

BUILDING COMPETENCE IN MANUFACTURING - DEFENCE ELECTRONICS

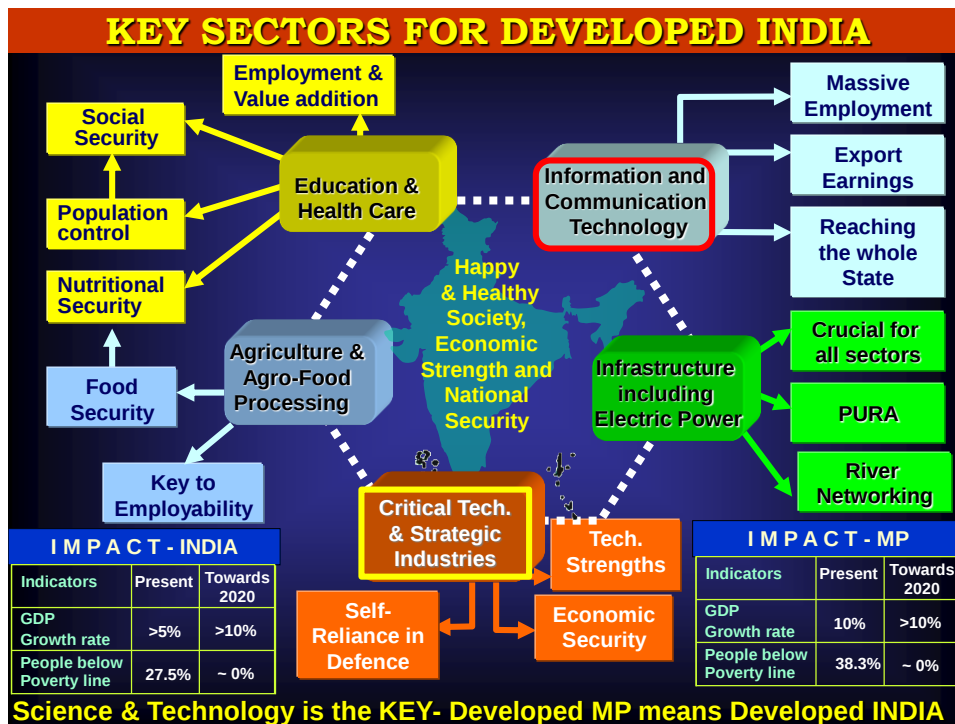
Presentation in
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BY

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Madhya Pradesh Initiatives Encouraging Investment & Growth

Investment Promotion

- Indl. Promo. Policy 2012 provides extensive fiscal and other incentives
- Simplified Regulatory & procedures
- Investment regions to be developed under DMIC project identified
- 4 new Indl. Corridors being developed.
- 20,000 Hectares of Land Bank established

Industrial Promotion

- Industrial growth rate of 10.4% during 11th Five Year Plan
- Key sectors
 - Energy, Textile, Auto & Auto Components, **IT & ITeS**, and mineral based industries
- Total outstanding investments (As of 2012-13): Rs.5,82,510 crores

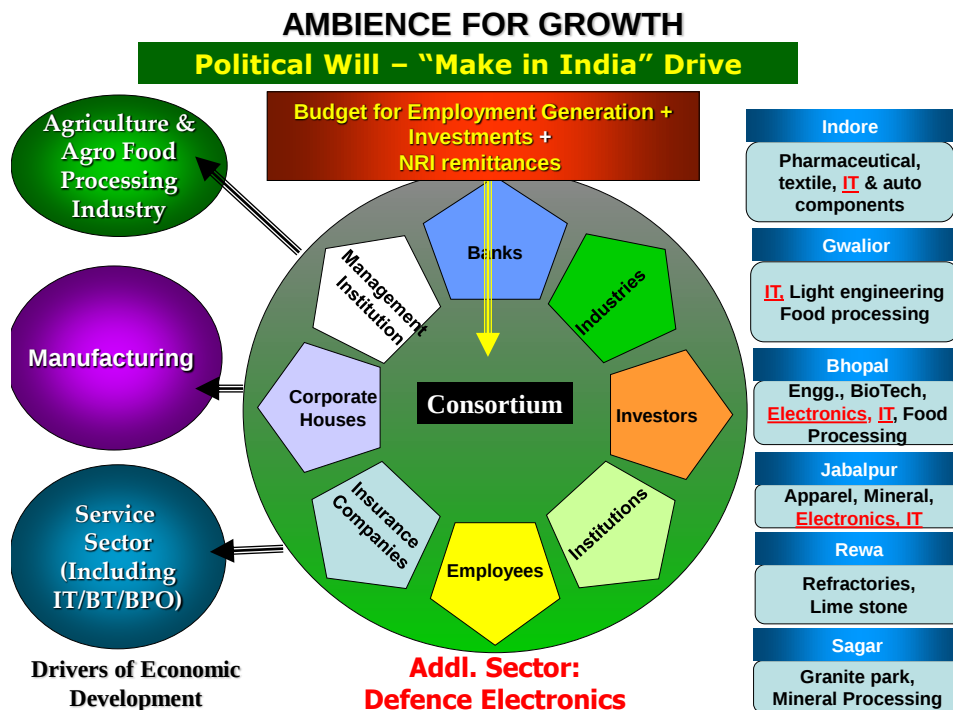
Skill Development

- 25 Dept. involved in skill devt of 15 Lakh persons in next 2 years.
- 113 Skill Development Centers at block level imparting training to 27000 persons per annum.
- 157 ITI being strengthened and Upgraded. 8 new ITIs being set up.

Major Industries

- Ordnance Factory, Itarsi,
- Ordnance Factory, Katni,
- Ordnance Factory, Khamariya, Jabalpur
- Defence Vehicle Factory, Jabalpur
- Gun Carriage Factory, Jabalpur
- Bharat Heavy Electricals Limited, Bhopal
- Security Paper Mill, Hoshangabad
- Telecom Factory, Jabalpur
- Rail Coach Repair Workshop, Bhopal
- DRDE, CAT (Adv. R&D)

Source: Madhya Pradesh Annual Plan 2013-14



DEFENCE EXPENDITURE

Rs. in Crores

	2011-12	2012-13	2013-14	2014-15
Defence Budget	164415.49	193407.29	203672	224000
Growth of Defence Budget (%)	11.59	17.63	5.31	9.98
Capital Expenditure	69198.81	79578.63	86740.71	89587.95
Growth of Capital Expenditure (%)	15.33	15.00	9.00	3.28
Share of Defence Budget in Central Govt. Expenditure (%)	13.07	12.97	12.23	12.70

1. Defence Requirement for India is large over shadowing many other sectors
2. This will upgrade economic development through manufacturing
3. Defence Electronics industries in Madhya Pradesh will boost the state economy giving large employment potential

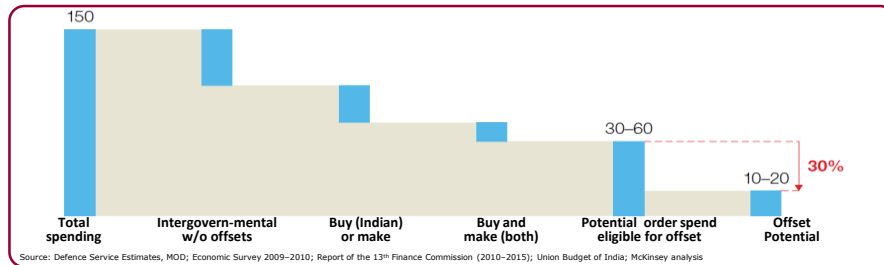
EXPECTED INDIA'S DEFENCE SYSTEM REQUIREMENT FOR NEXT 5-7 YEARS (\$150 Billion Business)

Plat form		Spending (\$bn)	Main orders expected
Air	Combat / trainer	26.3 (30%)	Medium multirole combat aircraft and other fifth-generation aircraft, Mirage upgrade, MiG-29 upgrade, Jaguar engine upgrade, basic trainer
	Support	15.8 (30%)	Transport aircraft, aerial tankers, long-range maritime patrol aircraft, midrange maritime reconnaissance aircraft, Phalcon AWACS, mini AWACS
	Rotary	9.1 (30%)	Light-utility helicopters replacing Chetaks for Navy, multirole helicopters for Navy, attack, heavy lift, light utility, light combat
LAND	Fighting Veh.	15.8 (40%)	Arjun main battle tank (MBT), T-90 MBT, light tank, futuristic ICV
	Artillery	4.2 (30%)	155 mm towed guns, 155 mm ultra light guns, 155 mm self-prop. tracked guns, 155 mm self-prop. wheeled guns
	Missiles	3.4 (70%)	Antitank missiles, CBU-105 sensor-fuzed weapon, short- to medium-range SAM, Agni-V, MICA
	Infantry Sys	1.1 (60%)	Futuristic Infantry Soldier as a System (eg, weapons, helmet, visor, clothing)
SEA		20.8 (70%)	A/c carrier: P-71; Destroyer: P-15B; Frigates: P-17A & 17B; corvette: P-28A
		46.7 (70%)	Nuclear: Arihant follow-on, Scorpene, P-75I, spl midget
		4.1 (40%)	Landing platform dock, landing ship tank, landing craft utility
C4I2SR		0.3 (90%)	Navy 3-D radar, radar-jamming integrated electronic warfare systems

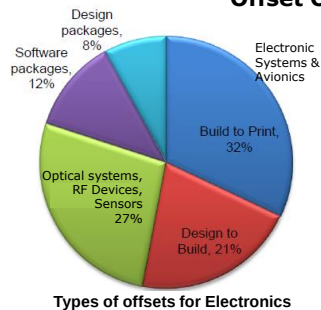
Source: Literature search; McKinsey analysis

**Share of Electronics & IT (H/W & S/W) : \$75.14 bn (Rs. 4,5 lakh Crores)
i.e. 50% of the total value**

DEFENCE SYSTEM REQUIREMENT FOR NEXT 5-7 YEARS (\$150 Billion Business)



Offset Opportunities for Manufacturing



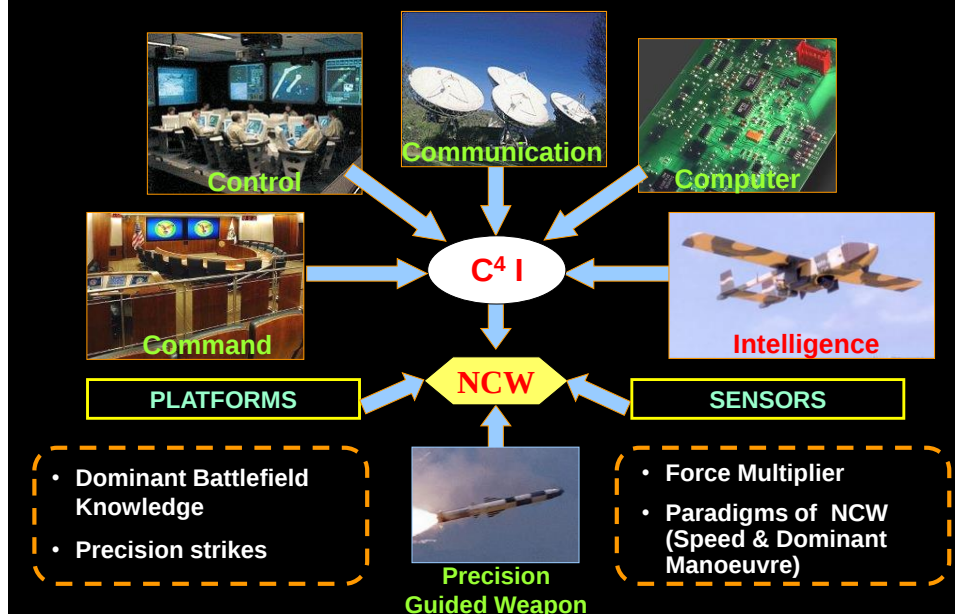
More than \$75 Bn available for Defence Electronics & IT Sectors

MP must capture a large portion of this domestic defence requirement & enter into export market of similar products

This can become an input for investment plans, infrastructure and skill development

NETWORK CENTRIC WARFARE

Integrates sensors, C3 and weapons in a network together



INTEGRATED GUIDED MISSILE DEVT. PROGRAMME. (JULY 1983)

Realisation of Indigenous Technologies
under Control Regime (MTCR)

CONSTRAINTS

- 20-30 YRS. OF TECHNOLOGY GAP
- CONSTRAINTS ON FLOW OF TECH. (MTCR)
- RAPID TECH. OBSOLESCENCE
- CHANGE OF USER REQMNTS DUE TO
 - NEWER SYSTEMS AVAILABLE IN THE MARKET
 - WAR STRATEGY
- LACK OF INDL. INFRASTRUCTURE

TECH. OBJECTIVES

- CONTEMPORARY PERFORMANCE AT THE TIME OF DEPLOYMENT
- MULTI-ROLE & MULTI-USER
- QUALITY & RELIABILITY
- COST EFFECTIVENESS
- SELF-RELIANCE

REQUIREMENT

- FUTURISTIC TECH. & NEWER CONCEPTS
- DESIGN ADAPTABILITY
- PROG. MGMT. LEADERSHIP
- NETWORKING OF INSTITUTIONS FOR CRITICAL TECH DEV.
- CUSTOMER DELIGHT



PRITHVI
(SRBM)



AGNI
(IRBM)



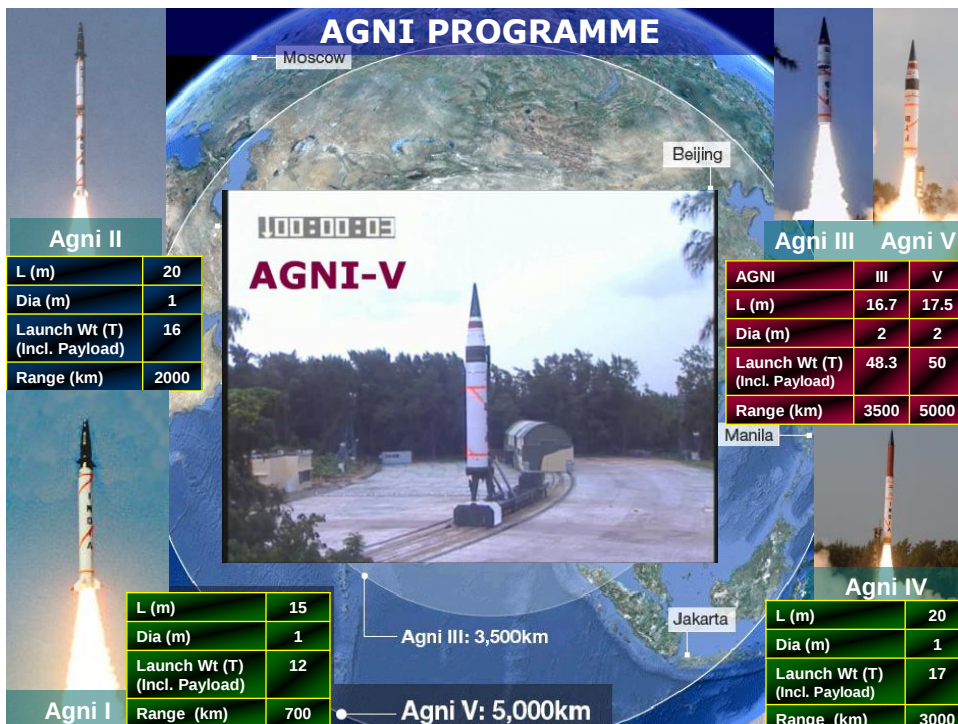
NAG
(3RD GEN. ATGM)



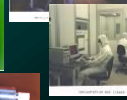
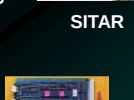
AKASH
(AREA DEFENCE SYS.)



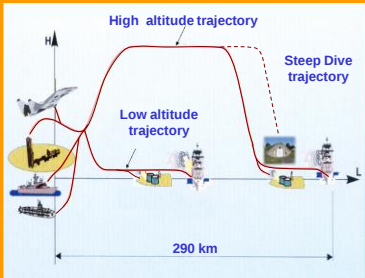
TRISHUL
QUICK REACTION,
AIR DEFENCE MISSILE



REALISATION OF CRITICAL TECHNOLOGIES TO COMBAT MTCR

 RE-ENTRY / CFD	 RL GYRO	 GUIDANCE & CONTROL	 SEEKER	 IMAGE PROCESSING
 SUPER COMPUTER	 ANUSIG	 ANUPAMA PROCESSOR	 SAGAR	 VIRTUAL REALITY
 COMPONENTS & DEVICES	 GATEC	 SITAR	 RAJENDRA	 3D CAR
 PROPULSION	 FLOATING POINT DSP	 HYDROPHONE	 SONAR	 CERAMIC RADOME
				 MATERIALS / COMPOSITES

TECHNOLOGY DENIED IS TECHNOLOGY GAINED

MULTI PLATFORM	MULTI TRAJECTORY	MULTI TARGET
 Underwater Launch	 High altitude trajectory Low altitude trajectory Steep Dive trajectory 290 km	SEA TARGETS   Corvette Frigate
		LANDTARGETS   Ammunition Dump Command Centre
		  Railway Yard Airbase
		DIVERSE ENVIRONMENT - SNOW / MOUNTAIN - DESERT / PLAINS - TROPICAL / SEA

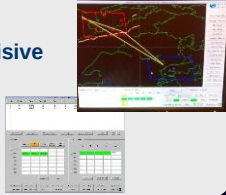
BRAHMOS UNIVERSAL MISSILE SYSTEM
First of its kind in the world

Critical Technologies Achieved in Weapon Complex

1. C4I

Situation Aware Decisive
Command Control,

- Interoperability
- Scalability
- Survivability



2. Mobile Autonomous Launcher



Single Vehicle
Autonomous Launcher
Electronic Controls
Sensors & Interlocks

3. Multi layer Communication

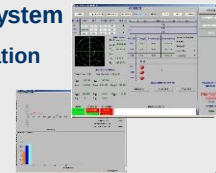
Secured Encrypted Commn.

- Access & Key Exchange
- Bit-stream
- Software controlled



4. Fire Control System

Trajectory Computation
Built-in Simulation



5. Reusable Integrated Weapon System

- Maintainability
- Training
- Simulation
- Documentation



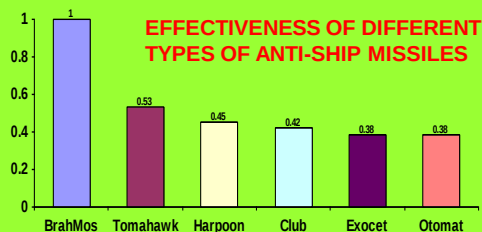
6. High Availability

Redundancy
Fault Tolerance



TOMAHAWK Vs. BRAHMOS

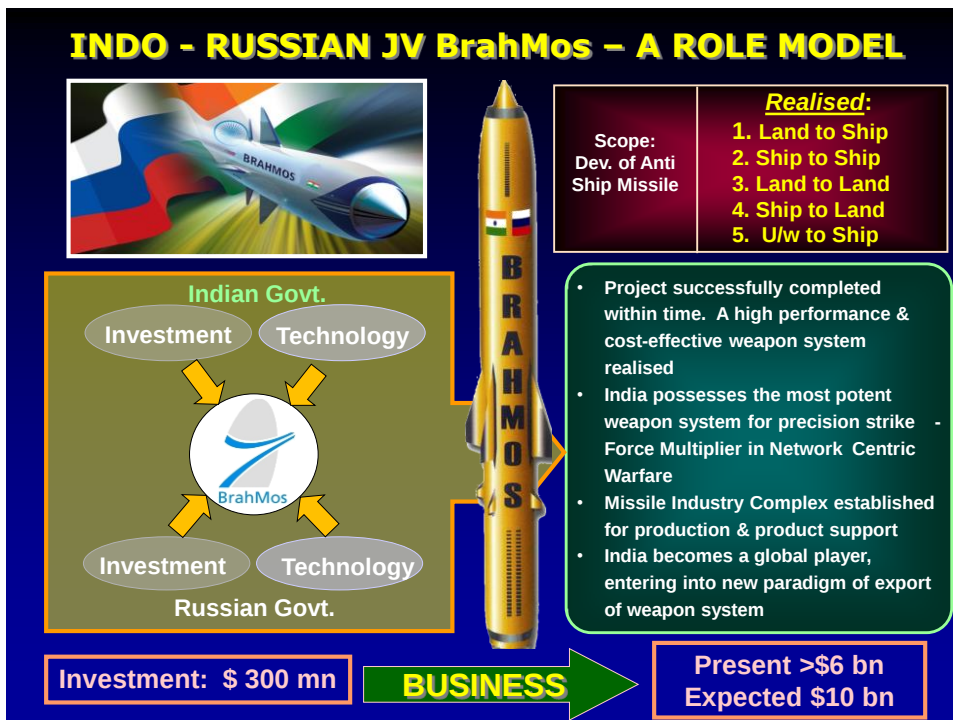
	TOMAHAWK	BRAHMOS
Speed	0.8 Mach	2.8 Mach
Time to hit the target	1 unit	1/3 rd (Faster engagement)
Kinetic Energy	1 unit	9 times. (High Destructive Power)
Target Dispersion (Moving targets)	1 unit	1/3 rd (Probability of hit is high)
Reaction Time	1 unit	1/3 rd (Pierces the Defence)
Universality	Nil	Same system for sea & land targets
Salvo	3 sec	2.5 - 3 Second interval on multiple targets (Land and Sea)



Supersonic Cruise Missiles: Competitors

Europe	"Perseus" (by 2030)
USA	Projects underway
Russia	Anti ship developed (Onix, Moskit)
China	Under development
S. Korea	Under development
Taiwan	Prototype developed (120 Kms)

BRAHMOS – WORLD LEADER IN CRUISE MISSILE FAMILY





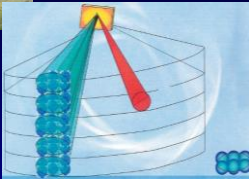
**VENTURING INTO THE
HYPERSONIC WORLD**
...where Speed is the POWER !
There is nothing like a dream to create the future.

SUDHARSHAN CHAKRA

NEW GENERATION SYSTEMS – *ELECTRONICS*



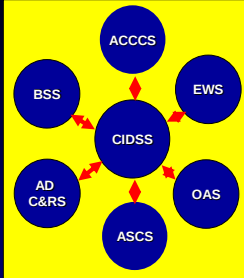
*Fire Control Radar
for Fighter Aircraft*



*4D Radar with advanced
Phased Array techniques*



*EO Surveillance
System Concept*



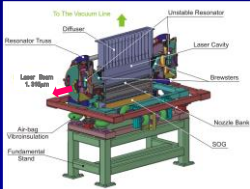
Tactical C3I Systems



*Medium Power Radar
(MPR)*



3D Tactical Control Radar



Planned 50 KW coil



SAMYUKTA MK-II

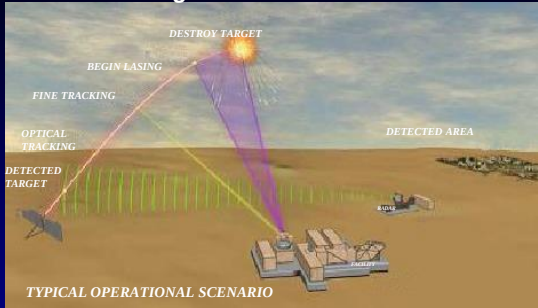


SANGRAHA VARIANTS

*Integrated SATCOM Terminal
Development Programme*

KINETIC ENERGY WEAPONS

High Power Lasers



TYPICAL OPERATIONAL SCENARIO

High Power Microwave



EMP explosion schematic




AIRBORNE TACTICAL LASER



LASER BEAM DIRECTOR



MOBILE PLATFORM



SPACE BASED LASER AGAINST BALLISTIC MISSILES

Nanotechnology Applications

Electronics & Computing

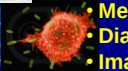
- Smaller, faster, more energy efficient and powerful computing and other IT-based systems




Medicine

- Cancer treatment
- Bone treatment
- Drug delivery
- Appetite control
- Drug development
- Medical tools
- Diagnostic tests
- Imaging





Defence & Security

- Miniaturised Electronics
- Nanofibres for Lighter Materials
- Active/reactive Ballistic Protection
- Environmental Protection
- Chem/Bio Detection and Protection
- Exoskeleton Components




Energy

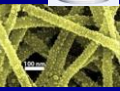
- More efficient and cost effective technologies for energy production
 - Solar cells
 - Fuel cells
 - Batteries
 - Bio fuels




Consumer Goods

- Foods and beverages
 - Advanced packaging materials, sensors, and lab-on-chips for food quality testing
- Appliances and textiles
 - Stain proof, water proof and wrinkle free textiles
- Household and cosmetics
 - Self-cleaning and scratch free products, paints, and better cosmetics





Sources: Presentations of K. Varahramyan (IUPUI) & Dr. Gernot S. Pomrenke (AFOSR)

APPLICATIONS OF NANO-ELECTRONICS IN DEFENCE



Flexible radar antenna



NanoSar SAR



Phased array radar

Nanomaterial for Smart Radar



Micro UAV



Wireless Soldier



Smart Vest (DEBEL)



Brain Implant Chip



Brain Computer Interface



Smart Helmet



Nanomaterial for Surface protection



3 coat epoxy paint



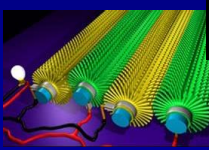
Antifouling paint for ship hull



Self cleaning coating



Self healing



Microfibre nanogenerator for energy storing



Wearable power with nanomembrane fuel cell



BIO-NANO-IT INDUSTRY COMPLEX



- National Nanoscience & Technology Initiative by GOI
- US\$200 mn for Promotion & dev. of Nanotechnology
- Good Internal & Export market potential
- High level of interest for investment from International agencies, venture capitalists for commercialisation of products

WHY MADHYA PRADESH?

- Availability of Rich biodiversity (~31% under forest cover) in MP
- Conducive environment for the bio-pharma Industries due to Biotech Policy
- Bio Tech. Park (Indore) & Bio fuel Park (Rewa) Available
- Strategic alliances with leading pharma companies
- An ideal place for setting up of Bio-Nano industry complex



ACTION PLAN FOR SELF RELIANCE IN DEFENCE SYSTEMS

- Establish Military Industry Complex (MIC)
 - Enlisting large, medium & clusters of industries to be partners along with Defence PSUs as members of MIC
 - Formulating procedures which will enable participation of cluster of industries to respond to RFP to design, develop and produce the systems (Irrespective of Private or Public)
 - Govt. funding for R&D (Also to Private companies)
 - Bring regulations and control procedures like USA managing private industries for manufacturing of defence systems
 - Create an MIC Authority to oversee building up production capability and capacity within India
- Govt. policy to encourage maximum indigenous systems in Armed Forces
- Encourage high technology tie-ups / JVs between Indian and other global defence industries for achieving competitiveness & for export
- Formulation of policy for export of high technology systems



Thank you

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