

“S&T Roadmap for Building a New India”

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Some of the most pleasant memories of my childhood are the myriad car excursions we used to have in our trustworthy Maruti 800 - me on the backseat with a fair amount of luggage, Maa on the co-driver's seat and Baba at the steering wheel. Baba's reluctance to seek directions from passers-by prompted Maa to buy us an All-India Road 'Atlas'. A remarkable book, detailed to perfection, which reliably led us to our many destinations across the country. The atlas provided several routes and options, which we'd spend the night before travel highlighting with a deep red. Every twist and turn were personalized for us to both enjoy the journey as well as reach our destination timely. This book is now buried somewhere in our storeroom having been replaced by a seemingly omniscient smart phone. An American-accent now prompts us to take turns on the road - trying hard to pronounce names of main streets and gullies as she urges us to reach our destinations. This accented and electronic roadmap, however upgraded and in sync with global sensibilities, cannot not always anticipate the ground realities in India - with our Sunday street bazaars, rallies & protests & dharanas, and impromptu cricket matches, among many others.

Stuck in road closures, and reliant on this soft-arrogant automation who insists on driving through a road blockage instead of searching for an alternate route, one can only hope that the roadmaps we adopt as a country keep in mind our unique Indian contexts and the milieu of our vast and diverse land if we are to take every Indian along on this journey of progress in science and technology.

The science and technology roadmap that I envision is one that is in constant evolution and upgrade, affecting and involving every facet of the nation's existence. Science and technology, I believe, must be forward thinking and innovative, but also must engage community and forward citizen science for it to be the forebearer of progress. Thus, science and technology roadmaps must be designed for efforts to be **robust yet dynamic**, both **global and local**, and one that is **for, by, and of our people** - all 135 crore compatriots. These three facets in drafting a forward-thinking roadmap, will enable us to forge towards increasing and inclusive progress as a global leader in science and technology.

Science and Technology – Robust and Dynamic

Every aspect of our existence is instilled deep with inputs from science and technology. It has been so since the *Agrarian revolution* five millennia back to *industrial upheaval* four centuries ago, progressing then to *information technology transformation* three decades earlier, and into the age of '*data driven instant outcome requirements*' that the present state-of-affairs demands. Our science and technology must be robust in techniques but also dynamic in upgradation to satiate demand. Take our Agrarian economy for instance - starting from selection of crops as per the needs of the country and demands of the market must be worked out with inputs from other sectors. Different aspects must be considered, the climate and weather predictions, consumer behaviour, availability of resources and optimisations of their use

- be it water, fertilisers, person-hours, equipment, transportation, financial transaction and marketing of the produce, every aspect will need data-driven decision making. This information will also have to be democratised by percolating to all stakeholders.

Science and Technology – Global and Local

Strides can be made in science and technology and consequently, the financial world, with availability of data related to economy at macro as well as micro levels, especially interlinking these to both the global and local scenarios to be in the vanguard of development. Unwise financial choices or economic transgressions can be negated to a very large extent if the transparency of dealings is ensured. Consider medicine and health, an important aspect of science and technology. Health of a nation is perhaps a true reflection of its progress. Unfortunately, our giant stride in healthcare is extremely skewed in its urban and elite centeredness. Remote, rural and underprivileged are at least five decades behind in availing these tremendous gains made by the world of healthcare. S&T has its role cut out to remedy this malady by making the medical facilities accessible and easily available to all. Promotive and preventive, diagnostic and curative, rehabilitative and restorative health care of individual as well as collective communities must be available to the policy makers so that prompt decision can be taken to mobilise and activate resources as per needs at the local levels, such as at gram panchayats. This will ensure universal healthcare, and states of crisis and panic of the summer of 2020 can be avoided in our nation's future.

Science and Technology for, by, and of 135 crore

Every component of living is intricately assimilated and entwined, starting from Education & Health, Infotainment and Telecommunication, Security and Safety, Finance and Economy, Law and Legislation, so on and so forth. The software, hardware, users' knowledge, and competence in terms of contribution and utilisation of these gains needs to be factored in. The data driven world that we live in must be always in a state of upgrade so that all information is fresh and cotemporary, to assist decision making. Therefore, the most vital aspect must be to educate the populace. S&T has to be woven in the educational fabric from the inception stage of fundamental education and importance of data needs to be percolated to all through rigorous citizen science efforts. Scientist, engineers, technologists, teachers, institutions and local governance must work hand in hand. Local representatives from the common populace must be brought into discussions on progress and infrastructure building. Indian institutes of science and technology must invest heavily in working alongside local populace and in citizen science and science communication initiatives. One way of going about these is to ensure the translation of research and science and technology documents into the myriad languages of our nation. This also means that S&T must work closely with art and culture, ensuring that languages, local theatre, even art and cinema can be used to further citizen science sensibilities among all. For, there is nothing worse as a roadblock to S&T progress than ignorance and exclusion of those whom science is being developed for. S&T has to be, like democracy, 'of-by-for' the people.

The S&T Road: Now and Looking Ahead

If we take a moment off from the existing scenario and reflect at the events of the past, we will realise how far we have indeed travelled since the birth of our great democracy. A news good or bad travelled in the near past not even a century ago, at the fastest means through telegraphy - yet the last mile connectivity was pedestrian. Today news is available at our fingertips, and we must walk the last mile intellectually discerning the accurate and reliable from others. The present pandemic has brought forth the wide chasm that exist between the affluent and the deprived. This gap will need to be bridged with availability of electronic resources to the last child. Education at every stage irrespective of disciplines must be scaffolded with a strong S&T infrastructure. The nation can simply not afford to sacrifice the human resources of the multitude from deprived background and hope to march into future with the head held high.

The most important portion of envisioning an effective roadmap is undoubtedly understanding the roads themselves. Every delivery-van contributing to the nation's progress is riding on the information superhighway. This must be made fault free for fast transportation of all kinds of vehicles be it education, health, agriculture, culture and art, finances, business, law and order, external and internal security, judiciary, or legislation. The list of these vehicles of S&T is endless and our roadmap must ensure that we forge forward keeping all of them in mind.

The modern, future-forward roadmap we are collectively envisaging must be strong and swift to ensure that the ride for every Indian is indeed **S**mooth and **T**ranquil. It is indeed a tall order but if anything can shoulder this extremely weighty load of forging our nation forward it has to be S&T. Now I understand why roadmaps are called Atlas - the titan upholding our world.

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