Talk on "The Nature and Role of Research & Development in Defence Preparedness" by Dr. Arvind Bharti

A talk on *"Nature and Role of R & D in Defence Preparedness"* was organised at Delhi Chapter on 29 April 2019.

At the outset Shri B D Jethra, Chairman, IIM Delhi Chapter welcomed Dr. Arvind Bharti and all present to the technical talk. Shri Nirmal Kakkar, Hony. Secretary, IIM Delhi Chapter, introduced *Dr Arvind Bharti, formerly in DRDO HQ, Ministry of Defence*. He gave a brief about academic and professional achievements of Dr. Bharti. Shri S C Suri, formerly Chairman and Head Technical Committee IIM Delhi Chapter also spoke about association of Dr. Bharti with IIM Delhi Chapter. After introductory references, the floor was handed over to Dr Arvind Bharti.

Dr Arvind Bharti outlined Global Perspective in `*Technological Leadership*' emphasising that any sovereign nation need be independent in its technological needs. In order to prevent economic exploitation by leveraging technology by powers that be, focus has to be on development of industrial capacities and in-house expertise by systematic enhancing the potentialities of R & D Institutes and Academic Institutions. This issue becomes much more critical in Defence sector.

In our country Defence Services prepare a 15 Years strategic plan LTIPP (Long Term Integrated Perspective Plan) approach - the present one covering the period 2012-27- based on Threat Perception, Operational directives and Global visibility of Systems as reported by International Defence Journals. DRDO's LTTPP (Long Term Technology Perspective Plan) is in consonance with the Services LTIPP, for maximizing inductions of DRDO *(Defence Research & Development Organisation)* developed products. Defence strategic process comprises Concept – R & D – Technology Demonstration - Production approach along with all related Stakeholders (Armed Forces, CAPFs, Academia, R&D Institutions, Industries, etc.) till Induction Stage. Generally `Mission Mode' Project Approach is taken. Dr. Bharti highlighted various steps in converting Scientific Knowledge to Production and subsequent Induction in Services.

Dr. Bharti described in brief **Department of DRDO**. He highlighted DRDO as the largest R & D Organisation in the country (59 years old), mandated to strengthen our Armed Services, aligned to National Defence Strategy and having strong partnership with ~ 150 National Academic Institutes, 15 National S&T Agencies, 8 DPSUs, OFBs & PSUs and ~ 800 Private Sector enterprises. All activities are spread evenly all over the country. Presently DRDO has 52 laboratories with ~ 7229 Scientists. Its Technology Spectrum comprises:

- Electronics & Computer Sciences
- Missile & Strategic Systems
- Aeronautical Systems
- Armaments, Combat Vehicles & Engineering
- Naval Systems & Materials
- Micro Electronics & Computational Systems
- Life Sciences

New Technology initiatives have also been taken in Cyber Security, Space Security, Directed Energy Weapons and LIC Technologies.

Dr. Bharti traced the history of DRDO, since its inception in 1958 and gave various examples of products, developed from Concept to Production stage, which have been inducted in the Armed Forces.

Dr. Bharti described in brief the overall *Technology Management* concept that DRDO is trying to establish in the country:

- with Academia and Research Institutes [Directed Research through Research Boards, Extra Mural Research and CARS (Contract for Acquisition of Research services), etc.]
- with Industry under `**Make in India**' thrust [TDF (Technology Development Fund), IMPRINT (Impacting Research Innovation & technology) and UAY (Uchhatar Avishkar Yojna), etc]

Dr. Bharti mentioned a few Key Technologies developed in:

- *Aeronautics* (Flight Control Laws for Unstable Aircraft, Fly by Wire Digital Flight Control System, Open Architecture Mission Avionics, Composite Structure, State of Art avionics for Combat Aircraft, etc.)
- *Missiles* (Re-entry Vehicle Structure, Twin engine liquid propulsion, Pre-fragmented and Submunition war head), Stabilisation and launch from moving platform, autonomous navigation, Three loop Digital Auto Pilot, etc.)
- *Electronic Systems* (High Accuracy Direction finding, High power jamming, High Accuracy Multi-Channel Receivers, Network centric information fusion, Multi

beam and Slotted Wave guide Antenna, Digital Receivers & High power transmitters, T/R modules for S/L bands etc.)

- *Combat Vehicles & Armaments* (Composite Armour, Autofrettaged Gun barrels, Flow formed rocket motors, Mobile Launchers, Hydro-Gas Suspension, Integrated Fire Control Systems, FRP Launch tube, Composite Propellant, etc.)
- *Naval Systems* (Transducer Array, State of art Signal processing techniques for target classification, MEMS based Hydrophones, Torpedo Propulsion Battery, State of Art Homing System, On-Board Computers & FCS, Mechanical Systems/Platform Interface & Integrated Test Systems etc.)

In Conclusion, Dr. Bharti highlighted the proposed gradual shift of present *Top Down Approach* for LTIPP requirement to *Bottoms Up Approach* likely beyond 2027.

The presentation which was supported by visuals and videos evoked a lively response amongst the audience. There were questions and subsequent discussions during/after the Presentation

The talk was attended by ~ 20 IIM DC members.

The audience found the programme very interesting and informative.

Shri Pankaj Bajaj Vice-Chairman, IIM DC, proposed a vote of thanks to Dr Arvind Bharti and all the participants.

As a token of appreciation, a Memento was presented to Dr Bharti by Chairman.

The programme concluded with lunch.