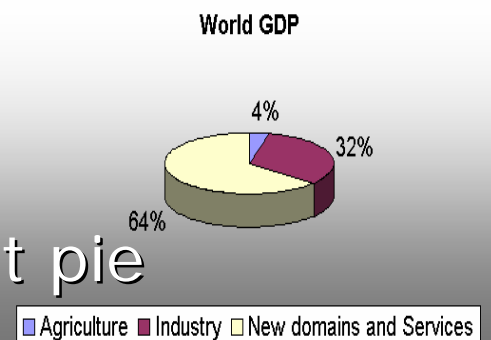


# Strategic View on ICT - Research and Development

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# ICT- Scenario

- ◆ Indian ICT growth is characterized by the success –mainly- in the service sector
- ◆ Growth and diversification of software applications in the world and transformation of Legacy systems were the fertile ground
- ◆ Success was always counted only to extend of Balance sheet and had less deep a review in to the national impact and long term impact of it on homogeneous education, sustainability of an outsourced economy and international standing in technology leadership etc.
- ◆ Yes, Service Sector occupies 64 % in World GDP and ICT has a significant pie



# Digital Economy

- ◆ The 21<sup>st</sup> Century will be characterized by the ICT economy because of penetration of technology in every social aspect and all utilities of life. ( \$14 Trillion influence ?)
- ◆ A clear leadership in ICT is indicative of National capability in Science and Technology similar to space and nuclear technology.
- ◆ The digital economy evolves around two entities: **Leaders** who introduce technology & products and **Service** providers who maintain and offer value addition. It is left to the nations and companies to decide where do they want to place themselves

- ◆ Today the IT revenue generation is around \$64 Billion

The Indian software and services exports including ITES-BPO is estimated at US\$ 40.3 billion in 2007-08, as compared to US\$ 31.4 billion in 2006-07, an increase of 28.3 per cent. The IT services exports is estimated to be US\$ 23.1 billion in 2007-08 as compared to US\$ 18.0 billion in 2006-07, showing a growth of 28.7 per cent in 2007-08.

Export revenues from ITES-BPO are estimated to grow from US\$ 8.4 billion in 2006-07 to US\$ 10.9 billion in 2007-08, a year-on-year growth of over 29.8 per cent.

**But How much did we do for the first time with originality?**



# Transformation to a Country of Innovation

- ◆ It requires a cultural change with confidence and leadership calling structural changes to the existing 20<sup>th</sup> century pattern of Industry and S, T, E centers leading to a purpose driven administration.
- ◆ It requires fundamental reforms in many domains: Education, R&D Institutions, Global reach Capability, Eng.Admin etc. Higher education where Content, Delivery and Knowledge generation channels need to be reorganized for productivity and creativity rather than extension work. Functional orientation and market/society driven guidelines must take over the policy driven sluggish education.
- ◆ Research, Inventions, Products and process (new) can not be realized under rigid process where IT industry counts its success



# Requirements

- ◆ It requires a research paradigm where caliber corresponds to creativity, success relates to innovation
- ◆ A National Plan for Innovation, retraining and repositioning is required to all Scientific and Selected Industrial houses to achieve fixed amount of success
- ◆ The reason is simple, no new process or product has taken the world by a storm in a decade ( or not even a breeze )
- ◆ Research requires targets of meaningful value, mere extension of work or duplicate realization of a process can not create leadership. "Think different", "prove useful" can only create new path of value.



# Innovation

- ◆ Innovation can be in any field, ICT service sector is not an exception
- ◆ Path breaking services, products and delivery mechanisms can be some options under rigid process of industry. But this may add value to service not the transition to leadership in ICT
- ◆ For the Innovations to take place innovative schemes and creative leadership is required. There are many strategic domains of ICT where India must come up as leader.

# Domains for Leadership

- ◆ Semiconductor Technology and Hardware
  - ◆ Memory
  - ◆ Processors
  - ◆ ( New Designs of Unconventional Processors)
  - ◆ Peripherals
  - ◆ Assembly and manufacturing machines
  - ◆ Controllers
  - ◆ Custom Chips, Nano Technology infusions
  - ◆ Integration Technology, Components of Future
  - ◆ Design Software
- ◆ A business of \$ 480 Billion (Annual) in coming years

# Domains for Leadership

## Software Engineering

- ◆ Design Software
- ◆ Modern Adaptive Operating Systems
- ◆ (Wide variety of Requirement met Super Virtual)
- ◆ Novel Software Technology for Industry
- ◆ New Development Paradigms with more Cognizance
- ◆ New Design support for Processors and long term Development of software and systems
- ◆ Modern Process Systems for Service Industry with more Cognitive and Autonomic Designs reducing Effort and Cost.
- ◆ Effective Machinery to make it Globally available at cost competitive positions
- ◆ Bio-Systems inspired computing and bringing out practical results
- A Business of \$ 260 Bn annual in **new** generation Software

# Domains for Leadership

## Communication Technology

- ◆ **Advances in Wireless Technology** being pushed to the products that really make Ubiquitous formats of impressive dimensions
- ◆ **Integration of 50 sensors** in personal devices for management
- ◆ **Development of New encoding and Topology management** with more compression, Security and Trust systems for Future (5G systems)
- ◆ **More of Autonomic Communication** research, Cognitive and adaptive systems
- ◆ **Multimedia with better standards**
- ◆ **Internet : Best, Fast, Comprehensive** and fully Cognitive Search Engines for first time, Servers and routers technology supplementing nodal intelligence for Global view at anytime anywhere
- ◆ **Design of Best Trust systems** for International banking covering world Economic Models
- ◆ **A Trillion \$ Business** waiting for new products and process

# Domains for Leadership

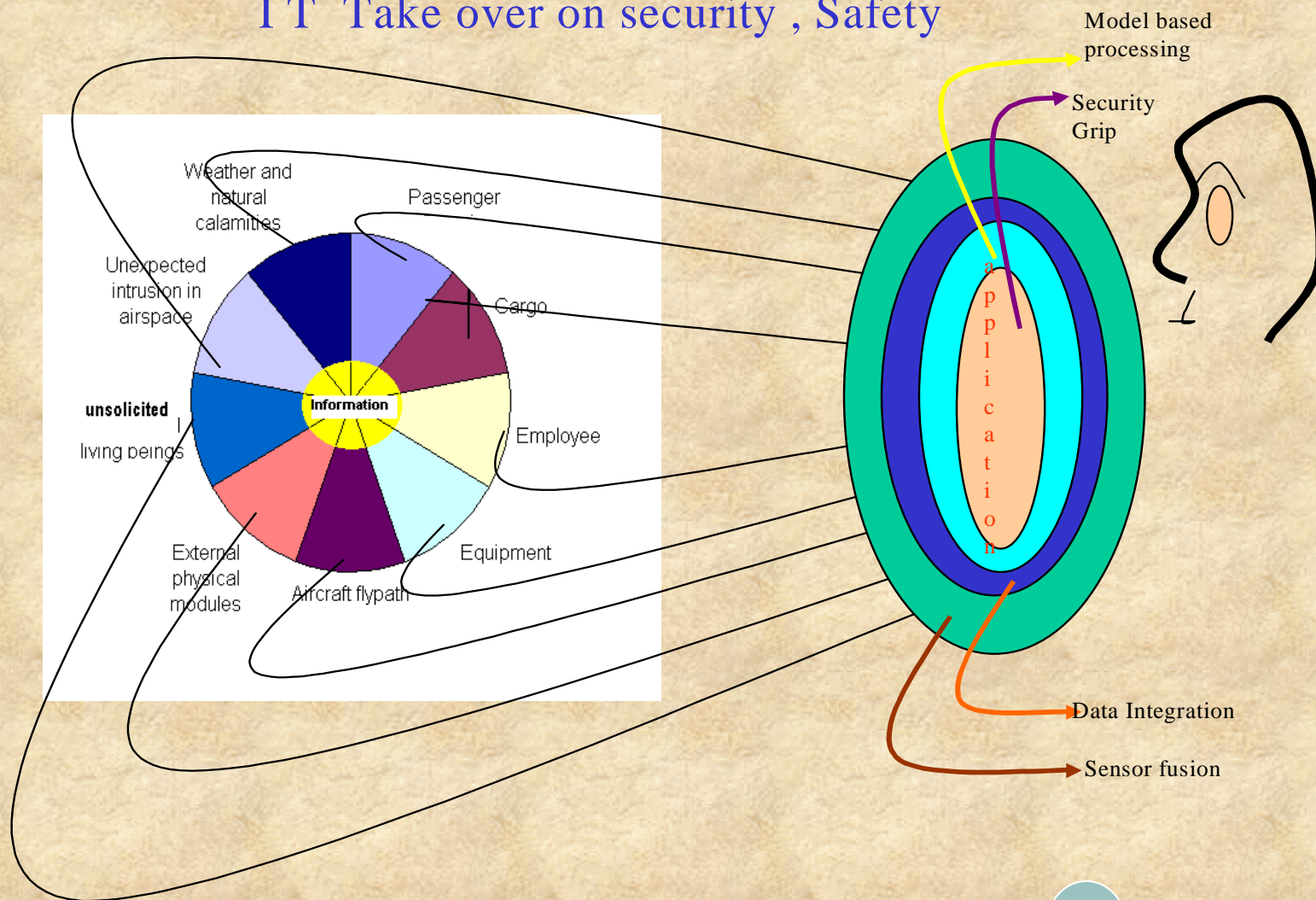
- ◆ Strategic Management for R&D in ICT
  - ◆ National ICT Innovation Council ( 4 years period)
  - ◆ A motivator as Leader
  - ◆ Members: Lead Professionals, Industry ( FICCI), DST, DIT, DBT, Space, Commerce
  - ◆ Accumulate Research Funds Across Depts, Hybridize Capital with FDI, Infuse Trans National Research Programs
  - ◆ Either Restructure old research Centers to modern pathways or start New ones
  - ◆ Recruit and Nurture Modern Thoughts and administrative systems with liberal intellectualism and objective controls
  - ◆ Research and Policy Formation for the Rise and growth of SMEs across the country in ICT ( like Service Industry)
  - ◆ Entrepreneurial fellowships In all Advanced Institutes or new Centers with Different Build and Administration



# Some Examples – No.1

R

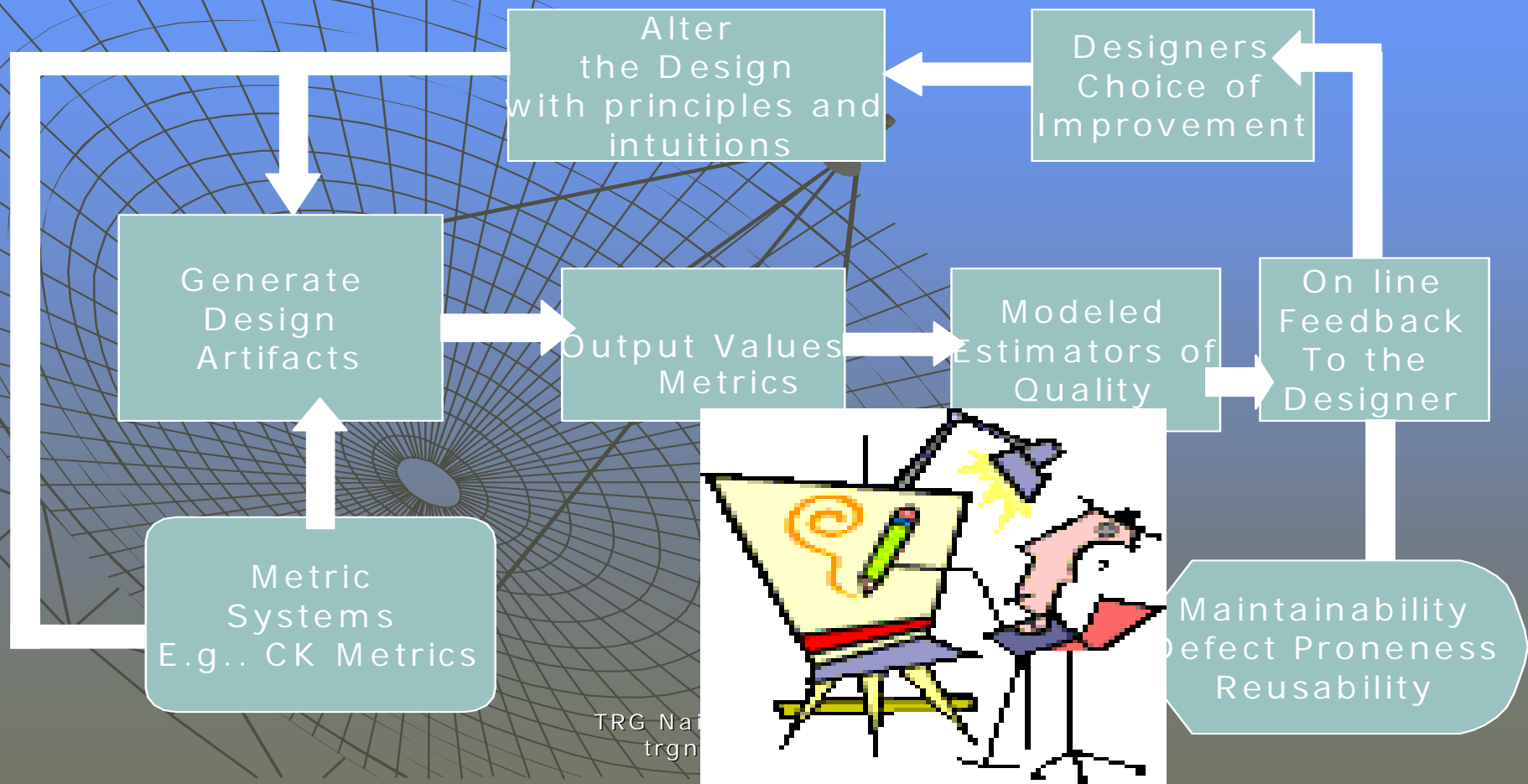
## IT Take over on security , Safety



R

# Some Examples No.2

## Autonomic Software Interactive Designs (Lyon,Fr)



# Examples No.3

## Cognitive Router

### Hidden Markov Model ( HMM )

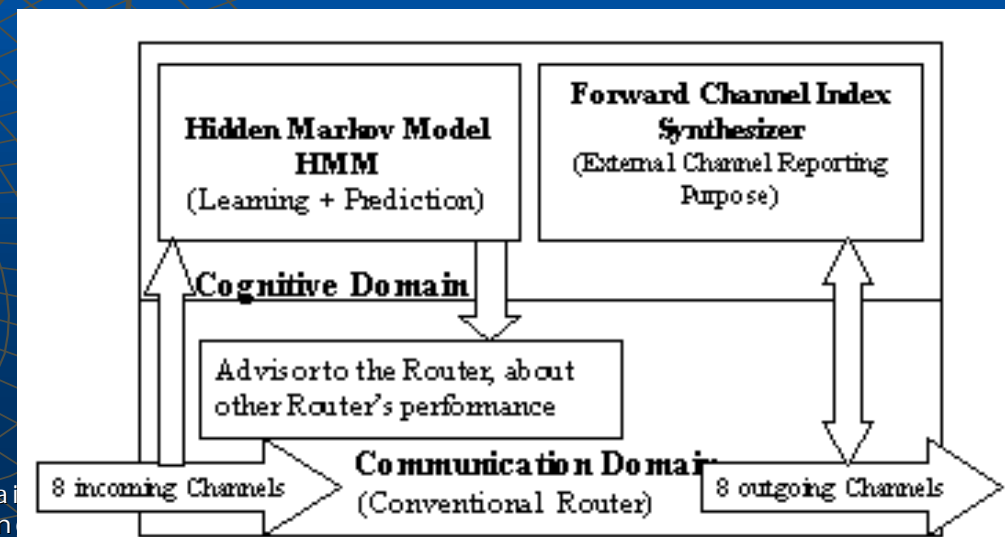
#### ◆ Cognitive Domain

Patent@ Final stages

- ◆ HMM receives its input packets from Network
- ◆ Forward Channel Performance Index (FCPI) Synthesizer calculates FCPI for every router
- ◆ Planning based on QOS requests and current FCPI
- ◆ Advisory actions to conventional routing work
- ◆ Cognitive packets goes to cognitive segment and conventional data packet goes for routing segment

#### Learning, Planning

- ◆ By implementing HMM the future performance factors of neighboring and beyond routers are realized in backward position.
- ◆ It **stretches** the network awareness



# Comprehensive Software Industry Analysis Model

C

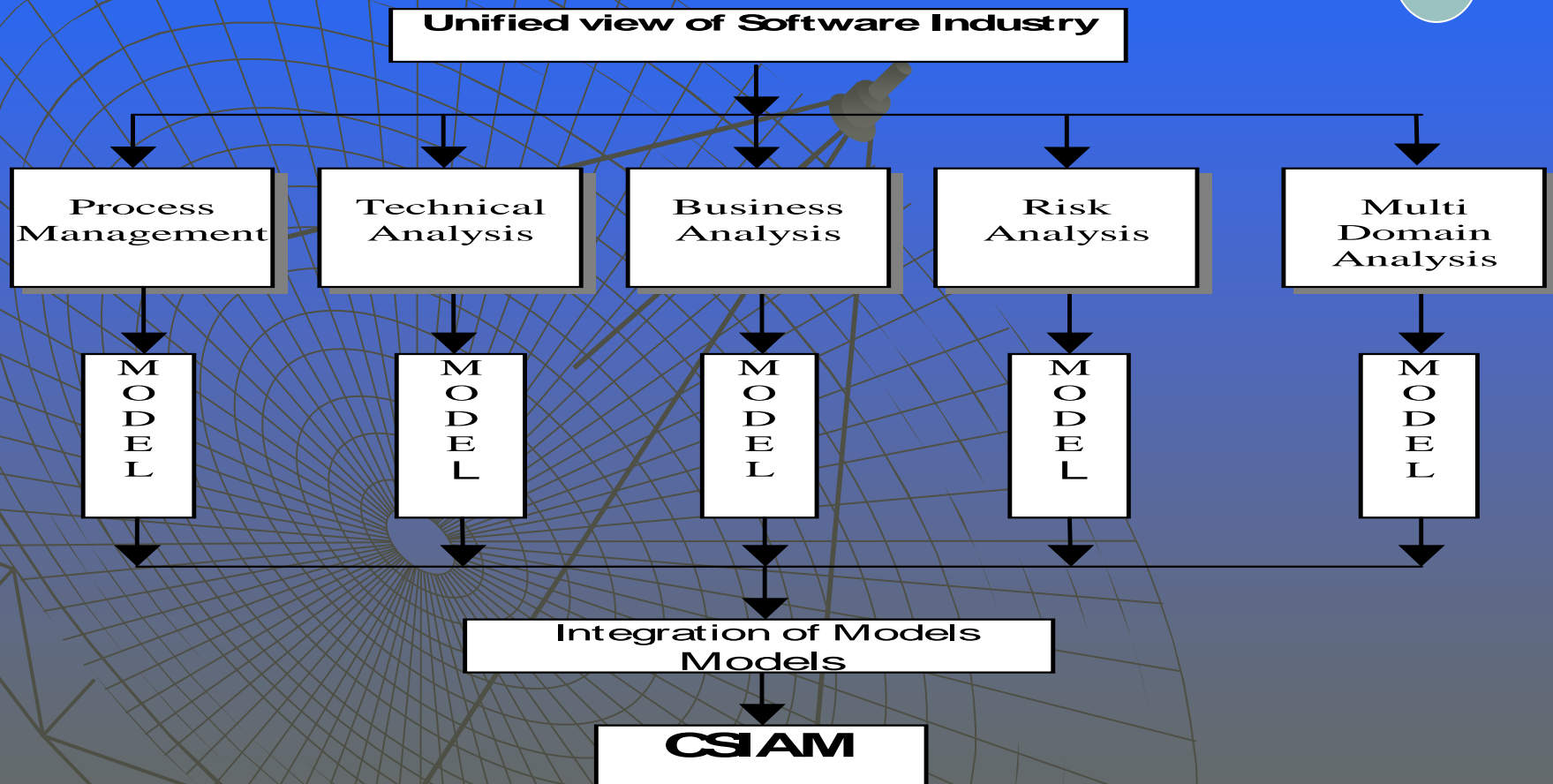


Figure 3. Multi Window Visualization of Software Industry

# Comprehensive Industry Analysis Model

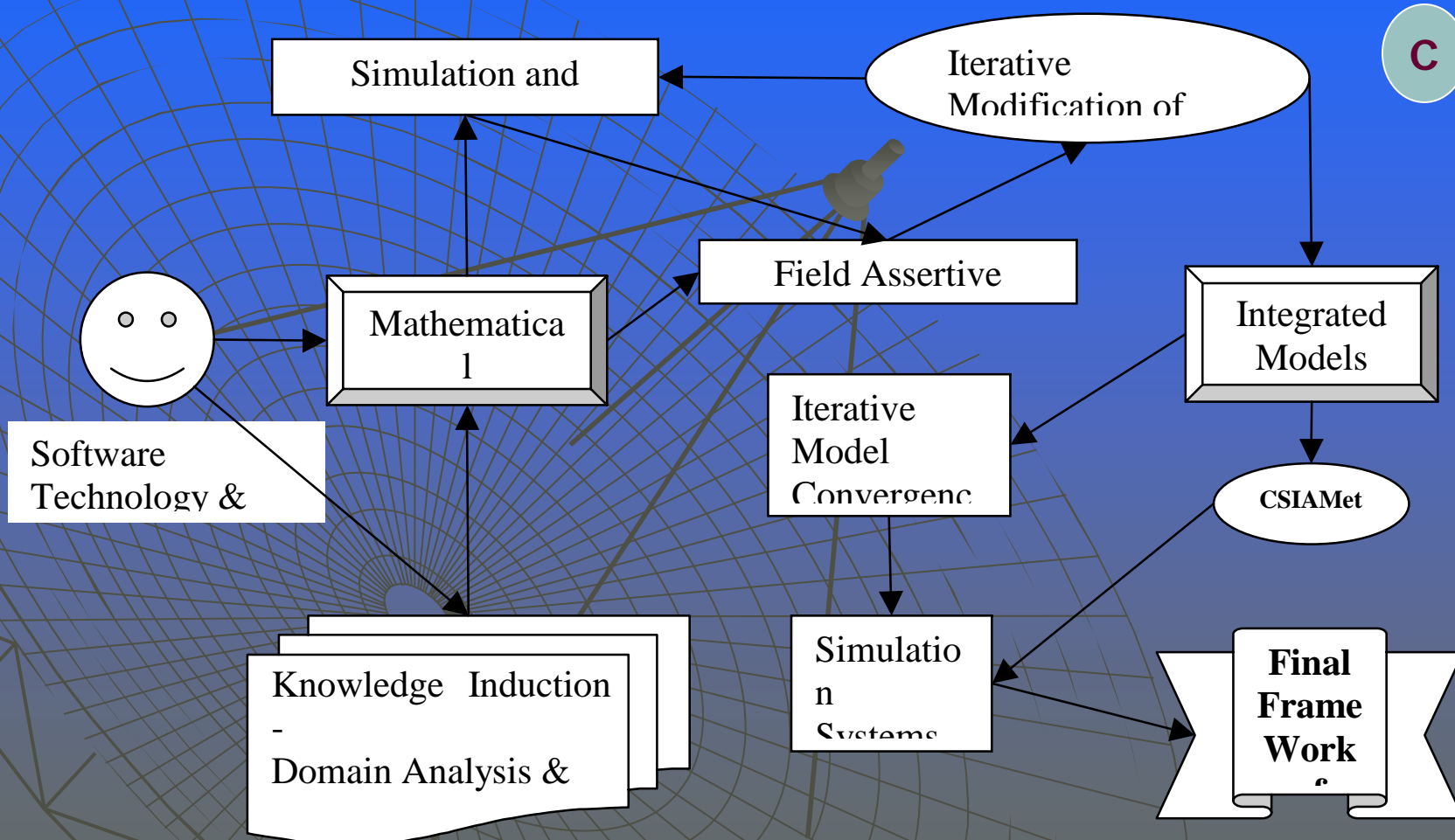
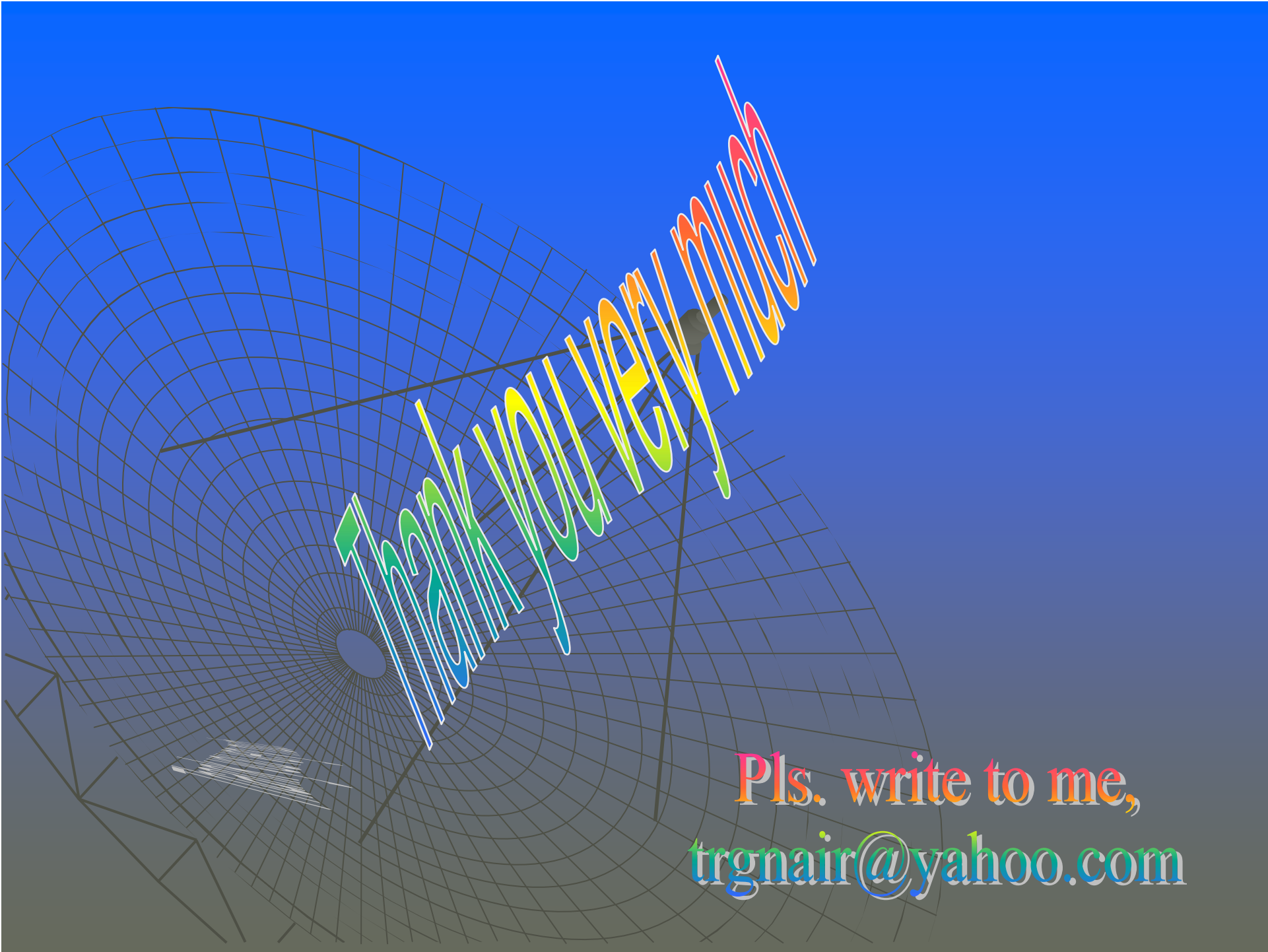


Figure 4. Prototype Design and Implementation

# ICT - R&D Growth

- ◆ An Organized Effort is the need of the day
- ◆ Restructuring of the Funding Schemes, Leadership pattern, Institutions, Education Model and Administration are required
- ◆ FICCI, Govt. Depts, Motivating Individuals must be in a council to govern this scheme
- ◆ Old paradigms and Technology/Person worship patterns must change to Identify challenges and generate solutions with objectives. Promote fermenting intellectual activity in less stressed, non outsourced environment.
- ◆ This will enable to realize a leadership position



THANK YOU VERY MUCH

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