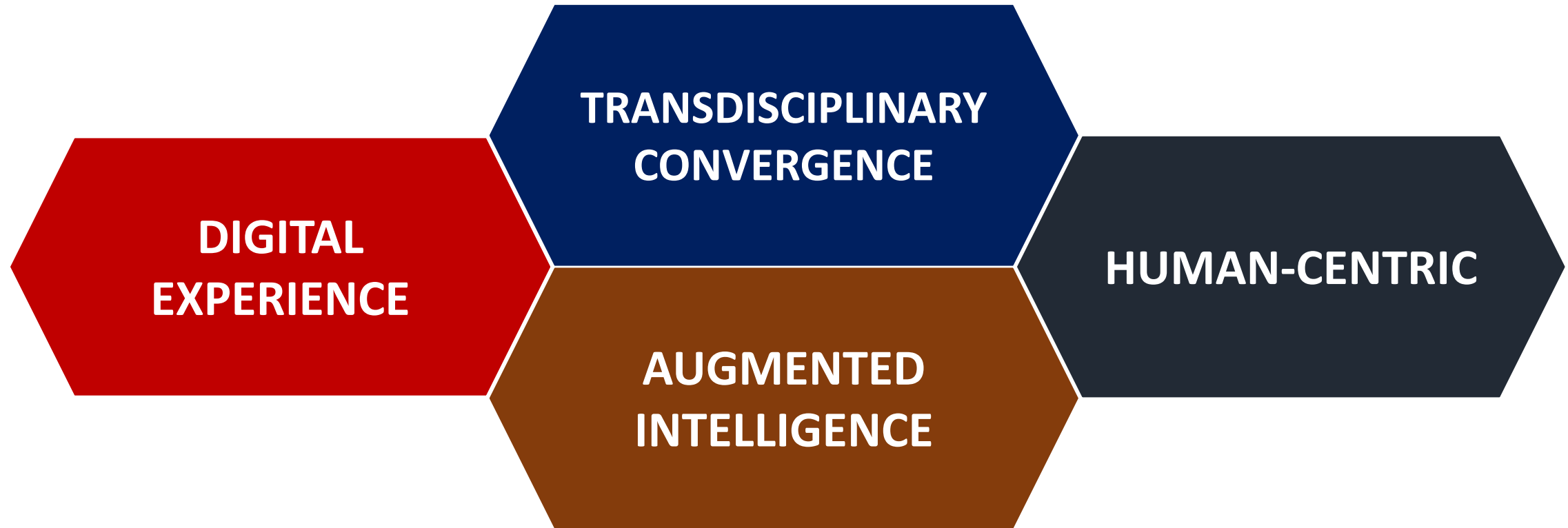


SYNERGY OF DISRUPTIONS AND TRADITIONAL LEARNING



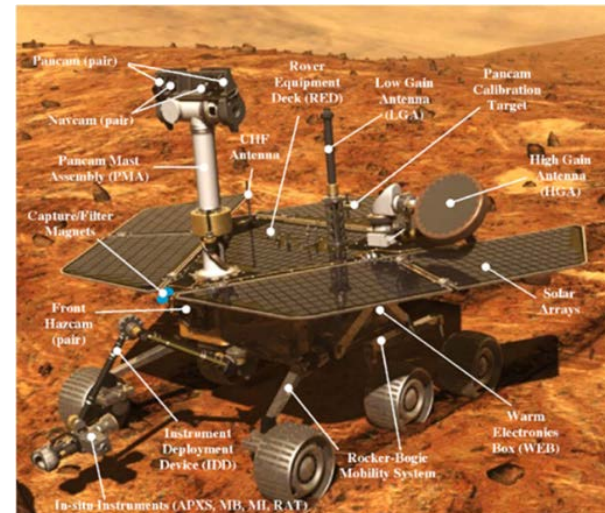
Partha P Chakrabarti

Indian Institute of Technology Kharagpur



Riding the Digital Revolution

Technology made Compute, Storage, Communication Free



Computing Impact on the Sciences

Physical Sciences

- Materials
- Process Engg
- Molecular Modeling

ICME

Life Sciences

- Genomics
- Metagenomics
- Systems Biology
- Personalized Medicine

Comp. Biology

Math, Statistical Sciences

- Optimization
- Risk
- Scheduling
- Analytics

Decision Sciences

Social and Business Sciences

- Knowledge
- Design Thinking
- Systems Thinking

Human Centric Systems

Computer Sciences

- Algorithms
- Models
- Systems
- Networks
- Data
- Intelligence
- Security
- Performance
- Robustness

Inventions at the Intersections

CONVERGENCE: New Additions to Vocabulary of Jargons



Intradisciplinary

Same Discipline, Different Levels of Training and Skill

Multidisciplinary

Independent, Sequential, Divisional
Exchange



Interdisciplinary

Joint, Interactive, Partnership
Dialogue, Hybridization, Complementary

Transdisciplinary

Integrative, Interdependence, Emergence
Reciprocity, Discourse, Shared Vocabulary, Extends



Source: Falk-Krzesinski, Holly. "Navigating Interdisciplinary Research for Success: Team Science."

Nissani, M. (1995). Fruits, Salads, and Smoothie: A Working Definition of Interdisciplinarity. Journal of Educational Thought, 29, 119-126.

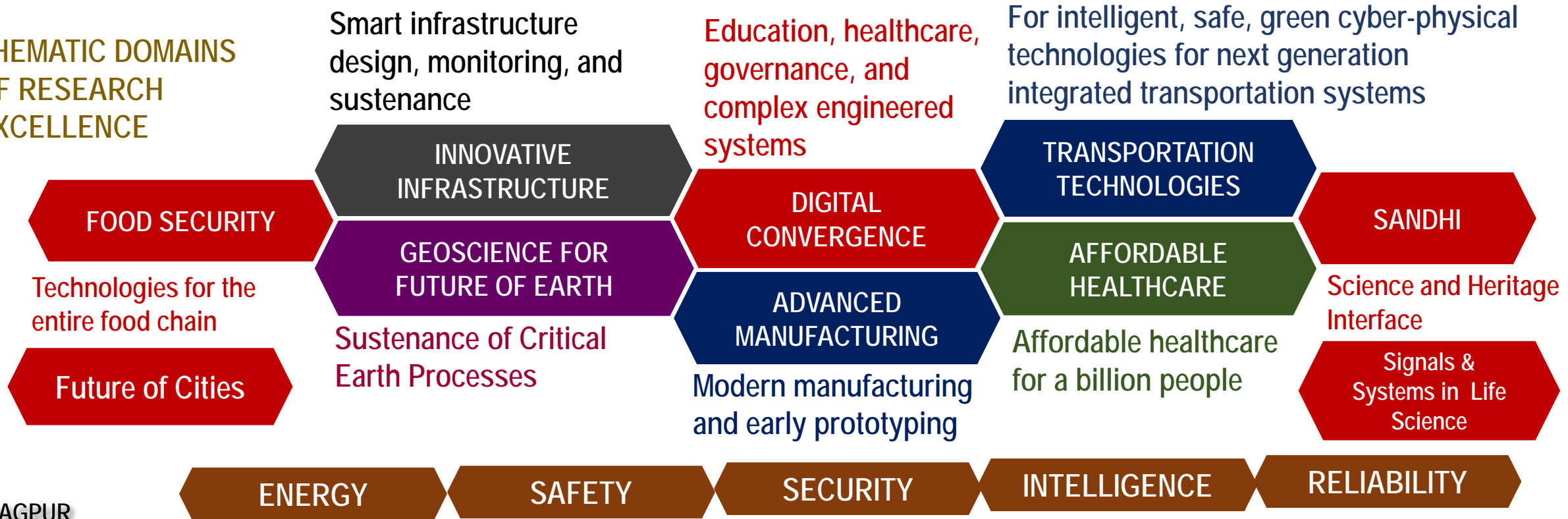
Additional Images Sources: http://all-free-download.com/free-photos/fresh_fruit_salad_191734.html, <https://pixabay.com/en/fruit-bowl-fruit-bowl-fruits-food-657491/>



Excellence Through Convergence



THEMATIC DOMAINS OF RESEARCH EXCELLENCE



Are These Beyond AI?

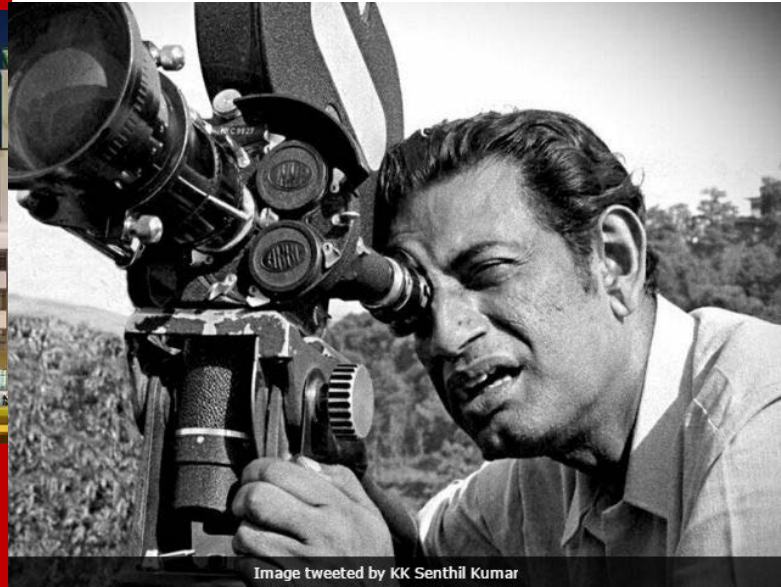


Image tweeted by KK Senthil Kumar

"Chitto Jetha Bhoysunyo"
is also popular among liberals in Bangladesh

Bangla	ইংরেজি
চিত্ত যেথা ভয়শূন্য, উচ্চ যেথা শির, জ্ঞান যেথা মুক্ত, যেথা গৃহের প্রাচীর আপন প্রাপ্তপত্তলে দিবসশরীরী বসুধারে রাখে নাই খণ্ড ক্ষুদ্র করি, যেথা বাক্য হৃদয়ের উৎসমুখ হতে উচ্ছসিয়া উঠে, যেথা নির্বারিত স্রোতে দেশে দেশে দিশে দিশে কর্মধারা ধায় অজস্র সহস্রবিধ চরিতার্থতায়, যেথা তুচ্ছ আচারের মরুবানুরাগি বিচারের স্রোতঃপথ ফেলে নাই গ্রাসি--- পৌরুষেবে করে নি শতধা, নিত্য যেথা তুমি সর্ব কর্ম চিন্তা আনন্দের নেতা, নিজ হস্তে নির্দয় আয়ত্ত করি পিতৃ-সময়ে	Where the mind is without fear and the head is held high;Where knowledge is free;Where the world has not been broken up into fragmentsBy narrow domestic wallsWhere words come out from the depth of truth;Where tireless striving stretches its arms towards perfection;Where the clear stream of reason has not lost its way into the dreary desert sand of dead habit;Where the mind is led forward by thee into ever- widening thought and action into that heaven of



Machine Composes Harmony That Sounds Like Bach

A musical score for the song 'The Rose Tree'. It features four staves labeled Soprano, Alto, Tenor, and Bass. The music is written in a key with one sharp (F#) and a 2/4 time signature. The Soprano part has a treble clef, while the other three parts have bass clefs. The lyrics 'The Rose Tree' are written below the staves, with the words 'The', 'Rose', 'Tree', 'The', 'Rose', 'Tree' aligned with the notes. The score is divided into two measures by a red vertical line.

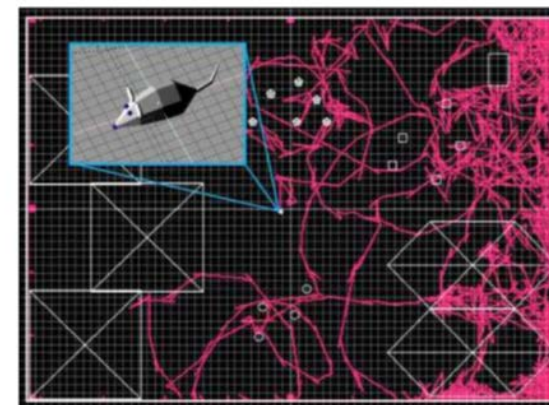
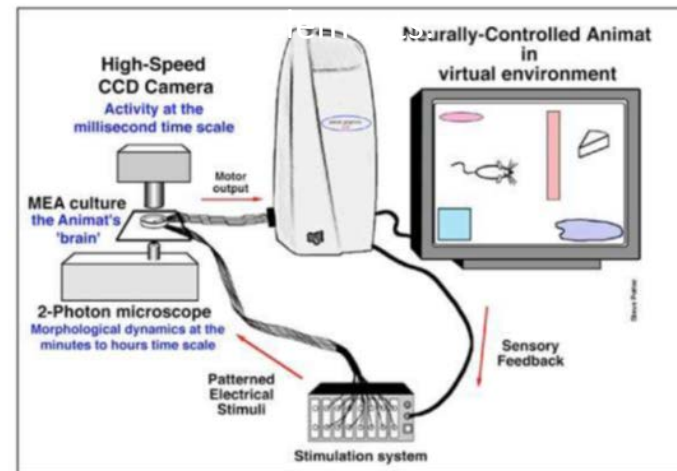


Fig. 4. Animat setup and activity. Above: neural signals are used to control the movement of an animat, whose 'brain' is exposed to microscopic imaging; feedback from the environment determines subsequent electrical stimulation of the living neuronal network in an MEA. Below: One hour of the animat's path (*curved lines*), as it moves about within its environment under neural control, with feedback. The white boxes represent various environmental obstacles.

[illegible]

Cognitive Systems

Augmentation

- Human-assist-system



Automation

- Human-as-system



Autonomy

- System-as-human

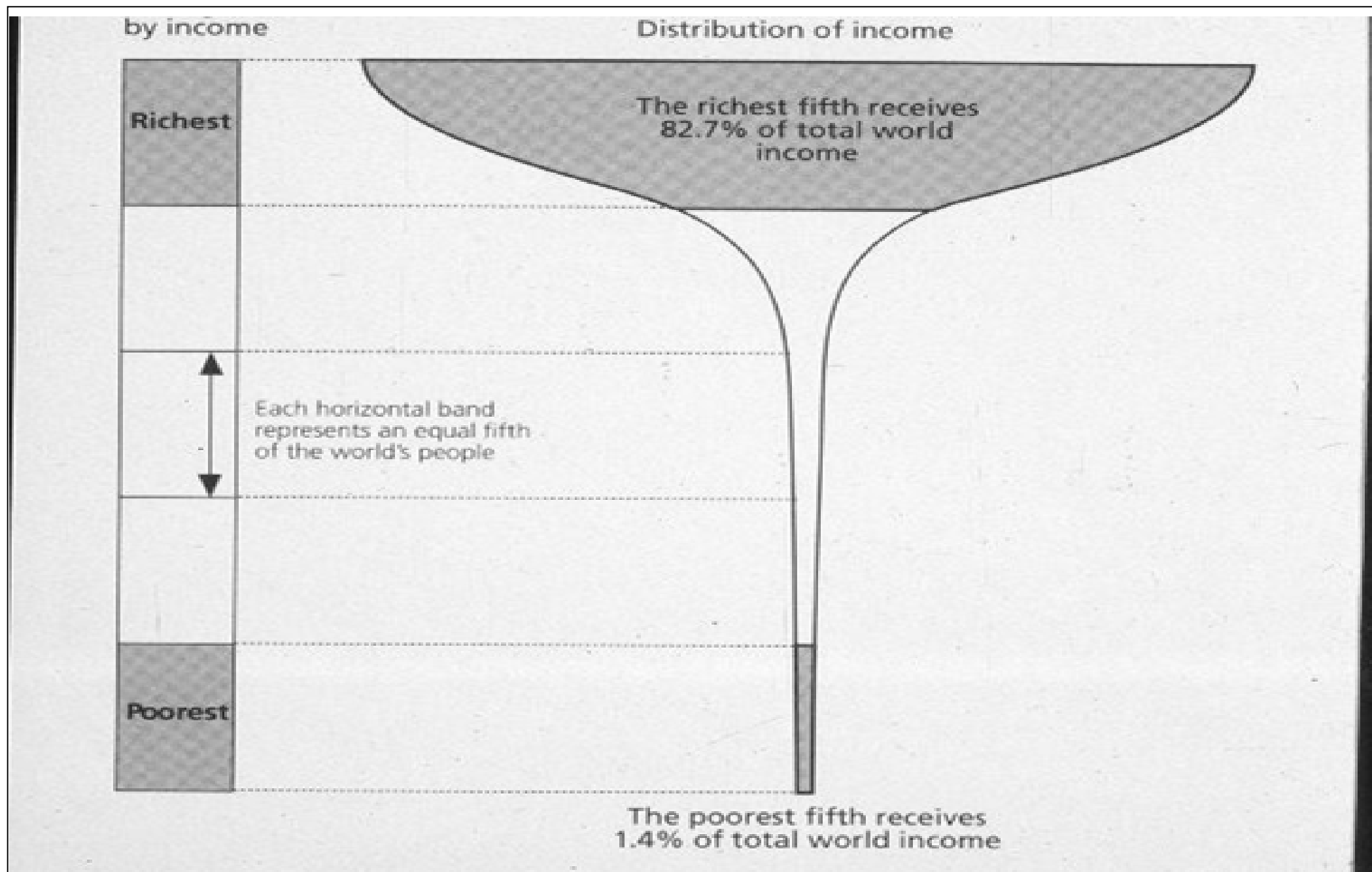


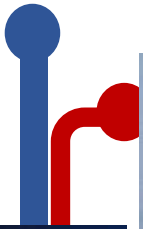


Reflections

- More New Information Generated in last 30 years than in last 5000 years
 - Education transformed from an integrated approach to a large set of highly compartmentalized technical disciplines, each with deep content on its own requiring study of almost a life-time to understand even a couple of disciplines well and keeping abreast on their developments.
- 'Polymaths' gave way to 'Super-Specialists'**
- Somewhere the Rhythm was Lost
 - Exploration, Creation and Consumption breached its Lakshman-Rekha and became Exploitation.
 - The developed world requires and equivalent of two Earths per year to meet its demand.
 - The top one-fifth richest consume more than four-fifths of the world's wealth.
 - More than one sixth without safe drinking water, one third without basic sanitation.







Revisiting Role of Education

Match the Following

Ensure Security of

Food, Water, Air, Energy, Ecology,
Biodiversity

Eradicate

Hunger, Poverty, Spread Disease,
Oppression

Universal Attainment of

Freedom, Equality, Health, Empowerment,
Education

Flourishing

Agriculture, Industry, Trade, Commerce

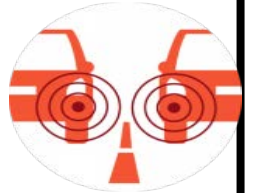
Enjoyment of

Prosperity, Peace, Knowledge, Brotherhood,
Contentment

Converging Physical, Chemical and Life
Sciences



Information & Communication
Technologies



Modern Genetics and Biotechnology



Material Sciences and Nanotechnology



Engineering Technology & Transportation

Economics, Policy and Planning
Ethics, Art and Culture

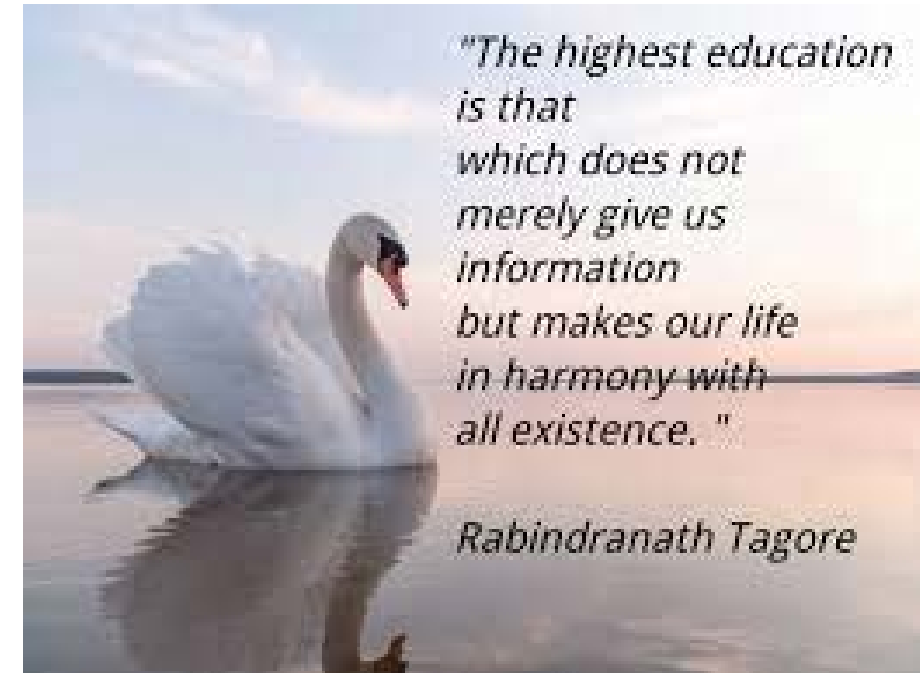


Need Democratization of Education





Harmonious Education: The Biggest Disruption Needed in Education Today



Thank you for Listening

