

INDIAN SPACE POLICY FOR TECHNOLOGICAL AND SOCIAL DEVELOPMENT

Mukund Rao

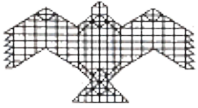
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**PRESENTATION AT INTERNATIONAL WORKSHOP
“SPACE POLICY AND LAW FOR SOCIAL DEVELOPMENT IN ASIA”
21ST MEETING OF ASIA-PACIFIC REGIONAL SPACE AGENCY FORUM
DECEMBER 3, 2014**



- **SPACE - OBJECTIVES AND GOALS & KEY FACTORS FOR SPACE**

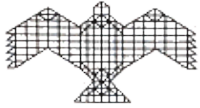
- PRESENT POLICY POSITION
- SOCIAL NEEDS FOR SPACE APPLICATION
- SPACE APPLICATION PROJECTS PLANNED
- SPACE POLICY TO PROMOTE SPACE INDUSTRY
- SPACE POLICY GOVERNANCE STRUCTURE



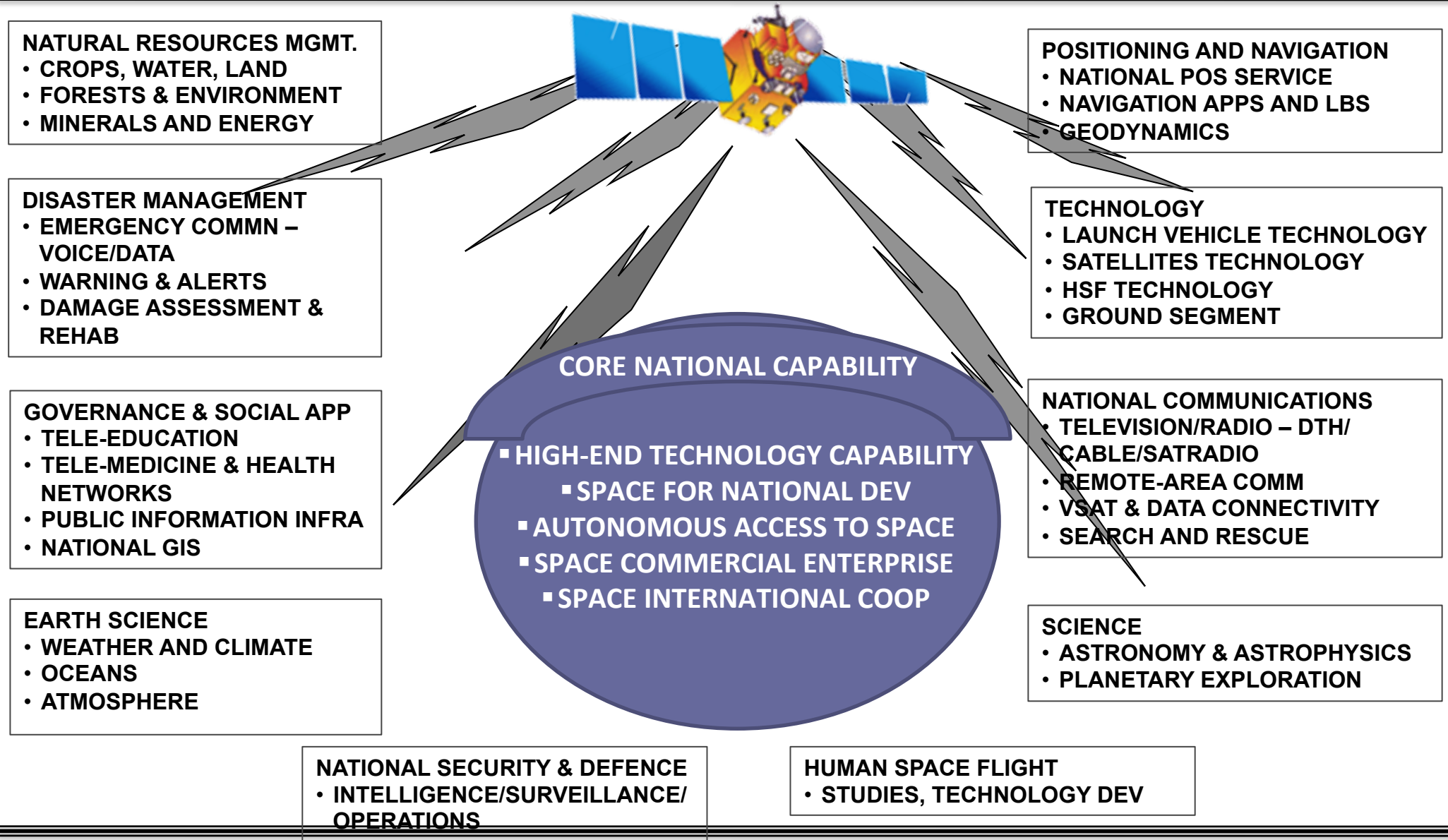
INDIAN SPACE – POLICY STATUS

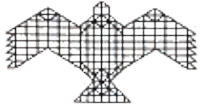
- **INDIAN SPACE ACTIVITIES STARTED IN 1963 - JUST “~50 YEARS YOUNG”**
- **1970 STATEMENT OF DR VIKRAM SARABHAI – STATED VISION AND POLICY TENET FOR INDIAN SPACE:**
 - **KEY EMPHASIS ON “SPACE FOR NATIONAL DEVELOPMENT”**
- **BROAD 10 YEARS ISRO MISSION PROFILES**
- **EVERY 5 –YEARS A PROFILE OF SPACE MISSIONS ANNOUNCED**

- **OPERATIONAL POLICIES FOR SPECIFIC SPACE-BASED ACTIVITIES**
 - **SATELLITE COMMUNICATIONS POLICY (1999)**
 - **REMOTE SENSING DATA POLICY (2001) (2011)**
- **POLICY PERSPECTIVE PAPERS ARE PRESENTED BY ISRO AND OTHER INDIAN INSTITUTIONS IN VARIOUS SPACE FORUM**

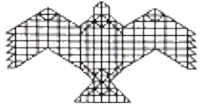


INDIAN SPACE – MAIN GOALS

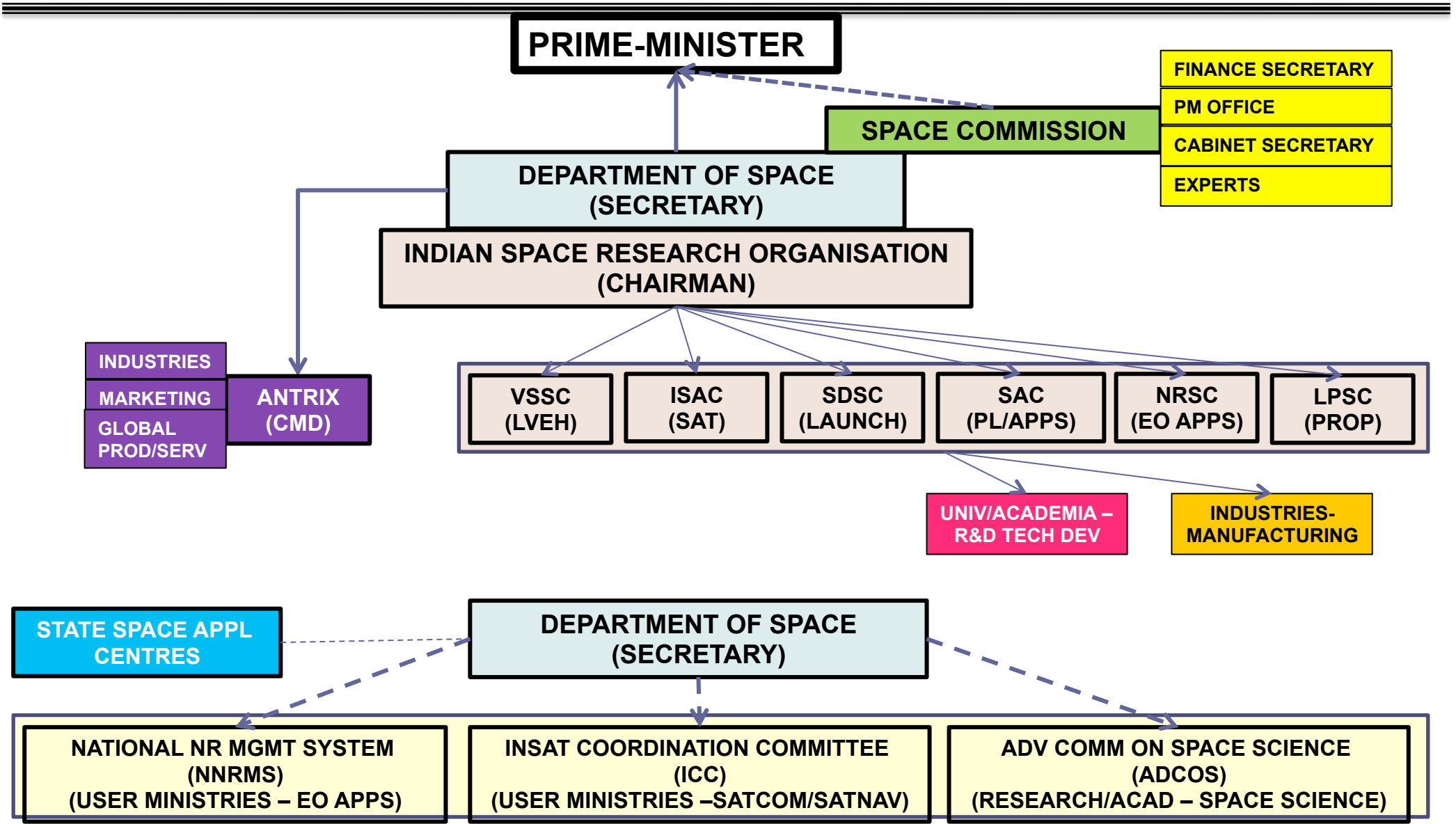


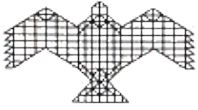


- **SPACE GOVERNANCE STRUCTURE**



INDIAN SPACE - STRUCTURE





- SPACE - OBJECTIVES AND GOALS & KEY FACTORS FOR SPACE
- SOCIAL NEEDS FOR SPACE APPLICATION

- **SPACE APPLICATION PROJECTS – ACHIEVED AND PLANNED**

- PRESENT POLICY POSITION

- SPACE POLICY TO PROMOTE SPACE INDUSTRY
- SPACE POLICY GOVERNANCE STRUCTURE

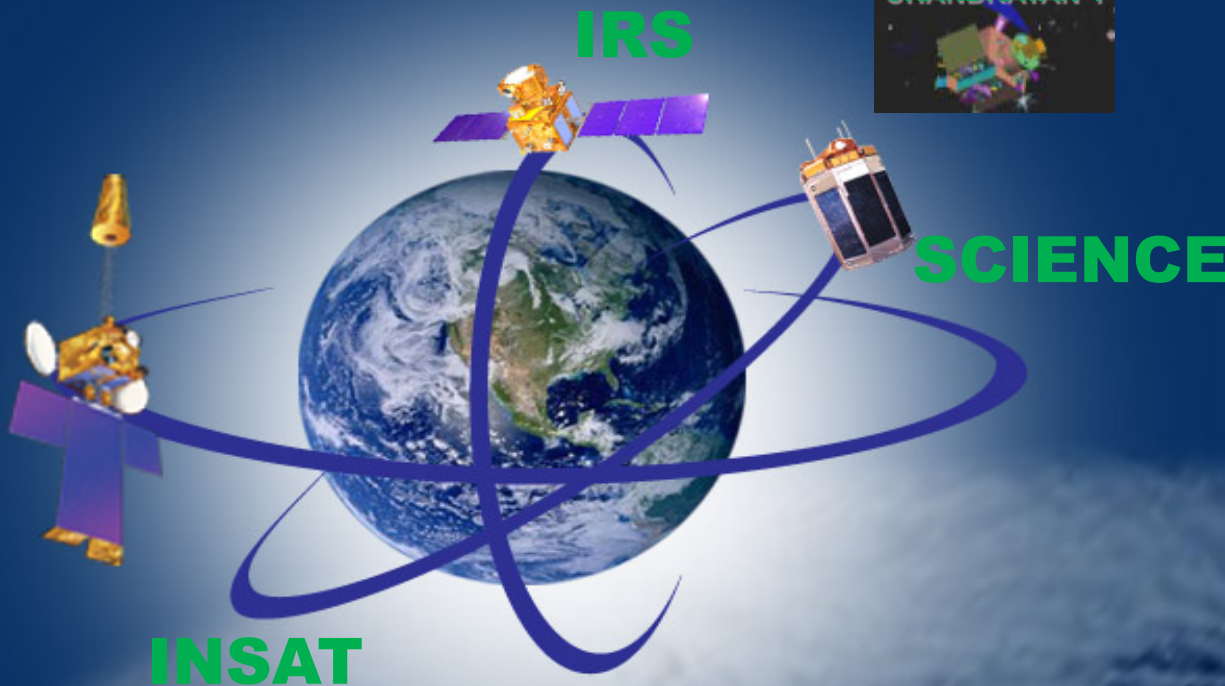
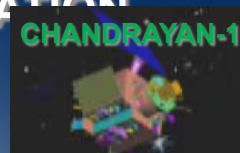
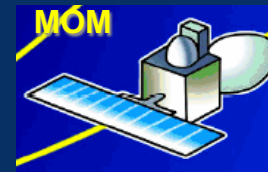
INDIAN SPACE – 50 YEARS ACCOMPLISHMENTS

- **SUCCESSSES**
 - 67 INDIAN SATELLITES
 - 44 LAUNCH MISSIONS
 - 47 FOREIGN SATELLITES
- **FAILURES**
 - 14 LAUNCH/SAT MISSIONS
- **WIDE RANGE OF APPLICATIONS - ~50+ MINISTRIES; 30+ STATES; 200+ UNIV**
- **INDUSTRY INVOLVEMENT**
- **ACTIVE INTERNATIONAL COOPERATION**

INVESTMENT OF INR 430 B

~20000+ PEOPLE

GLOBAL PRESENCE



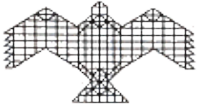
PSLV



GSLV



GSLV
Mk III



INDIAN SPACE – STELLAR ACHIEVEMENTS.....

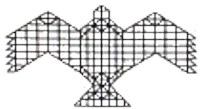
- **NATIONAL CAPABILITY – EXCELLENCE:**
 - PRECISION ENGINEERING, DESIGN AND RELIABILITY
 - HIGH-END TECHNOLOGY DEVELOPMENT AND SYSTEMS CAPABILITY
 - **SUPPORTING NATIONAL NEEDS:**
 - OPERATIONAL COMMUNICATION AND EO SATELLITES
 - OPERATIONAL POLAR LV & DEVELOPMENT OF GEO LV
 - SOCIETAL APPLICATIONS OF DEVELOPMENTAL COMMUNICATIONS, NR MANAGEMENT AND DISASTER MANAGEMENT SUPPORT
 - SUPPORTING COMMERCIAL USER-SERVICES – TV, DTH, EO/GIS
 - ENGAGING INDIAN INDUSTRY IN SUPPORT OF SPACE
 - COMMITTED PUBLIC FUNDING AND ACCEPTANCE
 - **THRUST TO NATIONAL SCIENCE ENDEAVOUR:**
 - SPACE SCIENCE AND EDUCATION
 - PLANETRAY MISSION FORAYS – MOON, MARS
 - **GLOBAL COMMERCIAL CAPABILITY:**
 - SPACE-BASED SERVICES AND BUSINESS MODELS
 - **ENGAGING INTERNATIONAL COOPERATION**
 - BI-LATERAL, JOINT MISSIONS, OPPORTUNITY COOPERATION, MULTI-LATERAL FRAMEWORKS
-
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Satellite Communications (SATCOM) Policy, 1999

(<http://www.isro.org/news/pdf/satcom-policy.pdf>)

- **GOALS OF THE SATCOM POLICY:**

- **BUILD NATIONAL CAPABILITIES**

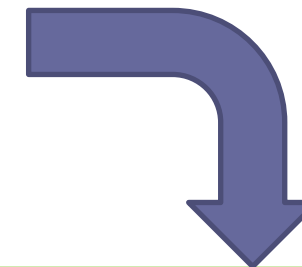
- **DEVELOP A HEALTHY AND THRIVING COMMUNICATIONS SATELLITE, GROUND EQUIPMENT AND SATELLITE COMMUNICATIONS SERVICE INDUSTRY**
- **SUSTAINED UTILISATION OF INDIAN SPACE CAPABILITIES - SATELLITES, LAUNCH VEHICLES AND GROUND EQUIPMENT DESIGN**

- **INSAT FOR SOCIAL-APPLICATIONS/DEVELOPMENT**

- **MAKING AVAILABLE INSAT SYSTEM TO A LARGER SEGMENT OF THE ECONOMY AND POPULATION**

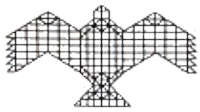
- **PRIVATE SECTOR INVOLVEMENT**

- **ENCOURAGING PRIVATE SECTOR INVESTMENT IN SPACE INDUSTRY**
- **ATTRACTING FOREIGN INVESTMENTS**



BIG BOOST FOR BUSINESS :

- **DTH SERVICES**
- **VSAT SERVICES**
- **EDUCATION OUTREACH**
- **TELEMEDICINE**
- **CONNECTIVITY**
- **CAPACITY LEASING**
- **GROUND EQUIPMENT**
- **JVS FOR SATELLITE VENTURES**
- **MANY NEW VA SERVICES**

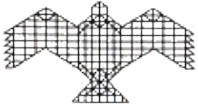


Satellite Communications (SATCOM) Policy, 1999

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- **AUTHORIZING CAPACITY OF INDIAN NATIONAL SATELLITES (INSAT) TO BE LEASED TO NON-GOVERNMENT (INDIAN AND FOREIGN) PARTIES ON COMMERCIAL TERMS**
- **ALLOW INDIAN PARTIES TO PROVIDE SERVICES INCLUDING TV UP-LINKING THROUGH INDIAN SATELLITES**
- **CO-ORDINATE AND REGISTER SATELLITE SYSTEMS AND NETWORKS BY AND FOR INDIAN PRIVATE PARTIES**
- **SATELLITES FOR GOVERNMENT USE FROM DEPARTMENT OF SPACE**
- **DTH PREFERENCE ON INDIAN SATELLITE SYSTEMS**
- **THE OPERATIONS FROM INDIAN SOIL USING FOREIGN SATELLITES UNDER CERTAIN CONDITIONS**

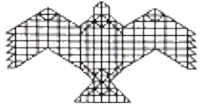
- **HIGH GROWTH IN DTH & VSAT MARKET**
- **GAP IN DEMAND-SUPPLY – GROWING DEMAND FOR SATELLITE CAPACITY IS A CHALLENGE**
- **“NON-CONDUCTIVE” ENV FOR INDIAN PRIVATE SECTOR SPACE AND GROUND SEGMENT**
- **ORBIT SPECTRUM RESOURCE OPTIMISATION**
- **INDUSTRY DEMAND FOR OPEN POLICIES –SPECTRUM AND ORBIT RESOURCES FOR INDIAN PVT SECTOR**
- **POLICIES FOR EFFICIENT, EQUITABLE AND RATIONAL USE OF SPECTRUM**



REMOTE SENSING DATA POLICY, 2001 AND 2011

- **MODALITIES FOR MANAGING AND/OR PERMITTING ACQUISITION/ DISSEMINATION OF REMOTE SENSING DATA IN SUPPORT OF DEVELOPMENTAL ACTIVITIES**
 - COMMITMENT OF GOI FOR CONTINUED (IRS) IMAGE AVAILABILITY
 - LICENSING REGIME INTRODUCED FOR:
 - OPERATING A REMOTE SENSING SATELLITE FROM INDIA
 - ACQUISITION/DISTRIBUTION OF REMOTE SENSING DATA WITHIN INDIA
 - ACQUISITION/DISTRIBUTION OF (INDIAN) REMOTE SENSING DATA IN COUNTRIES OTHER THAN INDIA.
 - “USER-BASED” REGULATION CONCEPT INTRODUCED
 - NON-DISCRIMINATORY 5.8 M TO ALL USERS AND “REGULATED ACCESS” FOR <5.8 M IMAGES
 - VITAL AREAS “MASKING OUT”
 - COMMERCIAL 1M IMAGES REGULATED FOR USERS
 - SINGLE-WINDOW DISTRIBUTION CONCEPT (THRU NRSC)
 - IMAGE DISDTRIBUTION LOGS
- **2011 RSDP UPDATION**
 - NON-DISCRIMINATORY 5.8 M/1M IMAGES FOR GOVT USERS
 - “REGULATED ACCESS” OF 1M IMAGES FOR OTHER USERS

- COMMERCIAL 1M IMAGES – “FETTERED OR NO ACCESS”
- REGULATOR AND DISTRIBUTOR – “CONFLICT”
- ISRO UNABLE TO MEET 1M AND 0.5M EO IMAGE NEEDS
- PRIVATE RS SATELLITES – NO OFFTAKE
- VITAL AREAS “MASKING” – AN OBVIOUS GIVE-AWAY
- NO SERVICE LEVEL GUARANTEES

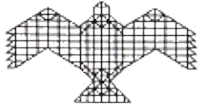


INDIAN SPACE – 2012-17 (12TH 5-YEAR PLAN) GOALS

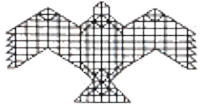
http://planningcommission.nic.in/plans/planrel/12thplan/pdf/12fyp_vol1.pdf

- **STRENGTHENING/EXPANDING OF OPERATIONAL SERVICES IN COMMUNICATIONS AND NAVIGATION**
- **DEVELOPING ENHANCED IMAGING CAPABILITY (WITH FINER RESOLUTION) FOR NATURAL RESOURCE MANAGEMENT, WEATHER AND CLIMATE CHANGE STUDIES**
- **SPACE SCIENCE MISSIONS FOR BETTER UNDERSTANDING OF THE SOLAR SYSTEM AND THE UNIVERSE**
- **PLANETARY EXPLORATORY MISSIONS**
- **DEVELOPMENT OF HEAVY LIFT LAUNCHER, REUSABLE LAUNCH VEHICLES AND THE HUMAN SPACE FLIGHT PROGRAMME.**
- **FASTER DELIVERY OF EO AND OTHER INFORMATION TO REMOTE AREAS**

2012 – 2017 (5 YEARS)	
Missions	58 (33 satellites)
Outlay	~INR 370 B



- **BASIC POLICY POSITION**

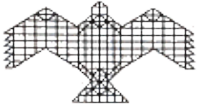


SPACE POLICYINTERNATIONAL THREAD ELEMENTS

- EMPHASISE NATION'S RIGHT-TO-ACCESS SPACE
- NATIONAL PRIDE
- TECHNOLOGICAL CAPABILITY-BUILDING
- MEETING NATIONAL DEVELOPMENT NEEDS
- ENHANCING SCIENTIFIC KNOWLEDGE
- LEADERSHIP
- INNOVATION IN TECHNOLOGY
- INDUSTRIAL STRENGTH
- EXPLORE AND REACH-OUT
- COMMERCE AND BUSINESS
- SUSTAINABILITY – CLIMATE, DISASTER, NATURAL RESOURCES
- INTERNATIONAL COOPERATION
 - SPACE HABITATION, PLANETARY EXPLORATION, DATA
- NATIONAL SECURITY
- DEBRIS MANAGEMENT
- LEGAL AND CONTRACTUAL LIABILITY

**FROM ANALYSIS OF
SPACE POLICIES OF
DIFFERENT NATIONS**

**NATIONS LOOK AT SOME OR MANY SUCH ISSUES FOR
SPACE ACTIVITIES PURSUIT...**



WHY POLICIES ARE IMPORTANTMORESO NOW

- **INDIA WILL CONTINUE TO BE A VIBRANT, GROWING, KNOWLEDGABLE AND ASPIRATIONAL SOCIETY:**
 - 1.25 B POPULATION – 70-80% LITERATE
 - >30% YOUNG POPULATION – EDUCATED, ASPIRATIONAL, INTELLIGENT, TECH-SAVVY....
 - HIGH TECHNOLOGICAL ADVANCEMENT
 - HIGH ECONOMIC GROWTH – ~INR 100 TRILLION ECONOMY - LARGE CIRCULATION OF CAPITAL
 - INCREASING LEGAL AND REDRESSAL
 - PROTECT NATIONAL INTERESTS – WITHIN AND OUTSIDE

**LAWS, POLICIES, PLANS
WILL PLAY AN INCREASING
ROLE**

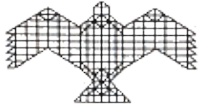
FUTURE OF DEMOCRATIC GOVERNANCE SYSTEMS :

- **OPEN AND RIGHTS-BASED**
 - **CITIZENS/SOCIETY MUST KNOW “EVERYTHING OF GOVERNEMENT”**
 - **LEGAL DEFINITION BECOMES IMPORTANT**
- **HIGH-TRANSPARENCY AND OBJECTIVITY**
 - **MORE AND MORE DEMAND FOR JUSTNESS**
- **DETERMINING EQUITABLE SYSTEMS**
 - **SOCIETY (CITIZENS) WILL QUESTION EVERY DECISION**
- **CONSTANT ASPIRATIONS “MAPPING”**
 - **SOCIETY EXPECTS ANTICIPATION OF THEIR NEEDS**
- **GUARANTEE IN PUBLIC DELIVERY**
 - **COMMITMENTS/PLANS WILL HAVE TO BE MET AND EXPLAINED**
- **GROWTH OF INDUSTRIAL BASE**
 - **INDUSTRIAL CAPABILITY AND COMMERCE**
- **INTERNATIONAL LEGAL AND LIABILITY**
 - **GLOBAL COMPLIANCE AND ALIGNMENT**



SPACE ACTIVITIES – WHY POLICY?

- **SATELLITE SERVICES CRITICAL FOR NATION'S DEVELOPMENT AND SOCIETY/CITIZEN SERVICES**
 - **LONG-TERM COMMITMENT ESSENTIAL; DOVE-TAILED TO KEY SERVICES/MINISTRY SECTORS**
- **SPACE SCIENCE AND PLANETARY MISSIONS – CATER TO NATIONAL SCIENTIFIC/EDUCATION GOALS AND ASPIRATIONS**
 - **LONG-TERM CONTINUITY IS IMPORTANT**
- **LARGE NUMBER OF INDIAN SPACE ASSETS (IN-ORBIT AND PLANNED)**
 - **TRACK, MONITOR, DE-ACTIVATION SCHEMES/PROTOCOLS, LIABILITY PROTECTION ARE IMPORTANT**
- **ROBUST AND OPERATIONAL LVs FOR NATIONs CONTINUED ACCESS TO SPACE –STRENGTHEN NATIONAL TECHNOLOGICAL CAPABILITY**
 - **TECHNOLOGICAL AND INVESTMENT ROAD-MAP IS CRITICAL**
- **PROTECT INDIAN SPACE ASSETS AND USAGE - DEBRIS, ATTACKS, CONTINGENCIES**
 - **TECHNOLOGICAL AND LEGAL PROTECTION REGIMES ARE IMPORTANT**
- **HIGH INVESTMENTS IN INDIAN SPACE ACTIVITIES – JUSTIFICATION AND TRANSPARENCY**
 - **INVESTMENT JUSTIFICATION AND BENEFIT DECLARATION (PRE- AND POST-PROJECT) ESSENTIAL**
- **FRONTAL INTERNATIONAL ROLE – COOPERATION, LEGAL REGIMES AND CAPACITY-BUILDING/ SHARING**
- **ENCOURAGE TO BUILD/DEVELOP NATIONAL/GLOBAL SPACE BUSINESS**
 - **PROFITABLE REVENUE-MODEL FOR SPACE FOR INDUSTRY**
- **SPACE FOR NATIONAL SECURITY**
 - **VITAL TO USE SPACE FOR SECURING NATION**

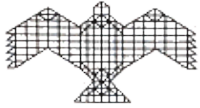


NATIONAL SPACE POLICYPROPOSED TENETS

POLICY RESEARCH STUDY BY NIAS

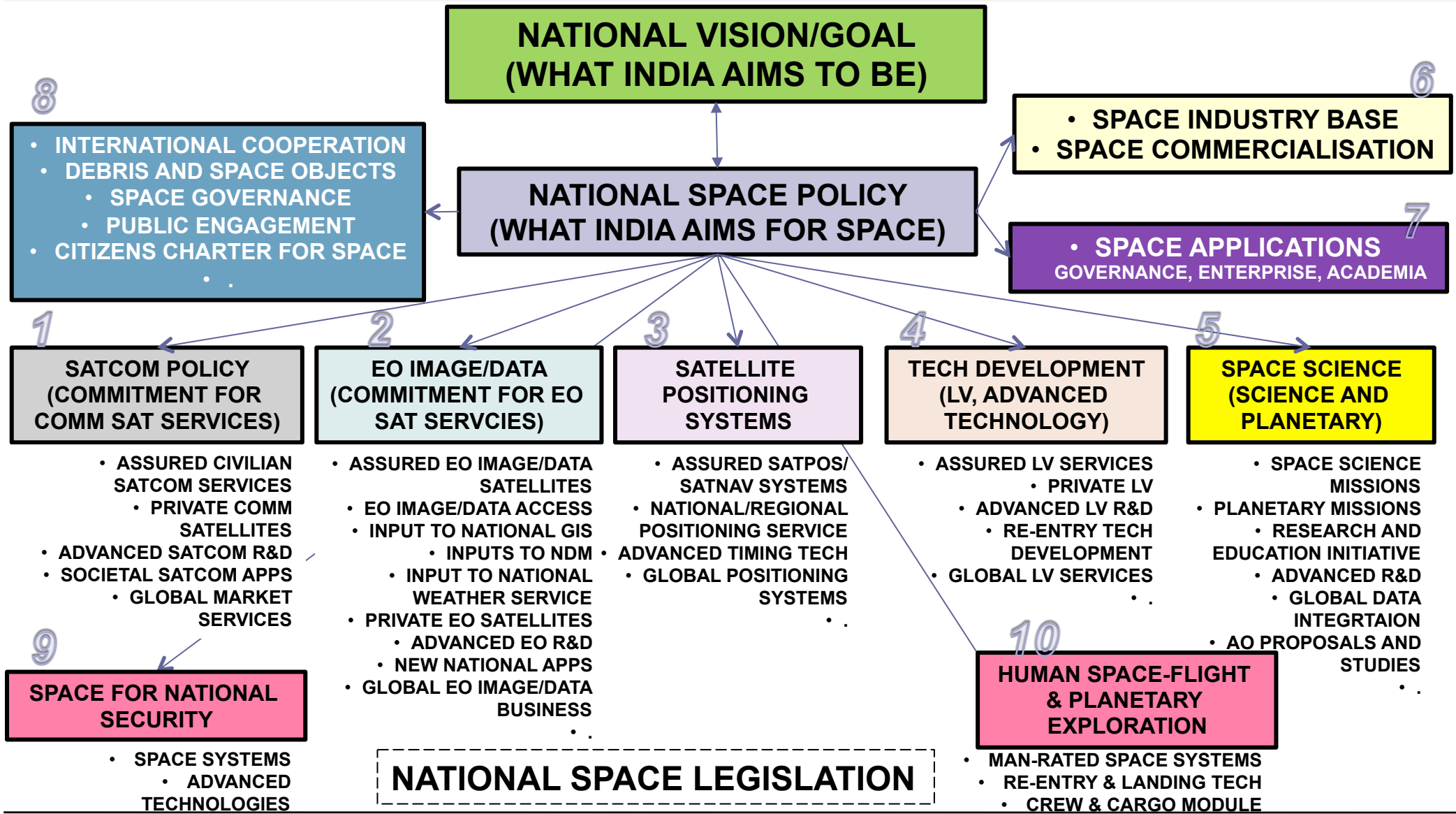
- EXPRESS SOVEREIGN RIGHT TO BRING BENEFIT TO CITIZENS FROM SPACE ACTIVITIES
 - PURSUIT OF (CIVILIAN) SPACE ACTIVITIES AND ACCESS TO SPACE
 - INVOLVE IN SHAPING INTERNATIONAL SPACE POLICIES, AGREEMENTS, RULES
- COMMIT TO DEVELOP/PROCURE AND PROVIDE SPACE ASSETS/ FOR NATIONAL SERVICES OF DEVELOPMENT
- ENSURE & JUSTIFY FUTURE INVESTMENTS IN SPACE
 - ESPECIALLY HUMAN SPACE-FLIGHT, PLANETARY MISSIONS
- ENSURE WIDER APPLICATIONS IN SPACE ACTIVITIES BY GOVERNMENT, INDUSTRIES AND CITIZENS
- DEVELOP STRONG INDIAN INDUSTRIAL CAPABILITY
 - DEVELOP SPACE ASSETS TO MEET NATIONAL DEMAND
 - PURSUIT OF GLOBAL SPACE MARKET - PROVIDING INDIAN SPACE PRODUCTS AND SERVICES
 - ADVANCED TECHNOLOGY DEVELOPMENT
- DEVELOP SPACE GOVERNANCE A - GLOBAL LEVEL PARTICIPATION AND NATIONAL POSITIONING
- PROMOTION OF INTERNATIONAL COOPERATION IN SPACE
- MEASURE ACHIEVEMENTS/PERFORMANCE
 - MID-COURSE CORRECTIONS
 - POLICY AND STRATEGY CHANGES
- POLICY/STRATEGY ROLL-OVER REVIEWS AND UPDATES

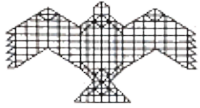
NATIONAL SPACE ACT???



NATIONAL SPACE POLICYPOSSIBLE FRAMEWORK

POLICY RESEARCH STUDY BY NIAS





NATIONAL SPACE FUTURE SCENARIO TO CONSIDER

IFFF IN NEXT 10-12 YEARS.... ANYWHERE AROUND

~100-150
MISSIONS

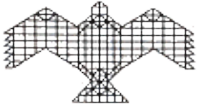
HUMAN SPACE-FLIGHT
PROG INITIATED

++PLANETARY/
SCIENCE MISSIONS

LARGER GLOBAL
BUSINESS

~INR 1000 B
INVESTMENT

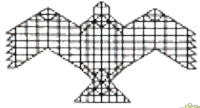
SEGMENT	PRESENT	FUTURE
Technology Development/ Investments	Government Academia	Government Academia Indian Space Industry
Satellites – build, operate	Government	Government (Advanced, Science, Planetary, HSF) Industry (Operational Satcom, EO)
Launch – build and market	Government	Government (Advanced) Industry (Operational)
Ground Systems development	Government Industry	Industry
Space based Services	Government Industry	Government (Societal, Advanced) Industry (Operational, Commercial) Academia (Science, Planetary)
Planetary Exploration and HSF	Government	Government (National/Intl. Coop Missions) Academia (Science) Industry (Dev Support)
International Cooperation	Government	Government (Multi-lateral) Industry (Commercial)
Investments	Government – 100%	Government – 50% (??) Industry – 50% (??)



LOOKING AHEAD

- **NIAS POLICY RESEARCH STUDY - A COMPREHENSIVE SPACE POLICY REPORT**
 - **SCIENTIFIC POLICY ANALYSIS**
 - **ASSESS INTERNATIONAL SCENE**
 - **INDIAN SCENE (ISRO, USERS, INDUSTRY, ACADEMIA)**
 - **ASIA-PACIFIC SCENE (JAPAN,.....) ---→ REGIONAL AP SPACE POLICY STUDY**
 - **GLOBAL SPACE ---→ GLOBAL AP SPACE POLICY STUDY**
 - **ASSESS FUTURE DEVELOPMENT SCENARIO IN SPACE**
 - **PARAMETRIC ANALYSIS OF SPACE POLICY**
 - **DETAILED DISCUSSION WITH NATIONAL/GLOBAL SPACE EXPERTS AND ISRO PROFESSIONALS**
 - **WIDE CONSULTATIONS AND INPUTS FROM SPACE TECHNOLOGY EXPERTS**

NIAS LOOKS FORWARD TO COLLABORATE IN AP REGION THRU SPLANAP.....



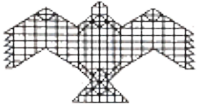
Thank you



GRATITUDE TO:

- Dr K Kasturirangan (have adapted freely from his ideation)
- (Few) ISRO Colleagues
- National Institute of Advanced Studies Colleagues

CREDITS TO:  **इसरो ISRO**
(For Indian Space Programme)



What are fundamental space policy objectives and goals to promote space application in your country? (fundamental documents concerning space policy/law, major space programs, priority, and budgetary situation)

In your country, what are the key factors that are important for space policy – national, regional and global level?

What kinds of social needs for space application (potentially / obviously) are there in your country?

What and how are space application projects moving ahead and/or planned in your country? (major space application programs/projects)

How about space policy to promote space industry? (policy on the promotion of space industry, relationship between governmental sector and private sector (industry), practical measure to promote space application and industrialization such as PPP)

What is space policy governance structure in your country to promote space application and industrialization? (decision making process, space policy coordination mechanism between R&D organization (space agency) and user ministries/agencies)

What is basic policy position in your country on international space cooperation, especially in Asia?